

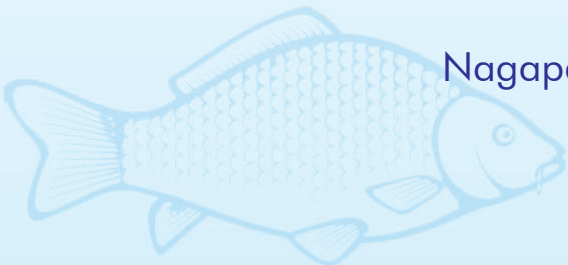
FIRST ANNUAL REPORT 2013 - 14



TAMIL NADU FISHERIES UNIVERSITY

First Line Beach Road

Nagapattinam - 611 001, Tamil Nadu





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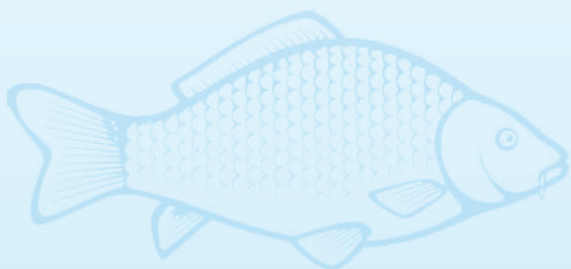
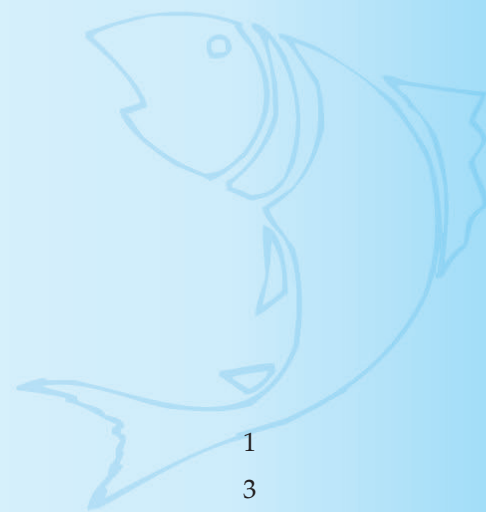
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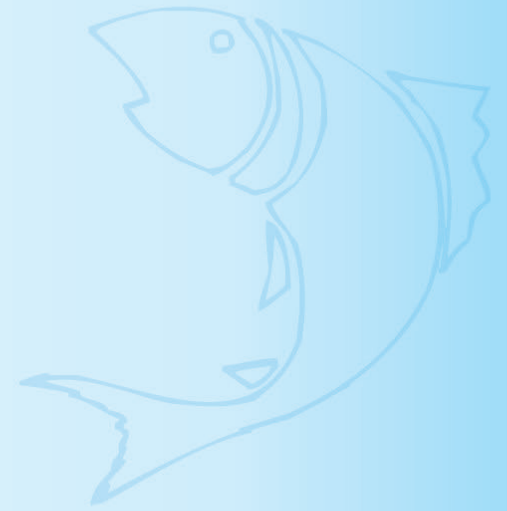
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PREFACE



Fisheries sector plays an important role in Indian economy and contributes substantially (5.4%) to the agricultural GDP of our country. India stands second in the total fish production with annual production of 8.46 million tonnes. Tamil Nadu contributes about 7.32% to total Indian fish production. Fisheries sector plays an important role in the livelihood of people across the nation including Tamil Nadu, which have a population of 11.38 lakh fisherfolk. The marine fishing fleets comprising of 6,728 mechanized fishing boats and 56,792 traditional fishing crafts exploit the total coastal length of 1,076 km in Tamil Nadu. Inland fisheries is an emerging area, as the major share out of total fish production due to introduction of various culturable species viz. Indian major carps, catfish, murrel, tilapia and shrimps, besides natural harvest from seasonal tanks, ponds and reservoirs.

Fish, as a food, is a rich source of protein that can alleviate the problems of malnutrition. Presence of health beneficial omega-3 fatty acids, particularly EPA and DHA, provides remedial measures against various diseases like hypertension, arteriosclerosis, cancer, etc. Increasing awareness among the consumers on fish as a health food creates enormous demand for more fishery products instead of other animal products. Changing lifestyle paves way for the development of many processed and ready to eat convenience products of home appeal, which generate opportunities in fish processing sector for the entrepreneurs in domestic markets. Fish processing sector has a strong backward and forward linkages, which in turn boost domestic fish processing, export-oriented processing and by-

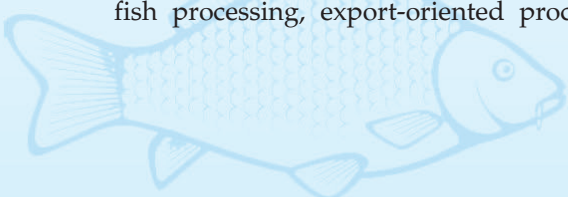
products processing. The export of fish and fishery products reached a level of Rs. 30,213/- crores during 2013-14.

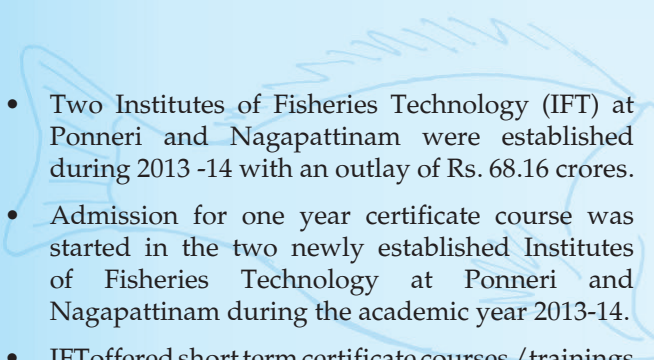
Tamil Nadu Fisheries University (TNFU), which has entered into the second year of birth, has pledged itself to offer professional education in fisheries to take up ventures in promising areas of fisheries across the State, through scientific approach to harness maximum benefits out of small input and without any harm to the natural environment and resources. Scientific rearing of tilapia, selected ornamental fishes, loaches, catfish, cobia, grouper and shrimps are few of the prioritized aquaculture based studies in future.

Setting up of national and international accredited testing laboratories for fishery products and diagnosis of fish diseases with state of art facilities is our priority to serve the fisheries community, who face stringent quality standards to market their produce. The University is planning to establish seafood knowledge centers to promote fish as a health food so as to augment the overall per capita fish consumption in the State from 9.8 kg to the global average per capita fish consumption of 18.6 kg.

TNFU has witnessed a number of land mark events during the year 2013-14 towards its development. Some of the notable events are given below:

- Tamil Nadu Fisheries University, an unitary professional Fisheries University, was established in the country on 19.06.2012 with an outlay of Rs. 18.1 crores by the Honourable Chief Minister of Tamil Nadu, Dr. J. Jayalalithaa

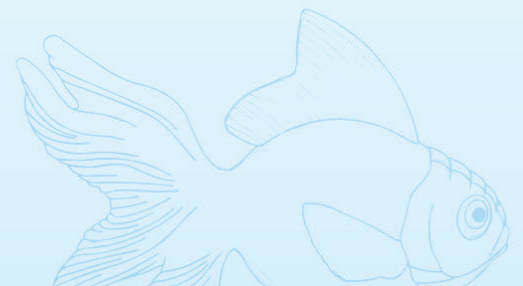


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- Two Institutes of Fisheries Technology (IFT) at Ponneri and Nagapattinam were established during 2013 -14 with an outlay of Rs. 68.16 crores.
 - Admission for one year certificate course was started in the two newly established Institutes of Fisheries Technology at Ponneri and Nagapattinam during the academic year 2013-14.
 - IFT offered short term certificate courses /trainings on “Ornamental fish culture;” “Freshwater fish farming”, “Value added fishery products”, “Shrimp farming” and “Integrated fish farming” to a total of 2,573 beneficiaries of Tamil Nadu with the financial support from NADP, NFDB, and Government of Tamil Nadu during the year 2013-14.
 - The University extends its wings to undertake collaborative research programmes within and outside the country for promotion of inter-

disciplinary approach, capacity building, technology transfer and wider dissemination of research findings. TNFU had established collaborations and linkages with Auburn University, USA during the year 2013-14.

I assure that the University will function with the new visionary ideas in the coming years so as to serve as a Center of Excellence in Fisheries, to provide guidance for the fisheries community, to enhance the productivity and to sustain livelihood. Above all, I thank all the staff and students of this University for their constant support and contributions all the year through, which has made me to successfully document this Annual Report for the benefit of the fisheries sector of Tamil Nadu.

Baskaran Manimaran
Vice-Chancellor



ACKNOWLEDGEMENT

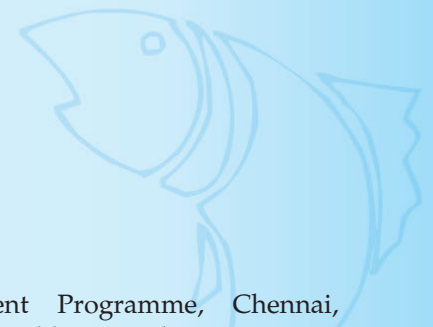
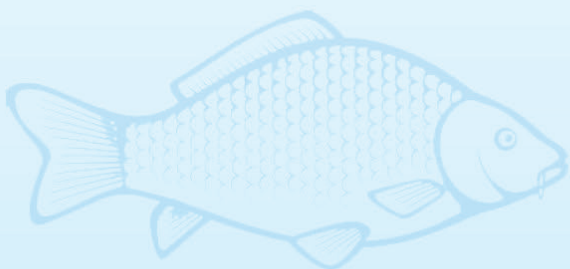
Tamil Nadu Fisheries University is the State funded professional Fisheries University in India imparting education, research and training to enhance fish productivity and utilization by following the State Agricultural University (SAU) pattern and syllabi. The long term mission of the Hon'ble Chief Minister of Tamil Nadu, Dr. J. Jayalalithaa, with the support of Hon'ble Minister for Fisheries, Thiru K.A. Jayapal in the establishment of an exclusive University is wholeheartedly acknowledged by the staff, students and fisheries professionals of this State. The University in its infant stage attempts to fulfill the mandates in the various fields of education, research and training through enhanced effort in the recent years in order to cope up with the tremendous growth in the fisheries sector. To accomplish the mission goals and mandates, the unconditional support rendered by the authorities of the State and Central Governments are gratefully acknowledged. The guidance and unstinted support from the Board of Management and three Statutory Committees were of immense help to identify our goals, prioritize and proceed into action.

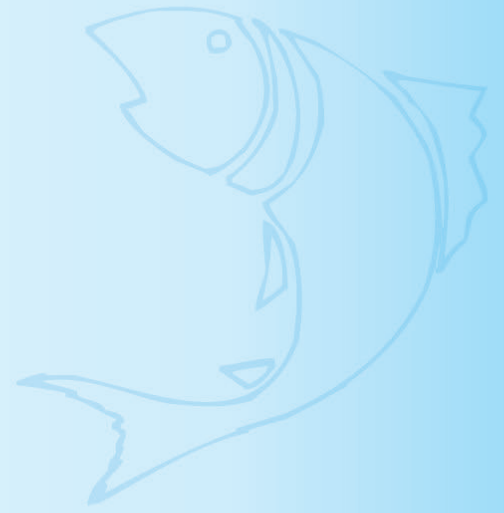
The University is very much grateful to the different agencies and departments of the Government of India and the Government of Tamil Nadu viz. Indian Council for Agricultural Research, New Delhi; Department of Biotechnology, New Delhi; Department of Science and Technology, New Delhi; Ministry of Food Processing Industries, New Delhi; Indian Council for Social Science Research, New Delhi; Central Planning Commission, New Delhi; National Fisheries Development Board, Hyderabad; National

Agricultural Development Programme, Chennai, National Center for Sustainable Coastal Management, Chennai; IAMWARM of World Bank, Chennai; State Planning Commission, Chennai and Gulf of Mannar Marine Biosphere Reserve Trust, Ramanathapuram for providing funding support to carry out the research programmes. Besides this, the University is very appreciative to the various private institutions, which have extended financial assistance for undertaking research in specific areas. The University extends its gratitude to fish farmers, shrimp farmers, seafood processing entrepreneurs, fish feed manufacturers, small scale value added fisheries entrepreneurs, and other stake holders in Tamil Nadu, who have provided ideas and suggestions to set up mission goals in priority areas.

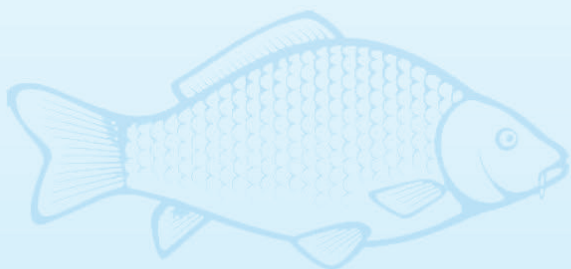
I am very grateful to the Officers, teachers, scientists, students, technicians, administrative and supporting staff of our University, who have helped in steering this University with their dedication, cooperation and team spirit. It also gives me immense pleasure to acknowledge the support received from the people of the State and functionaries at various levels. The generous support received from all the organizations through flow of human thoughts shall help to reform this University as an "ocean" with excellence in fisheries education, research and development programmes.

G. Jeyasekaran
Director of Research i/c





EXECUTIVE SUMMARY



EXECUTIVE SUMMARY

Fisheries and aquaculture is an important sector of food production, providing nutritional security to millions of people, contributing to the agricultural exports and engaging about 14 million people in different fish related activities. With diverse resources ranging from oceans to lakes and more than 10% of the global biodiversity in terms of fish and shellfish resources, our country has shown continuous and sustained increments in fish production. The fisheries sector has been one of the major contributors of foreign exchange through export. The State of Tamil Nadu has contributed about 8% to total Indian fish production, and about 20% in the value of Indian fish export. Tamil Nadu endowed with long coastal line, besides many inland water bodies like reservoirs, lakes, ponds, brackishwaters, for augmenting fish production. Govt. of Tamil Nadu has introduced many schemes for increasing the fish production, and fish consumption, as fish is considered the best animal protein possessing all health beneficial nutrients. The Tamil Nadu Fisheries University is actively taking part in the Govt. mission for increasing the fish productivity.

The Tamil Nadu Fisheries University (TNFU) is the professional fisheries science University in the country established by the Govt. of Tamil Nadu in 2012 having a dedicated faculty for academic and research in different branches of fisheries science with 116 scientific and 165 administrative supporting staff. This University has one constituent college (Fisheries College and Research Institute, Thoothukudi), two institutes (Institute of Fisheries Technology (IFT), Ponneri, Chennai; and Institute of Fisheries Technology, Nagapattinam), and three research stations (Fisheries Research and Extension Centre, Madhavaram, Chennai; Fisheries Training and Research Centres at Parakkai, Kanyakumari District; and Thanjavur). The other two institutes viz., Staff Training Institute (STI), Chennai; and Fisheries Institute of Technology and Training (FITT), Chennai, are to be brought under TNFU as per the TNFU Act 2012 of Govt. of Tamil Nadu. Besides that, this University has two important laboratories/centres (Fish Quality Monitoring and Certification Centre, Thoothukudi; Shrimp Diseases Diagnostic Laboratory, Madhavaram, Chennai) for serving the fish processing and farming industries.

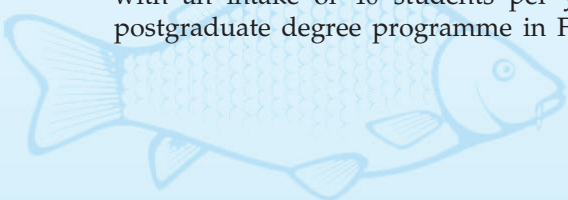
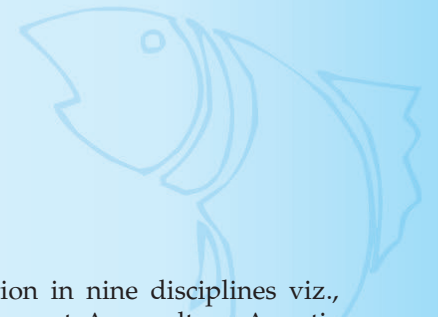
This University is offering a four year professional degree programme in Fisheries Science (B.F.Sc.) with an intake of 40 students per year, two years postgraduate degree programme in Fisheries Science

(M.F.Sc.) with specialization in nine disciplines viz., Fisheries Resource Management, Aquaculture, Aquatic Environment Management, Fisheries Biotechnology, Fisheries Engineering and Technology, Fish Processing Technology, Fish Quality Assurance and Management, Fisheries Economics, and Fisheries Extension with an intake of 28 students; and three years Ph.D. degree programmes in four disciplines namely Aquaculture, Fisheries Resource Management, Fisheries Economics and Fish Processing Technology with an intake of 6 students. This University is also offering two certificate courses (Harvest and Postharvest Technology, and Aquaculture) with a duration of one year; and two certificate courses (Ornamental Fish Culture Technology, and Better Management Practices (BMPs) in Shrimp Farming) with a duration of three months.

The University is extending financial assistance in the form of scholarships and fellowships to the students to undergo their under graduate and post graduate degree programmes through different central and state government agencies. Many student friendly facilities like library with computer and internet facilities, e-learning facilities, students placement cell, hostels are available in the University to promote the interests of students in acquiring knowledge on various aspects of fisheries science as well as in finding their suitable placements. The faculty members of this University were deputed to various faculty improvement trainings, summer / winter schools, seminars, etc. to upgrade their technical skills.

The University has operated 42 projects to a value of Rs. 1,934.82 lakh funded by different funding agencies of Govt. of India like Indian Council for Agricultural Research, Dept. of Biotechnology, and Dept. of Science and Technology of Ministry of Science and Technology, Ministry of Food Processing Industries, Central Planning Commission, Ministry of Environment and Forest, National Fisheries Development Board, and Govt. of Tamil Nadu like National Agricultural Development Programme, State Planning Commission, Part II, IAMWARM, and GOMBRT.

Important Central Govt. agencies funded projects that were operated in this University are National surveillance programme for aquatic animal diseases; An export oriented marine value chain for farmed seafood production using cobia (*Rachycentron canadum*) through rural entrepreneurship; InNoVacc: Indo-

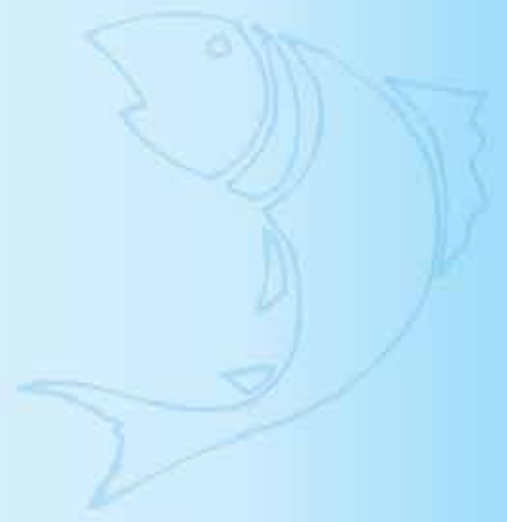


Norwegian platform for the development of candidate vaccines for invertebrate, piscine and avian species; Impact of climate change on the population structure and virulence of viral and bacterial pathogens in marine environment and host response alterations due to pathogen-abiotic synergy; Effect of kisspeptin on change in level of reproductive hormones and gonadal maturation in an air breathing fish, *Channa striatus*"; Impact of large scale cultivation of seaweed culture in coastal environment of India; Bioactive peptides from fish protein hydrolysates produced using endogenous proteinases from fish processing wastes; Quantitative infectivity potential assessment of WSSV and genotyping of virulent strains; Development of database for Indian seafood safety and traceability based on AFLP markers; Establishment of biosecured ornamental fish brood bank at Madhavaram, Chennai; Molecular characterization of pathogens associated with fish diseases in Assam- collaborative project with Assam University; Messenger RNA based assay for RT-PCR detection of viable *Salmonella* and *Vibrio cholerae* from fresh and processed finfish and shellfish; Characterization and maintenance of cell lines of fish and crab; Converting low value fish marketing to high value fish marketing among the marginalized fisherwomen in the coastal districts of Tamil Nadu.

