ICAR-CIFE

Mumbai-India

2020

वार्षिक प्रतिवेदन

Annual Report

वार्षिक प्रतिवेदन

Annual Report

ICAR-Central Institute of Fisheries Education -
Mumbai-India -

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Preface

PREFACE

Gopal Krishna
Director r

India's fish production, from both marine and inland sector, has been increasing in parallel with the increasing demand for food fish. With the vast resources available for fish culture, together with scientific advancements and inputs from entrepreneurship, the goal of achieving annual production levels of 20 million tons by 2025 from the current 13.7 million tons does not seem unachievable. Aquaculture in particular has a major role in ensuring food security and economic development and contributes to nearly 65% of total fish production of the country. The aquaculture sector has been growing steadily at around 7-8%, which is the highest compared to any other agriculture-related production sector in India. With exports valued at Rs. 47,000 crores (USD 6.73 billion) and a contribution of 5.3% to agricultural GDP, fisheries sector is the largest contributors to agricultural exports from India, in addition to providing livelihood to more than 25 million people in India, who are directly engaged in fisheries and aquaculture. Recently, the Government of India announced Pradhan Mantri Matsya Sampada Yojana (PMMSY) as a part of the Atmanirbhar Bharat programme for the development of fisheries sector and empowerment of those engaged in fisheries, expected to further boost the growth of this sector.

The growth and sustainability of fisheries sector requires intense research, training and extension activities in all field of fisheries, including capture, culture and post-harvest management. Fisheries education and training is integral to achieve rapid growth of fisheries sector. ICAR-CIFE, being a deemed university, has always been in the forefront of fisheries education and research. The institute is engaged in research in various fields of fisheries and has contributed immensely to the advancement of knowledge, growth of aquaculture through training, technology dissemination and entrepreneurship development.

During 2020, 96 students joined Masters (M.F.Sc.) programme and 67 students joined various Ph.D. programmes through entrance examinations conducted by the National Testing Agency. Further, 63 Masters and 35 Ph.D. students successfully completed their postgraduate programmes. Student accomplishments were duly rewarded by endowment awards and travel grants instituted in ICAR-CIFE.

The unprecedented situation in the form of COVID-19 pandemic that started in early 2020 led to the adoption of virtual mode of teaching, training and extension. CIFE could successfully complete postgraduate teaching, conduct exams and declare the results on time, despite the constraints and hardships in the face of the pandemic. The resolve displayed by the faculty, administration and students during this difficult time is highly commendable. The health and safety of the students were given the utmost priority. Consequent to the pandemic outbreak, the students were advised to move to their native places. Utmost care was taken to ensure timely completion of student degree programmes, so that the students were not deprived of their career development.

During the period of this report, 21 institutional projects and 15 externally-funded projects were operational in the institute. These projects focused on thrust areas of fisheries research such as optimization of aquaponics technique, biocontrol of fish parasites, improvement of harvest body weight, growth and reproductive performances of select aquaculture species, development of laboratory strains of inbred zebrafish, affordable alternate fish feed, breeding and larval rearing of commercially important ornamental fishes, conservation and inventorization of fish biodiversity, development of fish disease diagnostics and vaccines, disease monitoring and search for new emerging pathogens, monitoring of antimicrobial resistance in fish pathogens, assessment of the impact of farmer training, among others. The research performance of CIFE during this period is evident from 139 research papers published in national and international journals, apart from numerous training manuals and extension materials. Four patents were granted for the innovations by scientists of CIFE in 2020.

The development of inland saline aquaculture (ISA) is a flagship program of CIFE which is supported by a National Agricultural Higher Education Project (NAHEP) since 2018. This project has given a much-needed boost to the popularization and spread of aquaculture in inland saline affected areas in India by developing environment-friendly technologies to make ISA sustainable and profitable. Extensive training of farmers, on-field support activities, innovative farming methods, student and faculty training, development of industry- and entrepreneurship-oriented curriculum, technology development and popularization have been the focus of activities under NAHEP.

Farmers' training program has always been a priority at CIFE. Every year, Short Training Programs (STP) and Skill Development Programs (SDP) are conducted in CIFE headquarters as well as at its centers with the aim of introducing stakeholders of fisheries to the advancements in the field and to the new avenues for livelihood generation and entrepreneurship development. In 2020, 38 SDPs were organized which benefitted 2468 farmers from across the country. The Agri-Business Incubation (ABI) center has trained several potential entrepreneurs towards fisheries business development. Training programs were also conducted under TSP and SCSP in less privileged tribal areas of different States with the goal of enhancing farmers' income and livelihood promotion through fisheries.

It is exciting to share that ICAR-CIFE is completing six decades of its establishment in 2021. In this endeavor, several programmes have been contemplated throughout the year to commemorate the achievements of the Institute. The remarkable transformation from a training institute to a Deemed-to-be University of its stature in fisheries education could only be possible due to the dedicated and untiring efforts of staff of the past and the present, Heads of the Institute and the constant support from the ICAR headquarters. I would like to convey my heartfelt gratitude to all those who built this institute and moulded it into a preferred student destination and a hub of fisheries research in India.

We sincerely acknowledge the support, guidance and continuous encouragement by Dr. Trilochan Mohapatra, Hon'ble Secretary (DARE) & Director General (ICAR) in all our endeavors. We are grateful to Dr. J. K. Jena, Deputy Director General (Fisheries Science) for his encouragement and support in all our activities. We thank Dr. Pravin Puthran, ADG (Marine Fisheries), Dr. B. P. Mohanty, ADG (Inland Fisheries) and other colleagues from the Fisheries Division for their co-operation and support. Our sincere thanks are due to the Members of Board of Management, Chairman and Members of Research Advisory Committee, Members of Academic Council, Institute Research Council, Extension Council, Board of Examiners and other institute-level committees for their cooperation and support. I especially acknowledge the support of Team CIFE and congratulate the publication team for bringing out this wonderful compilation of our activities.

During this period some of our active and retired staff and their family members lost their lives to corona. We sincerely express our condolences to the bereaved families and pray to the Almighty to give them enough strength to come in terms with their loss.

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(Gopal Krishna)
Director

02

Executive Summary

Highlights

21 Institutional projects

15 Externally-funded projects

139 Research papers

34 Popular articles

17 Training manuals

21 Extension materials

63 M.F.Sc.

35 Ph.D.

38 Skill development programs

2468 Persons trained (SDPs)

9 Students were trained in international laboratories

8 Awards received by students

2 MoUs signed

4 Patents granted

Fisheries education and research have been instrumental in the development of the sector and will continue to be an integral part of national plan towards realizing the second blue revolution in India. In the last 6 decades, ICAR-CIFE has contributed remarkably to the development of fisheries sector since its inception in 1961, catering to the needs of industry and the academia alike. The institute has evolved from a training center to a Deemed-to-be-University and today, the institute with its highly qualified scientific and technical manpower offers post-graduate programmes in 11 specialized disciplines of fisheries science. Every year, about 150 post-graduate students gain entry into the institute through national level entrance examinations. CIFE has the best research infrastructure and laboratory facilities at the headquarter and at its five centers that provide enormous opportunities for the scientists and students to realize their research ideas into workable solutions to the problems of fisheries sector. The institute continues its endeavor of providing trained human resources, who continue contributing to the development of fisheries sector in various capacities as entrepreneurs, scientists, educationists, consultants and trainers.

The sudden outbreak of the viral pandemic in the form of COVID-19 in 2020 gave a severe jolt to the research progress and the academic activities. Nevertheless, CIFE could quickly come in terms with the emergency with contingent plans to carry out research, extension, teaching, and training activities. The virtual mode was adopted immediately and in quick succession, all the activities of the institute were routed through the virtual mode. This rapid transformation helped the institute to accomplish its set goals without significant shortcomings. The curricular activities including teaching, examination, evaluation and the declaration of results were done through the virtual platform. The training programs were also conducted online as scheduled.

The research activities of CIFE are oriented to serve the dual goal of scientific advancement and the welfare of the sector. In 2020, the institute operated 21 institutional projects and 15 externally -funded projects. These research projects focus on the key areas of fisheries such as the improvement of growth performances of cultivated fish species, utilization of seaweeds and fish bio-wastes, antibody-based disease diagnosis, development of fish vaccine, development of leaf meal-based aquafeed, nutritional intervention to improve reproductive performance of carp, aquaponics, diversification of cultured species, development of zebra fish lines for experimental purposes, breeding and larval rearing of ornamental fish, disease and antimicrobial resistance monitoring, risk assessment of chemical pollution of coastal water, bio-prospecting of microalgae, trophic chain-linked management of non-conventional fisheries resources, assessment of impact of SDPs, and predictive modeling for inland fisheries management. Despite the restrictions on laboratory access during the pandemic period, the research achievement were significant in 2020. CIFE published 139 papers in peer reviewed scientific journals. Further, 9 book chapters, 25 popular articles, 10 training manuals, and 21 extension materials were also published from CIFE. The faculty of CIFE delivered 50 invited talks in national and international forums.

The research, training and extension activities under the National Agricultural Higher Education Project (NAHEP) which is in operation at CIFE since 2018, have contributed enormously to the development of inland saline aquaculture in India. The project aims to develop environment-friendly aquaculture technologies for degraded soils with the ultimate goal of utilizing unused resources such as the soil affected by inland saline water for

aquaculture, livelihood generation and protection of the environment. The project has enabled Industry-academia collaboration to promote entrepreneurship among students, development of innovative technologies and ICT-based support system for farmers.

During 2020, CIFE and its centers conducted 38 skill development programs (SDPs) in which 2468 trainees participated from different parts of the country. The training programs covered diverse topics such as fish quality management & certification, fish health and water quality management, algal biomass production, novel fish feed preparation methods, scientific communication skills for students and researchers, ornamental fish culture and breeding, antimicrobial resistance in aquaculture etc. Stakeholders from different sections of fisheries sector such as the farmers, entrepreneurs, quality control managers, consultants, faculty from the SAUs and students were benefitted from the training programs.

Under Schedule Caste Sub-Plan (SCSP), four training programs were conducted on freshwater aquaculture, leaf meal-based fish feed, shrimp farming techniques and aquafeed preparation. Under the Tribal Sub Plan (TSP), six training programs were organized which involved 279 trainees from tribal regions of Maharashtra, Chhattisgarh, Manipur, Nagaland and Tripura. In addition, seeds, feed, cast nets other aquaculture inputs were provided under this program to promote aquaculture and income generation among the tribal communities.

In 2020, the institute conducted statutory meetings such as Research Advisory Committee (RAC), Institutional Research Committee (IRC), Academic council, Extension council and Board of Management. The institute celebrated the vigilance awareness week, Yoga day, Swachhta abhiyaan, Hindi pakhwada, Industry day, Farmers' day, Republic and Independence days. Due to the pandemic, most of these events were conducted virtually or with the involvement of limited faculty in the campus as per the guidelines prevailing at the time.

Despite the phenomenal turnaround of events due to the outbreak of COVID-19 pandemic that severely crippled the normal functioning of the institutions, the dedicated staff of CIFE strived extremely hard in ensuring continuation of academic, research, training and extension activities. The positive outlook and dedication of all the faculty and the students was instrumental in weathering the impact of pandemic. This, together with the constant support form ICAR headquarters has immensely boosted our commitment to fisheries sector through education, research and welfare of farmers.

03

Introduction

3.1. Introduction

The ICAR-Central Institute of Fisheries Education (CIFE) was established as a training center in 1961 under the administrative control of Ministry of Agriculture to promote fisheries education in the country by training officials of the state governments. In 1979, the institute was transferred to ICAR with the mandate of imparting fisheries education. The institute was granted the Deemed-to-be University status in 1989, offering post graduate education across 11 disciplines in fisheries science. Apart from post graduate education, the institute offers certificate courses and skills development programs. With the state-of-the-art facilities and laboratories, the institute has emerged as a center of excellence in HRD by producing competent manpower and catering to the needs of fisheries sector with its research in frontier areas of fisheries science. The activities of the institute are aligned in line with the national mandate of increasing fish production and farmers' income, with an ultimate goal of ensuring nutritional security. Apart from teaching and research, the institute plays a pivotal role in expansion of fisheries activities, enhancement of competence of fisheries professionals and dissemination of technology through training programs and extension activities.

Mission

To achieve academic and research excellence

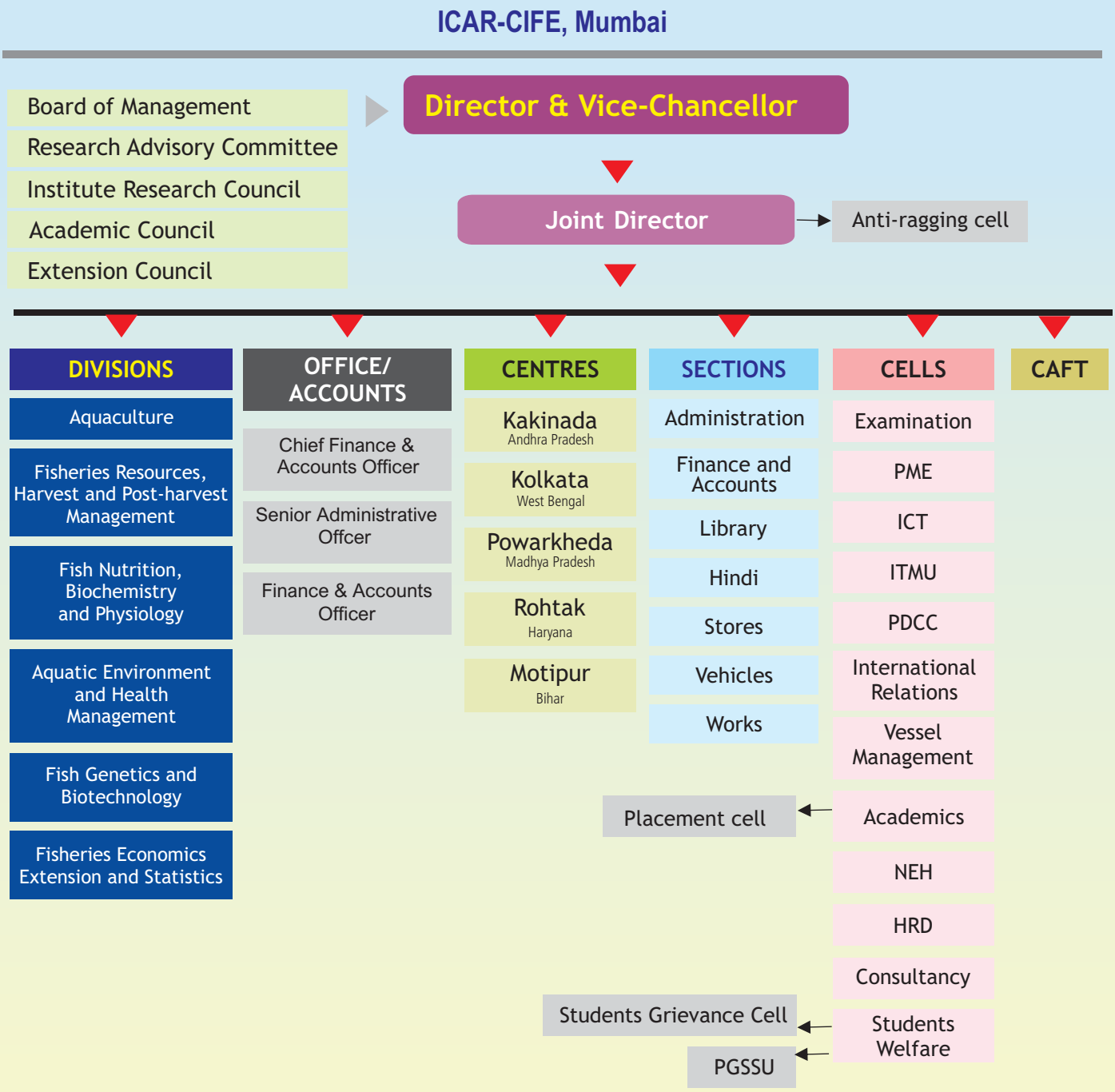
Vision

To be a world-class organisation providing leadership in fisheries education and research

Mandate

- Conduct post-graduate programmes in fisheries science
- Basic and strategic research in frontier areas of fisheries science
- Human Resource Development, capacity building and skill development through training, education & extension

3.2. Organogram



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Dr. Neelam Saharan r
Dr. R. P. Raman r
Dr. Munil Kumar r
Dr. Parimal Sardar r
Dr. Swadesh P. Tiwari
Dr. Rama Sharma r
Dr. A. K. Balange r
Dr. Megha K. Bedekar r
Dr. Shreedharan r
Dr. Muralidhar Ande r
Dr. Shashi Bhushan (President, PGSSU) r
Representative of ACM of PGGSU r
Mr. Mahesh B. Khubdikar r
(Member Secretary upto 30.04.2019) r
Mr.P.J.Davis (Member Secretary from 07.05.2019) r

3.3. Staff Position (2020)

Category Wise

CIFE Staff	Sanctioned	In position	Vacant
RMP	02	01	01
Scientific	107	87	20
Technical	106	56	50
Administrative	64	38	26
Skilled Supporting	46	41	5
Non Ministrial	01	01	00
Total	**326**	**224**	**102**

3.4. Budget (2020)

Rs. in Lakh

S. No.	Head	Sanctioned/ Balance C/f	Received	Expenditure Incurred
1.	Institute Expenditure	8,774.53	8,784.60	8,704.42 r
2.	CAFT	21.02	-	6.85 r
3.	SDU	147.76	116.35	82.99 r
4.	Library strengthening (SDAE)	63.47	11.53	59.50 r
5.	Scheduled caste sub-plan (SDAE)	-	100.00	84.78 r
6.	NAHEP	-	861.32	500.73 r
7.	Externally Funded Projects	246.44	173.00	233.23
	Total	**9,253.22**	**10,046.80**	**9,672.50**

Revenue generation: Rs. 53,94,880.00 Lakhs r

04

Academic Achievements

Highlights

Number of Students Enrolled During the Year 2020 (1 January-31 December, 2020)

M.F.Sc. 96

Ph.D. 67

Number of Successful Students During the Year 2020 (1 January-31 December, 2020)

M.F.Sc. 63

Ph.D. 35

50 Invited Lectures Delivered by Faculty

25 Guest Faculty Invited

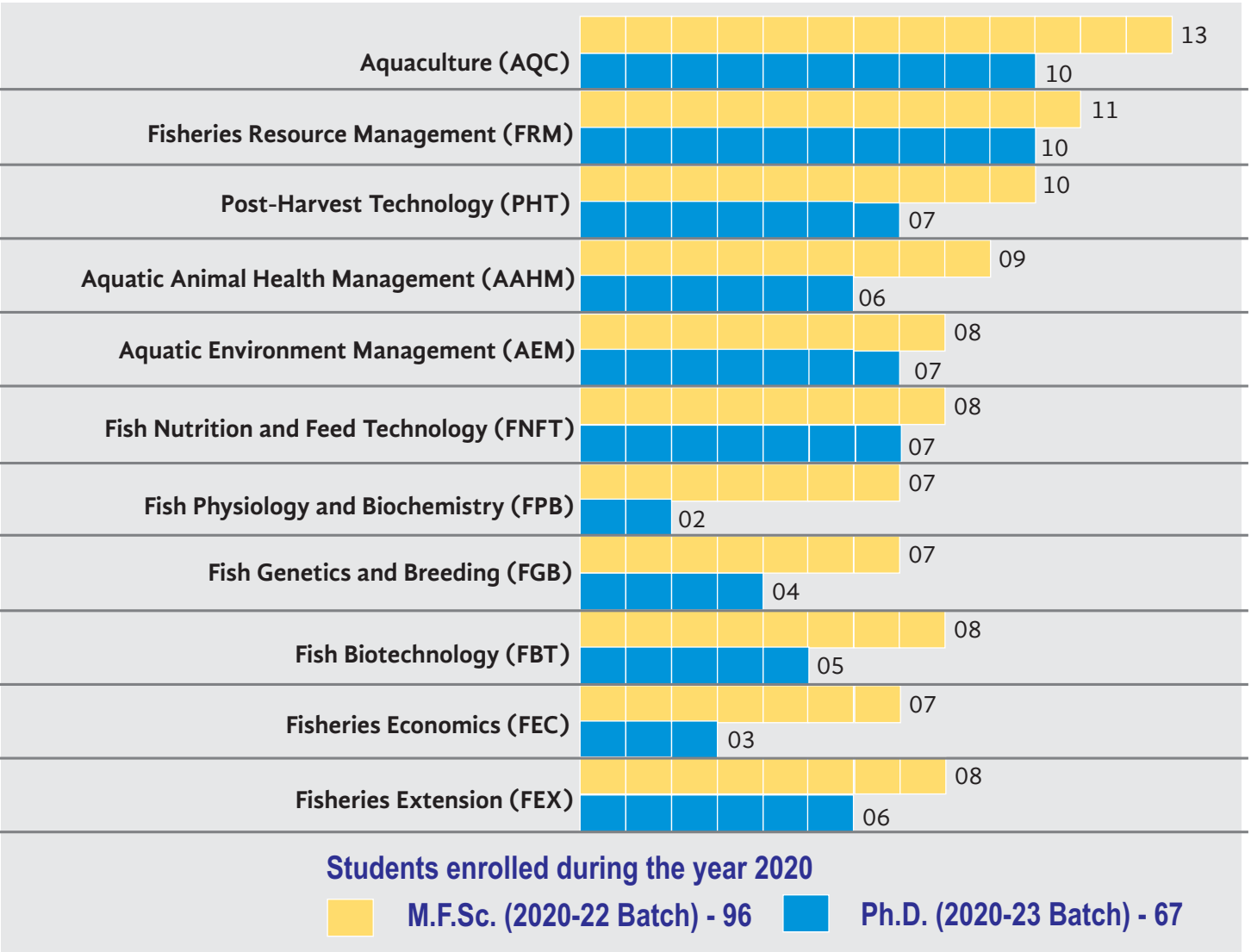
09 Awards Received by Students

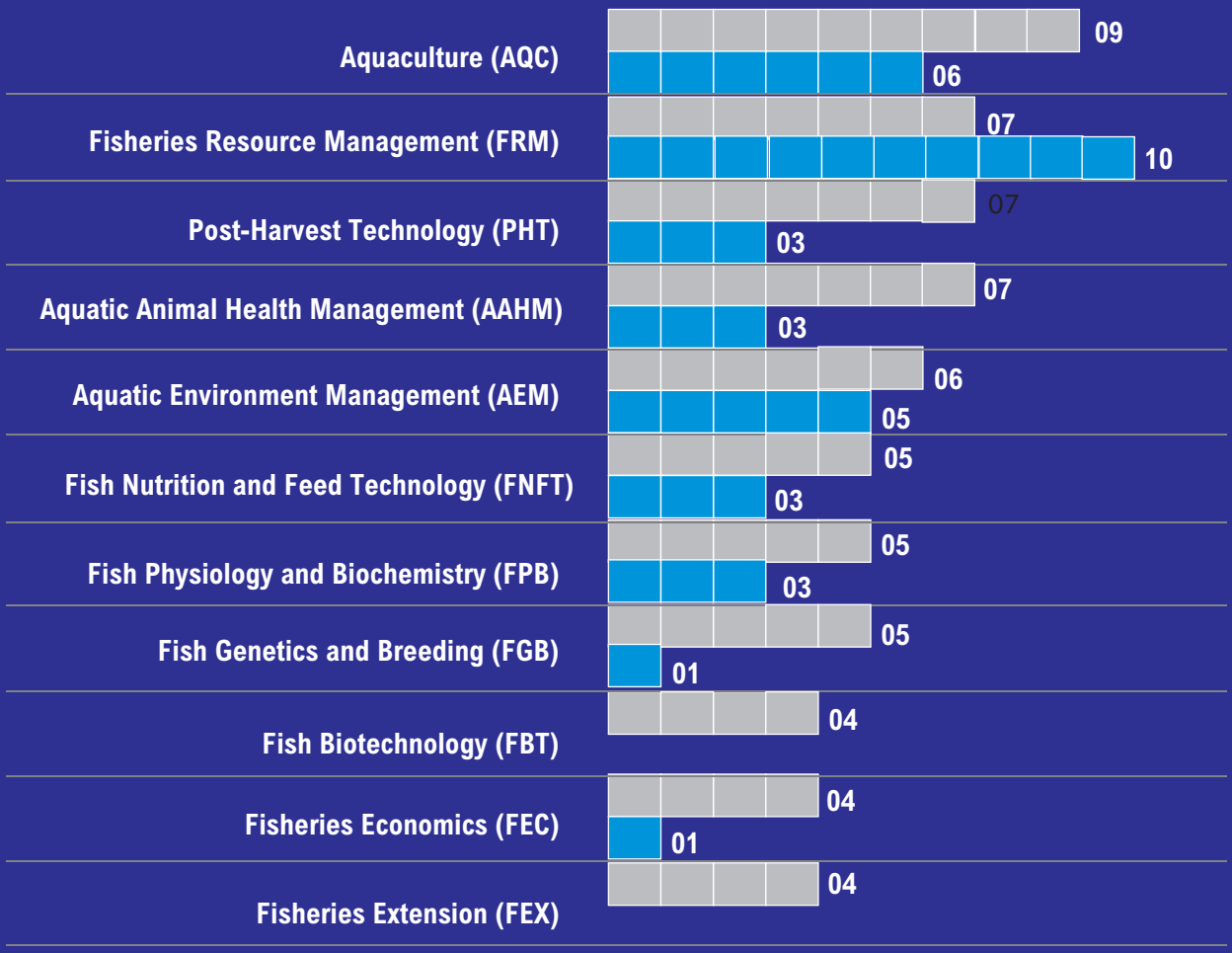
05 Papers Presented by Students in Conferences/ Symposia etc.

09 International Training Undergone by Students Funded by NAHEP, ICAR-CIFE, Mumbai

4.1 Enrollments

A total of 96 students have enrolled for the master's programme and 67 have enrolled for the doctoral programme which includes one foreign student from Bangladesh.





List of dissertations submitted by M.F.Sc. students (Batch 2018-2020): 63

No. of students awarded Ph.D. degree during 1 January - 31 December 2020: 35

4.2. List of Dissertations Submitted by M.F.Sc. Students (Batch 2018-2020)

1.	Mr. Chigo Basar AQC-MA8-02	Comparative Performance of Aero-Tube and Paddle Wheel Aerators in Pond Conditions for Culture of *Penaeus vannamei* (Boone, 1931) Using Inland Saline Water	Dr. Chandrakant M. H.
2.	Ms. Rida Riyaz Allayee AQC-MA8-06	Seasonal Variations in Health and Reproductive Indices of *Barilius vagra* (Hamilton, 1822)	Dr. Debajit Sarma
3.	Ms. Sanskruti Padra AQC-MA8-07	Study on Biology and Growth Performance of *Parambassis lala* (Hamilton,1822) Through Feeding Intervention	Dr. B. K. Mahapatra
4.	Mr. Subam Debroy AQC-MA8-08	Evaluation of Growth,Survival and Physiological Parameters of *Anabas testudineus* (Bloch, 1792) Reared in Inland Saline Water at Different Salinities	Dr. N. K. Chadha
5.	Mr. Sumant Chandravanshi AQC-MA8-09	Influence of Stocking Density and Feeding Frequency on Growth and Survival of Asian Striped Dwarf Catfish *Mystus vittatus* (Bloch, 1794)	Dr. P. P. Chakrabarti
6.	Ms. Swarnaprava Mohapatra AQC-MA8-10	Biology and Maturation of the Ornamental Shrimp *Caridina hodgarti* (Kemp,1913) through Dietary Manipulation	Dr. B. K. Mahapatra
7.	Ms. Thejaswini AQC-MA8-11	Biofloc Meal Production using Bioreactor: Process Optimization and Utilization of Biofloc Meal as a Dietary Ingredient for Genetically Improved Farmed Tilapia	Dr. Babita Rani A. M.
8.	Mr. Udipta Roy AQC-MA8-12	Assessment of Critical Control Points in Value Chain of Selected Ornamental Fishes in and Around Kolkata Hub	Dr. Paramita Banerjee Sawant
9.	Mr. John Daudi AQC-MA8-13	Biomass Production and Nitrogen Dynamic in Aquaponics System using Pangasius (*Pangasianodon hypophthalmus*) and Leafy Vegetables	Dr. Kiran Dube Rawat
10.	Ms. Bathina Prathibha AAH-MA8-01	Phenotypic and Molecular Characterization of Antimicrobial Resistance in Selected Bacterial Isolates from *Penaeus vannamei*	Dr. K. Pani Prasad
11.	Mr. Debojit Dekari AAH-MA8-02	Immunophysiology of the Teleost Gut: Prospects for Functional Nutrition	Dr. Jeena K.

12.	Mr. Lalruatfela AAH-MA8-03	Development of Recombinant Protein from Selected Gene of Tilapia Lake Virus (TiLV)	Dr. Megha Kadam Bedekar
13.	Ms. Manimozhi E. AAH-MA8-05	Prevalence Study on *Enterocytozoan hepatopenaei* (EHP) in *Penaeus vannamei* and Environment from Shrimp Farms of Maharashtra and Gujarat	Dr. K. Pani Prasad
14.	Ms. Monalisha Kumar AAH-MA8-06	Prevalence and Virulence Characteristics of Pathogenic Vibrios from Pacific White Shrimp (*Penaeus vannamei*) Reared in Inland Saline Waters of Different Salinity Regimes	Dr. Gayatri Tripathi
15.	Ms. Nasheeman Jabeen AAH-MA8-07	Study on Chemical Inactivation of White Spot Syndrome Virus (WSSV)	Dr. K. V. Rajendran
16.	Mr. Naveenkumar R. AAH-MA8-08	Phytochemical screening and *in vitro* Antibacterial Activity of Nut Grass, *Cyperus Rotundus l*. Rhizome Extract Against *Edwardsiella tarda*	Dr. R. P. Raman
17.	Ms. Abhipsha Dey AEM-MA8-01	A Study on Combined Effect of Triclosan and Microplastic on Stress Biomarkers of *Pangasianodon hypophthalmus*	Dr. Saurav kumar
18.	Mr. Angom Baleshwar Singh AEM-MA8-02	Effect of Triclosan in Gut Microbiota of *Labeo rohita*	Dr. Kundan Kumar
19.	Ms. Kangkana Das AEM-MA8-03	Synthesis of Silver Nanoparticles using Fish Wastes: Their Characterisation and Valorisation	Dr. K. K. Krishnani
20.	Ms. Pragati AEM-MA8-04	Production of Biomass of *Spirulina* (*Arthrospira*) *platensis* in Aquaculture Wastewater for Atmospheric Carbon Sequestration and Colorant Grade Phycocyanin	Dr. S. P. Shukla
21.	Mr. Sudarshan S. AEM-MA8-05	Evaluation of Toxicity of a Commercial Dye, Rhodamine B and its Bioremediation by a Green Microalga *Chlorella vulgaris*	Dr. Rathi Bhuvaneswari G.
22.	Mr. Vijay Kumar A. AEM-MA8-06A	Study on Carbon Sequestration in Inland Saline Shrimp Farming system.	Dr. Vidya Shree Bharti
23.	Ms. Nahida Quyoom FBT-MA8-03	Characterization of Geographically Isolated Stocks of *Lamellidens marginalis* (Lamarck, 1819) Using Microsatellites	Dr. A. Pavan Kumar
24.	Ms. Porkodi M. FBT-MA8-04	Identification and Characterization of Micrornas (Mirnas) in *Clarias magur* (Hamilton, 1822)	Dr. Aparna Chaudhari

26.	Mr. Prathik M. R. FBT-MA8-06	Development of Polyethylene Microplastic Fibers and Acute Toxicity Studies in Zebrafish	Dr. Gireesh Babu P.
Fish Genetics and Breeding			
27.	Ms. Dani Rupa FGB-MA8-01	Assessment of Genetic Diversity of Zebrafish (*Danio rerio*) from Arunachal Pradesh	Dr. Mujahidkhan A. Pathan
28.	Ms. Laishram Soniya Devi FGB-MA8-02	Inbreeding and Effective Population Size in Breeding Nucleus of Indian Major Carps from Selected Hatcheries of India	Dr. Shrinivas Jahageerdar
29.	Mr. Ajithkumar M. FGB-MA8-03	Genetic Studies on Morphometric, Reproductive and Visceral Traits of *Clarias magur* (Hamilton,1822)	Dr. Sunil Kumar Nayak
30.	Ms. Mukkeri Kranthirekha FGB-MA8-04	Synthesis, Characterization and Biodistribution of Carbon Nanotubes in Zebrafish	Dr. Rupam Sharma
31.	Ms. Sarvepalli Venkata Sai Varshini FGB-MA8-05	Evaluation of Surface Water Quality and Toxicity of Mithi River Water Using Zebrafish (*Danio rerio*) Embryos	Dr. Naresh S. Nagpure
32.	Mr. Chandan G. M. FNFT-MA8-01	Utilization of Fermented Mixed Leaf Meal in the Diet of *Labeo rohita* (Hamilton, 1822) Fingerlings through Alternate Feeding Schedule	Dr. N. P. Sahu
33.	Ms. Nisha Chuphal FNFT-MA8-02	Dietary Lipid Requirement of *Penaeus vannamei* (Boone, 1931) Juveniles Reared in Inland Saline Water	Dr. Parimal Sardar
34.	Mr. Shiv Kumar FNFT-MA8-03	Extraction of Flavanone Compound from Orange Peel and Evaluation of its Antioxidant Properties	Dr. Ashutosh D. Deo
35.	Mr. Tanmoy Kr Manna FNFT-MA8-05	Utilization of Fermented *Moringa oleifera* Leaf Meal in the Diet of *Labeo rohita* (Hamilton,1822) Fingerlings	Dr. Sikendra Kumar
36.	Mr. Vijayakumar Sidramappa Mannur FNFT-MA8-06	Dietary Lipid Requirement of GIFT Tilapia Juveniles Reared in Inland Saline Water	Dr. Shamna N.
37.	Ms. Darivemula Asha FPB-MA8-01	Effect of Different Protein Sources on Growth in Walking Catfish *Clarias magur*	Dr. P. P. Srivastava

38.	Mr. Karthik R. FPB-MA8-02	Designing a Smart Prototype of Superparamagnetic Iron Oxide Nanoparticles (SPIONs) Conjugated Aptamer based Heavy Metal Removal System from Water	Dr. Subodh Gupta
39.	Ms. Khumujam Sapana Devi FPB-MA8-03	Effects of Dietary Saponin Neutralisers on Growth Response of *Labeo rohita* (Hamilton, 1822) Fingerlings	Dr. Tincy Varghese
40.	Mr. Mohammad Ashraf Malik FPB-MA8-04	Utilization of Fermented *Eichornia crassipes* Leaf Meal in the Diet of *Cyprinus carpio* (Linn,1758) Fingerlings	Dr. Sukham Munilkumar
41.	Mr. Rajan Kumar Behera FPB-MA8-05	Osmoregulatory and Stress Mitigating Responses of Dietary betaine and L-Serine in *Penaeus vannamei* (Boone,1931) in Inland Saline Water	Dr. Subrata Dasgupta
Fisheries Economics			
42.	Mr. Abhilash Thapa FEC-MA8-01	Economic Analysis of Jhora Fisheries in West Bengal	Dr. Rama Sharma
43.	Ms. Bethsy Lalremtluangi FEC-MA8-02	Production and Supply Chain Analysis of Different Aquaculture Systems in Mizoram	Dr. Rama Sharma
44.	Mr. Shyam Datta Waghmare FEC-MA8-03	Economic Analysis of Reservoir Fisheries in Marathwada region, Maharashtra	Dr. Swadesh Prakash
45.	Mr. Sanjay Stephen Kalahasti FEC-MA8-05	Analysis of Marine Fish Production Dynamics Under Climate Change Scenario in Andhra Pradesh using Machine Learning Approaches	Dr. Vinod Kumar Yadav
Fisheries Extension			
46.	Ms. Akilandeshwari A. FEX-MA8-01	Assessment of Socio-Economic Vulnerability and Impact of Climatic Variables in Selected Reservoirs of Maharashtra and Tamil Nadu	Dr. Vinod Kumar Yadav
47.	Ms. Naila Majid FEX-MA8-03	Gender Analysis of Fisheries Sector in Kashmir	Dr. Arpita Sharma
48.	Ms. Nidhi Katre FEX-MA8-04	Fishers' Livelihood and Fisheries Governance in Bargi Reservoir of Madhya Pradesh	Dr. S. N. Ojha
49.	Ms. Camelia Chattopadhyay FEX-MA8-05	A Study on Socio-Economic Status of Tribes Involved in Fisheries in Purulia District, West Bengal	Dr. Arpita Sharma

Fisheries Resource Management

50.	Mr. Bejawada Chanikya Naidu FRM-MA8-01	Occurrence of Microplastics in Selected Bivalves of Maharashtra Coast	Dr. Martin Xavier K. A.
51.	Ms. Dhanalakshmi M. FRM-MA8-02	Stock Characterization of Spiny Cheek Grouper, *Epinephalus diacanthus* (Valenciennes,1828) along Indian Coast	Dr. Zeba Jaffer Abidi
52.	Mr. Pritam Das FRM-MA8-04	Stock Characterization of *Boleophthalmus dussumieri* (Valenciennes, 1873) from Indian Water	Dr. Shashi Bhushan
53.	Ms. Renuka Uikey FRM-MA8-05	Appraisal of Urban Small-Scale Fisheries of Mumbai, Maharashtra	Dr. Asha T. Landge
54.	Mr. Wanjari Rinkesh Nemichand FRM-MA8-06	Assessment of Productivity and Trophic Structure of Mumbai Coastal Waters: A Remote Sensing and Trawl Based Approach	Mr. Karankumar K. Ramteke
55.	Mr. Shiva Rajak FRM-MA8-07	Taxonomic Evaluation of Mudskippers of Subfamily Oxudercinae from Indian Waters	Dr. Shashi Bhushan
56.	Ms. Silpa S. FRM-MA8-08	A Taxonomic Evaluation of Species of Family Synodontidae Gill, 1861 Occurring in Indian Waters	Dr. A. K. Jaiswar

Post-Harvest Technology

57.	Mr. Bhuneshwar PHT-MA8-01	Nutrient Profiling and Protein Characterization of Mudskipper	Dr. Layana P.
58.	Ms. Devadharshini S. PHT-MA8-02	Comparative Evaluation of Different Methods for the Detection of Formaldehyde in Fish	Dr. A. K. Balange
59.	Mr. Kime Tath PHT-MA8-03	Isolation and Identification of Bacteria with Collagenase Activity from the Marine Environment and their Application in Fish Waste Remediation	Dr. Sanath Kumar H.
60.	Mr. Manivannan M. PHT-MA8-04	Studies on the Effect of Chitosan Incorporation in Batter for Coated Fish Products	Dr. Martin Xavier K. A.
61.	Mr. Rabinarayan Sahu PHT-MA8-05	Biological Extraction of Chitin	Dr. B. B. Nayak
62.	Ms. Sahana M. D. PHT-MA8-06	Utilization of Collagen from Airbladder to Produce Surgical Sutures	Dr. A. K. Balange
63.	Mr. Somnath Saha PHT-MA8-07	Seaweed-associated Bacteria and their Bioactivities	Dr. Manjusha L.

4.3. List of Students Awarded Ph.D. Degree during 1 January - 31 December 2020

Sr. No.	Name of the student	Thesis title	Major advisor	Date of *viva voce*
2.	Mr. Manish Jayant FNFT-PA3-02	Evaluation of Castor Seed Protein Isolate in the Leaf Meal Based Diet of *Labeo rohita* (Hamilton, 1822)	Dr. N. P. Sahu	10 January, 2020
3.	Mr. Amrutha Gopan FNFT-PA5-01	Utilization of Protein Isolates from Neem (*Azadirachta indica*) and Karanj (*Pongamia pinnata*) Seed Cake in the Diet of *Labeo rohita* (Hamilton, 1822)	Dr. N. P. Sahu	24 January, 2020
4.	Mr. Manoharmayum Shaya Devi FRM-PA5-01	An Appraisal of Single-Day and Multi-Day Trawl Fishery of Mumbai Coast	Dr. Latha Shenoy	31 January, 2020
5.	Ms. Upasana Sahoo AQC-PA3-17	Biology, Captive Maturation and Breeding of Indigineous Ornamental fish, Dwarf Gourami, *Colisa lalia* (Hamilton, 1822)	Dr. B. K. Mahapatra	07 February, 2020
6.	Ms. Roshan Maria Peter AQC-PA3-18	Evaluation of Potassium Supplementation on Physiological Response of *Etroplus suratensis* (Bloch, 1970) and Yield of Tomato in Recirculating Aquaponic System	Dr. A. K. Verma	10 February, 2020
7.	Mr. Pravesh Kumar FGB-PA5-01	Identification, Expresion Profiling and Functional Analysis of Gonadotropin Inhibitory Hormone (GnIH) Gene in *Catla catla* (Hamilton, 1822)	Dr. Rupam Sharma	17 February, 2020
8.	Ms. Ranjeeta Kumari AAH-PA4-03	Silencing of Interleukin-1 Receptor-Associated Kinase 4 (Irak4) Gene to Study its Effect on Immune System of *Penaeus monodon*	Dr. Megha Kadam Bedekar	21 February, 2020
9.	Mr. Sunil Kumar S. A. FRM-PA3-04	Resource Use Efficiency, Mapping and Sustainability of Cage-cum-pond Integrated Culture System	Dr. Latha Shenoy	27 February, 2020
10.	Mr. Sukhdhane Kapil Sukhdeo AEM-PA3-03	Assessment of Litter Contamination in Marine Fishing Areas and Different Sensitive Habitats of Gujarat	Dr. V. Kripa	28 February, 2020
11.	Ms. Anagha T. FPB-PA5-02	Physiometabolic Responses and Ovarian Disruption of *Labeo rohita* (Hamilton, 1822) Exposed to Titanium Dioxide Nanoparticles and its Mitigation Measures	Dr. Subodh Gupta	04 March, 2020

12.	Mr. Sanal Ebeneezar FPB-PA3-01	Dietary Requirement of Lysine and Methionine in Silver Pompano, *Trachinotus blochii* (Lacepede, 1801)	Dr. P. Vijayagopal	12 March, 2020
13.	Mr. G.P.W.A. Prabhath AEM-PA6-04	Downstream Processing of *Spirulina* (*Arthrospira*) *platensis* Grown in Aquaculture Effluents for Value Added Pigment Production	Dr. S. P. Shukla	13 March, 2020
14.	Ms. Anjali P.Thilakan AEM-PA5-05	Occurrence of Triclosan in Versova Creek of Mumbai and its Toxicity on Selected Aquatic Organisms	Dr. Kundan Kumar	13 March, 2020
15.	Ms. Ngairangbam Sushila AAH-PA5-05	Expression Studies of Recombination Activating Genes (RAGs) during Development and in Response to Bacterial Infection in Selected Ornamental Fish	Dr. Gayatri Tripathi	01 July, 2020
16.	Ms. Madhuri S. Pathak AQC-PA3-20	Growth and Physiological Responses of Silver Pompana, *Trachinotus blochii* (Lacepede, 1801) Juveniles in Inland Saline Ground Water	Dr. W. S. Lakra	01 July, 2020
17.	Mr. Kusunur Ahamed Basha AAH-PA2-02	Diversity and Characterization of Ammonia Oxidizing Bacteria from Freshwater Finfish Farms of Kerala	Dr. Toms C. Joseph	02 July, 2020
18.	Ms. Sibina Mol S. FRM-PA3-02	Taxonomic Evaluation of Different *Labeo* spp. (Family: Cyprinidae) in Cauvery River	Dr. B. K. Das	02 July, 2020
19.	Ms. Saritha S. FRM-PA5-07	Spatio-Temporal Variations in Biodiversity and Productivity of Dharamtar Estuarine Ecosystem, Maharashtra	Dr. Geetanjali Deshmukhe	03 July, 2020
20.	Mr. Pravin H. Sapkale AEM-PA5-04	Dynamics and Diversity of Bacterial Flora With Reference to Phosphorus Cycle in Mangrove Sediments along Mahim and Bhayander Creek, Mumbai	Dr. Neelam Saharan	03 July, 2020
21.	Ms. Huirem Bharati FRM-PA3-03	Habitat Ecology, Productivity and Fish Diversity of Rudrasagar Lake, Tripura	Dr. S. K. Das	04 July, 2020
22.	Mr. Rajesh Kumar Pradhan FRM-PA3-09	Study of Single-Day and Multi-Day Trawl Fishery of Gujarat Coast	Dr. Latha Shenoy	04 July, 2020
23.	Ms. Mahida Navghan V. FEC-PA4-02	Export Competitiveness and Value Chain Analysis of Seafood Products in Gujarat Coast	Dr. Nalini Ranjan Kumar	11 July, 2020
24.	Mr. Raghavendra C.H. AQC-397	Captive Breeding and Larval Rearing of Fringe-Lipped Peninsular Carp, *Labeo fimbriatus* (Bloch, 1795)	Dr. Kiran Dube Rawat	17 July, 2020

25.	Mr. Nirmal T. FRM-PA5-05	Taxonomic Study on Hermit crabs (Decapoda : Anomura) of the Tamil Nadu and Maharashtra Coast	Dr. A. K. Jaiswar	17 July, 2020
26.	Mr. Dilip Kumar Singh FNFT-PA3-01	Nutritional Evaluation of Berseem (*Trifolium alexandrinum*) Leaf protein Concentrate Fortified with Nano-Encapsulated Micronutrients on Growth and Immunological Responses in *Labeo rohita*	Dr. Subodh Gupta	18 July, 2020
27.	Mr. Vivekanand Bharti AEM-PA3-02	Impact of Climate Change on Small Pelagic Fishery Resources off South-West Coast of India	Dr. J. Jayasankar	03 August, 2020
28.	Ms. Suma D. PHT-PA5-02	Factors Influencing the Activities of Prolific Histamine Forming Bacteria from Fish	Dr. B. B. Nayak	04 August, 2020
29.	Mr. Sambid Swain AQC-PA3-08	Effect of Water Hardness and pH on Maturation and Reproductive Performance of *Symphysodon aequifasciatus* (Pellegrin, 1904)	Dr. Paramita Banerjee Sawant	05 August, 2020
30.	Mr. Lekshmi R.G. Kumar PHT-PA3-02	Designing Squalene Loaded Biopolymer Micro Particles with Emphasis on Stability, Bioavailability and Applicability as a Functional Food Ingredient	Dr. Suseela Mathew	10 August, 2020
31.	Mr. Vaisakh G. FRM-PA3-01	Ecology and Biology of *Tenulosa ilisha* from Narmada River and Ukai (Vallabh Sagar) Reservoir, Gujarat	Dr. B. K. Das	10 August, 2020
32.	Mr. Shyamal Chandra Shukla Das FRM-PA5-09	Life History Traits of *Cyprinus carpio* (Linnaeus,1758) from the River Ganga at Allahabad	Dr. A. K. Jaiswar	12 August, 2020
33.	Ms. Garima Anand FPB-PA6-02	Evaluation of Sesbania Leaf Meal Based Diet on Flesh Quality of *Cyprinus carpio* (Linnaeus, 1758) Reared in Inland Saline Water Under Different Salinities	Dr. P. P. Srivastava	19 November, 2020
34.	Ms. Iffat Jahan AQC-PA6-02	Breeding Biology and Maturation of *Cyprinus carpio* (Linnaeus, 1758) in Inland Saline Water	Dr. V. K.Tiwari	11 December, 2020
35.	Ms. Oishi Das PHT-PA5-05	Diversity of Extremely Halophilic Microorganisms and their Roles in Fermented Fish Products	Dr. B. B. Nayak	22 December, 2020

4.4. Invited Lectures Delivered in other Universities/Institutes Including Invited Online Lectures

Name of the Faculty	Title of Lecture Delivered	Name of University/Event	Date
Dr. Rajendran K. V.	New Paradigms in Invertebrate Immunity with Special Reference to Crustaceans	ICAR- Central Marine Fisheries Research Institute, Kochi, International Symposium MECOS3 (Marine Ecosystems Challenges and Opportunities), Kochi	07-10 January, 2020
Dr. K. K. Krishnani	Molecular Perspectives of Bacterial Bioremediation of Priority Agro-Chemicals	4th IUPAC International Conference on Agrochemicals Protecting Crops, Health and Natural Environment – Discovery and Development of Synthetic and Natural Products for Health and Pests Management	07-10 January, 2020
Dr. B. K. Mahapatra	Ornamental Fish Culture: An Emerging Important Component of Integrated Farming System	Dhaanyaganga Krishi Vigyan Kendras Ashrama, Sargachi, Murshidabad	11 January, 2020
	Biofloc and RAS Technology	Department of Fisheries, Govt. of West Bengal at ICAR-CIFE Kolkata Centre	12 January, 2020
	Ornamental Fisheries Landscape in India: Prospects and Issues	Salt Lake, Kolkata	25 January, 2020
Dr. S. P. Shukla	Biotechnology of Spirulina and its Application	Sir Sitaram and Lady Shantibai Patkar College of Arts and Science, Mumbai	30 January, 2020
Dr. Rajendran K. V.	Dealing with Emerging Diseases in Shrimp Aquaculture: Need for a Paradigm Shift	Society of Aquaculture Professionals (SAP) The AQUA INDIA 2020- The Changing Face of Indian Aquaculture	31 January – 01 February, 2020
Dr. Sunil Kumar Nayak	Fishery and Aquaculture Fish Breeding and Pond Construction and Government Schemes, Support and Subsidy Related to Fisheries for State and Centre	Indo-European Chamber of Commerce and Industry, Bhopal, Madhya Pradesh, under Agri-clinics and Agri-business Centre Scheme, Manage, Hyderabad	04 February, 2020
Dr. K. K. Krishnani	Bioremediation in Aquatic Environment - Application in Nucleic Acid-Based Techniques and Improved Technological Interventions in Inland Aquatic Environmental Management	Summer/Winter School on Advances in Management of Inland Open-water Ecosystem Health ICAR-Central Inland Fisheries Research Institute, Barrackpore	05-06 February, 2020