The important projects funded by the State Govt. agencies and private agencies are Biological efficiency of two different methionine sources for Pacific white shrimp, *Litopenaeus vannamei*; Empowerment of inland fish farmers in value addition; Empowerment of SC & ST population of Kanyakumari District through adoption of Ornamental fish culture practices; Skill oriented training programmes and Initiatives for fisherwomen of Pazhaverkadu Village, Thiruvallur District; Culture of Tilapia fish in earthen ponds as forage fish for Crabs at Pazhaverkadu; Efficacy of JR200 on growth performance, health, immunity of tiger shrimp, *Penaeus monodon* during experimentally induced Vibriosis; Training on value added fishery products; Establishment of marine engine and sea safety training centre for the fisherfolk in Tamil Nadu; Establishment of seafood knowledge highway to improve health, combat malnutrition and enhance income of fishers; Establishment of post harvest centre in Fisheries – Ponneri, Thiruvallur district; Increasing fish production in Tamil Nadu through production and distribution of genetically improved Tilapia; Establishment of chemical residue monitoring laboratory for fish in Tamil Nadu; Developing aquaculture entrepreneurship in Tamil Nadu by improving breeding strategies

and innovative farming protocols for high value ornamental fishes; Mass breeding and production of ornamental fishes and major carp seeds; Establishment of fish feed quality testing laboratory for the benefit of fish farmers of Tamil Nadu; Establishment of recirculatory aquaculture systems at Maritech Research and Extension Centre, Tharuvaikulam; Socio-economic empowerment of rural fisherwomen SHGs through enhanced market access; Assessment of freshwater fisheries resources potential of Tamil Nadu; Assessment of impact of trawling in Gulf of Mannar Biosphere Trust Region; Studies on by-catch reduction in trawl fishing of Gulf of Mannar Coast for biodiversity conservation; Development of environmental guidelines and operational protocol for sustainable development of cage culture in the reservoirs of Tamil Nadu; Utilization of fish solid waste for biogas production for indigenous application; Assessing the efficiency of aquatic plants and microalgae for reducing water hardness for the culture of ornamental fishes in coastal regions of Thoothukudi; Remedial measures for improvement of colour, texture and water holding capacity in frozen cephalopods for export; Impact of heat processing methods on the health beneficial omega-3 fatty acids of sardines; Participatory adoption on gender specific fish farming technologies in public/ panchayat water bodies for livelihood security in Tirunelveli district; Field level comparative trial study to access shrimp production by adopting periphyton based farming system in Nagapattinam district; Identifying suitable carbon source to augment the formation of bioflocs at farmers pond level in *Litopenaeus vannamei* intensive culture systems in Sirkali taluk, Nagapattinam district

The operation of the above said projects resulted in 44 research publications (15 International, and 29 National), 16 technical articles, and 22 articles in seminars/conferences/symposia. Two patents were filed and 18 technologies were developed by this University. This University has also imparted 98 skill development trainings, and awareness programmes benefitting 2,573 fishermen, fisherwomen, fish farmers, SHGs, fish processors, fish entrepreneurs. The University is also involved in advisory services to fishermen and fish farmers, and analytical services to fish processors and fish entrepreneurs in the form of testing the quality and safety of the fish and fishery products and issuing quality certification, and fish farmers in the diagnosis of fish diseases. The University had undertaken 27 construction works with a value of Rs. 2,225.55 lakhs in various centres.



INTRODUCTION





1. INTRODUCTION

HISTORICAL PERSPECTIVE

The Tamil Nadu Fisheries University (TNFU) was established by the Tamil Nadu as per the Act 21 of 2012 on 19th June 2012. The University Head quarters is located at Nagapattinam with three constituent Institutes functioning under this University namely, Fisheries College and Research Institute (FC&RI), Thoothukudi, Institute of Fisheries Technology (IFT), Nagapattinam and Institute of Fisheries Technology (IFT), Ponneri (Tiruvallur district) besides Fisheries Research and Extension Centre located at Madhavaram (Chennai), and Fisheries Training and Research Centres at Thanjavur and Parakkai (Kanyakumari). The other two centres viz., Staff Training Institute (STI), Chennai and Fisheries Institute of Technology and Training (FITT), Chennai are to be brought under TNFU as per the TNFU Act 2012 of Govt. of Tamil Nadu. The constituents provide R&D support for fisheries with a national outlook and regional focus. The University works in close liaison with different national and international human resource development and scientific agencies, at various levels.



Proposed Main Building of Tamil Nadu Fisheries University, Nagapattinam



Proposed Main Building of Institute of Fisheries Technology, Ponneri

Fisheries College and Research Institute, Thoothukudi, one of the constituent units of TNFU, started way back in October, 1977 by the Tamil Nadu Agricultural University (TNAU) as the second Fisheries College in India. It was brought under the Tamil Nadu Veterinary and Animal Sciences University (TANUVAS) on 19th September, 1989. The College was renamed as Fisheries College and Research Institute (FC&RI) in 1990 to focus more on research and extension activities, and has grown into a renowned fisheries Institute in the nation.

Tamil Nadu Fisheries University was established with the following objectives:

- To impart quality professional education in different branches of Fisheries Sciences as the University may determine
- To conduct organised research in frontier areas with the objective of developing cutting edge technologies in Fisheries Sciences
- To provide extension services like training, consultancy, project formulation to fish farmers, fisher folk, unemployed youth and entrepreneurs in Fisheries Sciences
- To facilitate comprehensive development of Fisheries Sciences for increased contribution to States economy and set bench mark standards through appropriate interventions in fisheries teaching, research and extension
- To generate baseline data on aquatic biodiversity and fisheries resource potential
- To generate high quality professionals in Fisheries Sciences by following Veterinary Council of India regulations as a model
- To create better opportunities for marketing and value addition of fish and fishery products
- To set up an aquatic disease diagnosis and surveillance system in the State

HIGHLIGHTS OF THE YEAR 2013-14

The Tamil Nadu Fisheries University conducted a series of stake holders meetings at Institute of Fisheries Technology, Nagapattinam; FC&RI, Thoothukudi; and Madras Veterinary College Campus, Chennai during May 2013.

To mark the entry of TNFU into the second year, Fisheries Experts Brain storming Session was



organized at FC&RI, Thoothukudi, on 19.06.2013 to develop vision plan for TNFU.



Stakeholders meet of TNFU at Chennai



TNFU Academic Seminar at FC&RI

field throughout the India. These four technologies were developed under the NAIP funded project on “An Export Oriented Marine Value Chain for Farmed-



Stakeholders meet of TNFU at Nagapattinam



TNFU Brain Storming Session at FC&RI

Tamil Nadu Fisheries University (TNFU) Nagapattinam has contributed four technologies, Pond culture of cobia, Cage culture of cobia, Cobia brood stock feed and Value added cobia products, out of the five identified NAIP approved technologies in fisheries

Seafood Production Using Cobia (*Rachycentron canadum*) Through Rural Entrepreneurship” operated at Maritech Research and Extension Centre, Tharuvaikulam of Thoothukudi district, a constituent unit of Tamil Nadu Fisheries University. The MoUs were signed between



Exchange of MoU between TNFU and Entrepreneurs in the presence of Secretary to Govt., Department of Agricultural Research and Education, Govt. of India, New Delhi



TNFU Research cum Extension Seminar at FC&RI



TNFU, Nagapattinam and three entrepreneurs Mr. Patnadkar of Ankola Karnataka State on pond culture of cobia, Mr. Rajkumar of N.N.Chavadi, Nagapattinam district on pond culture of cobia, Mr. Gunasekaran of Kuttiyandiyur, Nagapattinam District on Cobia value added products and the same were exchanged in the presence of Dr. K. Kasturirangan, Member, Science Planning Commission, Govt. of India and Dr. S. Ayyappan, Director General, ICAR & Secretary, Department of Agriculture Research and Education (DARE). According to the MoU, TNFU has to provide all necessary technical inputs to entrepreneurs throughout the cobia culture period and during the process of value addition in cobia fish products.

TNFU organized an Academic Seminar on 22.07.2013 at FC & RI, Thoothukudi to reorient the undergraduate courses in fisheries. One year certificate courses on "Aquaculture" and "Harvest and Postharvest Technology" were introduced at IFT, Nagapattinam and IFT, Ponneri, respectively.

TNFU organized a Research cum Extension seminar on 13.09.2013 at FC&RI, Thoothukudi to prioritize research areas of the University.

A Memorandum of Understanding was signed between TNFU and Auburn University, USA on 07.10.2013 in the presence of Dr. William H. Daniels in a function held at FC&RI, Thoothukudi to have collaborative research in various fields of fisheries and to have staff and student exchange programmes.



Exchange of MoU between TNFU and Auburn University, USA

Board of Management of TNFU was constituted by His Excellency, The Governor of Tamil Nadu on 04.03.2014 and the first meeting was held on 05.03.2014 at the Secretariat, Government of Tamil Nadu, Chennai.

ORGANIZATIONAL SET-UP

The organizational structure of TNFU follows the State Agriculture Universities pattern. The policy making functions of TNFU are managed through different bodies constituted for the purpose of education, research and extension activities as given below:

- Board of Management
- Academic Council
- Planning Board
- Finance Committee
- Research Council
- Extension Education Council
- Board of Studies

The **Board of Management** is the highest policy making body. The **Academic Council** is the academic authority of the University and shall have the control and general regulation of teaching and examination

in the standards prescribed. The **Planning Board** of the University shall advise on the planning and development of the University. The **Finance Committee** governs the finance and accounts of the University. The **Research Council** is the policy making body of the University in research. The **Extension Education Council** formulates the policies and broad outlines of extension education activities to be carried out by the University in cooperation with the concerned government departments. The **Board of Studies** shall frame curricula for undergraduate and postgraduate programmes; recommend to the Academic Council the establishment of new departments, abolition / subdivision / or otherwise reconstitution of the existing departments.

The research, education and extension activities of the University are managed by the Vice-Chancellor with the assistance of Registrar, Dean, Director of Research, Director of Extension Education, Controller of Examinations, Finance Officer and Estate Officer.



OFFICERS OF THE UNIVERSITY

| | |
|--|--|
| Chancellor | His Excellency Dr. K. Rosaiah Governor of Tamil Nadu |
| Pro-Chancellor | Thiru. K.A. Jayapal Hon'ble Minister for Fisheries Government of Tamil Nadu |
| Vice-Chancellor | Prof. Baskaran Manimaran |
| Registrar | Dr. K. Rathnakumar (From 24.04.2013 to 20.02.2014) |
| | Dr. M. Venkatasamy (Incharge) |
| Dean, Fisheries College and Research Institute, Thoothukudi | Dr. G. Sugumar (Incharge) |
| Director of Research | Dr. G. Jeyasekaran (Incharge) |
| Director of Extension Education | Dr. K. Rathnakumar |
| Director Institute of Fisheries Technology Nagapattinam | Dr. M. Nagoor Meeran (Incharge) |
| Director Institute of Fisheries Technology Ponneri | Dr. K. Rathnakumar (Incharge from 19.07. 2012 to 23.04.2013) |
| | Dr. D. Manikandavelu (Incharge from 24.04.2013 to 20.02.2014) |
| | Dr. S. Felix (Incharge) |
| Controller of Examinations | Dr. K. Rathnakumar |
| Finance Officer | Thiru. R. Ayyavoo |
| Estate Officer | Er. V. Venkatesan (Incharge) |

BOARD OF MANAGEMENT

| | |
|---|--|
| (Class-I Ex-officio Members) | |
| Chariman (Vice Chancellor) | Prof. Baskaran Manimaran |
| Member Secretary (Registrar) | Dr.M.Venkatasamy (Incharge) |
| Members | Secretary to the Government Animal Husbandry, Dairying and Fisheries Department Secretariat, Chennai – 600 009 |
| | Secretary to the Government Finance Department Secretariat, Chennai – 600 009 |
| | Secretary to the Government Law Department Secretariat, Chennai – 600 009 |
| | Commissioner of Fisheries State Fisheries Department Administrative Office Buildings Teynampet, Chennai – 600 006 |
| (Class-II Other Members) | |
| One Fisheries Scientist / Educationist | Dr.H.R.V.Reddy, Ph.D. Director of Research Karnataka Veterinary, Animal and Fisheries Sciences University P.B.No.6, Nandinagar Bidar Karnataka – 585 401 |
| One Progressive fish farmer or fisherfork nominated by the Government | Mr.S.Sudhagar, B.Tech. S/o. E.Subramanian 15, ESM Colony, Muthumariamman Koil Street, Velipalayam Nagapattinam – 611 001 |
| One representative of the fisheries business including cooperatives and fishery industry nominated by the Government | Er. R. Kulasekaran, M.Tech. S2, Achuthan Ramanuja Apartment Trustpuram III Cross Street Kodampakkam, Chennai – 600 024 |
| One Woman member with active interest in Societal development nominated by the Chancellor | Dr.R. Buvana, Ph.D. AA 67, 2 nd Street Anna Nagar, Chennai – 600 040 |
| One ICAR Nominee | The Director Central Institute of Brackishwater Aquaculture No.75, Santhome High Road, Raja Annamalaipuram, Chennai – 600 028 |
| One Member elected by the TN Legislative Assembly | Thiru. D. Jayakumar, B.Sc., L.L.B. Member of Legislative Assembly (Royapuram) No.10, Leith Castle South Street Raja Annamalaipuram, Santhome High Road, Chennai - 600 028 |
| One representative from NFDB | The Chief Executive National Fisheries Development Board Department of Animal Husbandry, Dairying and Fisheries Ministry of Agriculture, Govt. of India Pillar No. 235, PVNR Expressway SVPNPA Post, Hyderabad-500 052 |

**ACADEMIC COUNCIL**

| | |
|--|--|
| Chairman (Vice Chancellor) | Prof. Baskaran Manimaran |
| Member Secretary (Registrar) | Dr. M. Venkatasamy (Incharge) |
| Members (Class – I Ex-officio Members) | Secretary to the Government Dept of Animal Husbandary, Dairying and Fisheries |
| | Commissioner of Fisheries Tamil Nadu State Fisheries Department |
| Dean Fisheries College and Research Institute | Dr. G. Sugumar (Incharge) |
| Director of Research | Dr. G. Jeyasekaran (Incharge) |
| Director of Extension Education | Dr. K. Rathnakumar |
| Controller of Examinations | Dr. K. Rathnakumar |
| Class-II Other Members | |
| Professor to be nominated by the VC on rotational basis | Dr. Senthiladeeban |
| | Dr. K. Karal Marx |
| | Dr. D. Sukumar |
| | Dr. J. Stephan Sampathkumar |
| One Dean from ICAR recognized Fisheries College | Dr. T.V. Ramana, Ph.D. Dean Faculty of Fisheries Sri Venkateshwara Veterinary University Dr. Y. S. R. Bhawan Tirupati, Andra Pradesh – 517 502 |
| One person having special knowledge of practical experience in different aspects of Fisheries to be nominated by the Vice Chancellor | Dr. A. Arul Victor Suresh, Ph.D. Managing Director United Research (Singapore) Pvt. Ltd. 2, Woodlands Sector 1 # 05-03 Singapore – 738 068 |

RESEARCH COUNCIL

| | |
|--|----------------------------------|
| Chairman (Vice Chancellor) | Prof. Baskaran Manimaran |
| Member Secretary (Director of Research) | Dr. G. Jeyasekaran (Incharge) |
| Members | To be formed |

PLANNING BOARD

| | |
|-------------------------------|--|
| Chairman (Vice Chancellor) | Prof. Baskaran Manimaran |
| Members | Dr.M.V.Gupta, Ph.D. C 502, Aditya Elite B.S.Maktha Begumpet, Hyderabad – 500 016 |
| | Dr.W.S.Lakra, Ph.D. Director & Vice-Chancellor Central Institute of Fisheries Education Panch Marg, Off. Yari Road Versova, Andheri (W), Mumbai – 400 061 |
| | Dr.Yugraj Singh Yadava, Ph.D. Director Bay of Bengal Programme Inter-Governmental Organisation 91, St. Mary's Road Abhirampuram, Chennai 600 018 |
| | Dr. R. Prabakaran, Ph.D. Former Vice-Chancellor of TANUVAS W 510, 6 th Street, C-Sector Anna Nagar West Extension Chennai – 600 101 |
| | Dr.R.Paul Raj, Ph.D. Member Secretary Coastal Aquaculture Authority Shastri Bhavan Annexe, 2nd Floor 26, Haddows Road, Chennai - 600 006 |
| | Dr.K. Palanisamy, Ph.D. Principal Researcher (Water Economics and Policy) International Water Management Institute (IWMI) ICRISAT Campus Patancheru, Hyderabad – 502 324 |
| | Dr.V. Sundararaj, Ph.D. Former Dean No.9, Vembuli Amman Koil 2 nd Street (Opp. Sai Baba Temple) Gowrivakkam, Chennai – 600 073 |

FINANCE COMMITTEE

| | |
|------------------------------------|--|
| Chairman (Vice Chancellor) | Prof. Baskaran Manimaran |
| Secretary | Finance Officer, TNFU |
| Members (Ex-Officio members) | The Secretary to the Government Dept. of Animal Husbandry Dairying and Fisheries |
| | The Secretary to the Government Finance |
| Board Member (Non-Official) | Dr. H.R.V.Reddy, Ph.D. Director of Research Karnataka Veterinary, Animal and Fisheries Sciences University P.B.No.6, Nandinagar Bidar Karnataka – 585 401 |



EXTENSION EDUCATION COUNCIL

| | |
|---|------------------------------|
| Chairman (Vice Chancellor) | Prof. Dr. Baskaran Manimaran |
| Member Secretary (Director of Extension Education) | Dr. K. Rathnakumar |
| Members | To be formed |

BOARD OF STUDIES

| | |
|--|--|
| Chairman (Dean, Faculty) | Dr. G. Sugumar (Incharge) |
| Members | All Directors of the University Controller of Examinations All the Heads of the Departments |
| Elected Members among Associate Professors | Dr. R. Jeya Shakila Dr. P. Jawahar |
| Elected Members among Assistant Professors | Thiru. N. Jayakumar Mrs. T. Umamaheshwari |
| Nominated External experts in concerned subjects nominated by the Vice-Chancellor | Dr. K. M. Shankar, Ph.D. Dean College of Fisheries Karnataka Veterinary, Animal and Fisheries Sciences University Mangalore – 575 002 Dr. T. Jawahar Abraham, Ph.D. Professor Department of Aquatic Animal Health Faculty of Fishery Science West Bengal University of Animal and Fishery Sciences, Kolkata – 700 037 |

ORGANIZATION OF MEETINGS

| S. No. | Authorities | Date |
|--------|-----------------------------|---|
| 1. | Board of Management | Board of Management <i>Ad hoc</i> Committee Meeting held on 19.08.2013 First Board of Management Meeting held on 05.03.2014 |
| 2. | Planning Board | -- |
| 3. | Board of Studies | -- |
| 4. | Research Council | -- |
| 5. | Finance Committee | Finance Committee <i>Ad hoc</i> meeting held on 19.08.2013 |
| 6. | Academic Council | -- |
| 7. | Extension Education Council | -- |

CONSTITUENT UNITS OF THE UNIVERSITY

- ◆ Fisheries College and Research Institute, Thoothukudi
- ◆ Institute of Fisheries Technology, Nagapattinam
- ◆ Institute of Fisheries Technology, Ponneri
- ◆ Extension and Research Centres
 - ◇ Fisheries Research and Extension Centre, Madhavaram, Chennai
 - ◇ Fisheries Training and Research Centre, Parakkai, Nagercoil.
 - ◇ Fisheries Training and Research Centre, Thanjavur
- ◆ Staff Training Institute, Chennai (to be brought under TNFU as per TNFU Act 2012 of Govt. of Tamil Nadu)
- ◆ Fisheries Institute of Technology and Training, Chennai (to be brought under TNFU as per TNFU Act 2012 of Govt. of Tamil Nadu)

Organizational structure of the University

To assess the needs of the fisheries industry to take forward this infant University with appropriate future plans pertaining to education, research and extension activities, fisheries stake holders meetings were conducted on 20.05.2013 & 21.05.2013 at Nagapattinam, on 22.05.2013 at Thoothukudi, and on 27.05.2013 at Chennai. Subsequently, a Brain storming session was conducted, involving the fisheries experts, on 19.06.2013 at Thoothukudi. An Academic Seminar on 22.07.2013, and Research & Extension Seminar on 13.09.2014 were conducted at Thoothukudi for vision plan development. Consequent on these activities, conglomerating the suggestions, the following is the organizational structure for Tamil Nadu Fisheries University.

The Tamil Nadu Fisheries University (TNFU) shall have five faculties, five schools, five campuses, four centres and two training institutes.