Dr. Geetanjali Deshmukhe	Frontiers in Aquascience	Ramniranjan Jhunjhunwala College, Mumbai	14 February, 2020
Dr. Sunil Kumar Nayak	Composite Fish Farming	College of Fisheries Science, Nanaji Deshmukh Veterinary Science University, Jabalpur	24 March, 2020
Dr. Babitha Rani A. M.	Biofloc Technology for Effluent Management in Aquaculture	Dr. M.G.R. Fisheries College and Research Institute, Tamil Nadu Dr. J. Jayalalithaa Fisheries University	13 May, 2020
Dr. K. K. Krishnani	The Role of Environmental Biotechnology in Aquatic Environment Management	West Bengal University of Animal and Fishery Sciences, Kolkata	14 May, 2020
	Pros and Cons of Lockdown in Agriculture	Swami Shri Swaroopanand Saraswati Mahavidyalaya, Bhilai, National Webinar on Pros and Cons of lockdown during Pandemic (Covid19)	15 May, 2020
Dr. Abuthagir Iburahim S.	Artificial Intelligence in Fisheries	College of Fisheries, Karwardha, Chattisgarh	23 May, 2020
Dr. Babitha Rani A. M.	Biofloc Based Aquafarming	Faculty of Fishery Sciences, West Bengal University of Animal and Fishery Sciences, West Bengal	29 May, 2020
	Biofloc Technology of Sustainable Intensification in Aquaculture	Kerala University of Fisheries and Ocean Studies Kochi, Kerala	30 May, 2020
Dr. N. P. Sahu	Reforms Needed in Agri-Higher Education	All India Agriculture Student Association Webinar on Challenges, Opportunities and Future of Agri and Allied Research and Education: Post-Covid Era	30-31 May, 2020
	Aquaculture Research in North-East Region: Option and Opportunities	Central Agricultural University, Tripura and All India Students' Association Webinar on Strategies and Policy Intervention for Agricultural Development in Northeast India During COVID-19 Era North-East Region	13 June, 2020
Dr. N. P. Sahu	Reforms Needed in Higher Education Post-Covid Era	Vikhroli College, Mumbai, Maharashtra	24 June, 2020
Dr. Babitha Rani A. M.	Biofloc Aquaculture	Kerala University of Fisheries and Ocean Studies Kochi, Kerala Distant Dynamic Interactive Series	26 June, 2020

	Pre-Stocking Management, Development and Maintenance of Biofloc	Department of Fisheries, Govt. of Kerala.	10 July, 2020
	Post-Stocking Management	Department of Fisheries, Govt. of Kerala.	13 July, 2020
	Biofloc Technology: Prospects in India	Fisheries Research and Information Centre, Hebbal, KVAFSU, Karnataka	16 July, 2020
Dr. Geetanjali Deshmukhe	Mangrove-Series Importance Technologies Used in Conservation, Mapping, and Restoration of Mangroves in Urban Cities	Paryavaran Dakshata Manch, United Way, Mumbai	23 July, 2020 26 July, 2020
Dr. B. K. Mahapatra	Native Ornamental Fishes of Eastern India	College of Fisheries, Bihar Animal Science University, Kishanganj, Bihar	11 August, 2020
	Ornamental Fish Breeding and Farming for Livelihood Improvement in India	Faculty of Marine Science, Annamalai University, Tamil Nadu	18 August, 2020
	Biofloc Fish Farming for Entrepreneurship Development	Acharya Prafulla Chandra College, Kolkata	22 August, 2020
Dr. Megha Bedekar	Microbial Interventions in Better Fish Health	College of Fishery Science, NDVSU, Jabalpur, MP	06 September, 2020
Dr. B. K. Mahapatra	Impact of COVID-19 Pandemic in Fisheries Sector	Ramnagar College, Medinipore, West Bengal	07 September 2020
Dr. Rajendran K. V.	Diseases in Shrimp Aquaculture	Nanaji Deshmukh Veterinary Science University, Jabalpur	09-14 September, 2020
Dr. Rajendran K. V.	Chronic Disease Conditions in Farmed Shrimp and Elusive Aetiology	Institute of Science and Technology, Sathyabama University, Chennai ATDM 2020	14-17 September, 2020
Dr. Saurav Kumar	Fish Disease: Management and Prevention	Perspective of the Technology Driven Aquaculture for Bihar and Jharkhand	15 September, 2020
Dr. Rajendran K. V.	Zoonotic Diseases Associated with Aquaculture and Aquatic Organisms	National Academy of Agricultural Sciences, New Delhi, Virtual Brain Storming Session on One World-One Health	19 September, 2020
Dr. N. P. Sahu	Scope for Technological Innovation and Refinement in Fisheries and Aquaculture	Indian Institute of Technology, Bombay	22 September, 2020

Dr. Babitha Rani A. M.	Biofloc Technology for Effluent Management and Sustainability in Aquaculture	Faculty of Science, Department of Zoology, Tripura University, Tripura	25 September, 2020
Dr. Megha Bedekar	DNA Vaccines and their Application in Aquaculture	Fisheries College and Research Institute, Thoothukudi, Tamil Nadu	30 September, 2020
Dr. N. P. Sahu	Webinar on Marine Fisheries and Resources of West Coast: Sustainable Food and Economic Security of the Traditional Fishermen	ICAR- Central Marine Fisheries Research Institute, Mumbai	08 October, 2020
Dr. S. Munilkumar	Production and Use of Cladocerans in Aquaculture	Bharathidasan University, Tiruchirappalli, Tamil Nadu, LICA-2020	15 October, 2020
Dr. Rajendran K. V.	Viral Diseases Impacting Shrimp Aquaculture	Kerala University of Fisheries and Ocean Studies, Kochi. National Webinar on Aquatic Animal Health Management for Sustainability of Aquaculture Production	28 October, 2020
Dr. K. K. Krishnani	Biotechnological Applications in Aquaculture Development	Webinar by Department of Applied Zoology Mangalore University	12 November, 2020
Dr. Sunil Kumar Nayak	Role of Aquaculture in Doubling Farmer's Income	Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana	21 November, 2020
	Samanwit Matashya Palan	College of Fisheries Science, NDVSU, Jabalpur, Madhya Pradesh	27 November, 2020
Dr. Babitha Rani A. M.	Biofloc Technology in Aquaculture	College of Fisheries Alumni Association, Kerala University of Fisheries and Ocean Studies, Kochi, Kerala	06 December, 2020
Dr. Shobha Rawat	Fish Population Dynamics and Stock Assessment	Govind Ballabh Pant University of Technology and Agriculture, Pantnagar, Uttarakhand	06 December 2020 and 12-13 December 2020
Dr. Sunil Kumar Nayak	*Matashya Palan Evam Usase Hone Bale Labh* (In Bengali)	Agriculture Extension and Training Centre, Powarkheda, Hoshangabad, Madhya Pradesh	08 December, 2020
Dr. Megha Bedekar	Importance of Vaccination in Fish Health Management	Nanaji Deshmukh Veterinary Science University, Jabalpur, Madhya Pradesh	15 December, 2020

Dr. Shivaji Argade	Mainstreaming Women in Agriculture & Allied Areas" and "Gender, Livelihood and Micro Entrepreneurship	VAMNICOM, Pune	26 February, 2020
Dr. Shivaji Argade	Participatory Rural Appraisal	ATMA, Pune	27 February, 2020
Dr. Arpita Sharma	'Social Construction of Gender'.	ICAR-IVRI and NTR College of Veterinary Science, Gannavaram A.P.	14 April, 2020
Dr. Arpita Sharma	Sustainable Livelihood Development	Virtual Training Course Enhancing Income Through Sustainable Marine Fisheries in Post COVID 19 Era	11 May 2020
Dr. Arpita Sharma	IPR Issues in Fisheries and Aquaculture	National Webinar on Challenges, Opportunities and the Future of Indian Fisheries post COVID-19 Era	30 May, 2020
Dr. Arpita Sharma	Sustainable Fisheries Development in Socio-economic Context Towards Present Extremities	Webinar on Covid 19 and Fisheries: Potential Impacts, Mitigation and Management	18 June, 2020
Dr. Neha W. Qureshi	Descriptive Statistics, Graphical Analysis, Info graphics and Growth Rate Analysis and Data Mining Techniques in Fisheries	Dr. M.G.R. Fisheries College and Research Institute, TNJFU, Thalainayeru	17 August 2020
Dr. Neha W.Qureshi	COVID Challenges and Coping Strategies for Women in Fisheries and Aquaculture	Webinar Fisheries in COVID Times and After: Gender, Ground Truths and Growth	12-16 October, 2020
Dr. Arpita Sharma	Invited speaker: 'Gender and Migration'	National webinar on Migration and Feminization of Agriculture in India: Challenges and Opportunities	28 October, 2020
Dr. Arpita Sharma	Invited speaker: Gender As A System: Social Construction of Gender	Online Training Programme on Induction of Gender Concepts in Inland Fisheries and Aquaculture Sectors for Extension Functionaries	3 November, 2020
Dr. Arpita Sharma	Invited speaker and panel member: Allied Sector Extension	MANAGE dialogue on Future of Agricultural Extension and Advisory Services	19 November, 2020

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4.5. Guest Lectures Organised

Prof. Dr. K. K. Dwivedi
Vice-Chancellor,
The Institute of Technology and Management University, Gwalior, Madhya Pradesh
Liberal Arts Concepts for Higher Education
31 January, 2020

Mr. O. P. Saxena
Director, State Fisheries Department,
Govt. of Madhya Pradesh
Developing and Managing Fish Brood-Stock for Quality Seed Production
07 February, 2020

Status of Aquatic and Fisheries Resources of M.P. State
29 September, 2020

Mr. G. K. Verma
Founder/Entrepreneur
Maxbay Foods Pvt. Ltd
Entrepreneurship Opportunities in Fisheries
27 February, 2020

Mr. Siyaram Tiwari
MD, Indepth Management India Pvt. Ltd
Entrepreneurship Development in Fisheries
28 February, 2020

Dr. S. Chodhury
Associate Professor
West Bengal University of Animal and Fishery Sciences, Belgachia, Kolkata
Recent Advances in Fish Processing Technology
04 March, 2020

Mr. Kripan Sarkar
Entrepreneur
Rainbow Ornamental Fish Farm, Jalpaiguri, West Bengal
Role of Entrepreneurship in Fisheries and Aquaculture Development
05 March, 2020

Dr. Manish Kumar
Scientist,
Institute of Mineral and Material Technology, Council of Scientific and Industrial Research, Bhubaneswar, Orissa
Designer Biochars for Enhancing Aquaculture Productivity and Managing Associated Environmental Challenges
07 March, 2020

Dr. S. N. Biswas
Former Joint Director, Department of Fisheries, West Bengal
Orientation Aquaclinics and Aquapreneurship Development
11 March, 2020

Mr. Nitai Roy
Deputy General Manger, State Bank of India
Kamrup, Assam
Banking Services for Aquaculture Entrepreneurs
11 March, 2020

Dr. P. K. Mukhopadhyay
Retired Principal Scientist, ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar, Orissa
Tools and Implements in Aquaculture for One Stop Aquashop
12 March, 2020

Dr. T. J. Abraham
Professor
West Bengal University of Animal and Fishery Sciences, Belgachia, Kolkata
Fish Health Management: Bacterial Diseases and their Control
12 March, 2020

Dr. George John
Former Vice-Chancellor, Birsa Agriculture University, Ranchi, Jharkhand
The Technology Led Aquaculture Development
29 September, 2020

Mr. V. K. Shukla
Director,
State Fisheries Department, Govt. of Chhattisgarh
Status of Aquatic and Fisheries Resources of Chhattisgarh state
29 September, 2020

Dr. A. K. Panigrahi
Principal Scientist, ICAR-Central Institute of Brackishwater Aquaculture,
Chennai
Bio-floc in Freshwater Aquaculture
29 September, 2020

Dr. B. Meenakumari
Former Chairperson, Biodiversity Board
Challenges in Responsible Utilization of Biodiversity
12 October, 2020

Dr. K. Kathiresan
Prof CAS Marine Biology, Annamalai University, Chennai
How to Overcome Challenges in Responsible Utilization of Biodiversity
12 October, 2020

Dr. Arun K. Dhar
Director,
Aquaculture Pathology Laboratory,
School of Animal and Comparative Biomedical Sciences,
The University of Arizona, U.S.A
Expediting Pathogen Discovery in Shrimp by Combining Histopathology and Genomics
24 November, 2020

Dr. C. V. Mohan
Principal Scientist, World Fish, Malaysia
Aquatic Animal Health Within the Larger One Health Framework
24 November, 2020

Dr. Sudheesh P. S.
Project Leader (Aqua-USA), Merck Animal Health, U.S.A.
Aquaculture Vaccines: Path from Lab to Vial
24 November, 2020

Dr. Chumporn Soowannayan
Senior Researcher, Center-of-Excellence for Shrimp Molecular Biology and Biotechnology, Mahidol University, Thailand
Control of Acute Hepatopancreatic Necrosis Disease (AHPND) through the use of Biofilm Inhibitors
24 November, 2020

Mr. Y. Ravi Kumar
Managing Director,
Vaishaki Bio-Marine Pvt. Ltd,
Visakhapatnam, Andhra Pradesh
Indian Shrimp Aquaculture 2020: Caught Between the Pandemic and Epidemics
24 November, 2020

Mr. G. S. Bele
Assistant Soil Testing Officer
Soil Health, Collection of Soil Sample for Testing and Appropriate Use of Inorganic Fertilizers
05 December, 2020

4.6. Awards Received by Students

Mr. Sudhan C., *FRM-Ph.D. 2018-21*
Best Presentation Award
(Oral presentation)
Satyabhama Institute, Chennai
National Workshop on the Awareness of Marine Plastic Debris in Indian Seas (Pollution and Solution)-WAMP 2020
22-23 January, 2020

Mr. Tapas Paul, *AEM-M.F.Sc 2019-22*
Best Master's Thesis Award-2020
3rd International Symposium on Genomics in Aquaculture (ISGA-III),
ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar
23 January, 2020

Mr. Sudhan C., *FRM-Ph.D. 2018-21*
Second Best Poster Award
(Poster presentation)
Biodiversity of Gorai Creek,
United Way of Mumbai, Wetland Day 2020
02 February, 2020

Mr. Sudhan C., *FRM- Ph.D.2018-21*
Consolation Prize (Article writing)
Amrita Vishwa Vidyapeeth- National Article Writing Competition-2020
25 October, 2020

ICAR-CIFE Endowment awards announced on 31 October 2020

Dr. C. V. Kulkarni Best Ph.D. Student Research Award
2018: **Dr. Anutosh Paria,** *AAM-Ph.D.*
2019: **Dr. Neha Wajahat Qureshi,** *FEC-Ph.D.*

Dr. C. V. Kulkarni Best M.F.Sc. Student Research Award
2017: ***Mr. Vignesh. D.*** *PHT-M.F.Sc.*
2019: **Mr. Tapas Paul,** *AEM-M.F.Sc.*
2020: ***Ms. Abhilipsa Biswal,*** *FPB*

Dr. C. V. Kulkarni International Travel Award
2019: **Mr. Tapas Paul,** *AEM-M.F.Sc.*
2020: ***Ms. Abhilipsa Biswal,*** *FPB*

Dr. D. R. Jalihal Gold Medal (Best Thesis M.F.Sc.)
2018: **Mr. Rahul Krishnan,** *AAH -M.F.Sc.*
2019: ***Ms. Kasturi Chattopadhyay,*** *PHT-M.F.Sc.*
2020: **Mr. Kuntal Krishna Bera,** *AEM-M.F.Sc.*

Prof. Ravindranath Krothapalli International Travel Award

2018: ***Dr. Sandesh V. Patil,*** *FEX-M.F.Sc.*
2019: ***Dr. Somu Sunder Lingam R,*** *AQC-M.F.Sc.*

4.7. Papers Presented by Students in Conferences/Symposia etc.

Mr. Chanikya N. Bezawada, *FRM-2018-20*
Incidence of Microplastics in the Bivalves of Urban Beaches of Mumbai Coast and in Inland Fresh Water Lakes of Mumbai
International Symposium on Marine Ecosystem: Challenges and Opportunities, Kochi, Kerala
07-10 January, 2020

Mr. Tapas Paul, *AEM-2019-22*
Toxicological Effect of Triclosan on Panagasianodon hypophthalmus (Sauvage, 1878): Genotoxicity, Histology and Oxidative Stress
International Conference on Ecosystem Health and Fisheries of Indian Inland Waters: Multiple Stressors, Management and Conservation, College of Fisheries, Uttarakhand, India
17-19 February, 2020

Ms. Makamguang Kamei, *AQC-2016-19*
Study on growth of Lepidocephalichthys berdmorei (Blyth,1860) in Natural Habitats of Manipur
Ecosystem Health and Fisheries of Indian Inland Waters; Multiple Stressors, Management and Conservation
College of Fisheries, Uttarakhand, India
17-19 February, 2020

Ms. Ranjeeta Kumari, *AAHM-2014-17*
Development of a Novel shRNA Construct pSh-IRAK-4 for Silencing of IRAK-4 Gene and Delineating TLR-Mediated Pathway in Penaeus monodon in-vitro
Virtual Conference on Aquaculture Techniques and Disease Management, 2020
Sathyabama Institute, Chennai
14-17 September, 2020

Mr. Tapas Paul, *AEM–2019-22*
Triclosan as an Emergent Pollutant in Aquatic Biota: Present and Future Scenario
Online International Conference on Fisheries and Aquaculture (ICFA) Asian Institute of Technology, Thailand
26-27 November, 2020

4.8. International Training Attended by Students (Funded by NAHEP, ICAR-CIFE, Mumbai)

Mr. Vijay Kumar Mannur, *AEM-MA8-06*
Institute of Marine Research (Havforsknings Instituttet), Bergen, Norway
05 January-05 February, 2020

Ms. Nisha Chaupal, *FNFT-MA8-02*
Institute of Marine Research (Havforsknings instituttet), Bergen, Norway
05 January-05 February 2020

Ms. Hougaina Panmei, *AQC-PA7-08*
Interdisciplinary Centre of Marine and Environmental Research of the University of Porto, CIIMAR (Centro Interdisciplinar de Investigação Marinha e Ambiental) Avenida General Norton de Matos, Matosinhos, Portugal
07 January-07 February, 2020

Mr. Prasanta Jana, *FNFT-PA7-03*
Interdisciplinary Centre of Marine and Environmental Research of the University of Porto, CIIMAR (Centro Interdisciplinar de Investigação Marinha e Ambiental) Avenida General Norton de Matos, Matosinhos, Portugal
07 January-07 February, 2020

Mr. Sanjay C. S., *AQC-MA8-03*
Asian Institute of Technology (AIT), Bangkok
13 January-13 February, 2020

Mr. Manmohan Kumar, *AQC-PA7-05*
Lab of Aquaculture & Artemia Centre, Ghent University, Ghent, Belgium
13 January-12 February, 2020

Ms. V. Gomathy, *FEC-PA7-01*
Agribusiness and Applied Economics,
Director of Centre for Agricultural Policy and Trade Studies (CAPTS), North Dakota State University, USA
20 February-20 March, 2020

Mr. Velumani T., *FEX-PA7-02*
Michigan State University, East Lancing, Michigan, USA
20 February-20 March, 2020

Mr. Manas Kumar Maiti, *FNFT-PA8-01*
Norwegian
Institute of Food Fisheries and Aquaculture Research, Norway
08-16 March, 2020

4.9. Students Placement

Name of student	Place of posting
Dr. Irfan Ahmad Bhat, *FGB 2014-17*	University of Iceland, Reykjavík, Iceland
Assistant Professor	
Mr. Tasok Leya, *AAH 2015-18*	College of Fisheries, Birsa Agriculture University, Ranchi, Jharkhand
Mr. Gyandeep Gupta, *FPB 2017-20*	College of Fisheries, Birsa Agriculture University, Ranchi, Jharkhand
Mr. K. S. Wisdom, *FGB 2016-19*	College of Fisheries, Birsa Agriculture University, Ranchi, Jharkhand
Shweta Kumari, *FEX 2015-18*	College of Fisheries, Birsa Agriculture University, Ranchi, Jharkhand
Navghan Mahida, *FEC 2016-19*	Parul University, Vadodara, Gujarat
Senior Consultant (Fisheries)	
Mr. Ashutosh Kumar Singh, *AEM 2019-22*	Ministry of Fisheries, Animal Husbandry and Dairying, New Delhi
Fisheries Development Officer	
Ms. Charitha, *AAH 2017-19*	State Fisheries Department, Andhra Pradesh
Ms. Jettiboina Mahija, *FRM 2018-21*	State Fisheries Department, Andhra Pradesh
Ms. Mamatha Dasari, *AQC 2017-20*	State Fisheries Department, Andhra Pradesh
Mr. B. Madhusudhana Rao, *AAH 2017-20*	State Fisheries Department, Andhra Pradesh
Mr. Dharmaraj Patro, *FPB 2018-21*	State Fisheries Department, Andhra Pradesh
Mr. Sanjay Stephen, *FEC 2018-20*	State Fisheries Department, Andhra Pradesh
Ms. B. Pratibha, *AAH 2018-20*	State Fisheries Department, Andhra Pradesh
Ms. Sarvepalli V. Saivarshini, *FGB 2018-20*	State Fisheries Department, Andhra Pradesh
Ms. Daraivemula Asha, *FPB 2018-20*	State Fisheries Department, Andhra Pradesh
Ms. Dara Poojitha, *FBT 2018-20*	State Fisheries Department, Andhra Pradesh
Ms. Anjani DLSN, *FEC 2016-18*	State Fisheries Department, Andhra Pradesh
Mr. Pranab Dihingia, *AQC 2018-20*	State Fisheries Department, Assam
Ms. Jitika Sarkar, *AQC 2019-21*	State Fisheries Department, Assam
Ms. Sangita Bora, *PHT 2019-22*	State Fisheries Department, Assam
Mr. Samar Jyoti Chutia, *FBT 2017-19*	State Fisheries Department, Assam
Ms. Jyotishna Bora, *AEM 2019-21*	State Fisheries Department, Assam
Project Assistant	
Mr. Vel Selvi R., *FPB 2017-19*	National Agriculture Development Programme Scheme on Integrated Multi-Trophic Aquaculture based Culture Technology, Tamil Nadu
Senior Research Fellow	
Mr. Zahoor Mushtaq, *AAH 2017-20*	ICAR-Central Institute of Fisheries Education, Mumbai

05

Research Achievements

Institutional projects -

1. Effect of nutrients supplementation on selected vegetables & herbs in recirculating aquaponic system with Pangasius (*Pangasianodon hypophthalmus*)
2. Development of monoclonal antibody against *Flavobacterium columnare* and its use in rapid disease diagnosis
3. Risk assessment of emerging pollutant (Triclosan) in coastal water of Mumbai with a special reference to treatment strategies
4. Strategies for carbon sequestration to mitigate the effects of climate
5. Development of phytotherapy against *Argulus* parasite of fish
6. Improvement of harvest body weight of *Clarias magur* through genetic selection
7. Studies on synthesis and toxicity of bioconjugated carbon nanotubes in zebrafish model
8. Development of laboratory strains of zebrafish (*Danio rerio*) for biological studies
9. Assessing the impact of ICAR-CIFE's skill development programmes
10. Predictive modelling approach for inland fisheries management under climate change scenario
11. Percolation tank based aquaculture for tribals in Nashik district, Maharashtra by convergence of corporate social responsibility in aquaculture (CCSRA) model
12. Green feed for carp
13. Strategies to enhance feed intake and growth in carps during winter months
14. Effect of phytoestrogens on the reproductive performance of fish and its mitigation through nutritional intervention
15. Enhancing the utilisation of non-food fish and seaweed through technology refinement and upscaling
16. Effect of extraneous factors on trophic chain linked to non-conventional resources for sustainable management
17. Development of a multi-species brackishwater fish culture model
18. Development of package of practice for *Anabas testudineus* in eastern region of India
19. Studies on biological nutrient recovery from culturing of pangasius, *Pangasianodon hypophthalmus* (Sauvage, 1978) by seasonal vegetable & herbs in aquaponic system
20. Enhancing fish productivity through farmer participatory research in selected districts of Manipur (Chandel) and Madhya Pradesh (Barwani)
21. Evaluation of toxico-physiological effect of dietary cyanotoxin in selected carp species

Effect of nutrients supplementation on selected vegetables & herbs in recirculating aquaponic system with Pangasius (*Pangasianodon hypophthalmus*)

2019-22

A. K. Verma, P. P. Srivastava, Vidya Shree Bharti, Tincy Varghese and Madhuri Pathak

Technical Associate: ***Chandrakant M.H.***

Fig 1. Experimental unit to optimize the component ratio of *P. hypophthalmus* and mint in aquaponics

Fig 2. Experimental unit to determine the effect of potassium on *P. hypophthalmus*-spinach aquaponics

An experimental aquaponic system consisting of 30 identical rectangular fish tanks of 150 L capacity each (water volume 100 L) in combination with Nutrient Film Technique (NFT) hydroponics for plants was set. The experimental design consisted of 5 treatments (1 control and 4 treatments), each with 3 randomly assigned replicates (15 tanks each for two experiments). The first experiment aimed at determining the influence of component ratio on the growth of *Pangasianodon hypophthalmus* (Sauvage, 1878) and mint (*Mentha arvensis*) in an aquaponic system. *P. hypophthalmus* was stocked at the rate of 2.4 kg/m^3 (control without plants) and at the rate of 2.4 kg/ m^3, 2.8 kg/ m^3, 3.2 kg/ m^3 and 3.6 kg/ m^3, respectively in consecutive treatments with mint at the rate of 12 plants in NFT. Experimental unit for optimizing the component ratio of *P. hypophthalmus* and mint in aquaponics is shown in Fig. 1. The other trial aimed in determining the effect of potassium supplementation on the growth performance of *P. hypophthalmus* (Sauvage, 1878) and *Spinacia oleracea* L. in the aquaponic system. Fish were stocked in identical rectangular tanks (15 numbers) at the rate of 2.8 kg/ m^3 with 12 plants in NFT hydroponics. The system ensured a complete recirculation of water from the culture tank *via* a pump that directed the water to a filtration system made up of geotextile fabric and gravel before it entered the NFT component and finally recirculated back to the culture system. The experimental data analysis for various water quality parameters *viz*. dissolved oxygen (DO), alkalinity, hardness, total ammoniacal nitrogen (TAN), nitrite- nitrogen, nitrate -nitrogen etc. and mineral profile of water (potassium, sodium, calcium, etc.) was performed weekly, and fish and plant growth were recorded fortnightly for both the trials. The experiment on potassium supplementation unravels the physiological response of fish upon the different potassium dosage by scrutinizing the stress parameters in the *P. hypophthalamus* as well as the significance of supplementation on spinach growth and elemental composition.

Development of monoclonal antibody against *Flavobacterium columnare* and its use in rapid disease diagnosis

2019-21

Megha Kadam Bedekar, K. V. Rajendran, Gayatri Tripathi and Jeena K.

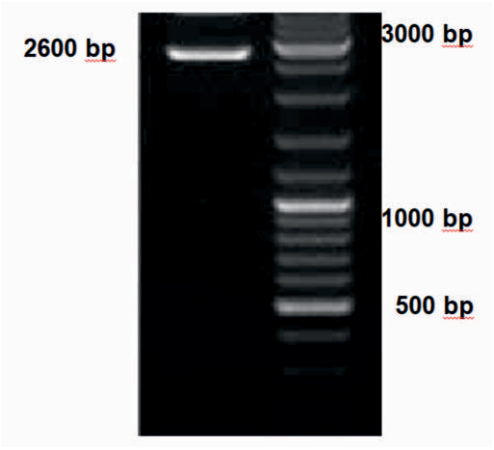


Fig. 1. Agarose gel electrophoresis (0.8 %), showing PCR amplification of Chondroitin AC lyase gene (2600 bp)

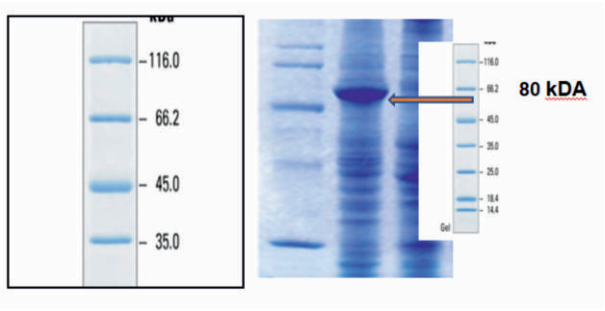


Fig. 2. Discontinuous 10% SDS PAGE showing 80kDA Chondroitin AC lyase recombinant protein

The project aims to develop monoclonal antibody (MAb) against *Flavobacterium columnare* (fish origin) strain isolated from local area. The project has been designed to identify the suitable candidate gene for developing MAb, and to validate the MAbs for sero-diagnosis of *F. columnare* antigen in field cases. For achieving these targets, we selected some candidate genes for MAb production. We have analysed the protein chosen for its suitability for MAb production by prediction methods, and we cloned and produced the recombinant protein. Based on the *in silico* review of proteins of *F. columnare* gene, Chondroitin AC lyase (AY912281) sequence was selected for targeting MAb production. The amino acid sequence of the protein was studied for its potential antigenicity for inducing MAb production by using prediction tools. The protein belongs to glycosaminoglycan (GAG) polysaccharide lyase family. This family consists of a group of secreted bacterial lyase enzymes capable of acting on glycosaminoglycans, such as hyaluronan and chondroitin, in the extracellular matrix of host tissues. Total length of gene: 2640 bp, Total amino acid sequence length: 761 aa Linear; Approximate predicted protein size in 80kDA; Open reading frame is from 157 – 2442 bp. Secondary structure prediction showed three motifs in protein and β sheets dominance in protein. Three important motifs were identified in the protein namely i) Alpha Alpha barrel, ii) Beta plated distorted sandwich and iii) Beta plated sandwich. The tertiary structure of the proteins was predicted using https://swissmodel.expasy.org/ and PDB http://www.ebi.ac.uk/thornton-srv/databases/cgi-bin/pdbsum. The structure

depicted parallel and antiparallel β sheets making a motif like structure by using α helix and loop skeleton generated by the position of amino acids. Antigenicity prediction found few important immunogenic regions in this protein. The recombinant protein was produced using competent *E. coli* cells BL 21 (Novagen) and the vector chosen for prokaryotic expression of the protein was pET 32a (Novagen).

Risk assessment of emerging pollutant (Triclosan) in coastal water of Mumbai with a special reference to treatment strategies

2019-21

Kundan Kumar, S. P. Shukla and Saurav Kumar

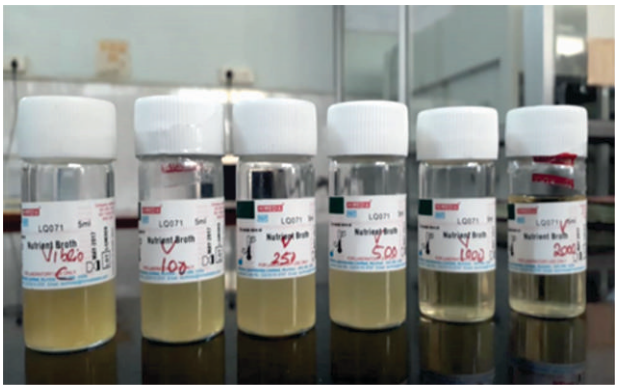


Fig. *In vitro* test of bacteria exposed to graded concentration of TCS

The study was undertaken to screen the Triclosan tolerant bacteria from the Versova creek. Water sample after serial dilution was spread over the triclosan supplemented agar plate with 200 ppm, and typical colonies with higher abundance were aseptically picked and streaked in a new plate for identification using VITEK® 2 automated bacterial identification system. The Minimum Inhibitory Concentration (MIC) was determined for the TCS tolerant bacterial isolates. Three bacterial isolates were identified from a creek water sample, namely *Sphingomonas paucimobilis*, *Vibrio fluvialis* and *Chromobacterium violaceum* with high TCS tolerance (TCS MIC of 1000, 1000 and 2000 mg/L, respectively). Further, all three bacteria were able to degrade and use TCS as a carbon source. The tolerance to TCS may be attributed to the presence of the TCS resistance gene(s) in the bacteria.

Strategies for carbon sequestration to mitigate the effects of climate

Sub-Project A:

Assessing carbon sequestration capacity and GHG emission potential and its mitigation under different aquaculture system

2019-22

Vidya Shree Bharti, Gayatri Tripathi, Hari Krishna, S. K. Nayak and G. Rathi Bhuvaneswari

Carbon sequestration in aquaculture system is affected by different management practices (ploughing, liming, manuring and fertilization, stocking and feeding etc). These

RATE OF SOIL C SEQUESTRATION (MEAN ± SE) IN SHRIMP POND BEFORE STOCKING

Treatment	Age of the pond (yr)	Sediment depth (cm)	Sediment accumulation rate (cm yr^{-1})	Bulk-density (g cm^{-3})	Organic carbon (%)	Carbon sequestration rate (kg/ha/ yr)
C	0+	1.087±0.54	1.087±0.54	1.491±0.02	0.477 ± 0.121	530 ± 120
T1	6	9.925±0.67	1.654±0.11	1.021 ± 0.05	0.626 ± 0.101	1062 ± 104
T2	6	11.27±0.26	1.879±0.43	1.076 ± 0.06	0.616 ± 0.670	1297±124
T3	7	13.42±0.22	1.918±0.03	1.123 ± 0.08	0.495 ± 0.103	1075 ± 66

Rate of soil carbon sequestration (mean ± SE, n = 4) after completion of culture period

Treatment	Age of the ponds (yr)	Sediment depth (cm)	Sediment accumulation rate (cm yr^{-1})	Bulk-density (g cm^{-3})	Organic carbon (%)	Carbon sequestration rate (kg/ha/yr)
T1	6.5	10.77±0.768	1.677±0.114	1.059 ± 0.152	0.570 ± 0.009	1012^{a} ± 210
T2	6.5	12.25 ±0.26	1.884±0.039	1.054 ± 0.042	0.836 ± 0.044	1660^{a} ± 54
T3	7.5	14.4 ±0.216	1.921±0.096	1.065 ± 0.017	0.784 ± 0.033	1603^{b} ± 156

practices affect soil organic carbon and its fraction. The soil carbon sequestration rate is varied from 530 ± 120 kg/h/year in control ponds (fallow pond) to 1297 ± 124 kg/h/year in treatment ponds (cultured pond), and carbon sequestration rate increased almost two times in all treatment ponds over 6 to 7 years of the culture period compared to control ponds. Three forms of soil organic carbon *i.e.*, very labile carbon, labile carbon and non-labile carbon were estimated in the fallow pond and shrimp culture system with varying stocking density (30, 45 and 60 no. /m^2). Among the three fractions, labile carbon varied significantly with the aquaculture intervention and it is the early sensitive indicator of the overall soil organic carbon stock change. The soil carbon sequestration rate increased in both treatment T2 and T3 by 28% and 49%, respectively compared to initial values. Among all the different carbon fractions studied total carbon (TC), total organic carbon (TOC) and total inorganic carbon (TIC) did not show any significant difference between initial and final sediment samples. The oxidizable C accounted 51-59% of TOC levels whereas, non-labile fractions accounted 41-49% of TOC levels.

Sub project B:

Documentation, inventorization and bioprospecting of micro-algae of freshwater, habitats of Maharashtra for atmospheric carbon sequestration

2019-22

S. P. Shukla, Kundan Kumar, G. Rathi Bhuvaneswari and Saurav Kumar

The work on amendment of culture medium, dry weight estimation and carbon content in the dry biomass have been initiated on the algal strains already isolated and maintained in the laboratory.

Fig. Cemented raceways with submerged culture mixing assembly

The design and trial of cemented raceways with submerged culture mixing assembly has been completed (Fig.). The analysis of growth, pigment composition, dry weight of *Spirulina* maintained in the laboratory has been completed (batch cultures).

Development of phytotherapy against *Argulus* parasite of fish

2017-20

Ram Prakash Raman, K. V. Rajendran and Saurav Kumar

The present study was conducted to screen various extracts of neem, *Azadirachta indica* leaf prepared using organic and aqueous solvents of concentration ranging from 1.0 to 3.5 g/L for its antiparasitic effect (AE) against various life stages including adult *Argulus japonicus* in goldfish, *Carassius auratus* under *in vitro* and *in vivo* conditions.

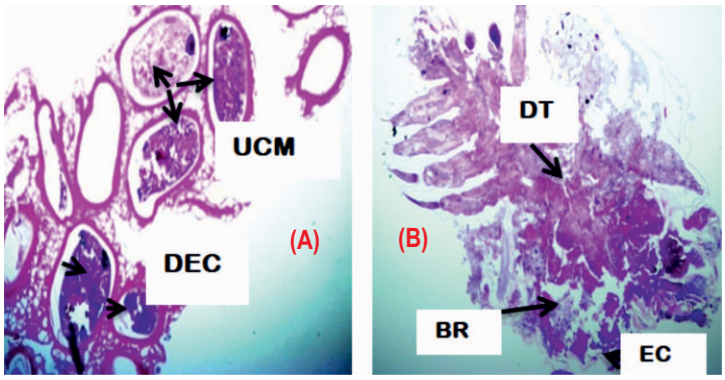


Fig. 1 (A) Eggs (B) Copepodide stage of of *Argulus japonicus* treated with 1.5 g/L of ethanolic extract of neem leaf for 6 h under *in vitro* condition

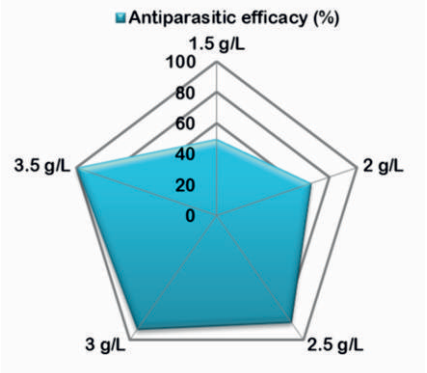


Fig. 2: *In vivo* 72 h antiparasitic efficacy (AE in %) of aqueous extract of *A. indica* leaf solutions against *A. japonicus* through bath treatment in *C. auratus*.

This work demonstrates that among the organic solvent extracts, the ethanolic extract of *A. indica* leaf showed significantly high AE with significantly reduced cumulative hatching percentage of eggs by 13±3 % at 1.5 g/L within a 15-day exposure than the control group (85 ± 5% hatching). The ethanolic extract was also effective against the copepodid stage (Fig.1 A &B) of the *A. japonicus* showed an AE of 100% at 1.5 g/L in 6 h under *in vitro* condition. The remarked histological changes were observed in the treated eggs showing an undifferentiated decaying mass of cells (UCM) with pronounced surface wrinkles, decaying embryonic cells (DEC) however; an extensive degeneration in the branchial region (BR), digestive tract (DT) and eye cells (EC) was observed in the copepodids treated with ethanol extract (Fig. 2). Although, the ethanolic extract was very effective in controlling various life stages of Argulus, it is not safe to treat the parasite under *in vivo* conditions.

Further, aqueous extract of *A. indica* leaf (3.5 g/L) caused 100% mortality of adult *A. japonicus* with an acceptable level of therapeutic index value of 1.796 at 72 h under *in vivo* condition (Fig. 2). This shows that the aqueous extract of neem leaf has the potential to control *A. japonicus* infection in goldfish and, therefore, can be used in the management of argulosis. Additionally, the advantages associated with aqueous extract in comparison to organic solvent based extracts are easy to prepare and apply, environmental friendly and economical. Antiparasitic efficacy of aqueous *A. indica* leaf

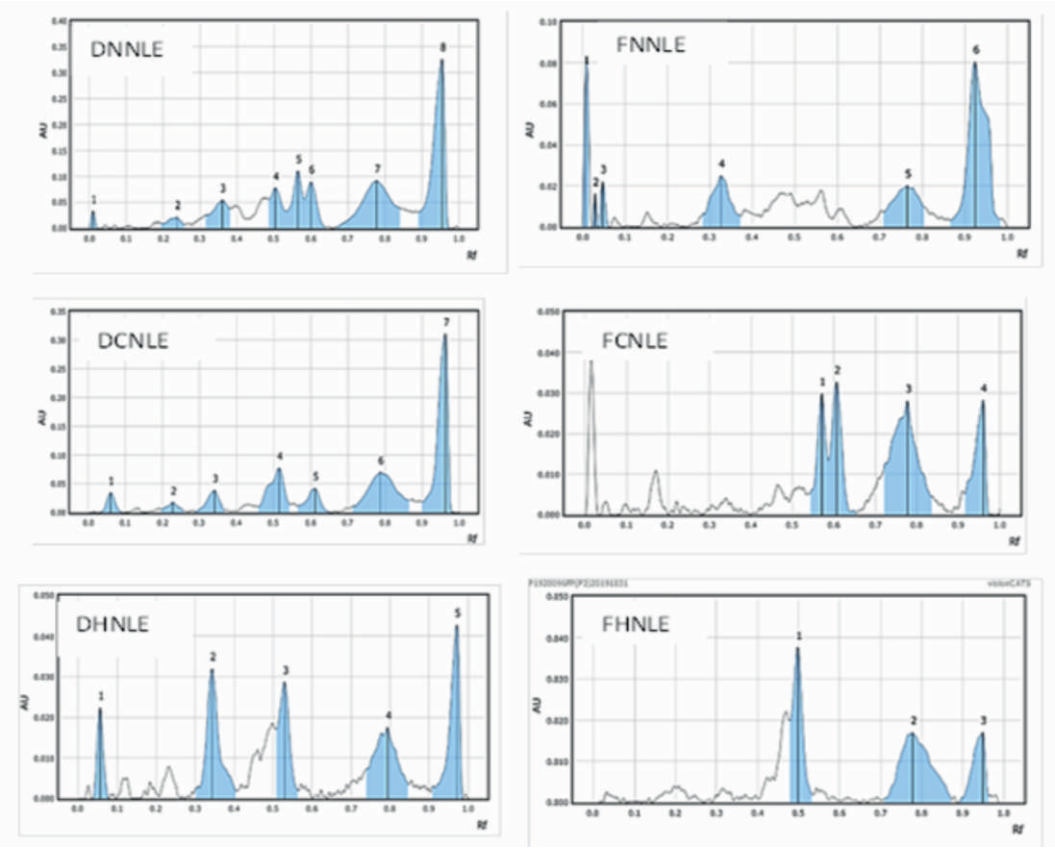


Figure 3. High performance thin liquid chromatography (HPTLC) analysis for screening the phytochemicals of prepared extracts

extract depends on the form of leaf (dried vs. fresh) and water temperature used to prepare the solution.

The present study also demonstrated a higher antiparasitic efficacy of aqueous extract of dried *A. indica* leaf in comparison to fresh leaf against *A. japonicus* under both in vitro and in vivo condition. Besides, the prepared aqueous dried *A. indica* leaf extract using water at room temperature (25 °C) in contrast to cold (4 °C) and hot (60 °C) was found more effective against the parasite. It is also evidenced during high performance thin liquid chromatography (HPTLC) analysis for screening the phytochemicals of prepared extracts that a higher diversity in bands in terms of alkaloids, saponins, flavonoids, terpenoid and tannins are present in *A. indica* leaf extract when prepared using normal water and dried leaf (Fig. 3). Further, the results of present study reveal the time dependent reduction in antiparasitic efficacy of aqueous extract of neem leaf but can be extended by storing in refrigerated temperature. However, mode of delivery through bath treatment was found suitable for aquarium system and a pouch containing dried neem powder was developed for ready to administer in the system.

Improvement of harvest body weight of *Clarias magur* through genetic selection

2017-22

Shrinivas Jahageerdar, Thongam Ibemcha Chanu, Arun Sharma, Sunil Kumar Nayak, Shamna N., Sikendra Kumar and Dhalongsaih Reang

The average body weight of magur at harvest after one-year culture was 134.92±0.99 g. Variations in the growth pattern were observed both within and between the families. The Trellis plot depicting the growth trajectories of individual animals within families confirms the same. The heritability estimate for the body weight was 0.44±0.07 at harvest. The accuracy of this estimate is influenced by several factors including the family structure, sample size, model, and the methods employed for estimation. In addition, the accuracy of variance components is also critical for correct estimates of heritability and breeding values by Linear Mixed Models. Usually, REML is the method of choice in pedigreed selection experiments, but it assumes a large sample size and sufficient data is often not available to fulfil the conditions of optimal likelihood estimates. Therefore, the use of alternative approaches for the evaluation of uncertainties in variance components and their functions is required. Sampling-based methods are an option for estimating uncertainties associated with the parameter estimates. Here, it was hypothesized that if the sample size does contain sufficient information, the estimates obtained from various approaches should essentially agree. The results indicated that the Bayesian and non-parametric bootstrap methods (NPBS) may be employed as alternatives to REML when the information content of the data is questionable.

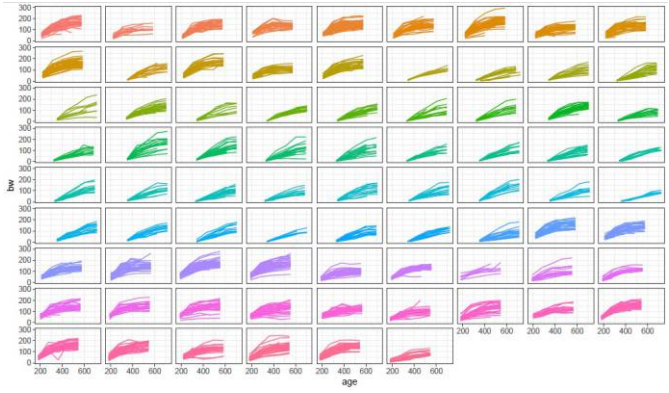


Fig.1. Trellis plot depicting the growth trajectories of individual animals within families

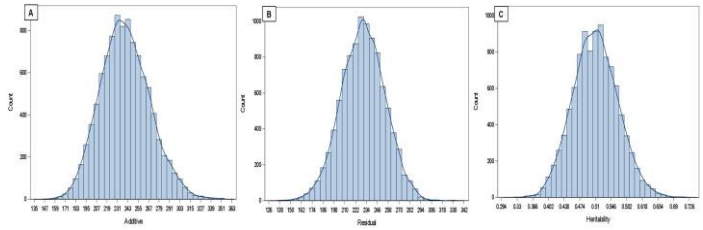


Fig.2. Distribution of additive and residual variance and heritability

Studies on synthesis and toxicity of bioconjugated carbon nanotubes in zebrafish model

2019-22

Rupam Sharma, Mujahidkhan A. Pathan, Gireesh Babu P., Gayatri Tripathi, Aparna Chaudhari and Pravin Walke

Technical Associate: ***Nalini Poojary***

Four types of multi-walled carbon nanotubes (MWCNTs) were synthesized by chemical vapor deposition (CVD) method using methane as carbon source and ferrocene as the catalyst. Quartz substrates were used for deposition. The four MWCNTs are pristine,

OH-functionalized, COOH-functionalized and BSA-functionalized. Particle sizes and the morphology were studied using scanning electron microscopy (SEM) and high resolution transmission electron microscopy (HR-TEM). The zeta potential of all the nanotubes was determined by DLS nanoparticle analyzer and zeta sizer. Further characterization was done by Fourier transform infra-red spectroscopy (FTIR) and Raman spectroscopy to confirm the quality and presence of functional groups in the CNTs. The LC50 values for BSA-, COOH- OH- and P- MWCNTs were estimated to be 150.45 mg/L, 228.62 mg/L, 285.81 mg/L and 237.38 mg/L, respectively in zebrafish embryos at 96 h. These values were calculated using Procprobit analysis of SAS 9.3. The toxicity of the CNTs was assessed by studying heart beats, embryonic deformities and histological changes. The biogenic synthesis of CNT is currently being carried out where green catalysts are being used.

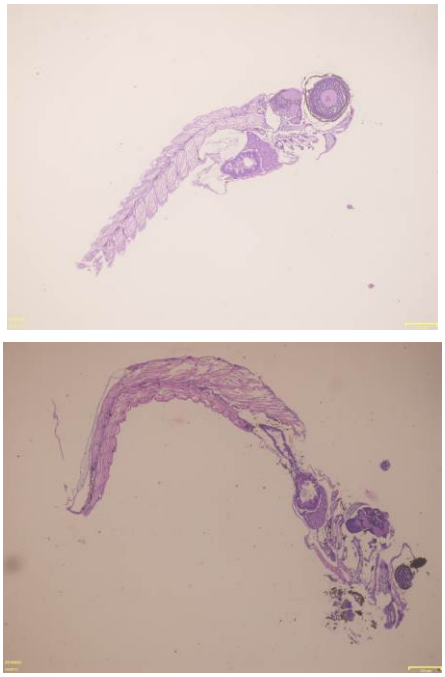


Fig. Zebrafish larvae at 96 h
(i) Control (ii) Exposed to LC20 of BSA-MWCNT

Development of laboratory strains of zebrafish (*Danio rerio*) for biological studies

2019-22

Mujahidkhan Pathan, Aparna Chaudhari, Angom Lenin Singh, Mahendra Sonawane and Kalidas Kohale

Modern genomic research is heavily dependent on zebrafish strains. The zebrafish fraternity is looking for polymorphic strains suitable for genetic mapping studies and as well as inbred strains used for various purposes. At CZeBraG, ICAR-CIFE, the goal is to develop three inbred lines and maintain the inbreeding level. These will be further crossed to generate a polymorphic line. During the reporting period 116 families of zebrafish were generated for the Assam line and mixed line and also produced by random mating. The inbreeding coefficient Fx of the Assam line ranged from 0 to 0.4375. Fecundity was recorded for all the zebrafish bred till date and results convey no significant effect of inbreeding on this trait. For genetic monitoring, 54 primers for microsatellite loci reported in zebrafish were designed and testing of primers and standardization of PCR is in progress.