I. Faculty :

1. Faculty of Fisheries Sciences
2. Faculty of Basic Sciences
3. Faculty of Information Technology (Fisheries)
4. Faculty of Fisheries Engineering
5. Faculty of Food Science and Nutrition

II. Schools :

1. School of Aquaculture
2. School of Harvest and Post-Harvest Technology



3. School of Fisheries Resources and Environment Management
4. School of Social and Information Sciences in Fisheries
5. School of Fisheries Business Management

III. Campuses :

1. TNFU Campus, Nagapattinam
2. TNFU Campus, Thoothukudi
3. TNFU Campus, Ponneri
4. TNFU Campus, Madhavaram
5. TNFU Campus, Vaniyanchavadi, OMR

IV. Centres :

1. Centre for Sustainable Aquaculture (CeSA) will function as separate Directorate with headquarters at Nagapattinam

2. Centre for Fisheries Management, Planning and Policy (CeFimaPP) will function as separate Directorate with headquarters at Vaniyanchavadi, OMR, Chennai
3. Centres for Fisheries Research (Outstations) under the Directorate of Research Education to be located in different parts of the State
4. Centres for Fisheries Extension (Outstations) under the Directorate of Extension Education to be located in different parts of the State

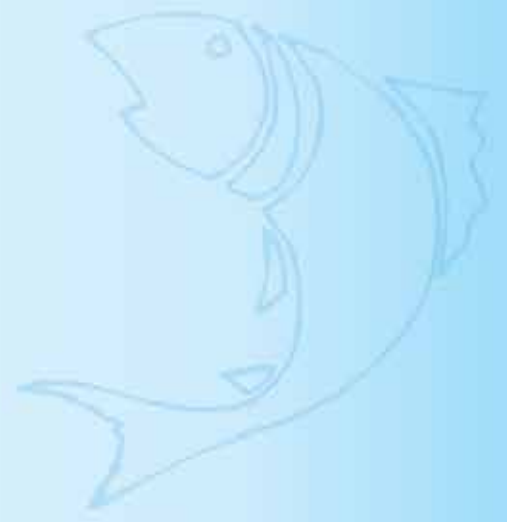
V. Training Institutes:

1. Staff Training Institute (to be renamed as Tamil Nadu Fisheries Academy)
2. Fisheries Institute of Technology and Training (These Institutes are to be obtained from Department of Fisheries, Government of Tamil Nadu as per the schedule of TNFU Act.)

Reorganization of Departments at Fisheries College & Research Institute, Thoothukudi

As per the organization structure for Tamil Nadu Fisheries University, to initiate the process, reorganization of the departments of Fisheries College and Research Institute, Thoothukudi was done on 01.10.2013, as given below:

| Earlier Departments in Fisheries College and Research Institute, Thoothukudi | | Reorganised Departments in Fisheries College and Research Institute, Thoothukudi | |
|--|--|--|--|
| 1. | Department of Aquaculture | 1. | Department of Inland Aquaculture |
| 2. | Department of Fisheries Biology and Resource Management | 2. | Department of Coastal Aquaculture |
| 3. | Department of Fisheries Environment | 3. | Department of Fish Pathology & Health Management |
| 4. | Department of Fishing Technology and Fisheries Engineering | 4. | Department of Fisheries Biology and Resource Management |
| 5. | Department of Fish Processing Technology | 5. | Department of Fisheries Environment |
| 6. | Department of Fish Quality Assurance and Management | 6. | Department of Fishing Technology and Fisheries Engineering |
| 7. | Department of Fisheries Biotechnology | 7. | Department of Fish Processing Technology |
| 8. | Department of Fisheries Economics and Management | 8. | Department of Fish Quality Assurance and Management |
| 9. | Department of Fisheries Extension | 9. | Department of Fisheries Economics |
| | | 10. | Department of Fisheries Extension |
| | | 11. | Department of Fisheries Information and Statistics |
| | | 12. | Department of Fisheries Biotechnology |
| | | 13. | Department of Basic Sciences |



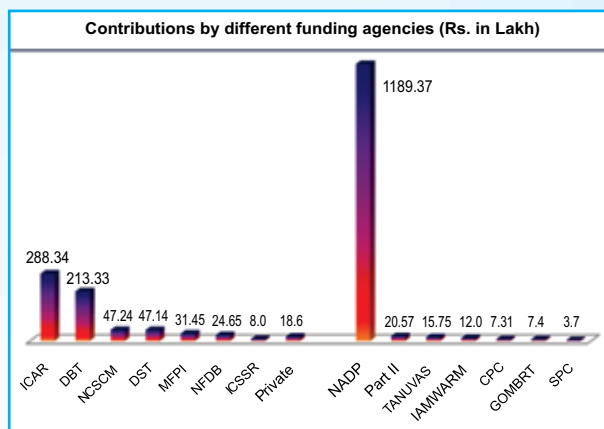
RESEARCH





2. RESEARCH

In the University, with the financial assistance from various funding agencies, a total of 42 research projects to a total outlay of ₹ 1,932.65 lakhs were in operation during the year 2013-14. The abstract of the same is furnished below.



State and Central Government agencies like National Agricultural Development Programme

(NADP), Chennai; Indian Council for Agricultural Research (ICAR), New Delhi; Department of Biotechnology (DBT), New Delhi; National Center for Sustainable Coastal Management (NCSCM), Chennai; Department of Science and Technology (DST), New Delhi; Ministry of Food Processing Industries (MoFPI), New Delhi; National Fisheries Development Board (NFDB), Hyderabad; Irrigated Agriculture Modernization and Water bodies Restoration and Management (IAMWARM), World Bank, Chennai; Gulf of Mannar Marine Biosphere Reserve Trust (GOMBART), Ramanathapuram and Central and State Planning Commissions (CPC and SPC), Chennai have supported the University to take up research projects during the year 2013-14. Major funding to a tune of ₹ 1,189 lakhs was provided by the NADP. Besides this, few private industries provided funding support to an amount worth 18.60 lakhs, to take up specific research problems, which provides examples of Industry-Institute partnerships.

ON GOING AND COMPLETED PROJECTS DURING 2013-14 (Rs. 1655.05 lakh)

| Sl. No. | Title of the Scheme | Funding agency | Budget (₹ in lakh) | Principal Investigator |
|---------|--|---------------------|--------------------|--|
| 1. | Establishment of marine engine and sea safety training centre for the fisherfolk in Tamil Nadu | NADP, GOI | 200.00 | Dr. N. Neethiselvan Professor and Head |
| 2. | Establishment of seafood knowledge highway to improve health, combat malnutrition and enhance income of fishers | NADP, GOI | 199.57 | Dr. S.A. Shanmugam Professor and Head |
| 3. | Establishment of post harvest centre in fisheries – Ponneri, Tiruvallur district | NADP, GOI | 178.00 | Dr. Cheryl Antony Associate Professor |
| 4. | An export oriented marine value chain for farmed seafood production using cobia (<i>Rachycentron canadum</i>) through rural entrepreneurship | ICAR-NAIP New Delhi | 152.91 | Dr. N. Felix Professor |
| 5. | Increasing fish production in Tamil Nadu through production and distribution of genetically improved Tilapia | NADP, GOI | 148.00 | Dr. K. Karal Marx Professor and Head |
| 6. | Establishment of chemical residue monitoring laboratory for fish in Tamil Nadu | NADP, GOI | 140.00 | Dr. G. Jeyasekaran Professor and Head |
| 7. | Developing aquaculture entrepreneurship in Tamil Nadu by improving breeding strategies and innovative farming protocols for high value ornamental fishes | NADP, GOI | 111.00 | Dr. S. Felix Professor and Head |
| 8. | Mass breeding and production of ornamental fishes and major carp seeds | NADP, GOI | 111.80 | Dr. S. David Kingston Professor and Head |
| 9. | Establishment of fish feed quality testing laboratory for the benefit of fish farmers of Tamilnadu | NADP, GOI | 101.00 | Dr. B. Ahilan Professor |
| 10. | InNoVacc: Indo-Norwegian platform for the development of candidate vaccines for invertebrate, piscine and avian species | DBT New Delhi | 73.46 | Dr. K. Riji John Professor and Head |



| Sl. No. | Title of the Scheme | Funding agency | Budget (₹ in lakhs) | Principal Investigator |
|---------|--|---|---------------------|---|
| 11. | Impact of climate change on the population structure and virulence of viral and bacterial pathogens in marine environment and host response alterations due to pathogen-antibiotic synergy | ICAR- NICRA | 55.00 | Dr. K. Riji John Professor and Head |
| 12. | Effect of kisspeptin on change in level of reproductive hormones and gonadal maturation in an air breathing fish, <i>Channa striatus</i> | DBT New Delhi | 49.31 | Dr. T. Francis Associate Professor and Head |
| 13. | Quantitative infectivity potential assessment of WSSV and genotyping of virulent strains | DBT New Delhi | 32.65 | Dr. M. Rosalind George Professor |
| 14. | Development of database for Indian seafood safety and traceability based on AFLP markers | SERB-MoFPI New Delhi | 31.45 | Dr. G. Jeyasekaran Professor and Head |
| 15. | Messenger RNA based assay for RT-PCR detection of viable <i>Salmonella</i> and <i>Vibrio cholerae</i> from fresh and processed finfish and shellfish | DBT New Delhi | 19.44 | Dr. G. Jeyasekaran Professor and Head |
| 16. | Characterization and maintenance of cell lines of fish and crab | DBT New Delhi | 9.82 | Dr. K. Riji John Professor and Head |
| 17. | Socio-economic empowerment of rural fisherwomen SHGs through enhanced market access | Planning Commission New Delhi | 7.31 | Dr. R. Jayaraman Professor and Head |
| 18. | Empowerment of inland fish farmers in value addition | DST New Delhi | 7.16 | Dr. P. Velayutham Professor and Head |
| 19. | Empowerment of SC & ST population of Kanyakumari district through adoption of ornamental fish culture practices | DBT New Delhi | 5.17 | Dr. S. David Kingston Professor and Head |
| 20. | Studies on bycatch reduction in trawl fishing of Gulf of Mannar coast for biodiversity conservation | Gulf of Mannar Biosphere Trust | 5.00 | Dr. B. Sundaramoorthy Professor |
| 21. | Assessment of freshwater fisheries resources potential of Tamil Nadu | State Planning Commission Chennai | 3.70 | Dr. R. Jayaraman Professor and Head |
| 22.. | Skill oriented training programmes and initiatives for fisherwomen of Pazhaverkadu village, Thiruvallur district | Ennore Port Trust | 3.10 | Dr. D. Manikandavelu Professor |
| 23. | Culture of Tilapia fish in earthen ponds as forage fish for crabs at Pazhaverkadu | Ennore Port Trust | 3.00 | Dr. D. Manikandavelu Professor |
| 24. | Efficacy of JR200 on growth performance, health, immunity of tiger shrimp, <i>Penaeus monodon</i> during experimentally induced Vibriosis | M/s. Kemin Industrial South Asia Pvt. Ltd. Chennai | 2.80 | Dr. S. Felix Professor and Head |
| 25. | Assessment of impact of trawling in Gulf of Mannar Biosphere Trust Region | Gulf of Mannar Biosphere Trust | 2.40 | Dr. N. Neethiselvan Professor and Head |
| 26. | Training on value added fishery products | Ennore Port Trust | 2.00 | Dr. D. Manikandavelu Professor |

Newly sanctioned projects during 2013-14 (₹ 277.60 lakh)

| Sl. No. | Title of the Scheme | Funding agency | Budget (₹ in lakhs) | Principal Investigator |
|---------|---|--------------------------|---------------------|--|
| 1. | National surveillance programme for aquatic animal diseases | ICAR- NFDB New Delhi | 80.43 | Dr. K. Riji John Professor and Head |
| 2. | Impact of large scale cultivation of seaweed culture in coastal environment of India | NCSCM MOEF Chennai | 47.24 | Dr. A. Srinivasan Professor and Head |
| 3. | Bioactive peptides from fish protein hydrolysates produced using endogenous proteinases from fish processing wastes | SERB-DST New Delhi | 39.98 | Dr. R. Jeya Shakila Associate Professor |
| 4. | Establishment of biosecured ornamental fish brood bank at Madhavaram, Chennai | NFDB MOA Hyderabad | 24.65 | Dr. S. Felix Professor and Head |
| 5. | Molecular characterization of pathogens associated with fish diseases in Assam- collaborative project with Assam University | DBT New Delhi | 23.48 | Dr.M. Rosalind George Professor |



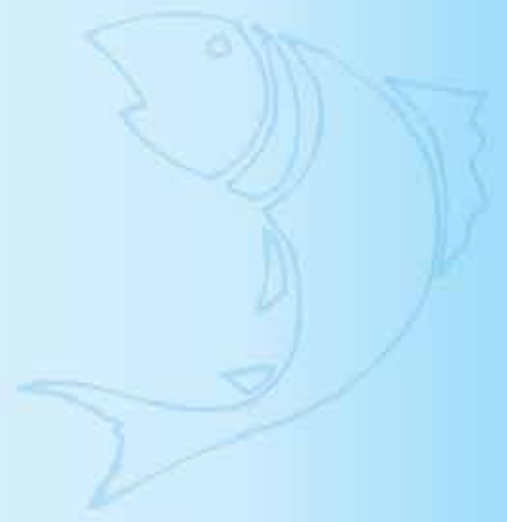
| | | | | |
|-----|--|-----------------------------------|-------|--|
| 6. | Establishment of recirculatory aquaculture systems at Maritech Research and Extension Centre Tharuvaikulam | Part II Scheme Govt. of Tamilnadu | 20.57 | Dr. S. Athithan Professor and Head |
| 7. | Development of environmental guidelines and operational protocol for sustainable development of cage culture in the reservoirs of Tamil Nadu | IAMWARM World bank | 12.00 | Dr. P. Padmavathy Assistant Professor |
| 8. | Converting low value fish marketing to high value fish marketing among the marginalized fisherwomen in the coastal districts of Tamil Nadu. | ICSSR New Delhi | 8.00 | Mrs. C. Jeevitha Assistant Professor |
| 9. | Biological efficiency of two different methionine sources for Pacific white shrimp, <i>Litopenaeus vannamei</i> | EVONIK Singapore | 7.70 | Dr. N. Felix Professor |
| 10. | Assessing the efficiency of aquatic plants and microalgae for reducing water hardness for the culture of ornamental fishes in coastal regions of Thoothukudi | TANUVAS Research Corpus Fund | 2.30 | Mrs. D. Manimekalai Assistant Professor |
| 11. | Remedial measures for improvement of colour, texture and water holding capacity in frozen cephalopods for export | TANUVAS Research Corpus Fund | 2.40 | Th. M. Muruganatham Assistant Professor |
| 12. | Utilization of fish solid waste for biogas production for indigenous application | TANUVAS Research Corpus Fund | 2.20 | Dr. P. Padmavathy Assistant Professor |
| 13. | Impact of heat processing methods on the health beneficial omega-3 fatty acids of sardines | TANUVAS Research Corpus Fund | 2.10 | Mrs. R. Shalini Assistant Professor |
| 14. | Participatory adoption on gender specific fish farming technologies in public/ panchayat water bodies for livelihood security in Tirunelveli district | TANUVAS Research Corpus Fund | 2.15 | Mrs. G. Arul Oli Assistant Professor |
| 15. | Field level comparative trial study to access shrimp production by adopting periphyton based farming system in Nagapattinam district | TANUVAS Research Corpus Fund | 2.50 | Mr. K.S.Vijay Amritharaj Assistant Professor |
| 16. | Identifying suitable carbon source to augment the formation of bioflocs at farmers pond level in <i>Litopenaeus vannamei</i> intensive culture systems in Sirkali taluk, Nagapattinam district | TANUVAS Research Corpus Fund | 2.10 | Mr. T. Anand Assistant Professor |

Self financing schemes

Self financing schemes are introduced to take the University further forward to build up self sustainable units so that they run in a profitable mode by captivating initial assistance from the University to establish the necessary facilities. The schemes provide various services in terms of analysis of fish products, fish seeds, fish disease diagnosis, etc., to the personnel undertaking fisheries activities and also offer employment to technical/ non technical staff to carry out the tasks in the respective schemes. The annual turnover received is being utilized for further strengthening the units with necessary inputs and a partial share is remitted to the University.

The University has three self financing schemes in operation during the year 2013-14, as detailed below:

| Sl. No. | Title of the Scheme | Centers | Services | Annual turnover (₹ in lakhs) |
|---------|---|---|--|------------------------------|
| 1. | Quality Analysis of Fish Samples | Fish Quality Monitoring and Certification Centre, DFAQM FC&RI Thoothukudi | Detection of bacterial pathogens by conventional and molecular methods, detection of shrimp viruses by PCR, proximate composition analysis, fat degradation products analysis, TVBN analysis, mineral estimation | 10.05 |
| 2. | Establishment of Shrimp Disease Diagnosis Laboratory | Fisheries Research and Extension Centre Madhavaram | Soil and water analysis, diagnosis of shrimp diseases | 0.25 |
| 3. | Setting up of iron frame case for lobster fattening under tie-up with Institute – Progressive farmer method | Maritech Research and Extension Centre Tharuvaikulam | Lobster fattening in cages by farmers with technical support from faculty | 2.00 |



RESEARCH HIGHLIGHTS



RESEARCH HIGHLIGHTS

FISHERIES BIOLOGY AND RESOURCE MANAGEMENT

Effect of kisspeptin on change in level of reproductive hormones and gonadal maturation in air breathing fish, *Channa striatus*

- Kisspeptin-10 is a very potent stimulator of the gonadotropic axis. Steroid hormone level was higher in murrel injected with natural kisspeptin-10 at 0.01 and 0.05 µg/g body weight of male and female fishes, respectively than the control. Efficiency of natural kisspeptin-10 compared with GnRH analogues and pituitary extract on gonadal maturation of *Channa striatus* showed that natural kisspeptin-10 injected fish had highest values of GSI, fecundity, ova diameter and steroid hormone levels.
- Effect of synthetic kisspeptin-10 compared with natural kisspeptin-10 on the gonadal maturation of *C. striatus* showed that natural kisspeptin-10 had slightly higher effect than synthetic kisspeptin-10 on the gonadal maturity.
- Synthetic kisspeptin-10 also responded well in breeding of murrels in pond after injection. But, in artificial fertilization, synthetic kisspeptin-10 responded well in females but not in males (especially during final spermiation). The effect of synthetic kisspeptin-10 tested on the induced breeding of Indian Major Carps was found satisfactory.



Murrel (*Channa striatus*)



Injection of hormone



Implantation of hormone

Effect of synthetic kisspeptin-10 (mammalian) on the gonadal maturation of Striped Murrel, *Channa striatus* (Bloch)

- In three synthetic kisspeptin-10 injected male fishes at the rate of 0.4 µg/g of body.wt, the level of testosterone increased to 10.53 ng/ml of blood, as compared to control with 2.2 ng/ml of blood.
- Estradiol level increased and the maximum level was 9662 pg/ml of blood (at 0.1 µg/g of body wt),

9681 pg/ml of blood (at 0.2 µg/g of body wt) and 9693 pg/ml of blood (at 0.4 µg/g of body wt).

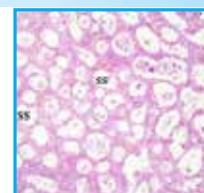
- GSI value fluctuated and the maximum GSI at the end of the sampling period was 1.11 at 0.2 and 0.4 µg/g body wt in synthetic kisspeptin-10 injected male fishes. Maximum GSI of > 6 was observed at higher concentrations in female fishes.
- Maximum fecundities of 10124, 10224 and 10426 were observed from the synthetic kisspeptin-10 injected fishes at 0.1, 0.2 and 0.4 µg/g body wt, respectively in December, 2012, and lower fecundities from January, 2013 to March 2013. Maximum fecundity of >12000 was observed at all concentrations of hormone treated fishes in May 2013.



Matured ovary



Section of ovary at the end of experiment



Section of testis at the end of experiment

Assessment of indigenous ornamental fishery resource of Tamiraparani River

- A total of 12 ornamental fish species have been collected and recorded during the study. The species recorded includes *Puntius sarana*, *P. chola*, *P. bimaculatus*, *P. filamentosus*, *P. tamiraparani*, *Etroplus suratensis*, *E. maculatus*, *Glassogobius giurus*, *Mystus oculatus*, *Ompak bimaculatus*, *Salmobhasia bacaila* and *Danio aequipinnatus*.
- In the present study, the numbers of species and their occurrence have been observed to be more in Tirunelveli than other two studied sites of Tamiraparani riverine system. Of the twelve species, *Etroplus suratensis* and *Puntius sarana* are abundant in all the three stations. *Etroplus suratensis* and *Puntius sarana* showed year round occurrence at Tamiraparani riverine system.



Danio aequipinnatus



Etroplus suratensis



Mystus oculatus



FISHERIES ENVIRONMENT

Impact of large scale cultivation of seaweeds on coastal environment of India

- Total number of phytoplankton species recorded from the three stations viz. Tuticorin, Mandapam and Mullimunai were 33, 35 and 19 species, respectively. In Mandapam, *Climacosphenia elongata* was dominant in the seaweed culture site and normal waters. *Leptocylindrus* sp. was dominant in Tuticorin. In Mullimunai coast, *Coscinodiscus eccentricus* was dominant.
- A total of 35 zooplankton species were recorded and copepod nauplius was found dominant in all the stations. The overall density of zooplankton was relatively higher in seaweed culture site when compared to normal site. Among the benthos, macrobenthic polychaetes and meiobenthic nematodes were dominant both in the seaweed culture site and control site of all stations.
- Distribution of bacteria examined in the three stations showed that 10 species were recorded in Tuticorin, 12 species in Mandapam and 6 species in Mullimunai coasts. Maximum density of bacteria was found in the sediments.
- Ecosystem health near seaweed culture site was evaluated based on the underwater survey. Wild seaweeds were found unaffected. No *Kapaphycus* sp. invasion was noticed in the coral reef ecosystem. Seagrass beds were also found healthy. Seaweed culture rafts were harboured by many crustaceans, fishes and other benthic animals. All the water quality parameters were found in normal range at all stations.