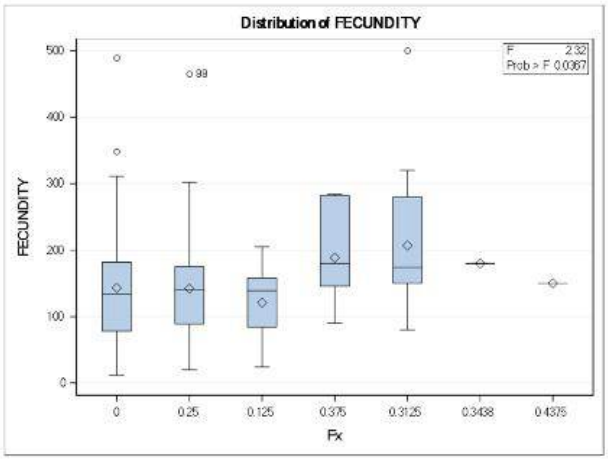


Fig. Variation in fecundity of zebrafish of Assam line at various levels of inbreeding

Assessing the impact of ICAR-CIFE's skill development programmes

2020-23

Shivaji Argade, S. N. Ojha, Ananthan P. S, Neha Qureshi, G. H. Pailan, Murlidhar P. Ande, Hari Krishna, Sunil Kumar Nayak and Md. Akalakur

Technical Associate: ***Dasari Bhoomaiah***

Skill development training aims to impart new knowledge and skill as well as build up favourable attitude among the trainees. Evaluating a farmers' knowledge and attitude towards skill development training will help to assess the training effectiveness and adoption probability of learnt knowledge and skill. The present study evaluated the impact of Skill Development Trainings (SDTs) entitled "*Mithe Pani Me Machhali Palan* (Freshwater Aquaculture)" on fish farmers' knowledge and attitude from different districts of Bihar State, India. Primary data were collected from randomly selected 250 trainees using feedback proforma and mobile phonic survey methodology. The first three levels of training evaluation model given by Kirkpatrick and Kirkpatrick were followed for measuring the immediate impact of skill development trainings. Data were subjected to descriptive and Z-test statistics. It was found that out of 250 trainees, majority (68.80%) of trainees had very low (28.80%) to low (40%) level of knowledge before the training, while 14% of trainees had low level of knowledge after the training. About 29% of the trainees had high level of knowledge before the training, while 36.40% of trainees had high level of knowledge after the training. None of trainees were found in the category of very high level of knowledge before the training which has increased to 13.60% after the training. The 'Z' test analysis between pre-training mean knowledge score (7.90) and post-training mean knowledge score (11.80) clearly indicated that SDTs had significant (*p=0.000*) positive impact on knowledge level of trainees. Almost half of the trainees exhibited high (34.40%) to very high (14.80%) level of favourable attitude towards SDTs who would be potential adopters of learnt knowledge and skills. Other side, about 23.60% trainees showed medium favourable attitude followed by less favourable (17.20%) towards SDTs. Certainly, host institution should have to think about enriching the training content in order to convert trainee's less favourable attitude to more favourable attitude towards SDTs which would ultimately contribute to their improved adoption and performance at farm level. The majority of trainees suggested that provision of information on central and state government schemes for promoting fish farming, more number of practical exposure visits to successful aquapreneur's farm, follow up training with same trainees, training in March or April months of the year to observe running hatcheries, preparation and marketing of fish value added products, practical demonstration on fish disease identification and management and biofloc technology must be incorporated in the training modules for strengthening skill development trainings and sustaining their impact in the field of fish farmers.

Predictive modelling approach for inland fisheries management under climate change scenario

2018-21

Vinod Kumar Yadav and S. N. Ojha

The different models- ARIMA, ARIMAX (ARIMA with Exogenous variables), ANN and NARX-ANN (Non–linear auto regressive with exogenous variable) were developed and compared on Maharashtra inland fish production data. Forecast of total inland fish production along with climatic variables (mean maximum temperature; mean minimum temperature; total rainfall, and mean wind speed) of Maharashtra state was also done. All the methods and models used in the study were tested using hold-out data, and the inclusion of climatic variables made the forecasts more accurate. Also, NARX-ANN performed better than ARIMAX in all cases. The results of the future scenario of total inland fish production were depicted and discussed in representing the mean percentage increase or decrease in total inland fish production corresponding to the simultaneous percentage increase/decrease (0 to 1 % with 10 equal intervals) in two most important significant variables (Mean max temperature, total rainfall/wind speed) obtained from sensitivity analysis.

The sensitivity analysis of climatic variables with fish production of Dimbe reservoir of Maharashtra state was done using ANN (Artificial Neural Network Method) and GAM (Generalized Additive Model) and it was found that TMRF (Total Monthly Rainfall) and MMAX(Mean Maximum Temperature) were the two significant variables. The fish production has negative relation with MMAX and positive relation with TMRF. It was also found that most of fish production data are coming with the MMAX ranged from 28 to 33 degree centigrade and TMRF ranged from 30 to 75mm.

Simulating the climatic variables under different climate change scenario (A_2B, A_1B) and prediction of Inland fish production of Maharashtra state and its selected reservoirs in simulated scenario are in process.

Percolation tank based aquaculture for tribals in Nashik district, Maharashtra by convergence of corporate social responsibility in aquaculture (CCSRA) model

2019-22

Arpita Sharma, K. K. Krishnani, K. Pani Prasad and Ajit K. Verma

Local Coordinators: ***Susanta Rout*** *and* ***Sachin Giram,*** *CSR Division, BOSCH, Nashik*

Fisheries and aquaculture has immense opportunities for the corporate sector's participation. These opportunities are already bringing private players but if there is a common aim of sustainable livelihood development by exploring synergies between different stakeholders for cumulative synchronised growth, that will contribute towards Sustainable Development Goals (SDGs). One such corporate sector participation is through Corporate Social Responsibility (CSR). Accordingly, in this project, Convergence of Corporate Social Responsibility in Aquaculture (CCSRA) model was implemented where Government organization ICAR-CIFE, Mumbai, CSR Department of a private sector company (BOSCH) and tribal youth converged to initiate aquaculture in

Lakshmanpada village percolation tank in Nashik, Maharashtra for livelihood development.

Participatory Rural Appraisal conducted in the village revealed that community residing around the percolation tanks is Thakar tribe which originally lived in hilly areas of Maharashtra. They are educated but had no knowledge or experience of aquaculture. The tribal youth group 'Laksh Yuva Gram Vikas Gat' with 15 members was formed under this project.

Trainings in Marathi and hindi were conducted in the village *anganwaadi* for 'Laksh Yuva Gram Vikas Gat' members and villagers by adopting Borich's TNA model and Knowledge, Skill, Attitude and Aspirations (KASA) assessment followed by training impact studies. Water availability in the tank was studied along with complete water analysis in the ICAR-CIFE Aquaculture laboratory. Overall, the water quality parameters were found within optimum ranges and suitable for freshwater culture. Advisories on seed stocking, growth monitoring, feeding were provided by project team. BOSCH CSR team was engaged in local coordination and provided inputs to 'Laksh Yuva Gram Vikas Gat' resulting in initiation of aquaculture in Lakshmanpada percolation tank.

Telephonic and in person aquaculture and extension advisories are being provided regularly to the group and BOSCH CSR by project team via text/video/audio in

Fig.1. Fish farming activities on site and growth monitoring of sampled fish stock at Lakshmanpada percolation tank, Nashik, Maharashtra

Hindi/Marathi. Visual confirmation though mobile phone is done by Laksh Yuva Gram Vikas Gat' members where text/photo/video/ audio messages are posted on group about meetings, completion of allotted tasks in real time, fish growth, feeding etc by uploading visual proof *via* smartphone. This has increased social ownership where all are engaged and learn from each other.

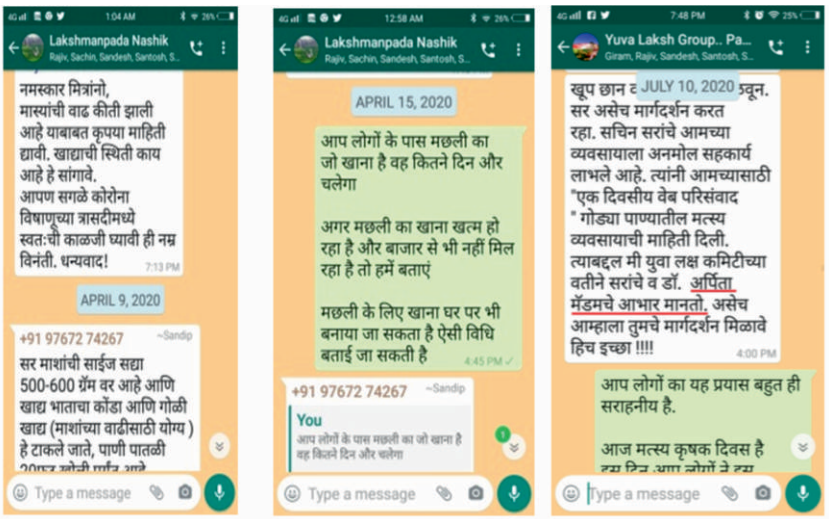


Fig.2 : Advisories provided to members during fish farming

An unexpected challenge of Covid - 19 pandemic and the lockdown was a huge setback in fish growth, input and fund availability. There were challenges to undertake online training programmes as there was a learning curve in the beginning. Basic training to use various online platforms was provided and '*Laksh Yuva Gram Vikas Gat*' members were motivated to participate in training programmes in Hindi/Marathi conducted by different organizations. They earned e-certificates from more than 5 programmes.

In addition, all efforts were made to provide advisories and keep the group engaged in times of crisis to instil confidence and provide motivation. Advisory services through small WhatsApp group using text/audio/video messages have proved to be efficient.

However, due to constraints of lack of funds and inputs during the lockdown period the fish growth was not as expected and only partial harvesting was done ensuring nutritional security. Second year stocking was less than the recommended number due to fund and seed availability constraint. Even with these challenges, aquaculture could be initiated for livelihood development in an untapped water body with the adoption of CCSRA model.

- Even with challenges, aquaculture can be done in percolation tanks if guidelines are followed.
- Innovative extension model of Convergence of CSR in Aquaculture (CCSRA) has scope and is useful for sustainable livelihood development and nutritional security.

Green feed for carp

2018-20

N. P. Sahu, P. P. Srivastava, G. H. Pailan, P. Sardar, Subodh Gupta, Munil Kumar, S. Dasgupta, Ashutosh D. Deo, Sujata Sahoo, Md. Aklakur, Sikendra Kumar, Tincy Varghese, Shamna N, Manish Jayant, Dilip Kumar Singh

a) Evaluation of leafmeal:

Three leafmeals *viz*. *Moringa oleifera, Eichhornia crassipes, Trifolium alexandrinum* were evaluated in the diet of *Labeo rohita* fingerlings.

***1. Moringa oleifera leaf meal* (MOLM)**

It could be incorporated up to 15% by replacing 50% MOC (30% inclusion level) in the diet of *Labeo rohita* without compromising the growth of fish. However, fermented *Moringa oleifera leaf meal* (FMOLM) could be incorporated up to 30% in replacement of 100% MOC in the diet of *Labeo rohita* with comparatively better growth performance and physio-biochemical responses of fish (Fig. 1).

ANFs such as tannin, phytic acid, saponin, alkaloid, total oxalates, total flavonoids contents were 15.64, 11.09, 1081.53, 522.00, 300.75 and 405.96 mg/100g, respectively in raw MOLM. Solid-state fermentation of MOLM with *Aspergillus niger* for 7 days lowered the ANFs *viz*. tannin, phytic acid, saponin, alkaloid, and total oxalate contents by 27.52, 47.20, 92.85, 45.59, and 37.16%, respectively. However, total flavonoids content was increased by 31.77%.

***2. Eichhornia crassipes* leaf meal (ELM):**

At 15% dietary inclusion of *Eichhornia* leaf meal (50% DORB replacement), *Cyprinus carpio* fingerlings exhibited higher growth performance than control and other dietary treatments. However, the growth performance was similar in 0% (control) and 30% dietary raw or fermented Eichhornia leaf meal fed groups and might be suggested as cost-effective feeding strategy for common carp fingerlings (Fig. 2).

***3. Trifolium alexandrinum* (Berseem) leafmeal (BLM) and Berseem protein concentrate (BLPC):**

Berseem leaf meal (BLM) can replace 50% DORB in the diet of *Labeo rohita* without affecting the growth, feed efficiency ratio, health and immune status (Fig 3). However, Berseem leaf protein concentrate (BLPC) can replace 50% SBM (soybean meal) in the diet of *Labeo rohita* without affecting the weight gain, SGR, FER and PER (Fig 4). More than 50% inclusion of BLM and BLPC adversely affected the growth, feed conversion and bio-chemical parameters of *L. rohita* fingerlings (Fig. 3 & 4). ANFs such as tannin, phytic acid, saponin, alkaloid, total oxalates and trypsin inhibitor contents were 0.34 %, 4.29 mg/100g, 0.91%, 3.46 %, 3.94 (mg/g) and 48.84 mg/100 g, respectively in raw BLM. Processing of BLM to berseem leaf protein concentrate (BLPC) reduced the ANFs viz. tannin, phytic acid, saponin, total oxalates and trypsin inhibitor by 41.20, 15.61, 73.60, 90.29 and 21.97 %, respectively, while alkaloid content was increased by 60.40%.

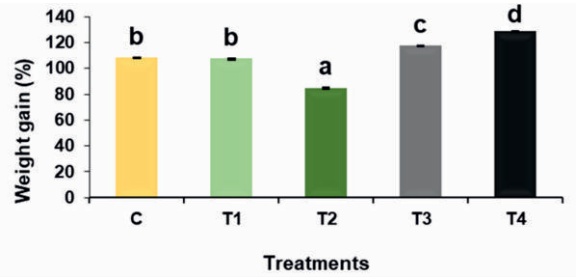


Fig1. Weight gain (%) of *L. rohita* fed with *Moringa oleifera* leafmeal based diet

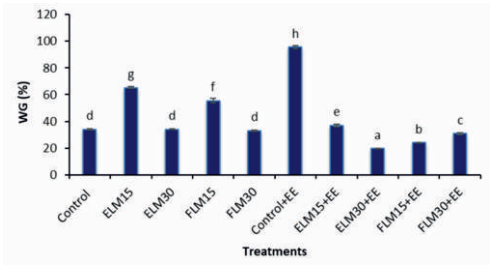


Fig 2. Weight gain (%) of *Cyprinus carpio* fed with *Eichhornia crassipes* leafmeal based diet (ELM- Eichhornia leaf meal; FLM- Fermented leaf meal; EE-exogenous enzymes)

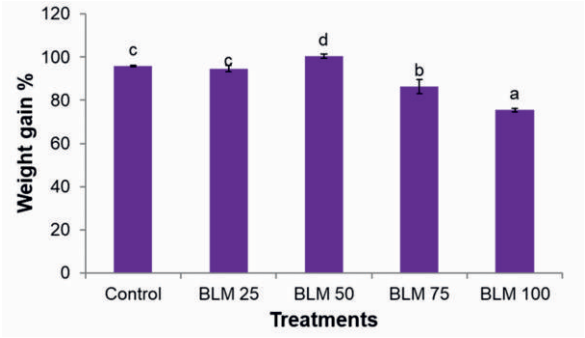


Fig 3. Weight gain (%) of *L. rohita* fed with Berseem leafmeal (BLM) based diet

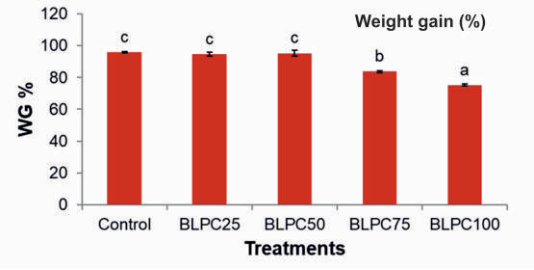


Fig 4. Weight gain (%) of *L. rohita* fed with Berseem leaf protein concentrate (BLPC) based diet

b) Strategies to enhance the utilization of mixed leaf meal (MLM)

Five leafmeal (sweet potato, sesbania, groundnut, lucaena and lemon grass) were blended together in an equal proportions to enhance the nutritional quality, and for dilutions of ANFs in final mixed leafmeal (MLM). These leafmeal were subjected for solid-state fermentation (SSF) with either *Aspergillus niger* and/or *Chaetomium globosum* for 120 h. The results of feeding trial exhibited negative effects on growth and feed conversion in *L. rohita* fingerlings. However, alternate day feeding of fermented MLM (30% inclusion) and 30% DORB (30% inclusion) based diet (C/T30) enhanced the nutrient utilization and growth performance in *L. rohita* fingerlings (Fig 5).

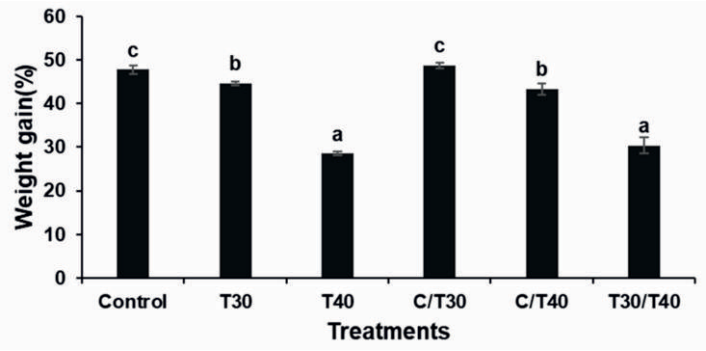


Fig 5. Weight gain (%) of *L. rohita diet* fed with mixed leaf meal based diet

c) Evaluation of castor protein isolate (CPI) in the diet of *L. rohita* fingerlings

Five iso-nitrogenous isonitrogenous (354.62 g CP/kg diet) and isocaloric (422.56 kcal GE 100/g diet) experimental diets were prepared and supplemented with L-lysine and DL-methionine as per the requirements. Soyabean protein isolate (SPI) was used as the major protein source in the control diet (without castor protein isolate (CPI)). The CPI successively replaced 25, 50, 75, and 100 % of SPI protein and designated as CPI25,

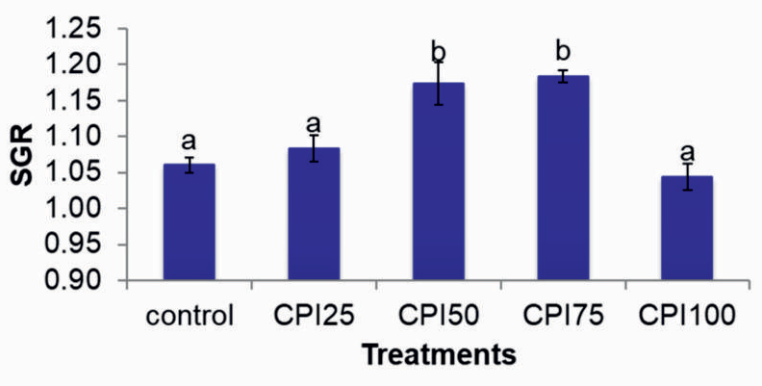


Fig.6: SGR of *L. rohita* fed with different level of castor protein isolate

CPI50, CPI75, and CPI100, respectively on protein equivalent basis. The CPI thereby contributes 0%, 11.73%, 22.67%, 33.20% and 43.73% of the total dietary protein. *L. rohita* fingerlings attained the best growth and feed conversion (P<0.05) in CPI50 and CPI75 fed groups. While similar growth rates, feed conversion and protein retention (P>0.05) were recorded in rohu fingerlings of control, PI25 and PI100 groups (Fig. 6). Based on the results, it can be concluded that CPI could be incorporated at 164.0 g/kg inclusion (complete substitution of soybean protein isolate) in the diet of *L. rohita*.

d) Evaluation of CPI or sweet potato leaf meal in the diet of *L. rohita* fingerlings

Fermented sweet potato leafmeal (FSPLM) can replace 100% DORB in the diet of *L. rohita* fingerlings. Growth performance, nutrient utilization and physio-biochemical indices were not affected (P>0.05) by dietary CPI and FSPLM. CPI and FSPLM can serve as protein and energy source and can replace 100% SPI and 100% DORB in the diet of *L. rohita*.

Strategies to enhance feed intake and growth in carps during winter months

2019-22

Ashutosh D. Deo, Md. Aklakur, Shamna N, Manish Jayant, Subodh Gupta and N.P. Sahu

The experiment was conducted to evaluate the *in vitro* antioxidant property of crude extract (hesperidin rich acid-alkali extract) prepared from the peel of Mandarin orange (*Citrus reticulata*) as presented in Fig. 7. The dry matter recovery of the prepared extract was found to be 1.80 %. The anti-oxidative property of the crude extract was evaluated by using ferric reducing analysis of plasma (FRAP) and 2, 2-diphenyl-1-picryl-hydrazyl-hydrate (DPPH) assays at 5.00, 2.50, and 1.25 mg/ml and compared with pure hesperidin (chemical grade, 80% purity) of similar concentration. FRAP value and DPPH inhibition were positively correlated with the concentration of crude and /or pure hesperidin; exhibiting maximum activities at 5 mg/ml (P<0.05). Hesperidin rich crude extract (HRCE) at 5mg/ml exhibited significantly higher FRAP value than all the concentration of pure hesperidin. DPPH inhibition (%) also followed the similar trend (P<0.05). In addition, both antioxidative properties of flavonoid compounds (crude and pure hesperidin) were tested in the experimental diets.

Five isonitrogenous (32% crude protein) and iso-calorific (333.46 Kcal/100g) diets were prepared using different concentrations of HRCE. The diets *viz*. control (0% HRCE), T1 (0.5% pure hesperidin), T2 (1.0 % pure hesperidin), T3 (0.5% HRCE), and T4 (1.0 % HRCE) were evaluated to test their anti-oxidative properties based on FRAP and DPPH

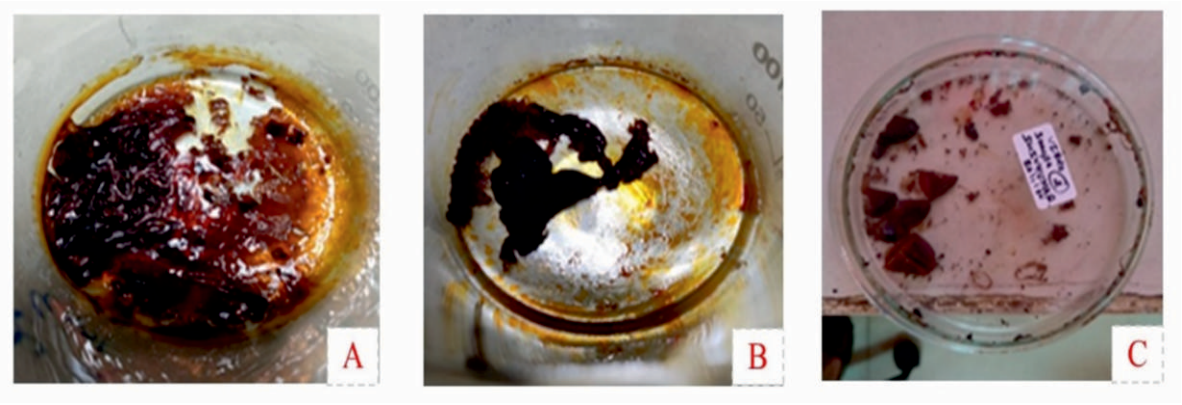


Fig. (A) Ethanolic (B) Aqueous and (C) Crude flavanone/ hesperidin extract prepared from orange peel

assays under *in-vitro* conditions. The diet containing 1.0 % HRCE (T4) exhibited significantly higher FRAP value (20.94 mmol Fe^{2+}/g) followed by 1.0 % pure hesperidin (T2), 0.5% HRCE (T3), 0.5% pure hesperidin (T1), and minimum value was observed in the control diet (P<0.05). FRAP value was higher in treatment groups than the commercial feed (except T1).

Similarly, maximum DPPH inhibition was observed in the group fed with diet containing 1.0 % HRCE and minimum in the control group. HRCE containing diets exhibited more scavenging properties than the diets containing pure hesperidin at the same inclusion level (P<0.05). Flavonoids compounds (mainly hesperidin) containing diets were shown to exhibit more DPPH activities compare to commercial and control diet. Therefore, it can be concluded that the supplementation of crude flavanoids extract rich in hesperidin compound improves the anti-oxidative properties of the diets.

Effect of phytoestrogens on the reproductive performance of fish and its mitigation through nutritional intervention

2019-22

Subodh Gupta, P. P. Srivastava, Tincy Varghese and Sunil Kumar Nayak

Soybean meal, a widely used aquafeed ingredient, is a rich source of phytoestrogen called genistein and daidzein. A 60-day feeding trial was conducted to determine the effect of dietary genistein on inducing vitellogenesis in reproductively active male and female *Cyprinus carpio*. Adult male and female *C. carpio* were fed with graded levels of genistein viz., 0, 1, 3, 6 and 9 mg% which is equivalent to 0, 4.5, 13, 27 and 40.5% inclusion of soybean meal in fish feed (based on the genistein content of 22.57 mg/100 g in defatted soybean meal (Fig. 1).