Utilization of fish solid waste for biogas production for indigenous application

- Different seafood processing wastes such as fish waste, shrimp waste, crab waste and cephalopod waste were analyzed for their physico-chemical

characteristics. Among various fish solid wastes, cephalopod wastes contained high concentrations of total nitrogen (13%) and other seafood wastes showed variations between 6.34 and 7.5%. The concentration of total phosphorous was very lower (0.56 %) than that of other fish solid wastes.

- Laboratory scale biogas production unit consisting of gas container (20 L capacity) and collection unit (2 L capacity) was set up and tested for the efficiency of gas production using fish wastes and cowdung slurry. Gas production was observed but in limited volume due to low temperature inside the biogas unit and absence of separate duct for the removal of slurry.
- A small outdoor biogas model unit was constructed with tank size of 1.7m x 1.3m x 1.15m and a biogas bag of premium quality tarpaulin with provision for raw material input, slurry discharge and gas collection. This outdoor unit warmed up during the day, which helped in the growth of thermophilic microbes that ensured the digestion of organic matter and enhanced gas production. Cowdung, 500 kg and fish waste, 100kg were introduced inside the biogas bag and allowed for gas production.



Laboratory scale biogas production unit



Small outdoor biogas model unit

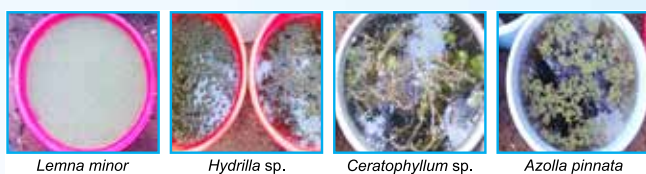
Assessing the efficiency of aquatic plants and microalgae for reducing water hardness for the culture of ornamental fishes in coastal regions of Thoothukudi

- Hardness removal efficiency of four different plants, *Azolla* sp., *Lemna* sp., *Ceratophyllum* sp. and *Hydrilla* sp. were tested in two different borewell waters with the initial hardness value of 1560 and 685 mg/l, respectively.
- At the end of experiment the final water hardness reduction percentage observed were 3.20 and 8.78%, 12.82 and 26.28%, 5.13 and 4.38%, 8.33 and 10.21%, 3.21 and 14.60% in the experiments conducted with *Azolla* sp., *Lemna* sp., *Ceratophyllum* sp., *Hydrilla* sp. respectively. All the



plants showed ability to reduce water hardness. Among the four plants, *Azolla pinnata* had the highest ability to reduce hardness.

- The gold fishes were introduced in the bore well water, which was treated with plants like *Azolla pinnata*, *Lemna minor*, *Ceratophyllum* sp. and *Hydrilla* sp. The initial length and weight of the goldfish in *Azolla pinnata*, *Lemna minor*, *Ceratophyllum* sp., *Hydrilla* sp. and control were 7.2 cm, 7.5 cm, 7.4 cm, 7.2 cm, 7.8cm and 8.63 g, 7.18 g, 7.47 g 8.59, 8.77 g, respectively. On 30th day length and weight of the gold fish observed were as follows, 7.25 cm and 8.70 g, 7.5 cm and 7.35 g, 7.7 cm and 7.35 g, 7.5 cm and 7.55 g, 7.4 cm and 8.70 g, 8 cm and 8.90 g in experiment conducted with *Azolla* sp., *Lemna* sp., *Ceratophyllum* sp., *Hydrilla* sp.



AQUACULTURE

An export oriented marine value chain for farmed seafood production using cobia (*Rachycentron canadum*) through rural entrepreneurship

- This project contributed in the introduction of new marine species Cobia in Indian aquaculture. Four technologies viz., pond culture of cobia, cage culture of cobia, cobia broodstock feed and value added cobia products were developed and approved by NAIP and published in the Compendium released by NAIP.
- Technology on Pond grow out culture of cobia was developed for the first time in India by Fisheries College and Research Institute, Thoothukudi with the production of 1kg/sq.m at the stocking density of 1 fish/4 m² with an average weight of 4 kg in a period of ten months.
- Technology on Cage grow out culture of cobia was developed using formulated feed at a stocking density of 4 fish/m³ with the production of 8 kg per m³ with an average weight of 4.5 kg in a period ten months.
- First phase of grow out culture of cobia in concrete tanks at 20 per m³(10 g size) attained average weight of 40 g in one month and 150 g in three months. The 40 g size grown cobia juveniles were found to be suitable for cage culture and 150 g found to be suitable for pond grow out culture for achieving 100% survival.

- Cobia broodstock feed was developed. Wet feed containing either cuttle fish (5 days) or sardines (2 days) + Ash Gourd (40 mg/kg feed) + Agar agar (20 mg/kg feed) fed ad libitum to cobia of 3 to 4 kg attained 12 – 13 kg in a period of 6 months in 6 m dia HDPE Cage. Ova measured 800 – 900 micron in female brood stock and condensed milt in male cobia brood stock were observed during cannulation.
- Five ready to eat cobia fish products viz., canned cobia, sous vide cook chilled cobia fish curry, hot filled chilled cobia fish curry, cobia in retort pouches and cobia pickle; four ready to cook products viz., fresh and frozen cobia, vacuum and modified atmospheric packaged products, cobia macroni and cobia noodles were developed. Two byproducts viz., collagen and leather were developed from cobia fish waste.
- Memorandum of Understanding (MoUs) were signed between TNFU, Nagapattinam and three entrepreneurs viz., Mr.Patnadkar of Ankola, Karnataka State and Mr.Rajkumar of N.N.Chavadi, Nagapattinam district on pond culture of cobia and Mr. Gunasekaran of Kuttiyandiur, Nagapattinam District on Cobia value added products.



Cage rearing of cobia



Harvesting of cobia



Harvested cobia



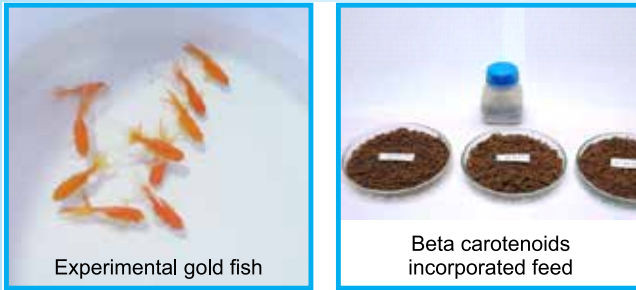
Cobia in retortable pouches

Influence of health promoting additives on the growth, gonad development and disease resistance of goldfish, *Carassius auratus* (Linnaeus, 1758)

- Three health promoting additives (mannan oligosaccharides, nucleotides and beta carotenoids) have shown improvement in growth, gonad development and disease resistance of goldfish *Carassius auratus* when compared to control.



- Among all the three additives, the beta carotenoids at 300ppm (0.03%) showed the highest value in the growth (mean weight gain - 3.072 g, mean weight gain per day- 0.0545g, specific growth rate - 0.698g), gonad development (gonado somatic index- male 3.487g and female 4.035g) and the disease resistance of goldfish against *Aeromonas hydrophila* was higher with the survival rate of 95%.



Establishment of 'Biosecured Ornamental Fish Brood Bank' at Madhavaram, Chennai

- "Biosecured ornamental fish brood bank' was established at Madhavaram Campus of Tamilnadu Fisheries University. Quality brood stocks were developed for economically viable ornamental fishes like *Danio devario*, *Puntius gelius*, *Puntius phutunio*, *Barilius barila*, *Badis badis*, *Colisa lalia*, *Colisa sota* and *Colisa fasciatus* to popularize the native varieties of fishes.
- Innovative culture practices in ornamental fish rearing were demonstrated using biosecured raceway system, biofloc based liner ponds and FRP cages as pond-in-pond systems. Quality ornamental fish brooders and seeds having good colour, finnage and health are being supplied to the farmers at subsidized rates.



Role of supplemented energy sources on spermatological parameters of selected cultivable carps

- Egg yolk at 5, 10 and 15% and glucose at < 1% were supporting the motility duration of the spermatozoa of common carp and mrigal. The initial mean motility duration of *C. carpio* was

265.66±4.5s and that of *C. mrigala* was 230.66±7.5s. At the end of 42nd day of cryopreservation, the mean motility duration of *C. carpio* spermatozoa cryopreserved with glucose at 0.25% and egg yolk at 5% resulted in mean motility duration of 110.33±3s and 149±2.6s, respectively (P>0.05). The spermatozoa of *C. mrigala* cryopreserved with glucose at 0.5% and egg yolk at 10% resulted in the highest mean motility duration of 204±3.6s and 145±4s, respectively (P>0.025).

- The highest percentage of live cells could be noticed only with glucose at 0.25% and egg yolk at 5% for *C. carpio* spermatozoa. The highest mean percentages of live cells were 71% and 78%, respectively for the above two energy sources.
- Therefore, glucose and egg yolk served as energy supporters that have led to higher mean motility duration and higher percentage of live cells for *Cyprinus carpio* and *Cirrhinus mrigala*.



Collection of milt from mrigal

Milt diluted to 100x times

Impact of plant extracts on biogrowth and immunostimulation of *Litopenaeus vannamei* (Pacific White leg shrimp) infected with *Vibrio harveyi*

- Efficiency of three plant extracts (*Andrographis paniculata*, *Moringa oleifera* and *Glycyrrhiza glabra*) on biogrowth and immunostimulation of *Vibrio harveyi* affected *Litopenaeus vannamei* was examined. Biogrowth and haematological parameters estimated at three different time intervals showed that the extract of *Andrographis paniculata* has maximum efficiency on enhancing the growth and immune system of *Vibrio harveyi* affected experimental shrimps.

Developing aquaculture entrepreneurship in Tamilnadu by improving breeding strategies and innovative farming protocols for high value ornamental fishes

- Brood banks were developed for valuable indigenous and exotic freshwater ornamental fishes under biosecured conditions. Breeding protocols were standardised for high value ornamental fishes through selective breeding, hormone based induced breeding, etc.



- BMPs were developed for innovative / intensive farming of ornamental fishes using raceways, recirculation system with aerobic microbial flocculent (AMF)/ green water technology. Breeding and farming technologies were disseminated to farming sector

Identifying suitable carbon source to augment the formation of bioflocs at farmers' pond level in *Litopenaeus vannamei* intensive culture systems in Sirkali taluk, Nagapattinam district

- Different types of carbon sources like sugar, carbon essence, atta, tapioca flour were selected and its carbon and nitrogen contents were analysed in the laboratory.
- Field experiments were conducted using the selected carbon sources at Hitide seafarms, Sirkali wherein the experimental ponds were stocked with *Litopenaeus vannamei* seeds. The samples were taken periodically and analyzed for the water quality, microbiology and planktonology. The samples tested showed that the carbon essence showed better results than sugar and tapioca flour.



Experimental farm



Quantification of Biofloc



Zooplankton population

Mass breeding and production of ornamental fishes and major carp seeds

- An ornamental fish culture unit was established, in which four species of live bearers and six species of egg laying ornamental fishes were being reared. Mass breeding of three varieties of angel fish and oscar fish were successfully carried out. A hatchery was established and breeding of common carp was also successfully carried out.



Ornamental fish culture unit

Field level comparative trial study to access shrimp production by adopting periphyton based farming system in Nagapattinam district

- In a trial study conducted in the shrimp pond, faster growth was observed in periphyton based pond (33g) compared to control (33 g) in 100 days of culture (DOC). Zooplankton growth was observed at optimum levels throughout the crop compared to control.
- Periphyton formation with rich growth of diatom, zooplankton was observed. Feed intake reduced by 15-20% in periphyton based pond compared to control pond.



Substrate erection in trial pond

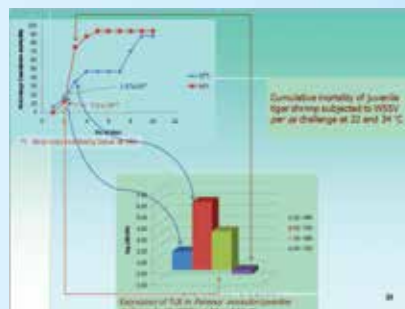


Split bamboo substrate with periphyton growth

FISH HEALTH MANAGEMENT

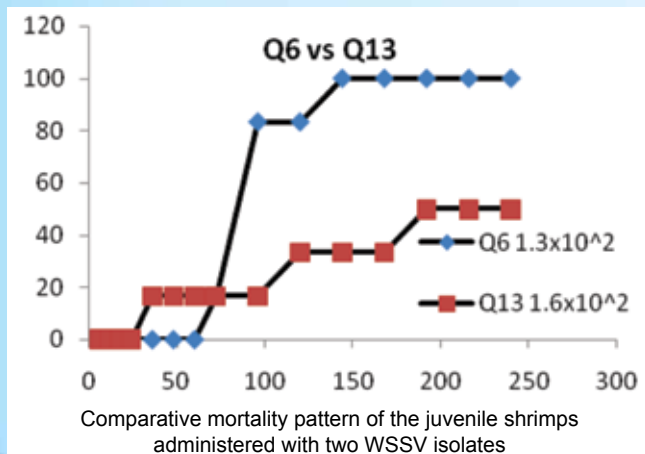
Impact of climate change on the population structure and virulence of viral and bacterial pathogens in marine environment and host response alterations due to pathogen-abiotic synergy

- Environmental stress of high temperature and salinity induced genomic variations in *Vibrio harveyi*. Multi abiotic stress caused by high salinity and temperature was found to bring about pathogen-abiotic synergy causing increased cumulative mortality in juvenile shrimps due to WSSV.
- Medicinal herbs incorporated feed was found to upregulate immune gene (tubulin and penaeidin) expression in juvenile tiger shrimps. Herbal feed was found to delay and reduce the mortality rate in WSSV infected shrimps at low temperature (24 °C) and at normal temperature (29 °C) conditions.



Quantitative infectivity potential assessment of WSSV and genotyping of virulent strains

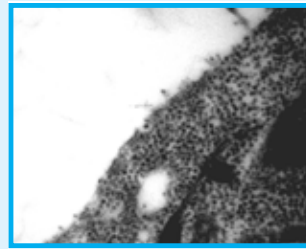
- WSSV prevalence was found to be at 41.99 % during the project period 2010-12 and the strains were found to be different genotypes based on ORF 94 and ORF 125, transposase region and ORF14/15
- Infectivity of the WSSV isolates was found to vary from 100 % to 45.83 % mortality and passaging of the virus resulted in genotype shift in one of the low virulent isolates (Q13).
- At low doses of WSSV inoculation, both high and low pH induced high mortality in shrimps while the mortality stagnated at 50% in shrimps in normal pH seawater. Induction of mortality was lower at 22°C compared to both 34 and 30°C. *Litopenaeus vannamei* was found to survive with low dose of WSSV with limited mortality



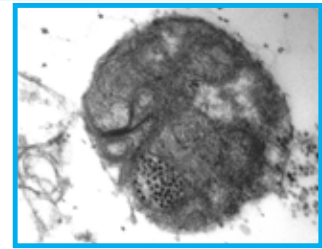
InNoVacc: Indo-Norwegian platform for the development of candidate vaccines for invertebrate, piscine and avian species - Fisheries College and Research Institute, Tuticorin

- Nodavirus (LCNNV-In01) was isolated from Asian seabass (*Lates calcarifer*) juveniles and characterised through electron microscopy, serum neutralisation, RT-PCR and sequence analysis. Full length genes of coat protein (1.4 kb - RNA2) and RNA dependent RNA polymerase (3.1 kb RNA1) were cloned and sequenced (Genbank Acc.Nos. HM485328 & JQ073720). Two clones of RNA2 were delivered to Dr. Sunil K. Lal, ICGEB, New Delhi for generation of VLP using the self assembling avian influenza viral coat protein genes.

- The cDNA of RNA1 and RNA2 was transcribed invitro and RNA was transfected into SSN-1 cells at equimolar concentrations using lipofectamine. CPE was obtained after 60 h of incubation and virus was rescued from SSN-1 cells.
- Gene expression of five immune genes viz. IFN, Mx, ISG-15, IRF-3 and Vig-1 was investigated with beta actin as the reference gene. CpG and LCNNV upregulated IFN, Mx, ISG-15 and IRF-3 in seabass cell line, while in clownfish cell lines LCNNV, CpG and poly I:C upregulated Mx, ISG-1 and Vig-1 genes. The study revealed that the innate immunity in Asian seabass could be enhanced by application of PRR ligands like CpG ODN, which has high application potential for improving the health status of the fish both by non-specific immunostimulation and also by increasing vaccination efficiency as adjuvants.



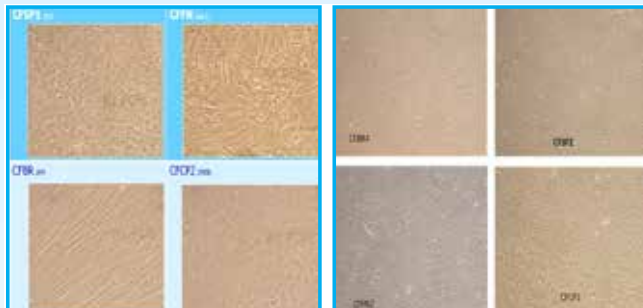
TEM image of LCNNV-In01 showing non-enveloped, icosahedral virus particles of 25–30 nm size packed in aggregates and in intercellular spaces in the SSN-1 cells.



Cytoplasmic aggregations of virus particles in special membranous envelopes observed in the cell cytoplasm.

Characterisation and maintenance of cell lines of fish and crab

- Cell lines were used for virus isolation and characterisation from infected fishes and two isolates were recovered. One of the isolate has been characterised and reported as koi ranavirus, which is the first ever ranavirus reported from a koi and the first report of a fish ranavirus from India.
- TEM image of koi ranavirus KIRV grown in SNKD2a cells showing icosahedral particle of 100-120 nm size. Virus particles are at the end of virus morphogenesis (bar = 200nm).
- Four cell lines developed from spleen, fin, caudal peduncle and brain of the clownfish tissues viz. CFSP, CFFN2, CFPC1 & CFBR were deposited at National Repository for Fish Cell lines at NBFGR, Lucknow.



Cell lines produced from the clown fish spleen (CFSP1, CFSP2) and Fin (CFFN, CFFN2)

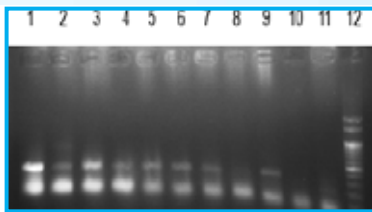
Cell lines produced from the clown fish Caudal peduncle (CFCP1, CFCP2) and Brain (CFBR, CFBR4)

Molecular characterization of pathogens associated with fish diseases in Assam

- Infected freshwater fish samples with different stages of ulcer were collected from two North-Eastern States viz. Assam and Manipur and analysed for the presence of viruses by diagnostic PCR for four DNA and three RNA viruses.
- Samples were also processed for virus isolation using cell culture systems. The infected fishes collected from Imphal and Silchar carried ranavirus infections indicated by the amplicons of specific sizes obtained by PCR.
- Cell culture analysis could not yield a virus isolate as yet. However, the samples are being further processed by bioassay studies to find if the filtered extracts could regenerate the infection in susceptible species for virus isolation.
- One of the amplicon generated for EHNV primers having a length of 321 bp sequenced to find out the homogeneity indicated that the amplicon has 99 % homogeneity to the major capsid protein gene of largemouth bass virus (LMBV) (Genbank Acc.No.FR682503)



Silcoorie region Silchar, Assam



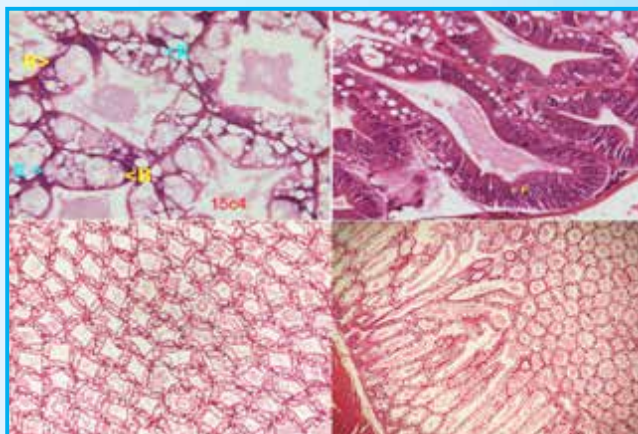
PCR targeting major capsid protein gene with 321 bp of EHNV with M151 & M152 primers. M1-M7 and M9 were positive

Surveillance of fish and shellfish diseases in selected districts of Tamil Nadu

- Awareness Programmes were attended for 87 and 70 shrimp farmers in and around

Vedaranyam and Manamelkudi, respectively. Talks on “Role of surveillance in disease control and health management”, “EMS or AHPND, an emerging disease of very serious concern among the Southeast Asian countries”, “Viral diseases affecting *Penaeus vannamei*” and “Best management practices to prevent the disease occurrence in shrimp farming” were given.