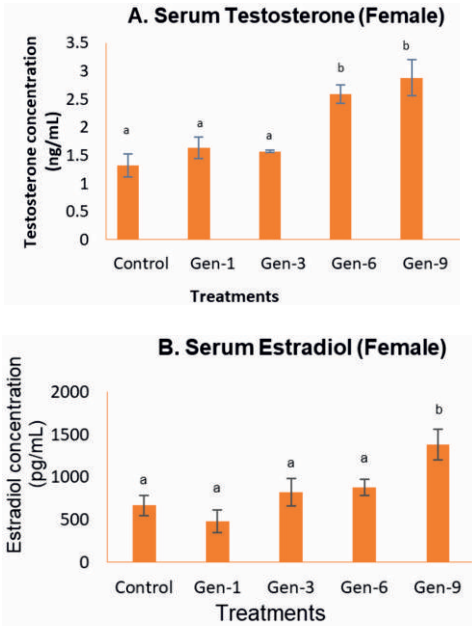


Fig. 1. Concentration of (A) Serum testosterone and (B) Serum estradiol of female *C. carpio* fed with graded levels of genistein

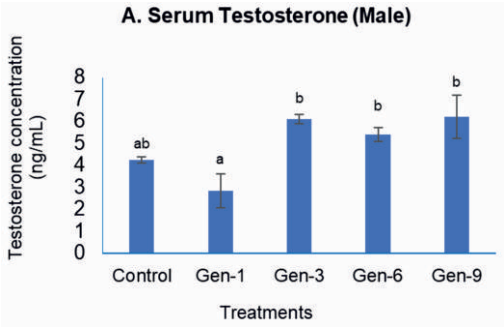


Fig. 2. Relative expression of (A)cyp19a1 mRNA to *β-actin* in ovary and (B)cyp19b mRNA to *β-actin* in brain of male *C. carpio* fed with graded level of genistein.

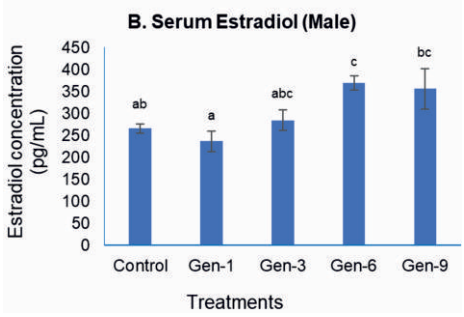


Fig. 3. Relative expression of vitellogenin (*vtgb2*) to *β-actin* in liver of (A) female and (B) male *C. carpio* fed with graded level of genistein (ΔΔCT)

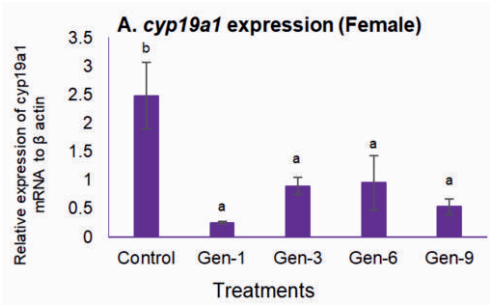


Fig 4. Phase distribution of oocyte in ovary of *C. carpio* fed with graded levels of genistein

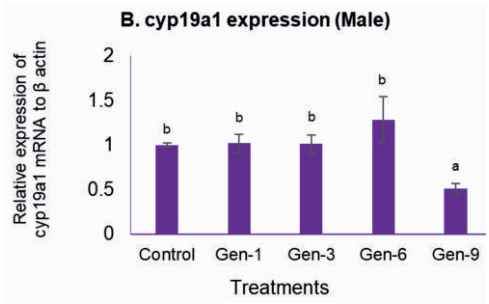


Fig. 5. Histological examination of the ovary

The impact of genistein in adult male and female *C. carpio* showed opposite trend to each other. Dietary genistein induced the testosterone and estradiol level in female *C. carpio* at 6 mg% and higher dose (Fig. 1). Genistein induced the serum estradiol in male *C. carpio* from 6 mg% onwards than control (Fig. 2).

The expression level of ovarian aromatase enzyme responsible for the conversion of testosterone to estradiol in the gonads were inhibited by genistein dose at 1 mg% in female while at 9 mg% in male *C. carpio* (Fig. 2). The estrogen receptor-β (erβ) expression was reduced in male and female while erα expression was increased in both male and female in genistein fed *C.carpio*. Dietary genistein reduced vitellogenesis in female while induced in male *C. carpio* when fed with 6 mg% onwards (Fig. 3). Increase in the dose of dietary genistein caused significant reduction in the number and size of vitellogenic oocyte in the ovary of *C. carpio* (Fig. 4 & 5).

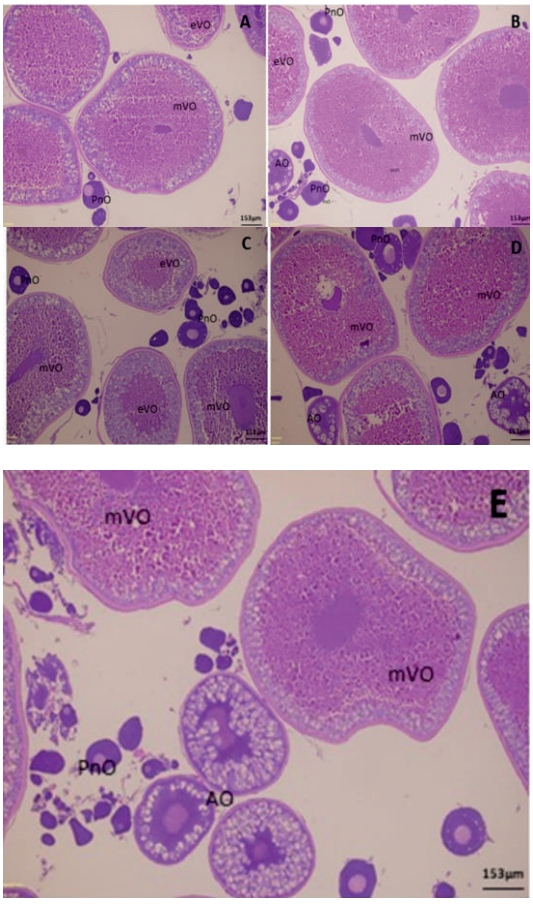


Fig.6. Histology of ovary dissected from control (A), Gen-1(B), Gen-3 (C), Gen-6 (D) and Gen-9 (E) groups; Abbreviations: mVO- mid vitellogenic oocyte; eVO- early vitellogenic oocyte; AO- alveolar oocyte; PnO- peri-nucleolar oocyte.

Enhancing the utilisation of non-food fish and seaweed through technology refinement and upscaling

Subproject: Innovative approaches towards sustainable production and use of selected live feed

2018-20

Gopal Krishna, Shamna N., Babitha Rani A. M., Rathi Bhuvaneswari, Upasana Sahoo, Sikendra Kumar, Jeena K. and Shashi Bhushan

A prototype for tubifex culture has been developed. The project has come out with two designs of low cost portable tubifex unit with locally procured material viz, a vertical RAS unit and a horizontal RAS unit. The vertical unit has small trays and a water holding tank. The water gets circulated among the trays through the inlet and outlet pipes attached in each tray. Water flow in the system is controlled to ensure the growth of the tubifex colony. In addition, a horizontal RAS based tubifex culture unit made of rectangular FRP tanks also has been developed. The standardized media used in both the system is a combination of soil (25%), ground nut oil cake (25%) and vegetable wastes (50%). The results of proximate analysis revealed that the crude protein, ether extract, total ash, crude fiber and nitrogen-free extract contents of tubifex (on dry weight basis) were 51.90, 8.14, 5.30, 2.04 and 32.62 % respectively.

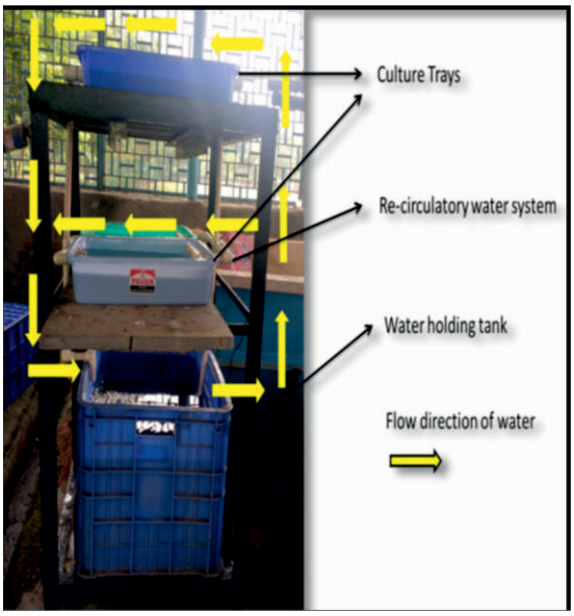


Fig 1. Setup of vertical tubifex unit

The sub culture of *Nannochloropsis* and *Isochrysis* spp. was done and culture of few more microalgae has been planned once the laboratory set-up is done. The outdoor culture of zooplanktons- moina, daphnia and rotifers has been planned to set-up.

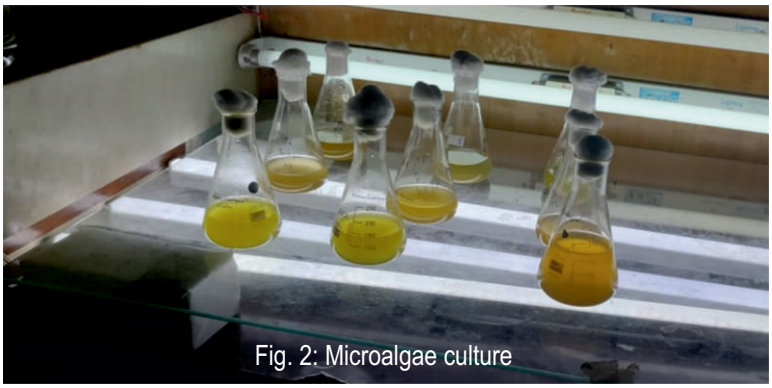


Fig. 2: Microalgae culture

Nutritional intervention for reduction of solid wastes and retention of nitrogen and phosphorus in recirculatory aquaculture of GIFT tipalia, *Oreochromis niloticus*

2020-23

Sikendra Kumar, Ashutosh D. Deo, A. K. Verma, Md. Aklakur and Tincy Varghese

The setup for recirculating aquaculture system (RAS) has been established. The repairing work such as installation of high-density curtains for protecting it from the direct sunlight and wind is under progress. The procurement of floating feed (35% crude protein & 6 % lipid) for the first experiment i.e. release of nitrogen and phosphorus in RAS of GIFT tilapia, *Oreochromis niloticus* is under progress.

Division

Fisheries Resources, Harvest and Post-Harvest Management

Effect of extraneous factors on trophic chain linked to non-conventional resources for sustainable management

2017-20

Geetanjali Deshmukhe, B. B. Nayak, Latha Shenoy, Ashok K. Jaiswar, A. K. Balange, Asha T. Landge, Zeba J. Abidi, Sanath Kumar, Manjusha L., Martin Xavier, Shashi Bhushan, Karan Ramteke and Layana P.

Technical Associates:

Satish Kamat, M. K. Chouksey, Avinash Sable, Pawan Kumar and B.T. Phande

In overall hauls, the maximum contribution was by discards (75%), commercial catch (23%) and marine debris (2%). Analysis of category-wise marine debris showed that plastics were the most dominant (56.90%) followed by fishing materials (20.20%), natural debris (18.80%) and rubber materials (4.10%). Average juvenile percentage per haul was estimated at 40%, followed by discard catch of adult fishes (35%), commercial catch of adult fishes (23%) and marine debris (2%). The trophic level of fishes showed maximum (35%) were in Mid-level carnivores followed by Top predators (22%), omnivores (21%), and High level carnivores (20%) whereas herbivores and detrivores were only 2%. FiB (Fish in Balance) index calculated was -0.06027

Cookies were developed incorporating different concentration of seaweeds. Cookies incorporated with 40% seaweed powder resulted in overall higher acceptability.

Fig. 1: Fish catch of dominant fish and shellfish

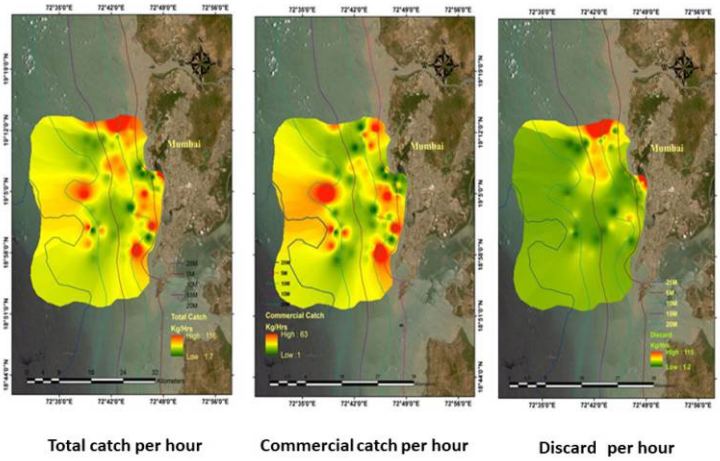


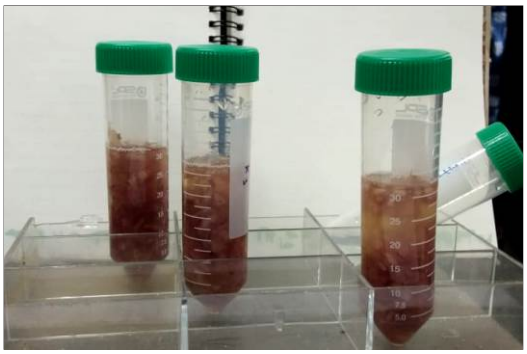
Fig. 2 : Map showing total catch, commercial fish catch and discard per hour in the sampling area

Enhancing the utilisation of non-food fish and seaweed through technology refinement and upscaling

Subproject: Evaluation of bioactivity of protein hydrolysate from seaweed

2018-20

Gopal Krishna, Manjusha L., Martin Xavier K. A., Layana P., Kundan Kumar, Saurav Kumar, Karan Kumar Ramteke, Vinod Kumar Yadav



Extraction of seaweed powder for protein hydrolysate preparation

Seaweeds such as *Kappaphycus* sp. *Gracilaria* sp., *Sargassum* sp., *Enteromorpha* sp., *Ulva lactuca*, *Padina* sp., *Chaetomorpha* sp., *Caulerpa* sp., *Sargassum* sp., and *Dictyota* sp. belonging to different families were collected and screened for their protein and moisture contents. In comparison with brown and green seaweeds, a higher protein content of 21.35-25.44 g/100g was observed in red seaweeds. Protein hydrolysates were prepared from dried seaweed powder using the enzymes alcalase and trypsin at enzyme to substrate ratio of 1:100, at a temperature of 50°C and pH 8 by hydrolysing for 5 hours. The degree of hydrolysis observed in brown seaweed hydrolysates such as those from *Sargassum* sp., and *Padina* sp. was higher compared to green and red ones. Hence, further studies of the bioactive potential of these protein hydrolysates were done by determining their antioxidant, antihypertensive and antidiabetic activities in-vitro. Among all the seaweed-enzyme combinations analysed, the protein hydrolysate prepared from brown seaweed *Padina* sp. using the enzyme alcalase showed higher bioactivity in terms of antioxidant (99.34% free radical inhibition), antihypertensive (95.04% ACE inhibitory activity) and antidiabetic activities (97.72% ß-glucosidase inhibitory activity). These results highlight the significance of bioactivity of seaweed protein hydrolysate which can be further utilized for their inclusion in pharmaceutical products for human and animal use.

Development of a multi-species brackishwater fish culture model

2019-22

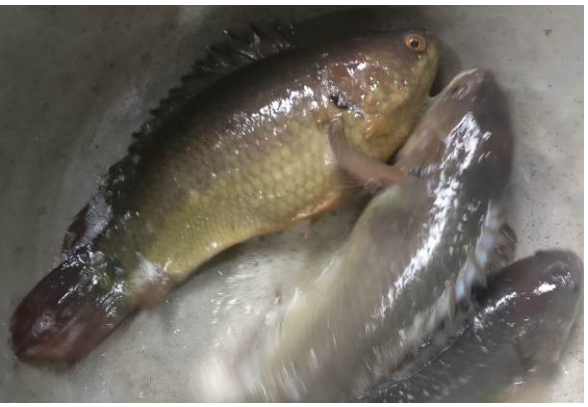
Muralidhar P. Ande, Karthireddy Syamala and K. V. Rajendran

Technical Associates: ***P. Srinivasa Rao, R. R. S. Patnaik***

An experiment was carried out in two experimental ponds of 0.5 acre each (2000 m^2). The first year of the project consists of the multispecies model with milkfish, *Chanos chanos, mudcrab, Scylla serrata, Seabass, Lates calcarifer*. The duration of the culture is 8 months.

The experimental ponds were dried and treated with tea seed cake @ 5ppm for the removal of unwanted weed fishes. The ponds were filled with water after 10-15 days. The stocking density for milkfish was 500 no. Milkfish with an average weight of 60 grams were stocked in both experimental ponds. The culture of mud crabs was carried out in individual floating boxes. A total number of 100 boxes were installed in each experimental pond. Crabs of 61 grams average weight were stocked in individual boxes. *L. calcarifer* fry of 1-2.5 inch size was stocked at the rate of 200 no. in each pond. At the end of the experiment, *C. chanos* attained a weight of 350 g.

The first crop of mud crabs were stocked with crabs of initial weight 61.12 g, which attained a weight of 250 g after a 6-months culture period, with a survival of 78%. *L. calcarifer* fingerlings of 1-2.5 inches (41 g) were stocked in the experimental ponds, which attained a weight of 143 g at the end of 4- month culture duration. In the second crop, mud crabs with an average initial weight of 71 g were stocked. After 3 months, these grew to 127 g with a survival rate of 85%.



Anabas testudineus (female)

Anabas testudineus (male)

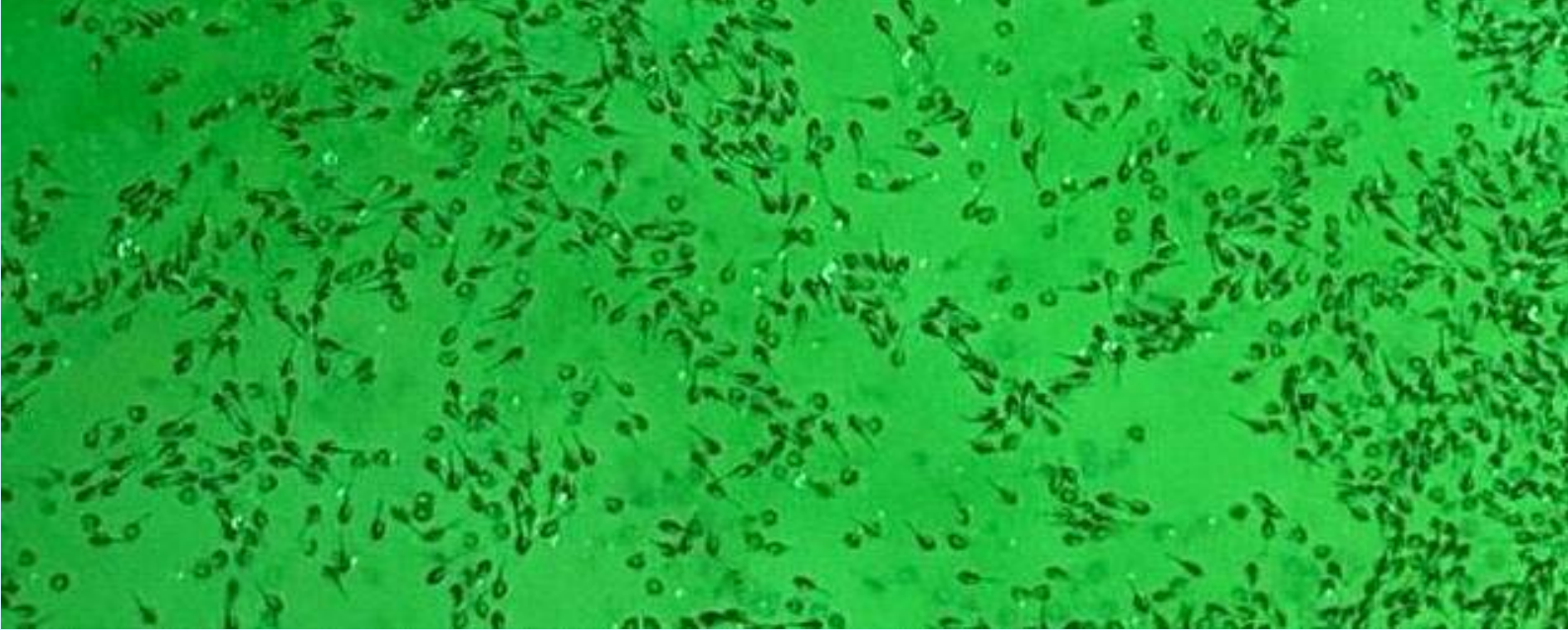
Development of package of practice for *Anabas testudineus* in Eastern region of India

2019-22

G. H. Pailan, B. K. Mahapatra, S. Munilkumar, S. Dasgupta, S. Sahoo, Md. Aklakur and D. K. Singh

Mass scale high-density larval rearing was attempted in three 350 litre FRP tanks with an average stocking density of 112±62.25 per litre with 5-day old larvae. It was observed that the average survival rate was 24±10.20 per litre at the end of 15 days rearing period producing 25200 post-larvae during the trial. Another experiment with varying stocking densities was performed to determine the optimum stocking density ranging from 10-60 larvae per litre in 4-litre glass cisterns with 2-day old larvae. Size of these larvae ranged from 4.33±0.47 to 8.3±0.47 mm length and 1.67±0.23 to 6.85±1.41 mg weight. The water quality parameters recorded during these trials were 32^{0}C -36^{0}C temperature, 7.6-8.5 pH, 7.5-8.5 mg/L dissolved oxygen and 0.1-0.5 mg/L ammonia. The highest survival rate was 50% in 10 larvae/L tanks. However, the larval density of 40/L yielding 32% survival could be the optimum density for commercial-scale operation.

Another experiment was conducted to determine the optimum stocking density for rearing of *Anabas testudineus* fry to fingerling over a period of 90 days. Five treatments *viz*. T1, T2, T3, T4 and T5 with three replicates were chosen randomly and *Anabas testudineus* fry (1.0 g average weight) was stocked in 50 L FRP tank containing 20 L water at the rate of 10, 20, 30, 40 and 50 fish per tank in respective treatments. Fish were fed on experimental diet containing 35% CP. Variation in water quality parameters were observed among different treatments and all the values were within the acceptable and suitable range for fish culture. Under the experimental condition, different treatments showed different growth rates. The growth rate of individual fish decreased with the increase in stocking density. Comparatively higher individual weight gain was observed in treatments T1 and T2. Survival rate negatively correlated with the socking density,



with the lower stocking density showing higher survival rates. SOD and Catalase activity of gill and liver tissues was estimated. The data showed similar increasing trend with increase in stocking density for both the tissues. This may be due to the adopted response towards the stress caused by increased stocking density. The experimental findings suggested that stocking density of 1 fish /L might be optimum for rearing of fry to fingerling in *Anabas testudineus*.

An experiment was conducted to evaluate the effects of different feeds on gonadal development in *Anabas testudineus*. Fish (body weight 35-65 g) were reared in cement tanks for 120 days at a density of 26 no./m3 with a male to female sex ratio of 1:1. The brood fish fed either with feed 1 (CIFABROOD) or with feed 2 (isonitrogenous and isoenergetic to CIFA Brood) at a rate of 3% body weight twice a day. Fish fed with feed 1 showed the highest gonadosomatic index (10.54 ± 0.65 %) in females; however the GSI of males (1.09-1.14%) did not show significant effect of feeds. The reproductive maturity of females on feed 1 was lower compared to the fish on feed 2. The maturity in males showed just opposite trend. The overall observations indicate that the formulated feed was better than CIFABROOD for developing spawning capability in females, whereas CIFABROOD showed promising for male maturity compared to the formulated feed. Interestingly, the ovarian growth was better in fish fed on CIFABROOD.

Centre

Powarkheda

Studies on Biological nutrient recovery from culturing of Pangasius, *Pangasianodon hypophthalmus* (Sauvage, 1978) by seasonal vegetable & herbs in aquaponic system

2019-22

Sunil Kumar Nayak, A. K. Verma, Dhalongsaih Reand, Arun Sharma

Technical Associates: Hasan Javed

Aquaponics unit has been set up at ICAR-CIFE Powarkheda Centre with 30 tanks. Okra plants with *Pangasius* are being grown in recirculating aquaponics system. Each tank has 44 fish of 4.5g average size and 6 Okra plants.

Centre

Motipur

Evaluation of toxico-physiological effect of dietary cyanotoxin in selected carp

2019-22

Md. Aklakur, Ashutosh D. Deo, D. K. Singh and G. H. Pailan

A preliminary study was carried out at Kolkata Center on the effect of dietary cyanobacteria in *Catla catla*. An algal culture facility along with the experiment facility for the project has been developed at the Motipur Center. The second experiment is in progress at Motipur Center. The study found a slow growth rate at higher dose (more than 2.5 %) of the blue green algae in fish feed. Experiments involving the includsion of Microcystins in Catla diet is in progress at Motipur Center and with the mixed BGA inclusion at Kolkata Centre.