- Three districts covered under active surveillance for marine shrimp farming are Nagapattinam (South of Kariakkal), Thanjavur and Pudukottai. Samplings were conducted across from 14 locations from farms under operation and those farms that reported on set of mortality. Of the 122 individuals collected through 34 sampling from 20 farms, 45 samples were analysed for the viral pathogens viz. WSSV, IHNV, MBV and BP. Ten out of 45 were positive for WSSV (22%) and 7 for IHNV (15.5%). MBV and BP were negative.
- Suspected EMS sample were collected in live condition to test for histopathology, bacterial isolation and identification. Histopathological analysis did not show typical AHPNS. Bacterial isolates were tested based on the primer sequences provided by Dr Flegel and both AP1 and AP2 primers did not give typical amplicons. The sequence analysis did not match with the sequence provided by Dr Flegel. Molecular analysis of 16srRNA of 1.5 kbp of two isolates was found to blast to *V. parahaemolyticus* and *V. alginolyticus*. However, the biochemical reactions did not correspond to the typical *V. parahaemolyticus*. Sequence analysis of IHNV showed 98% homogeneity with Taiwan isolate (AY355307). None of the samples indicated the presence of typical AHPND.



Histological sections of the hepatopancreas of *Litopenaeus vannamei* stained with H&E showing typical structural integrity



FISHERIES BIOTECHNOLOGY

Increasing fish production in Tamil Nadu through production and distribution of genetically improved Tilapia

- Availability of genetically improved tilapia within Tamil Nadu in the natural system was surveyed; and noticed that the said tilapia was available in the natural tanks in Krishnagiri district, Vaigai reservoir, Sattanur reservoir and also in the fish culture ponds of farmers in Thanjavur district. More than 90% of landings in Vaigai reservoir were dominated by tilapia with an average weight of 1 to 1.5 kg. Around 40 to 50 % of landings at Sattanur Dam were dominated by tilapia with an average weight of 1.5 to 2.0 kg.
- Technique for the development of tilapia broodstock, hapa breeding, sex reversal and larval rearing were standardized. Broodstocks were developed by stocking them in rearing hapas @ 6nos./m². Sex ratio maintained at 1:1. Hatchlings were fed with diet containing 17 methyl testosterone hormone with shrimp starter feed for a period of 21 days. Two dosages of hormone (50 mg/kg and 60 mg/kg) were tried for inducing sex reversal. Rearing of sex reversed tilapia was carried out by feeding with Artemia followed by pellet feed.



Genetically Improved Tilapia



Tilapia eggs



Tilapia hatchlings



Collection of eggs from the mouth of brood fishes

Studying the effect of synthetic hormones on the induced spawning and in vitro fertilization in common carp

- Synthetic hormones viz. ovaprim and wova-FH injected into males and female at dose of 0.2 ml/

kg and 0.3 ml/kg of the body weight, respectively had induced the spawning after 9 h of hormone administration

- Fertilization rate of ovaprim was 79.18%, wova-FH was 81.46% and control was 85.11%. The highest rate of hatching was achieved in ovaprim (63.08%) followed by wova-FH (61.71%) and control (79.25%). The highest rate of survival was achieved in ovaprim (63%) followed by wova FH (60%) and control (79%).
- Synthetic hormone viz., ovaprim can be effectively utilized to produce induced breeding and in vitro fertilization of common carp during winter period. Using this technique continuous production of common carp seedlings is possible.



Injection of ovatide hormone to common carp



Collection of milt from common carp



Stripping of eggs in common carp



In vitro fertilization in common carp

Mass production of triploid common carp (Cyprinus carpio) using chromosome manipulation techniques

- Synthetic hormone viz., wova-FH was injected intramuscularly to the brooders at the rate of 0.1ml/kg for male and 0.15 ml/kg for female. Induction of triploidy was done by giving heat shock (39°C, 40°C and 41°C) for 1 min and cold shock at (0-4°C) for 30 min, 45 min and 1 h after 9 min post fertilization.
- Fertilization rate ranged from 72.0-86.5%. Induction of triploidy using heat shock and cold shock was successful. The percentage of hatching of heat shock treated group was 63.5% at 39°C, 58.0% at 40°C and 50.0% at 41°C. The percentage of hatching of cold shock treated group was 53.0% at 0-4°C for 30 min, 44.0% for 45 min and 36.0% for 1 h.



Induction of triploidy in common carp by giving heat shock to fertilized eggs at 39° C for 1 min

Efficacy of JR200 on growth performance, health, immunity of tiger shrimp, *Penaeus monodon* during experimentally induced *Vibriosis*

- The effect of immunostimulant (JR 200, provided by M/s. Kemin Industries) supplemented diet on shrimp growth, survival and some hemato-immunological parameters was tested after an experimental challenge with *V.harveyi* in different concentrations. The LC50 value determined against *V. harveyi* was 3.98×10^6 CFU/ml. There was a significant difference between the treatment groups and control group at $p < 0.05$.
- JR-200 has shown positive effects with respect to immune enhancement and growth related factors in juveniles of shrimp which was also significant ($p > 0.05$) over the control groups.



Evaluating the efficacy of JR-200

FISHING TECHNOLOGY AND FISHERIES ENGINEERING

Assessment of impact of trawling in Gulf of Mannar Biosphere Trust Region

- Recruitment over fishing (fishing of brooders) was found to be the major problem due to trawling along the coast of Gulf of Mannar

- Out of the 25 species examined, recruitment overfishing was reported in 11 species such as *Scomberomorus commerson*, *Lethrinus lentjan*, *Lethrinus olivaceus*, *Alectis indicus*, *Decapterus macarells*, *Selaroides leptolepis*, *Stolephorus indicus*, *Parupeneus indicus*, *Lutjanus quinoquelineatus*, *Saurida tumbil*, *Lepturacanthus savala*, *Leiognathus dussumieri* and was found to occur from March to May.
- Three species such as *Decapterus russelli*, *Nemipterus japonicas*, *Nebiea maculate* were found to suffer both due to recruitment overfishing and growth overfishing. These species were found to be highly affected as both brooders and juveniles are captured heavily due to trawling
- Square mesh cod panel of 30 mm at 30% of the cod end has to be fixed in the cod end of trawl nets of Thoothukudi.



Nemipterus japonicas *Nebiea maculate* *Decapterus russelli*

Studies on bycatch reduction in trawl fishing of Gulf of Mannar coast for biodiversity conservation

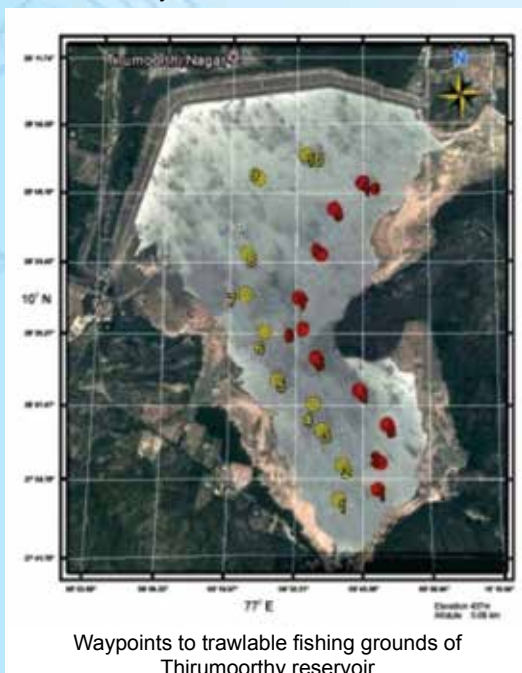
- Bycatch from bottom trawls of Thoothukudi coast was found to range between 80 and 90%, of which, 20- 40% were found to be discards. Bycatch from mid-water trawls of Thoothukudi coast was found to range between 70 and 85%, of which 10-30% were found to be discards. Discards were recorded up to 70% in catches of trawls, which were operated below the depth of 50m and this was less than 50% beyond 50m depth.
- Juveniles of commercial fishes were recorded up to 40% of the fish catches of trawl net. More than 60% of *P. semisculcatus* were found captured before attaining first maturity in mini trawls nets of Thoothukudi coast. Square mesh panel with 40 mm size was found to facilitate escapement of juveniles through square mesh of mini trawl.





Study on the performance of mini trawling in Thirumoorthy reservoir of Tamil Nadu

- A 38m two seam trawl with the head rope length of 38 m was designed and fabricated. The net was designed suitable for trawling from two boats each powered with a 25 hp out board engine. Topographic survey carried out using portable echo sounder revealed that there are trawlable fishing grounds in Thirumoorthy reservoir.
- During the survey, the depth of trawlable grounds of the reservoir varied from 9.5 to 12 m. Apart from this marked site, the remaining areas of the reservoir were found unsuitable for trawling as there were rocks, trees and trenches.
- The mean catch rate of trawl was found to be 9.5 kg per haul. Among the four species that contributed to the catch, rohu was found to be the dominant species followed by catla, mrigal and common carp.
- While comparing the CPUE of gill netting with that of trawling, it was found that trawling yielded a poor catch rate of 9.5 kg/haul against 11 kg/boat/day, considering one day soaking period as one haul for gill net and five gill nets as one gill net fishing unit.
- The study suggested that the either reduction in size of the trawl or increase in horse power of the towing boats used in the present study is required to make IMC more vulnerable to pair trawling in Thirumoorthy reservoir.



Optimization of mesh size of gillnet for barracuda fishing in Thoothukudi coast

- Four species of barracudas form the commercial fishery in the small and big meshed gillnets of Thoothukudi coast viz. *Sphyraena obtustata*, *S. forsteri*, *S. jello* and *S. picuta*.
- Barracudas could migrate and are available for fishing in shallow waters during the South-West monsoon (June to August).
- Selection factors derived for *S. obtustata*, *S. forsteri*, *S. jello* and *S. picuta* were 5.70, 7.04, 8.27 and 9.47, respectively. Optimum mesh sizes for the commercial exploitation of *S. obtustata*, *S. forsteri*, *S. jello* and *S. picuta* were estimated to be 4.21, 5.82, 5.92 and 8.87 cm, respectively. Commercially significant length group of *S. obtustata*, *S. forsteri*, *S. jello* and *S. picuta* was estimated to be 24, 41, 49 and 84 cm, respectively.



FISH PROCESSING TECHNOLOGY

Empowerment of inland fish farmers in value addition

- Methodologies for the preparation of different kinds of value added fishery products from freshwater fishes such as cultivable carps and tilapia were evolved through trails in the laboratory. The recipe and formula for the preparation of fish pickle, fish burger, fish macroni, fish noodles, fish cutlet and fish samosa were standardized. The consumer acceptability for different kinds of value added products from freshwater fishes were studied.
- Demonstrations of the technologies to the public, training programmes were conducted in Kanyakumari and Tirunelveli Districts.



Assessment of total mercury content in commercially important finfish and shellfish of the Gulf of Mannar coast

- The levels of mercury content in commercially important finfish and shellfish collected from three landing centres of Gulf of Mannar showed narrow range of variations. The levels were found to be below the legal limits (1 ppm) in all fishes and hence, safe for human consumption.
- The lead content was completely absent in all the fishes taken from three landing centres. The heavy metals concentrations in fishes could be arranged in the following descending order Hg → Cd → Pb.



Grouper, *Epinephelus quoyanus* Shrimp, *Penaeus semisulcatus*

Antimicrobial activity of biopeptides extracted from fish protein hydrolysate

- Fish protein hydrolysates (FPH) were prepared from skin and muscle of fifteen fin fishes using commercial protease enzymes viz. alcalase, trypsin, pepsin and papain by optimizing different concentrations and reaction times with constant pH and temperature of the respective enzymes. The maximum DH of 82% was obtained within 60 min with alcalase, followed by 51% DH with papain after 225 min, 50% DH with trypsin after 210 min and 29% DH with pepsin after 225 min at 1% concentration.
- Using the optimized process conditions FPHs were prepared from the muscle and skin of 15 species of finfishes and subjected to antimicrobial activity test against several bacterial pathogens. FPH prepared from fish skin alone exhibited antimicrobial property. Alcalase FPH showed maximum activity against *Staphylococcus aureus*, *Enterobacter cloacae* and *Escherichia coli*. Trypsin FPH had activity against *Klebsiella pneumonia*, *Enterobacter cloacae* and *Escherichia coli*.

- Biopeptide fraction (<30 KDa) derived from alcalase FPH alone exhibited antimicrobial activity against *Escherichia coli* (2mm) and none of the other biopeptides showed any activity.



Activity of trypsin and alcalase FPH against *E. coli*

Alcalase biopeptide (< 30 KDa) against *E. coli*

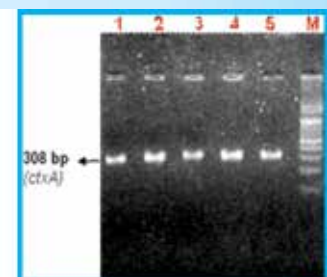
FISH QUALITY ASSURANCE AND MANAGEMENT

Messenger RNA based assay for RT-PCR detection of viable *Salmonella* and *Vibrio cholerae* from fresh and processed finfish and shellfish

- A RT-PCR assay for the detection of *Salmonella* serovars using five specific mRNA genes *hly*, *invA*, *hns*, *himA* and *fimA* was developed. Bioinoculation studies carried out proved the developed RT-PCR assay could detect the presence of *S. enteric* serovar Typhimurium in fresh and processed finfish and shellfish using a specific mRNA gene *invA* (275bp).
- A RT-PCR assay was developed for the detection of different strains of *Vibrio cholerae* using specific mRNA genes *rpoA*, *ctxA*, *tsf*, *groEL* and *rtxA*. Bioinoculation studies carried out proved the developed RT-PCR assay could detect *V. cholerae* O139 (SG24) in fresh and processed finfish and shellfish using the specific mRNA gene *ctxA* (308bp).
- RT-PCR assays developed could detect both the organism within 5 min of pre-enrichment in fresh and cooked finfish and shellfish. They were also detected by RT-PCR after 30 days in dried fish products. But, in the case of frozen products, only *V. cholerae* was detected after 30 days.



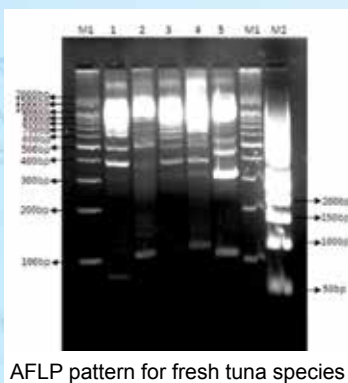
RT-PCR assay for the detection of viable *Salmonella typhimurium*



RT-PCR assay for the detection of viable *Vibrio cholerae*

Development of database for Indian seafood safety and traceability based on AFLP markers

- AFLP-PCR based analysis was done for the authentication of five commercially important tuna species namely 1. *Euthynnus affinis*, 2. *Auxis thazard*, 3. *Katsuwonus pelamis*, 4. *Thunnus albacares*, 5. *Thunnus obesus*. Genomic DNA extracted from fresh tuna was subjected to restriction digestion using *EcoR1* and *Mse1* enzymes followed by ligation with adaptors by using T4 DNA Ligase. Pre-amplification was done by using primer having one selective nucleotide and selective amplification was done using primers having three selective nucleotides.
- Different species specific AFLP banding patterns were obtained for fresh tuna in the primer combination *EcoR1*-AGA/*Mse1*-CTG. Amplified products were then analyzed by 2% metaphor agarose gel electrophoresis and their molecular sizes were determined by Alpha Innotech software.
- Species specific AFLP marker for different species of tuna are 67 bp for *Euthynnus affinis*, 113 bp for *Auxis thazard*, 590 bp for *Katsuwonus pelamis*, 131 bp for *Thunnus albacares* and 450 bp for *Thunnus obesus*. This AFLP marker can be used to authenticate commercially important tuna species available in Tamil Nadu.



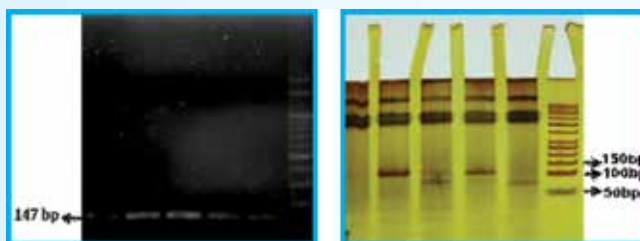
AFLP pattern for fresh tuna species

M1: 100 bp DNA ladder; M2: 50 bp DNA ladder

Development of PCR-RFLP method for identification of fish products from different species of sardines

- Authentication of sardine fish products made from five species of sardines viz., *Sardinella longiceps*, *S. gibbosa*, *S. albella*, *S. fimbriata* and *S. sirm* by PCR-RFLP method. Mitochondrial cyt b gene was amplified from all the products using the primers C-CB28df and C-CB341R having a product size of 147 bp, which was found to be specific for the sardines belonging to the genus, *Sardinella*

- Amplified DNA fragment on subsequent digestion with *HinfI* and *MnII* restriction enzymes yielded unique RFP patterns for the individual sardine species. *S. longiceps* was distinguished by the presence of no major bands. *S. gibbosa* had a single major band at 107 bp and no band >50bp. *S. albella* showed two clear bands at 107 bp and 80 bp. *S. fimbriata* had two major band with one major band at 107 bp. *S. sirm* had two bands with one major band at 75 bp.
- PCR-RFLP patterns of the cooked, chilled, frozen and salt-dried sardines also exhibited the same pattern as that noticed with raw sardines. The developed PCR-RFLP method can therefore be used for authentication of sardine species on commercial scale, even for processed products.



PCR amplification of mt cyt b gene from five species of sardines with 147 bp

PCR-RFLP patterns of *Sardinella longiceps*, *S. gibbosa*, *S. albella*, *S. fimbriata* and *S. sirm*

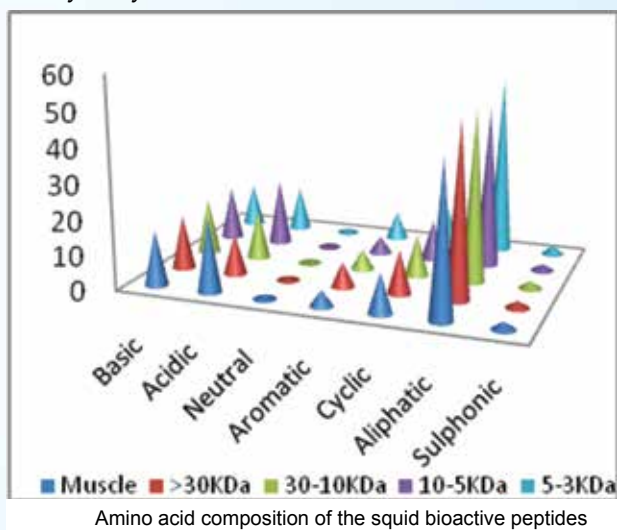
Antioxidative potential of the squid protein hydrolysates

- Antioxidative potential of squid protein hydrolysates (SPH) prepared using endogenous pepsin and trypsin extracted from seer fish was evaluated in comparison with commercial enzymes. Endogenous pepsin or trypsin were efficient than commercial enzymes in the hydrolysis. Pepsinogen SPH acts rapidly than pepsin SPH. Antioxidative properties viz. DPPH and ABTS activities were related to the presence of hydrophobic amino acids. Superoxide anion radical scavenging activity was based on the molecular conformation of peptides, while reducing power correlated well with the degree of hydrolysis (DH). Metal chelating abilities were influenced by the presence of suitable metal binding sites.
- Peptides of alcalase SPH fractionated based on different MWCO filters viz. 30KDa, 10KDa, 5KDa and 3KDa were examined for their amino acid composition. The proportion of aromatic and aliphatic amino acids increased with the decreasing molecular weights. The proportion of acidic and basic amino acids decreased with



decreasing molecular weight of peptides. The proportions of neutral and cyclic amino acids were almost constant in all molecular weight peptides.

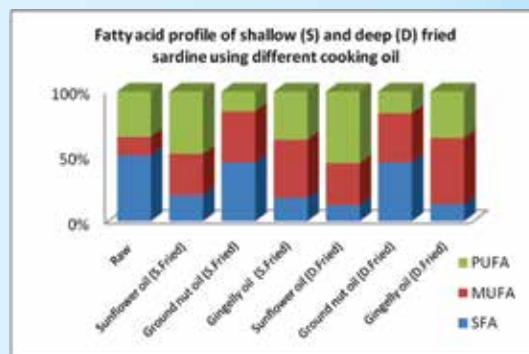
- SPH derived with commercial enzymes viz. pepsin, trypsin and alcalase showed DH of 8-15% within 150 min of reaction. Minimum inhibitory concentration (IC50) values exhibited by alcalase SPH for DPPH was 0.87 mg/ml; ABTS was 1.40 mg/ml; hydroxyl radicals was 0.2 mg/ml; superoxide anion radicals was 6.12 mg/ml; metal chelating ability was 0.8 mg/ml; and reducing power was 0.5 mg/ml. Pepsin SPH do not chelate metals. Trypsin SPH did not scavenge superoxide anion radicals.
- Peptides with desirable antioxidative potential can thus be prepared by choosing appropriate enzymes as well as desirable concentration of hydrolysates.