Externally Funded Projects

1. Network project on ornamental fish breeding and culture
2. Molecular screening, cell culture-based isolation and characterization of finfish and shellfish viruses and establishment of national repository
3. Understanding molecular basis of host-pathogen environment interaction of Tilapia lake virus disease
4. Development of dual combination vaccine for protection of *Labeo rohita* to bacterial pathogens *Flavobacterium columnare and Edwardsiella tarda*
5. Characterization of mucosal immunoglobins in tilapia and development of ELISA for diagnosis of Tilapia Lake Virus (TiLV) infection
6. Biomass production and downstream processing of *Spirulina (Arthrospira) platensis* for high-purity colorant grade Phycocyanin extraction
7. All India network project on fish health
8. National surveillance programme for aquatic animal diseases
9. Network Project on Assessment of AMR in micro-organisms associated with fisheries and aquaculture in India
10. Protein expression profiling of *Labeo rohita* using quantitative proteomics
11. Molecular and genetic characterization of selected important ornamental fishes of North-East India
12. Development of nursery based system for Pacific white shrimp, *Litopenaeus vannamei*, using ground inland saline water, and assessment of physiological and immunological parameters in single phase and two phase farming system
13. DNA barcoding and domestication of ornamental fishes of the Chindwin and Barak Surma Meghna river basins of North-East India
14. Captive maturation, breeding and culture of some indigenous ornamental fishes of Assam
15. Establishment of Amur common carp/Jayanti rohu hatchery and seed production unit for quality fish seed dissemination

Network project on Ornamental fish breeding and culture: Technology development on captive breeding and seed production of selected indigenous ornamental fishes native to North-eastern Hill regions and Western Ghats.

2018-24

Paramita Banerjee Sawant, N. K. Chadha, B. K. Mahapatra and Gayatri Tripathi

Funding agency: Indian Council of Agricultural Research (ICAR), New Delhi

Rs. 160.20 Lakhs

The project is operational at ICAR-CIFE, Mumbai and Kolkata Centre. Seven species of indigenous ornamental fishes have been taken up (three at Mumbai and four at Kolkata Centre) for captive maturation and breeding. Water quality parameters standardised, broodstock developed and breeding trials were carried out for all the seven species. Courtship behaviour was studied and conditions being standardised for captive breeding and larval rearing for the first time. Out of the seven species, trials are ongoing for breeding of zebra loach, yellow panchax and jerdon barb at Mumbai. According to the International Union for Conservation of Nature (IUCN), the zebra loach (*Botia striata*) is currently endangered in the wild due to habitat alteration combined with a small native range. Biological studies successfully carried out to throw light on length-weight relationships (LWRs), indicating b value for zebra loach within the expected range of 2.5–3.5. Sexes were separated and experiment initiated on broodstock development in 20 L covered aquarium tanks, fed according to a fixed schedule up to satiation with various broodstock diet plans and positive results obtained in terms of gonad

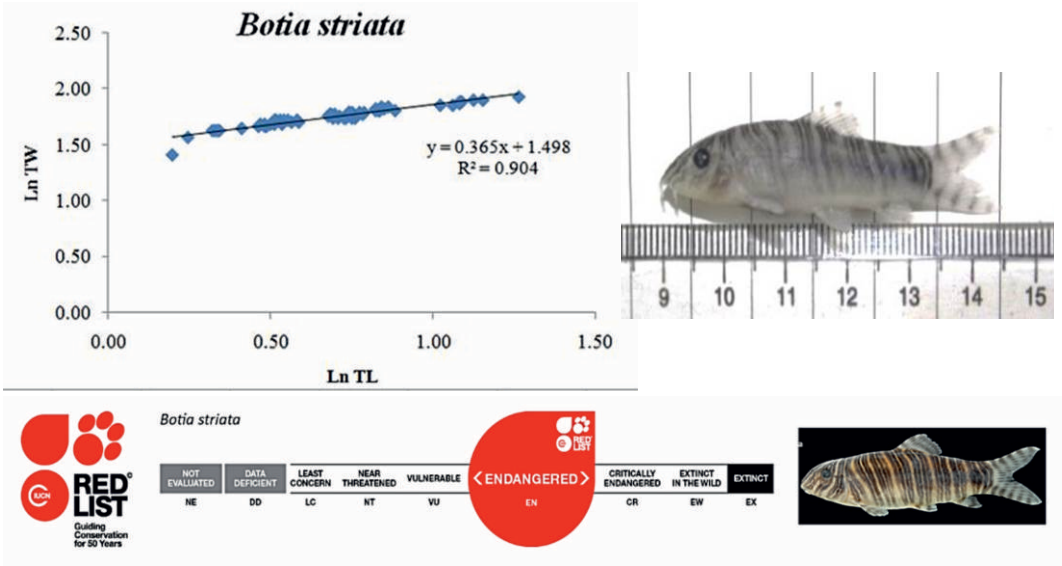


Fig. 1. Biological traits of the endangered indigenous zebra loach (*Botia striata*)

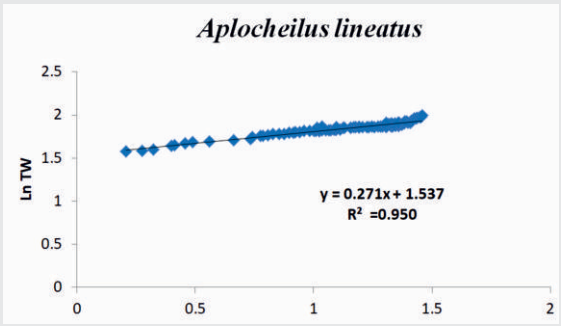
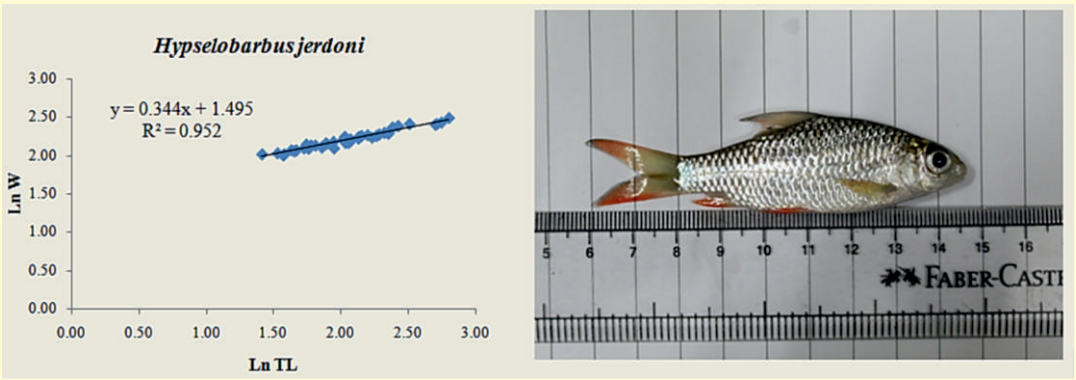
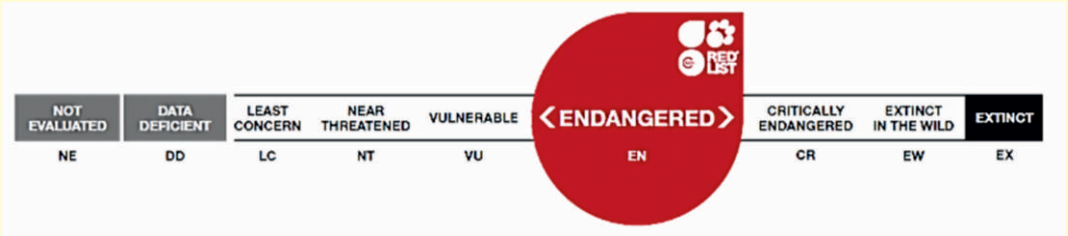


Fig. 2. Breeding of the striped panchax/ killifish (*Aplocheilus lineatus*) at Mumbai





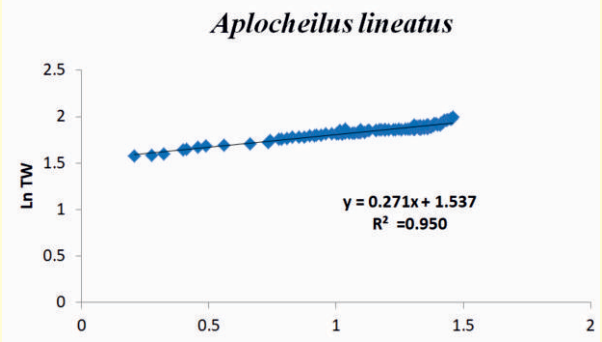


Fig. 3 Biological traits of the endangered indigenous ornamental jerdon's carp (*Hypselobarbus jerdoni)*

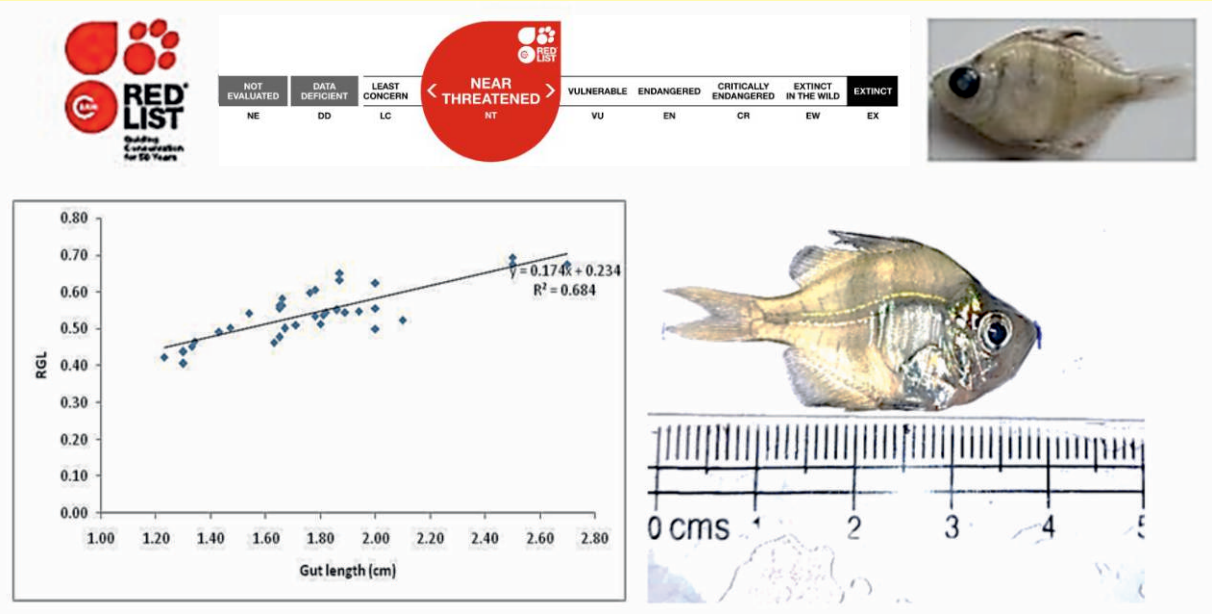


Fig.4 Broodstock maturation of the near threatened indigenous ornamental glassy perchlet (*Parambassis lala*)

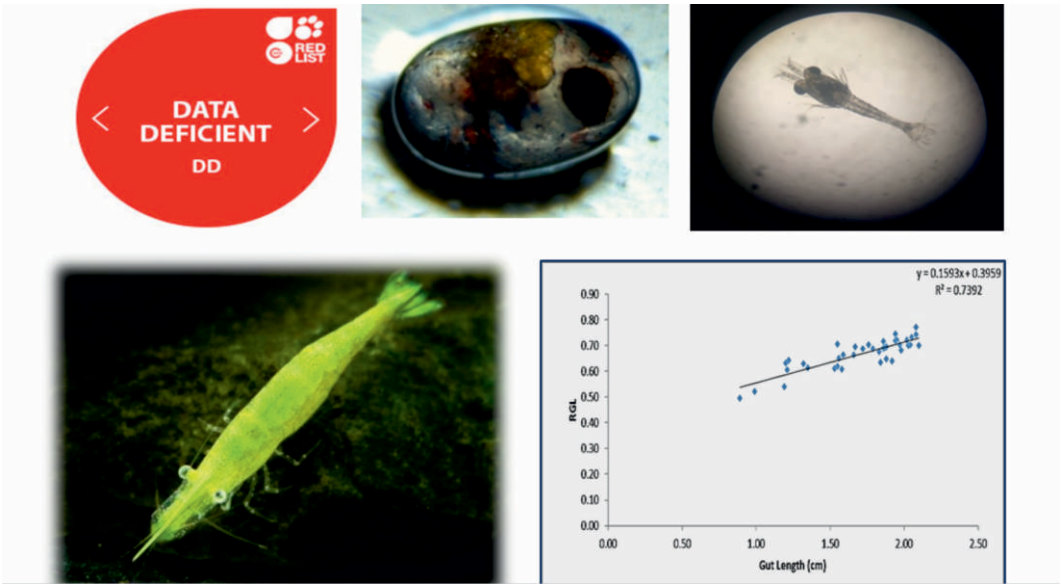


Fig. 5. Breeding and relative gut length (RGL) of data deficient indigenous ornamental green rocket shrimp (*Caridina hodgarti*)

development and courtship. Gonadal maturation was observed under standardised photoperiod regimes and breeding conditions set up by mimicking lotic terrain for breeding of this hill stream fish. *Aplocheilus lineatus*, commonly known as Striped Panchax/Yellow panchax/Malabar killi or Golden wonder killifish, recorded a length-weight relationship (LWR) within the expected range. Trials on with various feed combinations thrice a day up to satiation for a month were done on segregated sexes. Gonad development in the striped panchax *Aplocheilus lineatus* was optimum in a pair of brooders and breakthrough in breeding successfully achieved for the first time at

Mumbai, wherein, spawning occurred and limited number of sticky eggs were isolated and monitored for embryonic development and hatching. Hatching success achieved upto 80% and larval rearing ongoing using various combinations of weaning diets. *Hypselobarbus jerdoni*, commonly known as Jerdon's carp, is endangered according to the IUCN Red List and is endemic to the Western Ghats. It is benthopelagic and potamodromous in nature. The gut content analysis revealed its omnivorous nature. Fishes were fed with a combination of artificial diet and live plankton periodically to help them attain good gonadal growth. Gonadal development was fairly successful with onsite plankton production. Broodstock development of the green rocket shrimp *Caridina hodgarti* standardised and breakthrough in breeding has been achieved for the first at the Kolkata centre.

C. hodgarti showed abbreviated type of larval development. Species showing abbreviated development possess medium-sized eggs and are inhabitants of upstream, hill streams and impounded freshwater bodies. Post-hatched larvae reared successfully upto PL stage and larvae are being reared for raising them into reproductively active adults. The glassy perchlet, *Parambassis lala* reared on combinations of three types of live and formulated feed and the best feed combination worked out for broodstock development. Studies on biology and broodstock development of high fin barb (*Oreichthys crenuchoides)* and scarlet badis (*Badis badis*) are ongoing and feed of each is standardised for optimum broodstock development, maturation and breeding.

- Breakthroughs in breeding two indigenous ornamental fishes, *Aplocheilus lineatus* (the striped panchax/ killifish), and *Caridina hodgarti* (green rocket shrimp) were successfully achieved for the first time at Mumbai headquarters and Kolkata centre respectively.
- Broodstock development successful and optimisation of the captive maturation protocol on-going for the striped loach, jerdon's carp, high fin barb, glassy perchlet and scarlet badis.

Molecular screening, cell culture based isolation and characterization of finfish and shellfsh viruses and establishment of national repository

2017-21

K. V. Rajendran and K. Pani Prasad

Funding agency: Department of Biotechnology, New Delhi

Rs. 98.683 Lakhs

The goal of this research project is the establishment of repository for the finfish and shellfish viruses. This will be achieved through molecular screening (PCR-based) of shellfish and finfish for targeted viruses, characterization of the identified viruses and establishing a repository. Major species of finfish screened for viral infection during the period was ornamental fishes *Pterophyllum scalare* and screened for Red seabream iridovirus (RSIV) and Nervous necrosis virus (NNV). Other finfish species examined and the viral pathogens targeted for screening include *Oreochromis niloticus, Amphiprion ocellaris, Etroplus*, Salmon, Mackerel Crustaceans include farmed shrimp, *Penaeus vannamei* and mud crab, *Scylla serrata*. The viruses targeted in shrimp WSSV, HPV and MBV. Crabs were screened for MBV and reovirus. In addition, molluscans such as *Mactra violecea* and *Perna viridis* and the virus targeted include *Abalone herpesvirus (AbHV).* During the period, NNV was detected in the brain tissue from *P. scalare* and TiLV in tilapia. For the fish viruses, infected tissue repository of NNV and TiLV was made and stored at -80°C. Infected tissue repository of two isolates of WSSV collected from the west coast of India has also been made. An interesting observation made during the period is the detection of monododon baculovirus (MBV), recently re-named as *Penaeus monodon nudivirus* (PmNV). PCR amplification, sequencing and histopathology were carried out to confirm the presence of the virus. This is the first time the virus has been recorded in mud crab. Infected tissue respository of the virus has been made. Besides, the viral pathogens, a repository of the PCR controls (8 shrimp viruses, 6 finfish viruses and 2 molluscan viruses through bulk production of plasmid DNA) are made which can be provided to other diagnostic laboratories.

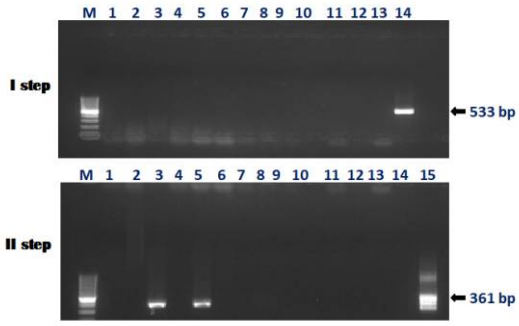
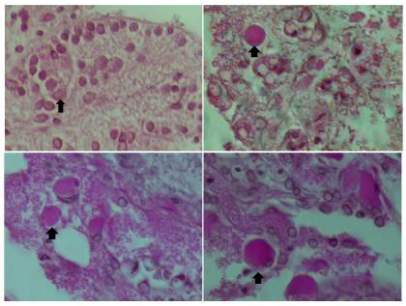


Fig.1. Agarose gel showing PCR products of *monododon baculovirus* (MBV) or *Penaeus monodon* nudivirus (PmNV) in mud crab. I-Step PCR: Lane M- 100 bp molecular marker; Lane 1-12 samples; Lane 13- Negative control; Lane 14- Positive control. II step PCR: : Lane M- 100 bp molecular marker; Lane 1-12 samples; Lane 13 & 14- Negative controls; Lane 15- Positive control



Understanding molecular basis of host-pathogen environment interaction of Tilapia lake virus disease

2019-22

K.V. Rajendran, Megha Kadam Bedekar and Saurav Kumar

Funding agency: National Agricultural Science Fund (NASF)

Rs. 86.33776 Lakhs

During the reporting period, co-infecting microbial pathogens associated with tilapia lake virus (TiLV)-infected tilapia were investigated. A total of 45 bacterial isolates were obtained in the present study of which 34 were isolated from infected tilapia and 11 from healthy fish. The species identities of the isolates determined from 16S rRNA sequences. Most bacteria (23/34) were isolated from TiLV-infected fish were Gram-negative. Among the Gram-negative bacteria, *Aeromonas veronii* was the dominant bacterium (47%; 16/34) followed by *A. hydrophila* (4/34). *Staphylococcus* spp. and *Bacillus* spp. were dominant among Gram-positive bacteria. *Aeromonas* spp. together constituted 61% (21/34) of all the isolates from the virus-infected tilapia. All the bacterial isolates were screened for their pathogenicity to tilapia by intraperitoneal injection. *A. veronii* strain isolated from infected fish was used for further experimental infection. Fish injected intraperitoneally with 0.1 mL of bacterial suspension containing 10^2-10^6 CFU *A. veronii*. The control group was injected with 0.1 mL sterile PBS. The clinical signs and mortalities were recorded for 14 days. Intraperitoneally injected *A. veronii* reproduced the clinical signs of naturally infected tilapia. Further, *A. veronii* could be re-isolated from the experimentally infected tilapia. Based on the field-level and experimental evidences, it was observed that virulent *A. veronii,* as a co-infecting bacterium, can have an important role in the severity and outcome of the disease.

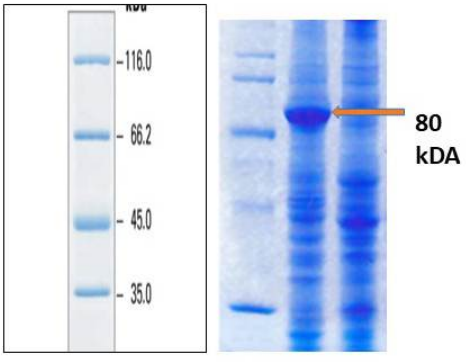


Fig.1. Expression of 80 kDA Chodroitin AC lyase recombinant *F.columnare*

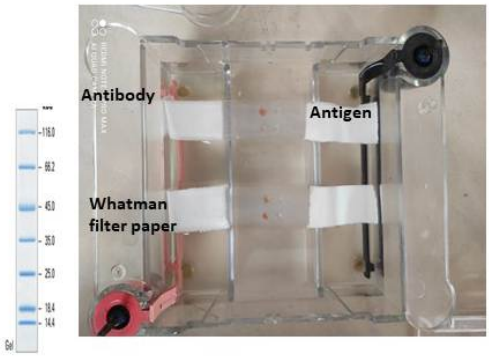


Fig.2.Counter current electrophoresis technique for detecting *F.columnare* antigen

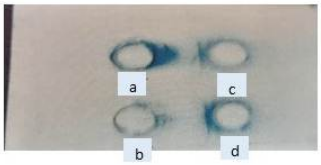


Fig.3.
(a) *F.columnare* antigen
(b) recombinant antigen
(c & d) Immune sera developed in rabbit

Fig.4. Tilapia fingerling showing lesions of *F.columnare*

Development of dual combination vaccine for protection of *Labeo rohita* to bacterial pathogens *Flavobacterium columnare and Edwardsiella tarda*

2015-21

Megha Kadam Bedekar, Kundan Kumar and Saurav Kumar

Funding agency: ICAR- Consortia Platform for Vaccines and Diagnostics

Rs. 145.55 Lakhs

A formalin killed whole-cell vaccine against *Flavobacterium columnare* and *Edwardsiella tarda* was developed and field demonstration of vaccine was performed at fish farm in Pen, Maharashtra. Six hundred healthy fish, having an average weight of 10 ± 2.5 g for each in different vaccination trial groups *viz*. *F. columnare* (rohu, catla and mrigal) and dual (*F. columnare* and *E. tarda* in the combination of 1:1) (in rohu) were used for the immunization study, including a control group (without vaccination). The experiment was conducted in six hapa 4x2x1 m each placed in an earthen pond having dimension 10x20x1.5 m. The water temperature of the pond was between 25 ± 2 °C. In brief, experimental fish were exposed to the primary vaccine by immersion method and on 21st day booster. On 35th day, fish were challenged with LD50 dose of bacteria *F. columnare* and *E. tarda*. Subsequently, fish were observed for seven days for gross pathology and mortality, and relative percent survivable (RPS) was calculated. We recorded high survival rate in vaccinated rohu and mrigal. Subsequently a new novel regional strain of *F. columnare* was deposited in the ICAR-National Centre for Veterinary Type Cultures (NCVTC) under accession number VTCCBAA1428. De novo Whole Genome Sequencing and analysis of *F. columnare* was done. The sequence showed a total of 3,496,885,752 bp (~3.50 Gb) HQ data of DNA used for de novo assembly using Velvet followed by GapCloser software for filing gaps. The assembly obtained is having 97 scaffolds of assembly size of ~3.15 Mb with an N50 of 90,721 bp. In total, 60 t-RNAs and 5 rRNAs were identified DNA sample. 15 putative microsatellites were identified from 97 scaffolds using MISA script, which remains the same after a flanking of 150bp. A total of 2714 genes were predicted from 97 scaffolds using Prodigal software. In total, 2664 genes in NR; 1593 in UniProt; 1804 in COG and 1438 CDS in Pfam database were annotated for DNA. It was found that majority of the hits were against the species *F. columnare* followed by *Flavobacterium columnare NBRC 100251 = ATCC 23463* in DNA sample. Scaffold_70 16s rRNA fasta sequence showed top Blast hit against *Flavobacterium columnare* DNA. The GO distribution was carried out using Blast2GO command line tool. GO terms were assigned to a total of 1084 genes in DNA. Wherein 764 genes were assigned to biological process, 540 genes to cellular component and 864 genes to molecular function for DNA sample.