Impact of heat processing methods on the health beneficial omega-3 fatty acids of sardines

- Sardine curry was examined for the changes in fatty acid composition particularly, omega 3 fatty acids when subjected to cooking for varying time duration. The dominant fatty acids in the fish curry were lauric acid, myristic acid, linoleic acid and linolenic acids that had been derived through the migration from the cooking oil and ingredients used for curry preparation. There was a reduction in EPA from 9.61% to 2.29% in 20 min boiled sardine curry and to 0.49% in 30 min boiled sardine curry. The DHA content reduced from 14.72% to 2.86% in 20 min. boiled sardine curry and to 0.42% in 30 min boiled sardine curry. However, sardine pieces in curry retained 56% of EPA and 51% of DHA even after boiling for 20 min.

- Effect of shallow and deep frying of sardine (*Sardinella gibbosa*) in different cooking oils viz sunflower, groundnut and gingelly oils was investigated. There was an increase in fat content upon frying. Fat content was low in deep fried sardines than shallow fried ones. Cholesterol decreased in sardines shallow and deep fried in sunflower and gingelly oil but increased in sardines shallow fried in groundnut oil. Oleic and linoleic acids were the predominant fatty acids. The destruction EPA and DHA was more in shallow fried sardines than deep fried ones.
- Effect of microwave cooking on the fatty acid composition of sardine was investigated. Fatty acid profiles of microwave cooked sardines at different time period of 20, 30 and 40 sec were compared with that of raw and sardines boiled to 10 min. The retention of EPA and DHA were higher in sardine microwave cooked for 20 sec.



Establishment of chemical residue monitoring laboratory for fish in Tamil Nadu

- LC MS/MS equipment for the detection and quantification of antibiotics and pesticide residue was purchased. Methods for analysis were being developed for several antibiotics viz. chloramphenicol, nitrofurans, oxytetracyclines and sulfonamides.
- Construction of the 1st floor in the existing Fish Quality and Monitoring Certification Centre was completed. Required laboratory furnitures have been purchased to set up the laboratory for NABL accreditation.



Chemical residue monitoring laboratory



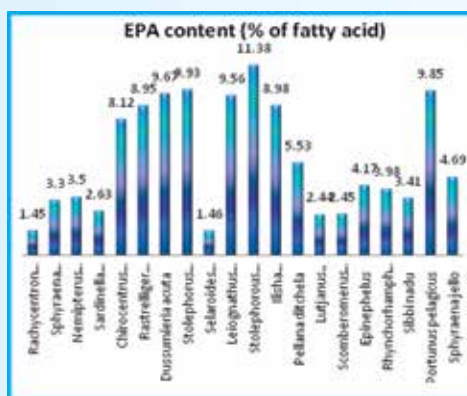
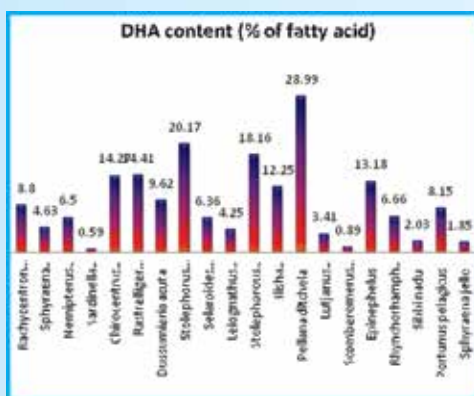
LC-MS/MS system



BASIC SCIENCES

Nutritive values of fishes landed in the East coast of Tamil Nadu

- Nutritive values including protein, fat, ash, cholesterol, calcium, iron and phosphorus contents of 80 fishes were tested. Protein varied from 8.49 to 26.14%; lipids from 0.13 to 14.72%; cholesterol from 4.86 to 180.52 mg%; calcium from 64.24 to 1887.10 mg%; iron from 0.06 to 28.46 mg% and phosphorus from 15.25 to 443.26%. *Lethrinus elongatus* had high protein, while *Leiognathus dussumiera* had high lipids. Cholesterol was high in the squid *Loligo duvacei*.
- Fatty acid compositions of 53 fishes were tested by the gas chromatography. DHA was found to be higher in *Pellona ditchela* (29% of fatty acid), *Stolephorus commersonii* (20%) and *S. devisi* (18%). EPA was higher in *Stolephorus devisi* (11.4%), *S.commersonii* (9.9%), *Portunus pelagicus* (9.8%), *Dussumeria acuta* (9.7%) and *Leiognathus dussumeri* (9.6%). Therefore, small sized pelagic fishes are therefore good sources of DHA and EPA.
- Instruments such as HPLC, GLC, thermalcyler, gel documentation system, refrigerated centrifuge, etc. were added to create facilities for testing the nutritional quality of fishes.



FISHERIES ECONOMICS, EXTENSION, INFORMATION AND STATISTICS

Application of information and communication technologies (ICTs) in marine capture fisheries of Andhra Pradesh

- With respect to the response to ICT tools, the majority of fishermen who operate mechanized fishing vessels perceived the ICT tools to be reliable, complex to use, costly, useful, very much needed by them and more willing to use the ICT tools in fisheries.
- A majority of the fishermen respondents had medium level of positive perception about the application of ICT tools. Among the various ICT tools owned/operated by the respondents, mobile, TV, VHF, Echo sounder and GPS were the popular ones.



Fishing trawler fitted with Echo sounder



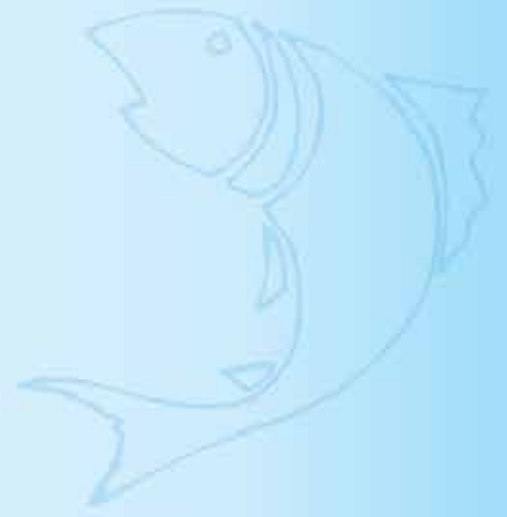
GPS in fishing vessel



Fishing vessel fitted with Radar



Fishing vessel fitted with Universal Automatic Position Identification System



**DEVELOPED
TECHNOLOGIES/ PATENTS /
PRODUCTS**





3. DEVELOPED TECHNOLOGIES/ PATENTS / PRODUCTS

TECHNOLOGIES

Aquaculture

- Pond culture of cobia
- Sea cage culture of cobia
- Development of feed for cobia brood stock
- Development of low cost cage farming technology for reservoir fisheries
- Raceway technology for gold fish and rosy barb using aerobic microbial flocculent
- Culture of Koi carp using biofloc technology in lined ponds
- Indoor live feed culture techniques for *Daphnia* sp.
- Technology for mass production of *Mesocyclops* sp.

Fishing Technology and Fisheries Engineering

- FRP plywood Squid jigging platform
- Improved Norwegian Collapsible Trap

Fish Quality Assurance and Management

- Developed RT-PCR assays for the detection of toxigenic strains of viable *Vibrio cholerae* by targeting mRNA of *rtxA*, *ctxA*, *groEL*, and *tsf* genes
- Developed a RT-PCR assay for the detection of viable *Salmonella* by targeting mRNA of *invA* gene
- Developed PCR-RFLP method for the detection of five different species of sardines, viz., *Sardinella gibbosa*, *S. longiceps*, *S. albella*, *S. fimbriata*, and *S. sirm* by targeting mt cyt b gene and employing the restriction enzymes, *HinfI* and *MnII*
- Developed PCR-AFLP markers for the detection of five different species of tunas viz., *Thunnus albacares*, *T. obseus*, *Katsuwonus pelamis*, *Euthynnus affinis*, and *Auxis thazard* using the primer combination of EcoRI-AGA/MseI-CTG.
- Developed a new colour test kit for detection of formalin in fish

PATENTS APPLIED

Aquaculture

- Designing and fabrication of inland raceways for intensive rearing of ornamental fishes (Patent Application No. 1096/CHE/2013)
- Mass production of *Daphnia magna* (live feed) in organic medium for Ornamental fish feeding (Application filed)

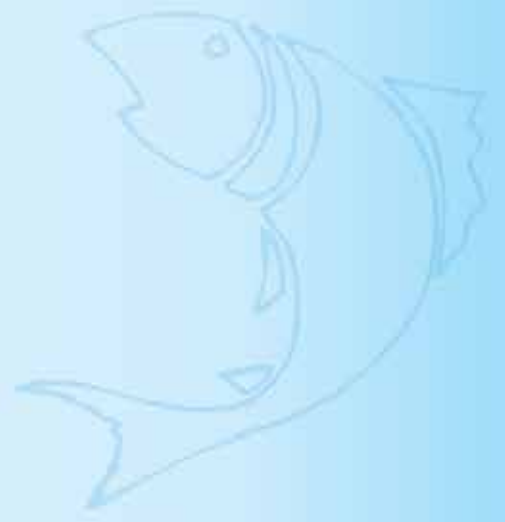
PRODUCTS

Fish Processing Technology

- Value added products from cultured cobia meat

Fish Quality Assurance and Management

- Developed fish collagen films with sorbitol as crosslinking agent
- Developed fish collagen-chitosan-calcium acetate films and scaffolds



EDUCATION





4. EDUCATION

EDUCATIONAL PROGRAMMES

Academic programmes

The academic programmes include UG programme (Bachelor in Fisheries Science), PG programme (Masters in Fisheries Science) and Ph.D. programme (Doctor of Philosophy). These programmes are periodically updated and redesigned based on the feedback, experience, demands and changing global scenario with the approval of Board of Studies and Academic Council of the University. Textbooks, teaching and practical manuals are prepared for every course to improve the quality of education, with funds obtained from ICAR Development Grant. The e-contents have been created for all the B.F.Sc. courses jointly with College of Fisheries, Mangalore under ICAR-NAIP project.

Undergraduate Programme

The B.F.Sc is a four years professional degree programme in Fisheries Science, offered in FC & RI, Thoothukudi, with an intake capacity of 40 students every year. Fifteen percent of the seats is allotted to the students of other States that are filled up through all India level entrance examination conducted by the ICAR, New Delhi. The college has adopted the ICAR common syllabus pattern for B.F.Sc. degree programme from the academic year 2009-10. The programme has 174 total credits; Of which the

course work comprises of 134 credits in six semesters followed by 20 credits for Experiential Learning in 7th semester (110 working days) and 20 credits for In-plant Training in 8th semester (110 working days), and an all India Study Tour. An academic year consists of two semesters each having 110 instructional days. The curricular activities are planned and monitored by the Education Technology Cell (ETC) with the assistance of Students' Coordinators and Counselors. The pattern of instruction and evaluation is the semester course credit system. An enrolled student shall have to score a minimum Overall Grade Point (OGPA) of 5.5 out of 10.0 in order to earn B.F.Sc. degree.

Post Graduate Programmes

Master of Fisheries Science (M.F.Sc) is a two years Post-graduate degree programme offered in nine disciplines, namely Aquaculture, Fisheries Resource Management, Aquatic Environment Management, Fish Processing Technology, Fisheries Engineering and Technology, Fisheries Biotechnology, Fisheries Economics, Fisheries Extension, and Fish Quality Assurance and Management. The candidates possessing B.F.Sc. degree are eligible for admission through a common entrance test conducted by the University. Among the total seats available in PG programme, 25% are filled up by the ICAR, based on the all India level JRF examination. ICAR syllabus is adopted for M.F.Sc. programme from 2011-12. The programme has 55 total credits including one credit for seminar and 15 credits for research.



Selection of fish brooders by students



Stocking of fish seeds by students



Grading of shrimps by students



Students at fish processing unit



Students at work in Laboratory

Ph.D. degree programmes are being offered in regular and part-time mode in four disciplines, namely, Aquaculture, Fisheries Resource Management, Fisheries Economics, and Fish Processing Technology. The programme has 75 total credits including 2 credits for seminar and 45 credits for research. The enrolled student shall have to score a minimum Overall Grade Point (OGPA) of 6.5 out of 10.0 in order to earn M.F.Sc. and Ph.D. degree.



Admission

The details of admission strength, number of students admitted, overall strength and number of students successfully completed during 2013 – 14 are summarized below.

| Courses | Admission strength | Admitted during 2013-14 | Overall strength during 2013-14 | | | Successfully completed during 2013-14 |
|---------|--------------------|-------------------------|---------------------------------|----------|-------|---------------------------------------|
| | | | Batch | Strength | Total | |
| B.F.Sc. | 40 | 40 | 2013-14 | 40 | 142 | 30 |
| | | | 2012-13 | 40 | | |
| | | | 2011-12 | 34 | | |
| | | | 2010-11 | 28 | | |
| M.F.Sc. | 28 | 27 | 2013-14 | 27 | 52 | 10 |
| | | | 2012-13 | 25 | | |
| Ph.D. | 6 | 5 | 2013-14 | 05 | 12 | -- |
| | | | 2012-13 | 06 | | |
| | | | 2011-12 | 01 | | |

Academic Research

During the year under report, 66 students registered for M.F.Sc and Ph.D. degree programmes. The theses submitted by 10 students were accepted by the University for the award of M.F.Sc. degree.

Scholarships

Thirteen B.F.Sc students received government scholarship to the tune of Rs.83,480 while 58 M.F.Sc students received university scholarship to a tune of Rs.28,80,000 and two M.F.Sc students received ICAR fellowship to the tune of Rs.3,29,000 during the period under report.

Endowments

Institution of Dr.M.C.Nandeesha Endowment for capacity building of Fisheries Students

It has been proposed to institute an Endowment in the name of Late Dr.M.C.Nandeesha, the then Special officer, TNFU as 'Dr.M.C.Nandeesha Endowment' for capacity building of Fisheries Students through Internship. The proposal was accepted in the first Board of Management meeting. A sum of Rs. 11,70,008/- (Rupees Eleven lakhs seventy thousand and eighty only) is deposited for this purpose.

STUDENTS AMENITIES AND ACTIVITIES

Hostel

The FC & RI hostel has provided accommodation to 158 students comprising of 84 boys and 74 girls students belonging to undergraduate and postgraduates. The hostel is administered by one Warden and two Deputy Wardens, including one lady deputy warden. The

Hostel Amenity Committee meets regularly in order to review the hostel accounts and mess rates and recommend necessary measures for the efficient and economical functioning of students messes. Separate recreation halls are provided for watching the TV programmes. Three washing machines have been provided to the boys' hostel and girls' hostel.

At present, 63 boys are residing in the UG hostels and 21 boys are residing in the PG hostel. Besides students from Tamil Nadu, 2 students from Bihar, 2 from Andhra Pradesh, 2 from Karnataka, 1 from Maharashtra and are staying in this hostel. The construction of third block with two floors for the boys' hostel is completed at a value of Rs. 47.65 lakhs. The ground floor was constructed at a cost of Rs.27.85 lakhs from the State Government fund and the first floor was constructed at a cost of Rs.19.80 lakhs from the ICAR Development Grant.



New UG block of Boys hostel



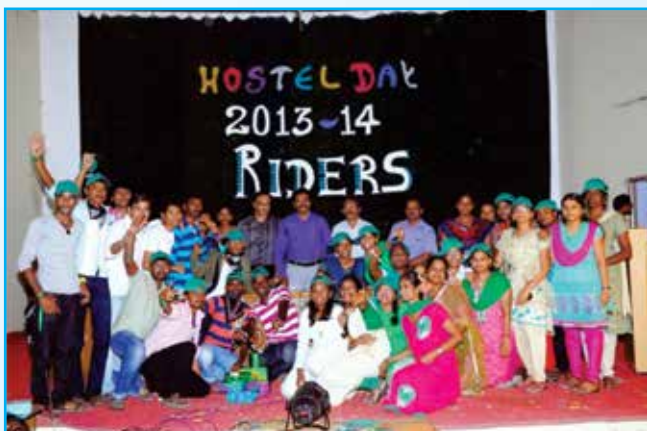
One R.O. plant (500 lr. per hour) has been installed in the boys' hostel for drinking water purpose. The ICAR, Government of India has already released Rs.100.00 lakhs towards the construction of new hostel for boys.



New First Floor in PG block of Girls hostel

Presently 55 UG students, 19 PG students and 1 Ph.D. student are accommodated in the girls' hostel. Besides students from Tamil Nadu, 3 from Kerala, 2 from Karnataka and 1 from Andhra Pradesh are staying in this hostel. Three R.O. plants (25 lr. per hour) have been installed in the girls' hostel for drinking water purpose in the three blocks. Every block has been provided with inverter facility.

The students of the Fisheries College and Research Institute, Thoothukudi celebrated first ever hostel day function under TNFU, on 09.11.2013. The students were divided into four houses viz. Blue Whales, Green Turtles, Red Groupers and Yellow Finners for conducting different competitions. Boys conducted



Yellow finners with Overall Championship at FC&RI Hostel Day

most of the competitions in their hostel, Dolphin House; while girls had their most of the competitions in their hostel, Mermaid Castle. Recreational competitions

like Sack race, Arm wrestling, Laugh without stop, Treasure hunt, Belly boy, Eat-o-mania, Horse race, Ballon breaking, Lucky corner, Musical chair, Pot breaking, Tug of war, Dumb charade, Pattukkupattu, Spot performance, Group dance and Fancy dress were held on that occasion. Mr. K. Pon Venkatesh, Managing Director of M/s S. Ponnusamy Nadar and Sons Private Limited, Thoothukudi was the Chief Guest of the function. The Yellow Finners won the Overall Championship.

Students Placement and Carrer Guidance Cell

The Student's Placement and Career Guidance Cell functioning in FC&RI, Thoothukudi organizes campus interviews and provides the list of fisheries graduates and postgraduates to various corporate companies for recruitment. The cell maintains a computerized database of fisheries graduates and postgraduates. Utilizing this database, the cell provides the list of graduates to the recruiting agencies. The cell collects and disseminates higher education information available from various sources for the welfare of the student community.

During the year under report the cell had arranged campus interview for M/s. CP Aquaculture Pvt Ltd, Chennai for the benefit of outgoing UG and PG students. Three PG students and one UG student were placed at fish processing companies in and around Thoothukudi. Two UG students and seven PG students entered the Tamil Nadu State Fisheries Department in the position of Inspector of Fisheries, and thirteen PG students succeeded in getting the posts of Scientists at the ICAR, Govt. of India.

LIBRARY

The library is one among the well known libraries for fisheries science in the country, with a constructed space of 515 sq. mt, housing 17,371 books, 3,791 back volumes, 2,370 free publications and subscribing 50 journals both print and online. In addition more than 1,700 online journals are accessible throught CeRA in the field of Agricultural Sciences. The library also boasts one of the largest ASFA data bases in the nation. The service offered to the staff and students include lending of books, referencing, internet browsing, reprographic service and student's guidance cell for competitive examinations. This library has a working time of 12 h from 8.00 am to 8.00 pm to meet out the needs of the staff and students of this Institute. It has modern documentation services such as CD-ROM services, online databases search and internet.



STUDENT ACTIVITIES

Students Association Activities

Three students of Fisheries College and Research Institute participated in the final competition conducted by the Paventhar Bharathidasan Trust on 29.04.2013 and 30.04.2013 at Madras Veterinary College, Chennai and Mr. G. Kantharajan, IV B.F.Sc. won the first prize in elocution competition. Thirty students of Fisheries College and Research Institute, Thoothukudi participated in 'STECOFEST' organized by V.O.C College, Thoothukudi on 6.10.2013. In this event, Mr. G. Kantharajan, IV B.F.Sc won the 2nd prize in Tamil elocution, while Ms. S. Jerusha, of III B.F.Sc., and Ms. R.

2013-14 was inaugurated on 6th November 2013 at Kayal Kalaiarangam. Mr. D.R. Kodeeswaran, Chief Executive, V.V.D. Group and Secretary, Indian Chamber of Commerce and Industry, Thoothukudi was the Chief Guest.

The students' association organized an inter-collegiate quiz competition 'FIZZOREE' on 24.02.2014, sponsored by Sterlite Copper, Thoothukudi. MEPCO, Engineering College, Sivakasi won the first prize and bagged the "DELPHINUS TROPHY". Mr. P.Divakaran, General Manager-Operations was the Chief Guest.



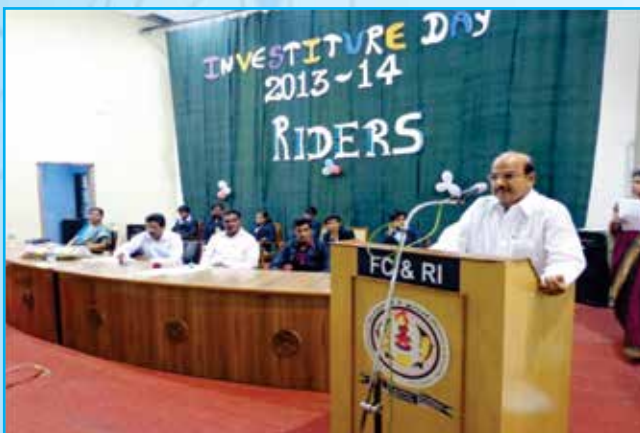
Students with trophy in the Inter Collegiate Quiz Competition

Hamsavalli of II B.F.Sc won the 2nd prize in the Quiz competition. In the inter-collegiate quiz competition organized by the Rotary Club of Thoothukudi on 18th September, 2013 at "Rotary House of Friendship", Ms. S. Jerusha, of III B.F.Sc., and Ms. R. Hamsavalli of II B.F.Sc. won the first prize and bagged the Trophy.



Students of MEPCO, Engineering College, Sivakasi receiving the "DELPHINUS TROPHY"

An inter collegiate cultural competition 'FISFEST' was conducted on 25.02.2014. Mr. S. Anantha Chandra Bose, Chairman, V.O.C. Port trust, Thoothukudi was the Chief Guest. A.P.C. Mahalakshmi College, Thoothukudi won the "FISFEST TROPHY".



Inauguration of Students Association 2013-14



Students of A.P.C. Mahalakshmi College, Thoothukudi receiving the "FISFEST TROPHY"

The Students' Association of Fisheries College and Research Institute, Thoothukudi for the year

Fisheries College and Research Institute celebrated its first College Day function after becoming a separate University on 22nd June 2013. Various competitions were conducted for students. Offstage events such as



Ms. S. Jerusha, receiving the Miss Fisheries 2013 award

Admad, Mr.Fitness, Skit, Group dance (folk), Fashion walk, Miss. Fisheries and Mr. Fisheries were conducted. Mr.V.R.Hari, I.R.S. Assistant Commissioner, Income Tax Department, Thoothukudi was the Chief Guest and Dr. Pooja Hari distributed the Prizes to winners. Third Year B.F.Sc students won the Cup for overall performance with maximum points.

SPORTS ACTIVITY

- Tamil Nadu Fisheries University teams were formed in Kabaddi (men), Volleyball (men) and Athletics (men and women) by conducting selection trials among the students.
- The Tamil Nadu Fisheries University teams were participated in the 15th All India Inter Agricultural University Sports and Games Meet 2014 held at Assam Agricultural University,



III B.F.Sc. Girls performing cultural programme

creative writing, Artist's Aile, Amalgamation, Rangoli Competition, Flower Arrangement, Hair Dressing and Mehendi Design, Quiz Competition, Cook without Fire, Junk Art, Do it if U Can were conducted. On stage competitions such as Classical Dance, Solo Singing, Adapt-tune, Group singing, Group dance (western),



TNFU Kabbadi team in the 15th All India Inter Agricultural University Sports and Games Meet, Assam Agricultural University

Jorhat, Assam during March 2014. TNFU Kabaddi Men Team performed very well, followed by TNFU Volleyball (men), Athletics (men and women) teams.



I B.F.Sc. Boys performing cultural programme



FC&RI Sports Meet declared Open by the Respected Vice Chancellor, TNFU



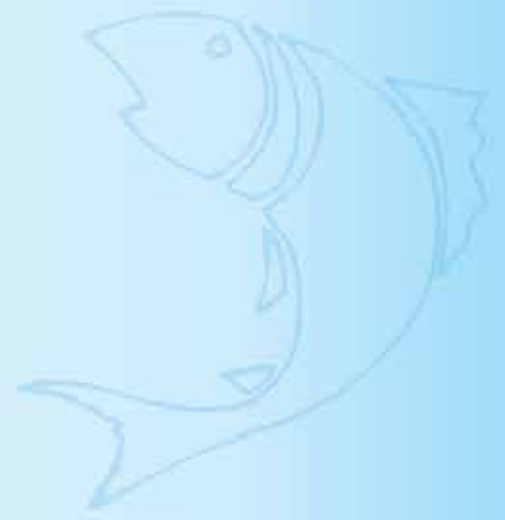
The First Annual Sports Meet of the College under the banner of Tamil Nadu Fisheries University was conducted on 03.01.2014 at Fisheries College and Research Institute, Thoothukudi. The Sports Meet was declared open by Prof. Baskaran Manimaran, Honorable Vice-Chancellor, Tamil Nadu Fisheries University, Nagapattinam. The students performed March-Past, and Ceremonious Welcome was accorded to the Honorable Vice-Chancellor. About 20 athletic events were conducted and 200 students actively participated with true spirit of sportsmanship. The Chief Guest, Th. N. Mylvahanan, I.P.S., Superintendent of Police, Ramanathapuram District, in his address, emphasized the importance of sports to the students and distributed the prizes to the winners. Mr. G.Raghunath and Ms. N.Valli, II year B.F.Sc. students of the College won the Individual Athletic Championship for Men and Women, respectively. The II B.F.Sc. students bagged the Overall Championships, while the 'Stallion' contingent of the I B.F.Sc. was adjudged the best Marching Team.



Students Marchpast in FC&RI Sports Day



II B.FSc students with the Overall Championship in Sports Day



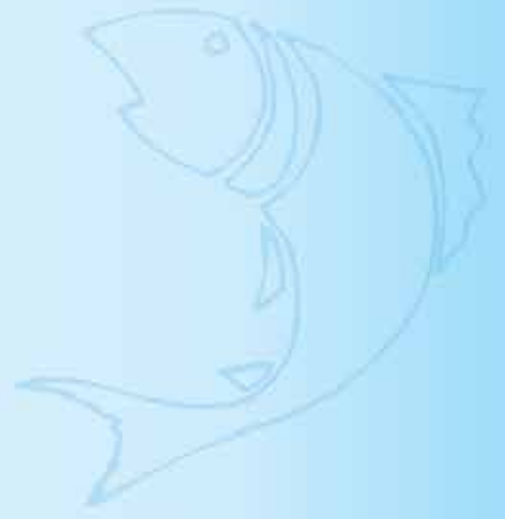
HONOURS / AWARDS





5. HONOURS / AWARDS

| Sl. No. | Name of the institution /staff/ student | Name of the award/honor | Awarding body | Purpose of award | Nature of award |
|---------|---|--|---|---|---|
| 1. | Ms. S. Ajidhaslin M.F.Sc Department of Aquaculture Fisheries College and Research Institute, Thoothukudi | Alltech International Young Scientist Competition- Runner-up, Asia Pacific Region | Alltech USA | For the research work in M.F.Sc degree on Modulation of expressed innate immune genes following viral infection in seabass (<i>Lates calcarifer</i>) cell lines | Medal Citation and 1,000 USD |
| 2. | Ms. C. Judith Betsy M.F.Sc Department of Aquaculture Fisheries College and Research Institute Thoothukudi | Maulana Azad National Fellowship | Ministry of Minority Affairs, Govt. of India through UGC, New Delhi | To pursue Ph.D. degree and higher research for a period of five years | Monthly Fellowship together with annual contingency and support to the Institution |
| 3. | Mr. U. Manimaran II M.F.Sc. Department of Fish Quality and Management Fisheries College and Research Institute Thoothukudi | II Prize for Best Poster presentation | CIFE Mumbai | First Students Research Convention on "Innovation in Fisheries" | Certificate and Shield |
| 4. | Ms. S. Jerusha III B.F.Sc Fisheries College and Research Institute Thoothukudi | I Prize for Best Poster presentation | CIFE Mumbai | First Students Research Convention on "Innovation in Fisheries" | Certificate and Shield |
| 5. | Ms. V. Gomathy and Ms. R. Sangavi II B.F.Sc Fisheries College and Research Institute Thoothukudi | II Prize for Best Exhibit | FC&RI Thoothukudi | Science exhibition as a part of Science Day | Certificate and Cup |
| 6. | Mr. R. Selvaganapathy I M.F.Sc. Department of Fish Quality and Management Fisheries College and Research Institute Thoothukudi | III Prize for Best Exhibit | FC&RI Thoothukudi | Science exhibition as a part of Science Day | Certificate and Cup |



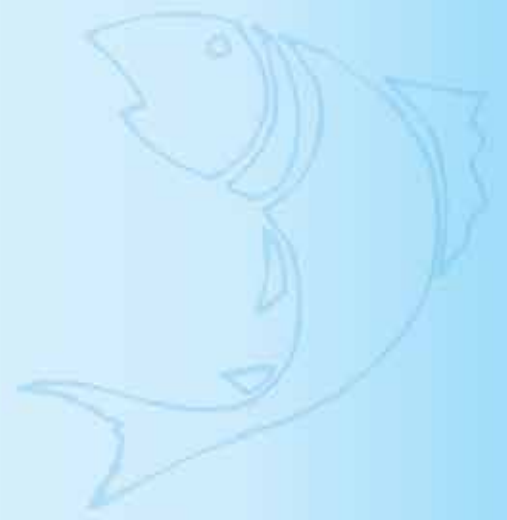
DISTINGUISHED VISITORS





6. DISTINGUISHED VISITORS

| Sl. No. | Name & address of the visitor | Date of visit | Place of visit |
|---------|--|---------------------------------|--------------------|
| 1. | Dr. G. Shakthinathan, Ph.D. Dean University of V.O.C. College of Engineering Anna University Campus, Thoothukudi | 17.4.2013 | FC&RI, Thoothukudi |
| 2. | Thiru. R. Balakrishnan, IAS Director Entrepreneurship Development Institute Govt. of Tamil Nadu, Chennai | 28.05.2013 | FC&RI, Thoothukudi |
| 3. | Dr. S. Vijayakumar, IAS Secretary to the Government Dept. of Animal Husbandry, Dairying & Fisheries Govt. of Tamil Nadu, Chennai | 05.06.2013 | IFT, Ponneri |
| 4. | Dr. M. Rajaram, IAS Secretary Dept. of Information and Tamil Development Govt. of Tamil Nadu, Chennai | 02.06.2013 | FTRC, Thanjavur |
| 5. | Thiru. K. Baskaran, IAS District Collector Thanjavur | 02.06.2013 and 14.06.2014 | FTRC, Thanjavur |
| 6. | Dr. T. Jawahar Abraham, Ph.D. Professor Department of Aquatic Animal Health Faculty of Fishery Sciences West Bengal University of Animal and Fishery Sciences, Kolkata | 13.09.2013 | FC&RI, Thoothukudi |
| 7. | Dr. William H. Daniels, Ph.D. School of Fisheries, Aquaculture & Aquatic Sciences Auburn University, USA | 06.10.2013 and 07.10.2013 | FC&RI, Thoothukudi |
| 8. | Dr. E.G. Silas, Ph.D. Vice Chancellor (Retd.) Kerala Agricultural University 37, Ambady Retreat, Chilavanoor Road, Kochi | 09.10.2013 | FTRC, Parakkai |
| 9. | Dr. Vaibav Mantri, Ph.D. Scientist In-charge Central Salt and Marine Chemicals Research Institute, Mandapam Camp Ramanathapuram District | 10.01.2014 | FC&RI, Thoothukudi |
| 10. | Dr. Martin Kumar, Ph.D. IAMWARM World Bank Consultant Tamilnadu State Fisheries Department, Chennai | 24.01.2014 | FC&RI, Thoothukudi |



HUMAN RESOURCES DEVELOPMENT





7. HUMAN RESOURCES DEVELOPMENT

Scientists of TNFU attended various Trainings / Summer Schools / Short-term courses / Workshops / Seminars / National and International Conferences organized by other institutions within India as well as abroad.

TRAININGS

| Name and Designation | Title of the Programme | Duration | Place |
|--|---|--------------------------|-------------|
| Dr.N.V.Sujathkumar Professor and Head | Multimedia Digital Content Development | 02.12.2013 to 15.12.2013 | Hyderabad |
| Dr. B. Chrisolite Assistant Professor | CAFT Training on "Food Quality and Safety Management Systems" | 04.12.2013 to 24.12.2013 | Coimbatore |
| Dr.N.V.Sujathkumar Professor and Head | Use of e-learning resources for BFSc degree programme | 15.01.2014 to 19.01.2014 | Mangalore |
| Dr.N.V.Sujathkumar Professor and Head | Technology enhanced learning in agriculture | 13.03.2014 to 16.03.2014 | Hyderabad |
| Dr. C. Anand Assistant Professor | Capacity building programme for University Teachers at G.B. Pant University of Agriculture and Technology | 19.12.2013 to 23.12.2013 | Panth Nagar |
| Dr. P. Jawahar Associate Professor | Training program on data analysis using SAS | 01.02.2014 to 07.02.2014 | Cochin |

SUMMER / WINTER SCHOOLS, SHORT / REFRESHER COURSES

| Name and Designation | Title of the Programme | Duration | Place |
|--|--|--------------------------|--------------|
| Tmt. J. Jaculine Pereira Assistant Professor | Recent Advances in Bioinformatics for quality livestock production | 02.05.2013 to 22.05.2013 | Chennai |
| Dr.V.Senthilkumar Assistant Professor | Decision support systems in agriculture using quantitative techniques | 02.09.2013 to 22.09.2013 | New Delhi |
| Dr. A. Gopalakannan Assistant Professor | Winter School on Advances in molecular and serological tools in fish disease diagnosis | 09.09.2013 to 29.09.2013 | Bhubaneshwar |
| Dr.P. Chidambaram Assistant Professor | Advances in Aquatic Animal Health Management in finfish and shellfish | 11.10.2013 to 31.10.2013 | Mumbai |
| Dr.P. Padmavathy Assistant Professor | Refresher course on "Integrated Coastal Zone Mangement" | 28.10.2013 to 31.10.2013 | Mangalore |
| Dr. P. Padmavathy Assistant Professor | ICAR Winter school on Reclamation of saline and alkaline soils through aquaculture | 06.11.2013 to 26.11.2013 | Mangalore |
| Thiru. S. Santhosh Kumar Assistant Professor | Three weeks residential winter school for capacity building and technology | 22.01.2014 to 11.02.2014 | Chennai |
| Thiru. K.S.Vijay Amirtharaj Assistant Professor | Development and nano-sizing of biotechnological products for fisheries and aquaculture | 05.02.2014 to 25.02.2014 | Mumbai |

WORKSHOPS

| Name and Designation | Title of the Programme | Duration | Place |
|----------------------------------|---|--------------------------|-----------|
| Dr.B.Sundaramoorthy Professor | Workshop Jointly organizing jointly by COC, Canada and NAARM on "Emerging practices of open educational resources in higher education and training" | 16.05.2013 to 17.05.2013 | Hyderabad |



| Name and Designation | Title of the Programme | Duration | Place |
|--|---|--------------------------|-------------|
| Dr. R. Jayaraman Professor and Head | Attracting and Retaining Youth in Agriculture and Allied Activities | 30.07.2013 to 31.07.2013 | Chennai |
| Dr. N.Neethiselvan Professor and Head | State level consultative workshop on Sustainable Fishing Organized by MPEDA & NETFISH | 29.08.2013 | Thoothukudi |
| Dr. Ravaneswaran Professor | State level workshop on Developing customized skill development programmes in livestock poultry and fisheries sector in TamilNadu | 14.08.2013 | Chennai |
| Dr. G. Jeyasekaran Professor and Head | State level consultative workshop on Towards Sustainable Fishing Organized by MPEDA & NETFISH | 29.08.2013 | Thoothukudi |
| Dr. R. Jayaraman Professor and Head | Governance for Inland Fishery Development in Commons- Village Tanks and Ponds | 12.09.2013 | Madurai |
| Dr.N.V.Sujathkumar Professor and Head | Strategic Workshop on Communication Needs of Marine Fishermen | 09.11.2013 to 10.11.2013 | Chennai |
| Dr.B.Sundaramoorthy Professor | Strategic Workshop on Communication Needs of Marine Fishermen | 09.11.2013 to 10.11.2013 | Chennai |
| Dr. R. Jayaraman Professor and Head | Workshop on Fisheries Development | 10.02.2014 to 11.02.2014 | Chennai |
| Dr. N. Felix Professor | NAIP Annual Workshop-2014 | 21.02.2014 to 22.02.2014 | New Delhi |

SEMINARS / CONFERENCES / SYMPOSIA, etc.

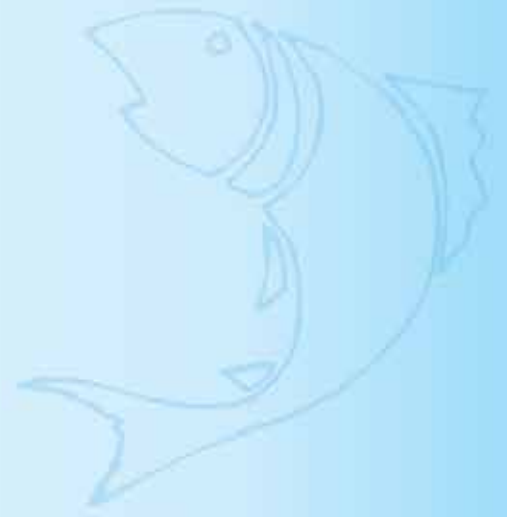
| Name and Designation | Title of the Programme | Duration | Place |
|--|--|--------------------------|------------|
| Dr. P. Jawahar Associate Professor | Special consultation on seaweeds – Their distribution in India, potential uses as livelihood option for coastal communities and conservation issues – organised by SICOM , Ministry of Environment and Forests | 08.06.2013 | New Delhi |
| Dr. G. Jeyasekaran Professor and Head | FSSAI Scientific panel meeting on Fish and Fisheries products | 02.07.2013 & 15.10.2013 | New Delhi |
| Dr. N. Felix Professor | Agritech Investor Meet | 18.07.2013 to 19.07.2013 | New Delhi |
| Dr. G. Jeyasekaran Professor and Head | MPEDA Technical monitoring committee meeting on Antibiotic residues in shrimp | 30.07.2013 | Cochin |
| Dr. Karal Marx Professor and Head | Expert Consultation on fish genomics research in India: a way forward held at NBFGR | 02.08.2013 | Lucknow |
| Dr. R. Jeya Shakila Associate Professor | Review meeting on Marine Products Development | 02.12.2013 | New Delhi |
| Dr. R. Jayaraman Professor and Head | International Conference on “Small-scale Fisheries Governance – Development of Well being and Sustainability | 10.12.2013 to 13.12.2013 | Hyderabad |
| Dr. R. Jeya Shakila Associate Professor | National seminar on Therapeutics and Marine Bioactive compounds | 10.12.2013 | Gandhigram |
| Dr. Nagoor Meeran Director i/c | Experts meeting on Promoting Aquaculture in TamilNadu | 12.12.2013 | Chennai |
| Dr.B. Ahilan Professor | International seminar on Ornamental fish breeding, farming and trade | 26.01.2014 to 27.01.2014 | Cochin |



| Name and Designation | Title of the Programme | Duration | Place |
|--|--|--------------------------|------------|
| Dr.C.B.T. Rajagopalam Professor and Head | International seminar on Ornamental fish breeding, farming and trade | 26.01.2014 to 27.01.2014 | Cochin |
| Dr. T. Francis Associate Professor and Head | International seminar on ornamental fish breeding, farming and trade | 26.01.2014 to 27.01.2014 | Cochin |
| Dr. K. Karal Marx Professor and Head | Symposium on Recent Advances in Molecular Biology | 04.03.2014 to 05.03.2014 | Coimbatore |
| Dr. K. Riji John Professor and Head | Conference on Strategies for bridging the yield gap in Fisheries and Aquaculture | 24.03.2014 to 25.03.2014 | Mangalore |
| Dr. S. Athithan Professor and Head | Conference on Strategies for bridging the yield gap in Fisheries and Aquaculture | 24.03.2014 to 25.03.2014 | Mangalore |

OVERSEAS TRAININGS / SEMINARS / CONFERENCES, etc.

| Name and Designation | Title of the Programme | Duration | Place |
|----------------------------|------------------------|--------------------------|-----------|
| Dr. B. Ahilan Professor | Aquarama 2013 | 01.06.2013 to 03.06.2013 | Singapore |



**SEMINARS / SYMPOSIA /
WORKSHOPS / SUMMER /
WINTER SCHOOLS / TRAININGS
ORGANZIED**





8. SEMINARS / SYMPOSIA / WORKSHOPS / SUMMER / WINTER SCHOOLS / TRAININGS ORGANIZED

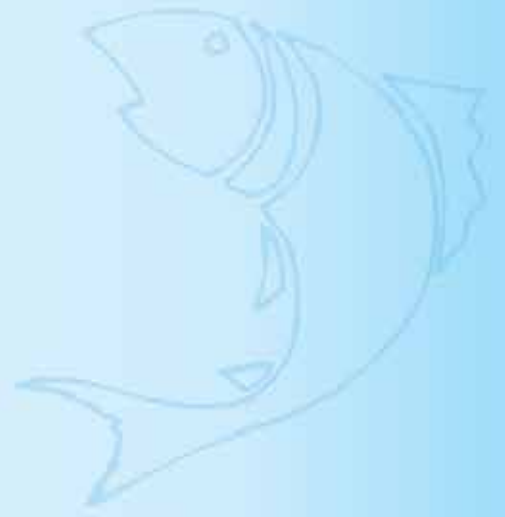
During 2013-14, various Trainings / Summer / Winter Schools / Short-term courses / Workshops / Seminars / Conferences conducted for the benefit of the scientists are listed below:

TRAININGS

| Title of the Programme | Name of the Department / Institute | Place and Duration | Sponsoring Agency | No. of Participants |
|--|--|--------------------------------------|---|---------------------|
| Fisheries stake holders meeting | Tamil Nadu Fisheries University | Chennai 27.5.2013 | Tamil Nadu Fisheries University Nagapattinam | 60 |
| Training on Fish Processing and Value Addition | Dept. Fish Processing Technology FC & RI | Thoothukudi 15.07.2013 to 26.08.2013 | Entrepreneurship Development Institute Chennai | 28 |
| Training on Improved harvest and post harvest practices for sustainable fisheries and enhancing the income of fisherfolk | Dept. of Fisheries Extension FC & RI | Thoothukudi 30.07.2013 to 08.08.2013 | National Fisheries Development Board (NFDB) Hyderabad | 20 |
| Training on Disease management in ornamental fish culture | Fisheries Research Extension Centre Madhavaram | Chennai 13.02.2014 | National Agriculture Development Programme | 16 |
| Training on Advanced ornamental fish culture and breeding | Fisheries Research Extension Centre Madhavaram | Chennai 27.03.2014 to 28.03.2014 | Marine Products Export Development Agency, Chennai | 9 |

WORKSHOPS

| Title of the Programme | Name of the Department / Institute | Place and Duration | Sponsoring Agency | No. of Participants |
|---|------------------------------------|------------------------|--|---------------------|
| Technology Promotion Workshop on Cobia Culture and Preparation of Value Added Cobia Products | Tamil Nadu Fisheries University | Pattukottai 09.07.2013 | NAIP, New Delhi & Business Development and Planning Unit, CIFT, Cochin | 33 |
| Technology Promotion Workshop on Pond and Cage Culture of Cobia and Preparation of Value Added Cobia Products | Tamil Nadu Fisheries University | Chennai 10.07.2013 | NAIP, New Delhi & Business Development and Planning Unit, CIFT, Cochin | 71 |



EXTENSION EDUCATION ACTIVITIES





9. EXTENSION EDUCATION ACTIVITIES

EXTENSION EDUCATION

Directorate of Extension Education is functioning with the objective of planning and execution of all extension programmes of the University in close consultation and Co – operation of the Dean’s and the Directors of Institute of Fisheries Technology of the University. The Directorate Collaborates and Co – ordinates the research findings and outreach programmes with the Department of Fisheries and other Government organization by conducting regular training and refresher courses. To create awareness among the farmers on the latest development in the field of Fisheries Science, it publishes periodicals, bulletins etc for effective dissemination of information for the rural mass, exhibitions, media coverage, All India Radio, and Television coverage are also being organized at regular intervals. It also guides and supervises centres in conducting training programmes.

TRAINING PROGRAMMES

Two Institute of Fisheries Technologies, Two FTCs, One Fisheries Research and Extension Centre are involved in imparting training programmes on various aspects of Fisheries. These training programmes are organized based on the needs of the farmers. Training for farmers on composite fish farming, ornamental fish breeding, ornamental fish culture, integrated fish farming, seaweed farming, hygienic handling of fish, value added fish products, sea safety & Navigation methods etc, and the demonstration on all aspects of these activities have been successfully conducted.



Training programme at IFT, Ponneri in the presence of Secretary to Govt., Dept. of Animal Husbandry, Dairying and Fisheries and the Vice Chancellor, TNFU

During the period under report, a total of 45 oncampus and 40 off campus training programmes were organized benefitting 939 and 883 farmers, respectively.



Visit of the Secretary to Govt., Department of Animal Husbandry, Dairying and Fisheries to IFT, Ponneri in the presence of Vice Chancellor, TNFU

EXHIBITION

Participated in the Regional Exhibition at Villupuram, organized by TANUVAS, to popularize livestock and fisheries on 22.04.2013 A total of 18000 farmers visited the exhibition. A stall having facilities like charts, models, pamphlets, Live fishes, CDs, Video programmes on fisheries technologies exposed the activities to the public.



TNFU stall at Regional Exhibition, Villupuram

Participated in the Fish Festival organized by the State Fisheries Department, held at Chennai from 09.05.2013 to 12.05.2013. The stall received wide response from the public. A total of 22000 persons visited the exhibition.



TNFU stall at Fish Festival, Chennai



TNFU stall at Agri-Intex International Exhibition organised at CODISSIA Trade Fair Complex, Coimbatore

A stall was put up at the Agri-Intex International Exhibition organised by CODISSIA at CODISSIA Trade Fair Complex, Coimbatore from 11.07.2013 to 14.07.2013. Charts, folders, pamphlets, etc., have been prepared in different areas of fisheries for display and



Demonstration at Agri-Intex International Exhibition organised at CODISSIA Trade Fair Complex, Coimbatore

distribution. Carps from Bhavanisagar were arranged for the display in the integrated composite fish culture demonstration pond excavated outside the exhibition hall for the farmers view.

Freshwater ornamental fishes and carps were displayed in the glass and FRP tanks respectively in the exhibition stall. Video CDs on composite fish culture and preparation of fish pickle were also displayed and sold to the visitors.



TNFU stall at TECHUCEN'13

The Fisheries College and Research Institute, Thoothukudi, participated in the TECHUCEN'13 exhibition organized by the University College of Engineering (Anna University, Tirunelveli Region) in association with Kanyakumari District Administration from 07.10.2013 to 08.10.2013 at Nagercoil to promote Industries in Kanyakumari district. Exhibits on boat models, collapsible traps, value added fishery products, bio-resource models, freshwater ornamental fishes, etc. were displayed. Activities of the Tamil Nadu Fisheries University were explained to the students and public.

In order to intensify the awareness on the functioning and services provided by Tamil Nadu Fisheries University, the University celebrated Pongal Vizha - 2014 as "Meenvala Vara Vizha" during January - 2014, through its constituent Colleges



Pongal Vizha function at Ganapathy Samudhiram, Thoothukudi



Institute of Fisheries Technology's and extension outlets. During this celebration, Training, Seminars, exhibition cultural events, sports events and farmers meet were conducted during the month of January – 2014. This Meenvala Vara Vizha celebration were organized to showcase the activities and achievements of Tamil Nadu Fisheries University and importance of fisheries sector in promoting rural economy.

Fish Food Festival was organised at Kombuthurai by Fisheries College and Research Institute, Thoothukudi on 25.01.2014. A competition on fish curry preparation was conducted for fisherwomen, who participated in the Fish Food Festival. A total of 40 fishermen and fisherwomen participated in this festival.

AWARENESS PROGRAMMES

Eight awareness programmes on 'Health Benefits of Fish' were conducted in various places of Thoothukudi District by the Department of Fish Processing Technology, Fisheries College and Research Institute, Thoothukudi, benefiting 747 participants.



Awareness programme on 'Health Benefits of Fish' at FC&RI

of Thoothukudi district at two village community ponds (14 acres) in association with SCAD Krishi Vigyan Kendra, Vagaikulam. The farmers were given hands on training on package practices on Tilapia culture, Ornamental fish culture and Carp culture.



Awareness programme at Ganapathi Samudiram, Thoothukudi

An Awareness campaign on Opportunities in Fisheries Education, was organised at Ganapathi Samuthram Village, Srivaikundam Union, Thoothukudi District on 19.01.2014. As part of the event entertainment programmes were conducted for children and women of the village. Folders with information on various topics on fisheries technologies were distributed to villagers including Self Help Groups and rural youths.



Demonstration on fish culture at Surankudi of Thoothukudi district



ARS Scientists interacting with Village leader at Tharuvaikulam Fishing Village

Demonstration on Composite Fish Culture was done on 27.01.2014 at Surankudi, Villathikulam Block



A field experience training for the 99th batch of seven ARS Scientists was arranged at Tharuvaikulam fishing village, near Thoothukudi from 24.02.2014 to 14.03.2014. The scientists had the opportunity to discuss with Village President, Co-operative Society President and Village Key Officials. Further, they were taken to various industries and institutes related to fisheries to study the operational procedures of the organizations.

ADVISORY SERVICES

About 297 farm queries were received and responded during the reporting period. The farm queries related to fish farming, aquaculture, fishing, and fish processing were given suitable advices and guidelines for the benefit of the farmers and fishermen.

The Fisheries College and Research Institute, Thoothukudi received about 1,008 visitors during the reporting period. School children, college students, entrepreneurs, farmers and fishermen were among the visitors. The facilities such as Museum, Farm Complex, Laboratories, Library, Aquarium, Shore laboratory complex were shown and activities were explained for the benefit of the visitors.

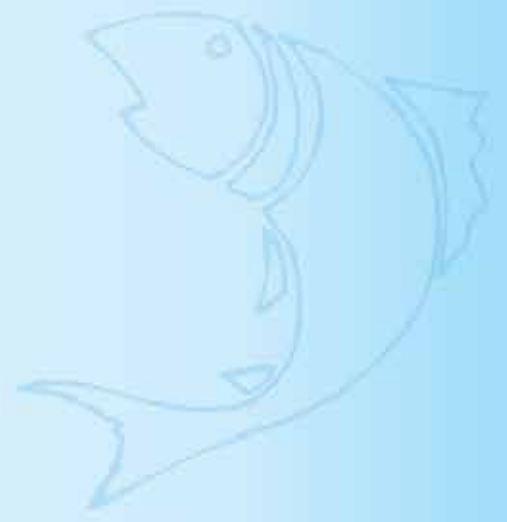
ANALYTICAL SERVICES

About Rs.10,04,500/- was generated as income by the Fish Quality Monitoring and Certification Centre of the Department of Fish Quality Assurance and Mangement, FC&RI from analyzing samples received from private industries belonging to the States of Tamil Nadu, Andhra Pradesh, Kerala, and Karnataka such as M/s. Vitality Aquaculture Pvt. Ltd., Thoothukudi, M/s. Kadal Kanny Frozen foods Pvt. Ltd., Thoothukudi,

M/s. Asvini Fisheries (P) Ltd., Thoothukudi, M/s. Phillips Foods India (P) Ltd., Thoothukudi, M/s. Kader Investment and trading Ltd., Thoothukudi, M/s. Edhayam Frozen Foods, Thoothukudi, M/s. ALM Trading Company, Nagapattinam Dist, M/s. Lavanya Exports, Thoothukudi, M/s. Pon Broilers, Thoothukudi, M/s. Sri Dhanalakshmi Industries, Sivakasi, M/s. Diamond Seafood, Thoothukudi, M/s. St. Peter & Paul Seafood Export (P) Ltd., Chennai, M/s. RJM Exports, Thoothukudi, M/s. N&N International, Chennai, M/s. Super Seafood Products Pvt., Ltd., Thoothukudi, M/s. Fernando International, Thoothukudi, M/s. Ayshwarya Seafood Private Limited, Chennai, M/s. Britto Seafoods Exports (P) Ltd., Thoothukudi, M/s. PSV Seafood, Udankudi, Thoothukudi, M/s. SAS Pickles, Thoothukudi, Ms. Deborah, M.S. University, Tirunelveli, M/s. Byju, Thoothukudi, Dr. S. Ramdhas, Town Health Office, Kodaikanal, M/s. ASR Sea foods, Thoothukudi, M/s. Jude bharath, Thoothukudi, M/s. Nila Seafoods Pvt Ltd, Thoothukudi, M/s. Omni Products Pvt Ltd, Thoothukudi, M/s. Ramajayam kumaran dry fish company, Thoothukudi; M/s. Asvini Fisheries (P) Ltd., Bhimavaram, Andra Pradesh, M/s. Vasista Marine, Bhimavaram, Andra Pradesh, M/s. Liberty Frozen Foods Private Limited, Vishakapattinam, M/s. Nutrient Marine Foods Ltd., Bhimavaram, Andra Pradesh; M/s. High Seas Exim, Chandiroor, M/s. Geo Aquatic Products Pvt. Ltd., Alleppy; M/s. RF Exports, Kerala; and M/s. Blue Water Foods and Exports (P) Ltd., Mangalore, for various quality tests. The shrimp disease diagnostic laboratory also generated income through the testing of various shrimp samples brought by fish farmers for viral pathogens.



Interaction of the Vice Chancellor, TNFU with the Secretary to Govt., Department of Animal Husbandry, Dairying and Fisheries



FINANCE





10. FINANCE

During the year 2013-14, grants totaling Rs. 4,63,30,596/- lakh were received from various sources as detailed below :

| Source of funds | Value (In Rupees) |
|--|----------------------|
| Government of Tamil Nadu | 1,54,64,000 |
| Government of Tamil Nadu Agencies | 12,99,779 |
| Indian Council for Agricultural Research | 1,30,00,000 |
| Departments of Government of India | 1,49,05,094 |
| Private and other agencies | 12,91,611 |
| Revenue generated | 3,70,112 |
| Total | 4,63,30,596 |

FINANCE AND ACCOUNTS

Revenue

State Government has released the following grants during the year 2013-2014:

| | |
|------------------------------|----------------------|
| Non – Plan | - |
| Plan (including New Schemes) | 1,54,64,000/- |
| Total | 1,54,64,000/- |

Indian Council of Agricultural Research

The ICAR has continued to support the university by releasing the following grants during the reporting period

| | |
|---------------------------|----------------------|
| For 100% financed schemes | - |
| For 75% financed schemes | - |
| Development grant | 1,30,00,000/- |

Government of India

Government of India has sanctioned grants for implementing various sponsored research programmes during the reporting period.

| | |
|--------------|----------------------|
| GOI | 1,49,05,094/- |
| Total | 1,49,05,094/- |

Agencies

| | |
|--|--------------------|
| Tamil Nadu Government Agencies | 12,99,779/- |
| Other Private Agencies and Training Grants | 12,91,611/- |
| Total | 25,91,390/- |

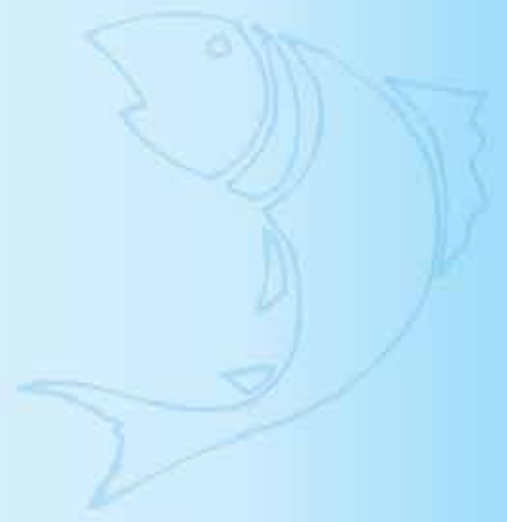
Revenue Generated

| | |
|--|------------|
| The University generated income by way of fee from services, Students fees, sale of farm produces and value added products, other sources from plan and non plan schemes | 3,70,112/- |
|--|------------|

Expenditure

The actual expenditure incurred during 2013-14 (Un-audited) under different grants are given below:

| S. No. | Details | (In Rupees) |
|--------|--|--------------------|
| 1. | Pay and allowances (including pension) | 2,75,91,895 |
| 2. | Recurring contingencies | 83,09,587 |
| 3. | Library books and Journals | 30,00,000 |
| 4. | Non-recurring | 1,40,21,731 |
| | Total | 5,29,23,213 |



PUBLICATIONS





11. PUBLICATIONS

RESEARCH PUBLICATIONS

1. Jeevithan, E., R. Jeya Shakila, A. Varatharajakumar, G. Jeyasekaran and D. Sukumar, 2013. Physico-functional and mechanical properties of chitosan and calcium salts incorporated fish gelatin scaffolds. *International Journal of Biological Macromolecules*, 60:262-267 (NAAS rating 7.7)
2. Rosalind George M., K. Riji John, M. Mohamed Mansoor, R. Saravanakumar, P. Sundar, and V. Pradeep, 2014. Isolation and characterisation of a ranavirus from koi experiencing mass mortalities in India. *Journal of Fish Diseases*, DOI.10.1111/jfd.12246 (NAAS rating 7.6)
3. Jeya Shakila, R., B. Edwin Raj and N. Felix, 2013. Sensory, biochemical and microbial qualities of canned farmed cobia processed with Indian spice masala mix. *Journal of Aquatic Food Product Technology*, DOI. 10.1080/10498850.2013.775210 (NAAS rating 7.2)
4. Hema, S., R. Jeya Shakila, S.A. Shanmugam, and E. Jeevithan, 2013. Processing and storage of restructured surimi stew product in retortable pouches. *Journal of Food Science and Technology*, DOI. 10.1007/s13197-013-1154-0 (NAAS rating 6.9)
5. Hussain, I.A., G. Jeyasekaran, R. Jeya Shakila, K. T. Raj and E. Jeevithan, 2013. Detection of hemolytic strains of *Aeromonas hydrophila* and *A. sobria* along with other *Aeromonas* spp. from fish and fishery products by multiplex PCR. *Journal of Food Science and Technology*, DOI. 10.1007/s13197-013-1190-9 (NAAS rating 6.9)
6. Jawahar Raj, K., K. Uma, G. Rebecca and K. Saravanabava, 2013. Basic expression of toll like receptor 18l (TLR 18) mRNA in selected species of food fishes of India. *Indian Veterinary Journal*, 90 (7): 25-27 (NAAS rating 4.33)
7. Palanikumar, M., A. Ruba Annathai, R. Jeya Shakila and S.A. Shanmugam, 2014. Proximate and major mineral composition of 23 medium sized marine finfishes landed in the Thoothukudi coast of India. *Journal of Nutrition and Food Science*, 4 (1): 1-7 (NAAS rating 4.3)
8. Chidambaram, P., 2014. A survey on the microbial and Histopathological lesions in ornamental fishes in the farms of Tamil Nadu, India. *Journal of Experimental Zoology, India*, 17(1): 165-170 (NAAS rating 3.7)
9. Sandeepkumar, B. Sundaramoorthy, N. Neethiselvan and D. Sukumar, 2013. Study on longfinning of *Epinephelus undulosus* (Quoy and Gaimard, 1824) along Thoothukudi coast, South east coast of India. *Journal of Experimental Zoology, India*, 17(1): 133-139 (NAAS rating 3.7)
10. Manojkumar, N. Neethiselvan, A. Karthy and C. Beena Mol, 2013. Selectivity on the Yellow fin trevally (*Caranx ignobilis*, Forsskal, 1775) along Southeast coast of India. *Journal of Experimental Zoology, India*, Accepted (in press) (NAAS rating 3.7)
11. Jawahar, P., B. Sundaramoorthy and P. Chidambaram, 2013. Studies on breeding biology of *Panulirus homarus* (Linnaeus, 1758) along Thoothukudi coast. *Journal of Experimental Zoology, India*, 17 (1):175-181. (NAAS rating – 3.7)
12. Sundaramoorthy, B., Sandeepkumar and N. Neethiselvan, 2013. Long line selectivity on *Epinephelus malabaricus* (Bloch and Schneider, 1801) along Thoothukudi coast, South India. *Tamil Nadu Journal of Veterinary and Animal Sciences*, 9(2): 93-103 (NAAS rating 3.4)
13. David Kingston, S., J. Mary Sophia and V. Viji, 2014. Angel fish (*Pterophyllum scalare*) – Stunted growth and swimming abnormalities. *Tamil Nadu Journal of Veterinary and Animal Sciences*, Accepted for publication (NAAS rating 3.4)
14. Balasubramanian, A., K. Dhanapal and P. Jawahar, 2013. Technical and economical feasibility in the operation of raft catamaran of Krishnapatnam coast, Andhra Pradesh, *Tamil Nadu Journal of Veterinary and Animal Sciences*, 9(1): 44-50 (NAAS rating 3.4)
15. Francis, T., C. Archanadevi, M. Selva magheshwaran, 2013. Cryopreservation of carp spermatozoa. *Indian Journal of Science and Technology*, 6(5): 4524-4530 (NAAS rating 3.2)
16. Anulekshmi, C., B. T. Rajagopalsamy and G. Indra Jasmine, 2013. Effect of clove oil and benzocaine on the respiratory metabolism of angel fish, *Pterophyllum scalare*. *Indian Journal of Science and Technology*, 6(7) : 4853 – 4861 (NAAS rating 3.2)



17. Senthiladeeban, R. and M. Rajakumar, 2012. Fish consumption practices in Thoothukudi, Tamil Nadu. *Journal of Fisheries Economics and Development*, 13 (2):1- 8 (NAAS rating 2.7)
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