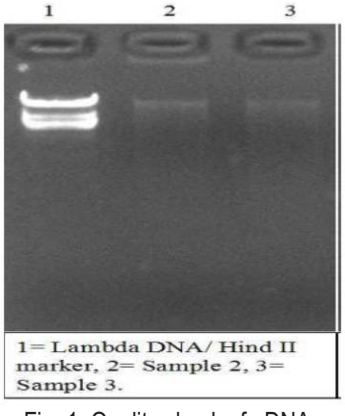


Fig. 1. Quality check of gDNA on 0.8% agarose gel

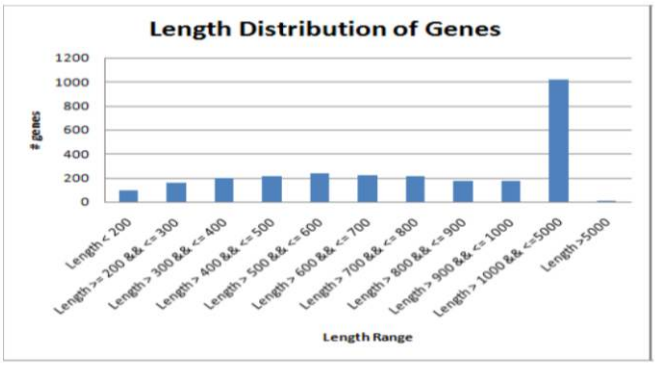


Fig. 2. Length distribution of *F. columnare* genes

Characterization of mucosal immunoglobins in tilapia and development of ELISA for diagnosis of Tilapia Lake Virus (TiLV) infection

2019-21

Megha Kadam Bedekar, K. V. Rajendran and Jeena K.

Funding agency: Department of Biotechnology, New Delhi

Rs. 29.00 Lakhs

Tilapia lake virus is a new emerging challenge to Indian tilapia culture. With aim to develop a noninvasive technology for this virus, mucosal immunoglobins of tilapia (*Tilapia niloticus* and GIFT tilapia) were characterized. Diseases and suspected tilapia fish were collected from tilapia farm which and virus was confirmed by RT-PCR. Diseased Tilapia fish used in the present study were collected from a tilapia farm located near Mumbai and were suspected of TiLV infection. Disease symptoms of sudden mortality, fin erosion, exophthalmia and anorexia were observed. In order to develop ELISA test for detection of TiLV in mucous samples, a positive control and TiLV specific protein is needed to capture antibody in sandwich ELISA. For this purpose, we have developed recombinant segment4 protein. Following procedure has been followed. All available isolates of TiLV segment 4 genes (complete coding sequence) were retrieved from National Center for Biotechnology Information (NCBI). The different isolates of this segment were analyzed using Bioinformatics tools such as standard nucleotide BLAST and multiple sequence analysis clustalΩ (Omega) (Sievers *et al*., 2011). Antigenicity prediction and secondary structure for the available sequence was also analyzed using prediction tools, in order to ensure suitability of the protein for ELISA. Codon usage bias was analysed for TiLV segment 4 gene (MK392375.1) nucleotide sequences to make it compatible for expression by *E. coli* expression host. This was done by using the bioinformatics tool OptimumGene™ (GenScript, USA). After codon usage analysis, a 1065 bp-long construct containing codon-optimized TiLV segment 4 gene sequence was synthesized by GenScript (Piscataway, NJ USA) company. Codon optimized sequence was further used to clone pET 28 a(+) expression vector and transform *E. coli* BL21 (DE3) competent cells. Recombinant protein of 35 kA was expressed. The protein will be used further for ELISA test.

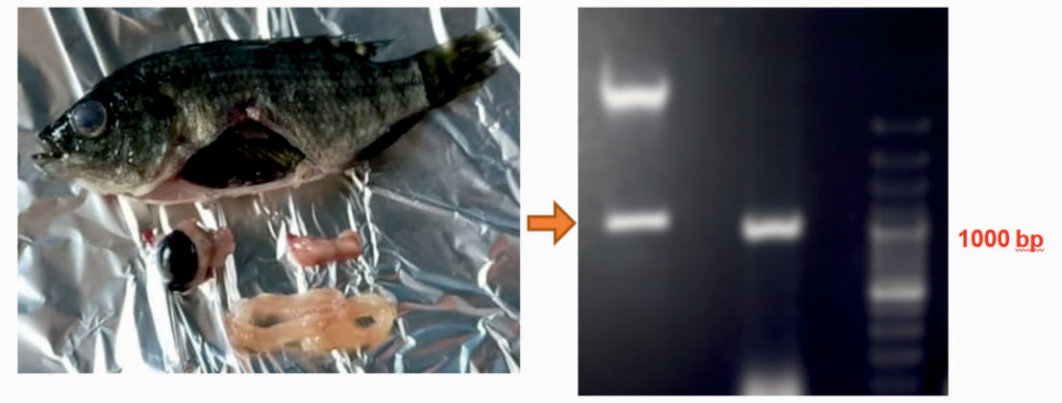


Fig. TiLV infected *T. niloticus* and agarose gel electrophoresis (1%) showing restriction enzyme digestion (Nde I and Xho I) of pET-seg4; L1 showing release of 1065 bp segment 4 of Tilapia lake virus gene from 5286 bp pET28 vector; L2 PCR amplified 1065 BP gene segment.

Biomass production and downstream processing of *Spirulina (Arthrospira) platensis* for high-purity colorant grade phycocyanin extraction

2017-2021

S. P. Shukla and G. Rathi Bhuvaneswari

Funding agency: Department of Biotechnology (DBT), New Delhi

Rs. 38.8 Lakhs

The fabrication and installation of photobioreactors was completed and the trial was conducted in the month of March 2020. The yields of the biomass and phycocyanin were compared between a newly designed Continuously Stirred Open Bioreactor (CSOB) and a Tubular bioreactor with an integrated harvesting module (Fig.). The biomass yield was 1.73 folds higher in tubular bioreactor as compared to SCOB under similar outdoor conditions. From 7 the day onwards, a daily yield of 3.33 – 3.62 g dry wt/L for SCOB and 0.611-0,652 g dry wt/L was recorded after the addition of supplementary nutrients at a rate of 75 mg/g fresh weight harvested. The protein content in the biomass produced was above 60% for both the culture systems. The phycocyanin yield ranged between 106-116 mg/g dry wt for both types of bioreactors. The purity of phycocyanin was not affected and the purity was above 1.0 (A620/A280nm) for the biomass produced in SCOB and tubular bioreactor.

Fig. Prototype of indoor tubular bioreactor and Phycocyanin extracted from the biomass of *S. platensis*

All India network project on fish health

2015-21

K. Pani Prasad and Swadesh Prakash

Funding agency: Indian Council of Agricultural Research (ICAR), New Delhi

Rs. 16.00 Lakhs

The biosafety and efficiency of oxytetracycline and emamectin benzoate to control bacterial infections in *Cyprinus carpio*, *Hypophthalmichthys molitrix* and *Ctenopharyngodon idella* were evaluated. The tissue depletion of OTC and emamectin benzoate in edible tissue organs of *C. carpio*, *H. molitrix* and *C. idella* was conducted and the tissues were sent to CIFT, Kochi for LC MS-MS analysis. The survey on marketing and usage pattern of drugs and chemicals and loses due to diseases in aquaculture were collected and uploaded on to the dedicated site. The farmers awareness programmes were conducted to popularized biosecurity and best management protocols for improved fish health and reduce losses due to diseases.

Network project on assessment of AMR in micro-organisms associated with fisheries and aquaculture in India

2018-21

K. Pani Prasad and Jeena K.

Funding agency: Indian Council of Agricultural Research (ICAR), New Delhi

Rs. 40.00 Lakhs

The baseline data of brackish farms of Thane and Ratnagiri district of Maharashtra; Surat and Valsad district of Gujarat was collected and uploaded on to the site. The bacteria targeted for isolation and characterization *Vibrio sp., Staphylococcus* sp*., E. coli* were isolated from shrimp and characterized through biochemical and molecular tests. The antibiotic susceptibility testing for the bacteria isolated was undertaken and the results were analyzed using WHONET software. The phenotypic testing was undertaken for the detection of AMR and confirmed for the expression of resistance genes of specific bacteria.

Name of the States	Districts	No of Farms	No of Isolates isolated and confirmed				
			E. coli	*Staphylococcus sp.*	*Vibrio* Sp.	*S. aureus*	*V. parahaemolyticus*
Maharashtra	Thane	29	25	29	24		3
	Ratnagiri	8	6	6	8	2	
Gujarat	Surat	14	11	11	8	1	5
	Valsad	14	12	14	13		
Repeated	Thane	19	15	19	15		
	Ratnagiri	3	2	3	1		1
	Surat	1	1	1	1		
Total		88	72	83	70	3	9

R% - Resistant Percentage, I%- Intermediate Percenta

National surveillance programme for aquatic animal diseases (NSPAAD)

2013- 21

K. Pani Prasad and Ram Prakash Raman

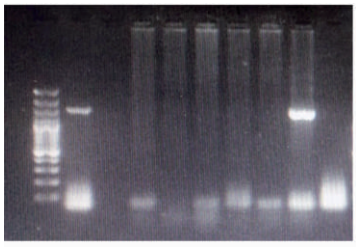
Funding agency: National Fisheries Development Board (NFDB), Hyderabad

Rs. 149.70 Lakhs

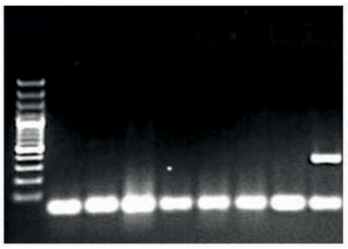
During 2020, a total five districts have been covered from the two states of Maharashtra (Raigad and Thane) and Gujarat (Navsari, Valsad and Surat) as per the standard protocols. These areas are been identified based on extensively shrimp cultured district and as included for the base line data collection, sample collection as well as for farmers awareness programme. The species *L. vannamei* were collected and PCR testing was conducted for detection of WSSV, HPV, MBV, IMNV, YHV, IHHNV and EHP under this programme. Emergency harvesting was recommended for the disease infected farms and thus saved from great economic loss to farmer. Small Farmers groups were created among the farmers to deliver the proper information if any disease outbreak occurs. All the data has been uploaded on NSPAAD website provided by ICAR-NBFGR. Awareness programme was held for farmers at Valsad regarding identification of common disease occurring in culture, control and preventive measures and also about various water quality parameters.

Details of surveillance done during January- December 2020

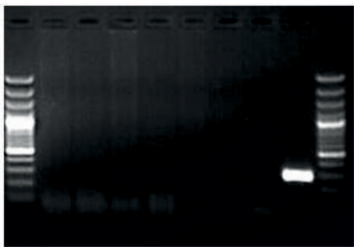
Month	Total no. of farms	Total no. of ponds	Total no. of samples	Screening done for
Jan	3	4	90	WSSV, HPV, MBV, IHHNV, IMV, YHV & EHP
Feb	9	20	430	
Oct	6	20	410	
Dec	3	13	270	
Total	22	57	1201	



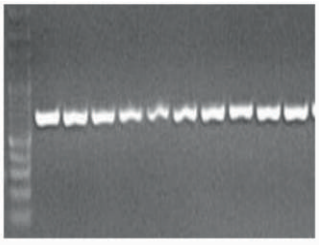
WSSV +ve



YHV –ve



IHHNV -ve



Molecular confirmation of *Vibrio* spp. using *Vibrio* genus 16S rRNA primers amplicons of 663 bp

Antibiotic sensitivity test of *S. aureus* isolated from shrimps

EHP infected shrimp shows growth retardation, size variability and

Awareness programme conducted at Valsad, Gujarat (18 participants)

Farmers' awareness programme organized at Saphale (Maharashtra)

Antibiotics	*E.Coli*		*Vibrio* Spp.		*Staphylococcus* Spp.		*Staphylococcus aureus*		*Vibrio parahaemolyticus*	
	R%	**I%**	**R%**	**I%**	**R%**	**I%**	**R%**	**I%**	**R%**	**I%**
Penicillin G					100	0	100	0		
Ampicillin	66.7	15.3	67.1	24.3					77.8	11.1
Aztreonam	0	8.3								
Cefotaxime	4.2	12.5	11.4	12.9					0	11.3
Cefoxitin	0	0	12.9	17.1	13.3	0			33.3	33.3
Chloramphenicol	0	0	0	0	0	0				
Tetracycline	5.6	1.4	0	2.9		2.4				
Ciprofloxacin	1.4	5.6	0	5.7	1.2	9.6				
Trimethoprim-Sulfamethoxazole	1.4	0	0	0	0	0	0	0		
Erythromycin	70.8	29.2			25.3	63.9	33.3	33.3		
Nalidixic Acid	16.7	22.2								
Ceftriaxone	1.4	0								
Ceftazidime			1.4	0						
Gentamicin			0	1.4	4.8	3.6				

Protein expression profiling of *Labeo rohita* using quantitative proteomics

2017-21

Mukunda Goswami, Sanjeeva S, Mujahid K. Pathan and M. Gandhi

Funding agency: Department of Biotechnology (DBT), New Delhi

Rs. 100.546 Lakhs

Mass spectrometry based workflow was finalised for 19 tissues of *Labeo rohita* for the identification of proteins (Fig.). Targeted validation assay (SRM) optimised for three tissues (eye, male and female gonads) for peptide level identification of tissue enriched proteins. Post translational modification sites were analysed for phosphoproteomic, methylation of all the proteins. *L. rohita* Peptide Atlas (LPA) was developed as a public repository for sharing all obtained proteomic, post translation modification and peptide information with the scientific community. One patent application has been submitted in collaboration with IIT, Bombay (Application No.:TEMP/E-1/24209/2020-MUM).

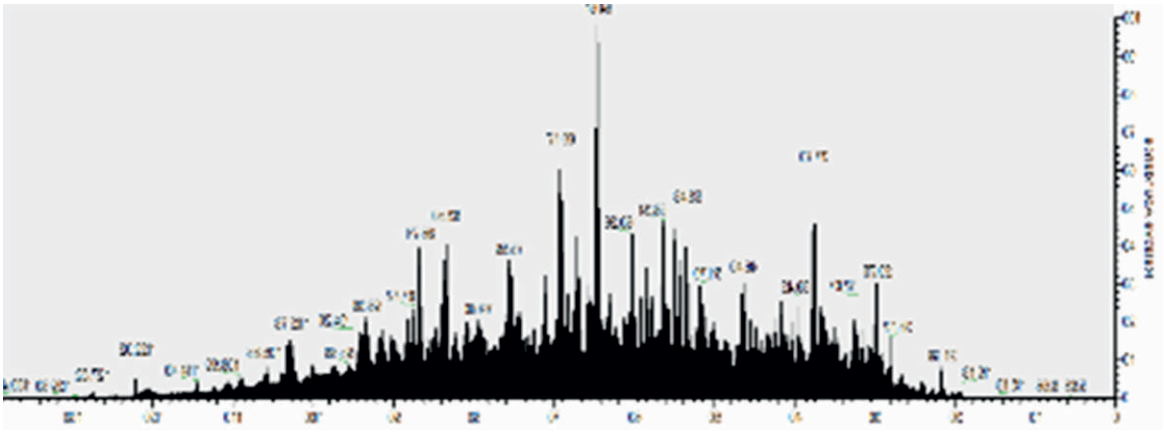


Fig. Chromatography of in-gel digested proteins of *Labeo rohita*

Molecular and genetic characterization of selected important ornamental fishes of North-East India

2017-21

Mukunda Goswami, Rupak Nath, A. Pavan Kumar and R. N. Bhuyan

Funding agency: Department of Biotechnology (DBT), New Delhi

Rs. 87.41 Lakhs

Twenty-four new ornamental fish species were collected from various parts of the NE India by the collaborating institution St. Anthony's College, Shillong. Taxonomic identification was done based on morphological characteristics and genomic DNA was isolated from 120 samples. Three mitochondrial genes (COX-I, 16S rRNA and Cyt b)

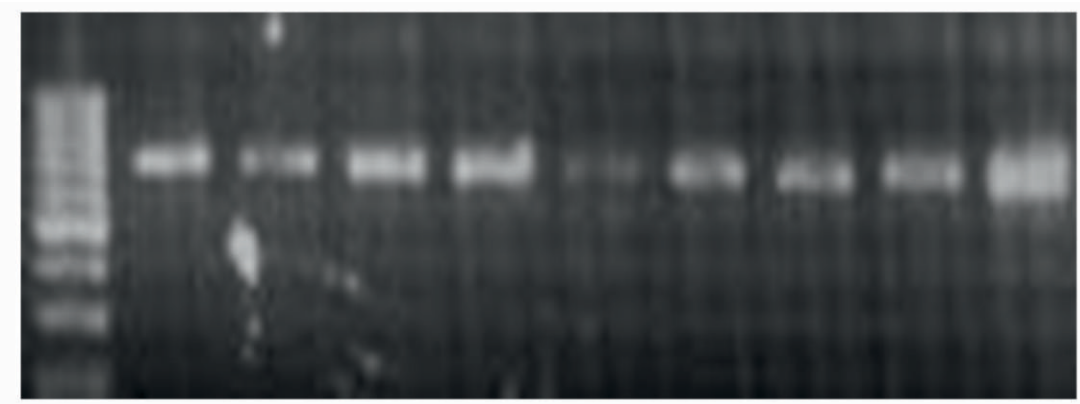


Fig.1: COX-I gene fragment of 650 bp amplified from collected cyprinid species

were sequenced for molecular characterization and phylogenetic analysis (Fig. 1). Phylogenetic relationship among the species of Spiny Eel group was established. Sequence analysis of cyrpinids and catfish species is being done.

Nanodelivery of conspecific kisspeptin to enhance sexual maturity and gonadal development in *Catla catla*

2020-23

Rupam Sharma, Gireesh Babu P., Sunil Kumar Nayak and Aparna Chaudhari

Funding agency: Department of Science and Technology (DST)- Nanomission, Govt. of India, New Delhi

Rs. 30.54 Lakhs

This project aims to study the effect of nano-conjugated kisspeptin on gonadal development and reproductive parameters of *Catla catla* and to see whether the maturity can be attained earlier than normal. Project sanction was received in December 2020.

Development of nursery based system for Pacific white shrimp, *Litopenaeus vannamei*, using ground inland saline water, and assessment of physiological and immunological parameters in single phase and two phase farming system

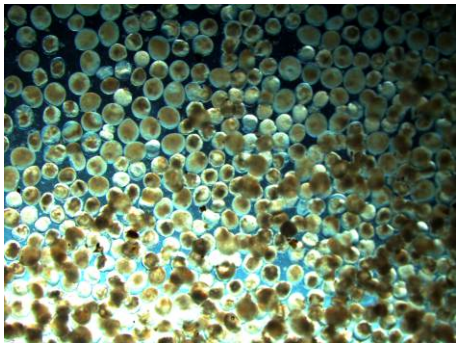
2018-21

V. Harikrishna, Pankaj Kumar, Sreedharan K . and Satya Prakash

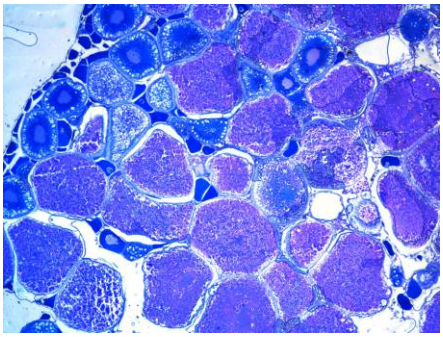
Funding agency: Department of Biotechnology (DBT), Government of India

Rs. 57.00 Lakhs

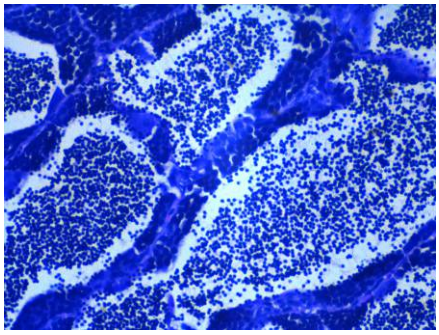
As per the results obtained during the first year, stocking density of 200 no./m^2 was selected for the nursery rearing *i.e.*, double phase farming system (25-30 days rearing in nursery ponds and shifting into grow out ponds at the different stocking density of 30 and 45 no./ m^2). Simultaneously, same stocking densities (30 and 45 no./m^2) have been selected for the single phase farming system in grow out ponds (1000 m^2 area each). Different ponds were stocked with the respective densities and different parameters were assessed by periodic sampling. Significant variations in growth have been recorded in the treatment group 1 (30 no./m^2) and 2 (45 no./m^2). FCR was found to be lowest in treatment group 1. Average body weight (ABW) and weight gain were found to be the highest in treatment group 1.



Unfertilized Eggs



Late vitellogenic and maturing oocytes



Testes with active seminiferous tubules

DNA barcoding and domestication of ornamental fishes of the Chindwin and Barak, Surma, Meghna river basins of North-East India

2017-20

S. Munilkumar, B. K. Mahapatra and A. Pavan Kumar

Funding agency: Department of Biotechnology (DBT), Government of India

Rs. 24.648 Lakh

DNA barcodes were generated for 25 species collected from the wetlands of Phayeng, (Imphal West District), Nongren (Imphal East District) and riverine ecosystem based on basins of Chindwin and Barak which included Iyei river (Noney District), Taret river (Tengnoupal District), Barak river and Karong (Senapati District).

The average length and weight of *Lepidocephalichthys berdmorei* collected from the wild population was 7.27±1.88 cm and 3.46±1.48 g, respectively (N=227), with a condition factor k of 0.7±0.1. The analysis of gut content reflected that *L. berdmorei* is an opportunistic bottom feeder. The food items (%N) of different prey category were 34% Zoochlorelleae, 23% Cladocerans, 20% Nematodes, 16% Copepods and 7% Diatoms.

Histological studies of *L. berdmorei* carried out during May and July showed that most females carried late vitellogenic and maturing oocytes indicated by eccentric germinal vesicles, and few were perinucleolar (primary growth oocytes), indicating the fish at spawning-capable phase. In males, testes had active seminiferous tubules with continuous germinal epithelium, lumen filled with spermatozoa indicating spawning-capable phase. Accordingly, three breeding trials were conducted with 33 brooders (3.37-4.71g female and 2.5-2.72 g male) during May and July. However, proper fertilization could not be achieved. Fish kept in captive condition also showed late vitellogenic and maturing oocytes indicated by eccentric germinal vesicles and few with perinucleolar (primary growth oocytes), suggesting that the fish were in spawning-capable phase.

Captive maturation, breeding and culture of some indigenous ornamental fishes of Assam

2017-20

B. K. Mahapatra, Parimal Sardar and Subhendu Datta

Funding agency: Department of Biotechnology (DBT), Govt. of India

Rs. 26.36 Lakh

Two indigenous ornamental species of Assam namely *Botia dario* and *Pethia (Puntius) gelius* were selected. For domestication, fish were collected from different locations of Assam. Water samples were collected from natural habitat and water quality parameters were analysed. The preferred food and feeding habits of these fish were also studied. Semi-natural conditions were created in the laboratory. Stocks of *Pethia gelius* procured from wetlands of Assam were maintained in three different systems i.e. RAS (flow through system), cement tank and fiber tank for captive maturation and breeding. For captive maturation of *Botia dario* four different indoor and outdoor rearing systems were created i.e. RAS system (small pieces of 6″ diameter plastic pipe), cement tanks with and without mud bottom (confined system), and fiber glass tank with hide out (small pieces of 6″ diameter plastic pipe and broken earthen pot). Effects of photoperiod and temperature on gonadal development of broodstock were also studied. In *Botia dario,* neither natural photo-thermal nor regime at 12L: 12D simulated temperature along with natural photoperiod was effective to initiate gonad recrudescence in both the sexes. Gonado-somatic indices of both males and females were highest in control under ambient natural photoperiod and temperature. Breeding trials of both the species were conducted. Trials failed in case of *Botia dario* due to immature gonads in males. Six breeding trials of *Pethia gelius* were done and bred successfully and package of practices for mass scale seed productions and culture under captivity were developed. The larval rearing of six batches of *Pethia gelius* under RAS (flow through system) was conducted successfully.

Centre

Powarkheda

Establishment of Amur common carp / Jayanti rohu hatchery and seed production unit for quality fish seed dissemination

2018-21

Sunil Kumar Nayak, Dhalongsaih Reang and Madhuri Pathak

Funding agency: National Fisheries Development Board (NFDB)

Rs. 25.00 Lakh

Breeding and spawning pool designs of the Chinese circular hatchery have been given to CPWD. Procured 1000 number of Amur common carp fingerling from NFFBB, Bhubaneswar. Reared at ICAR-CIFE Powarkheda with biosecurity measures.

NAHEP

Achievements

2020

NATIONAL AGRICULTURAL HIGHER EDUCATION PROJECT

Development of Energy Efficient and Environment Protective - Aquaculture Technologies for Degraded Soils -

Centres for Advanced Agricultural Science and Technology (CAAST)

Funded by: **World Bank & Govt.of India**
Supported by: **ICAR-Education Division**

2018-22

Dr. Gopal Krishna
Principal Investigator
director@cife.edu.in

HIGHLIGHTS

- The project encompasses different concepts of inland saline water aquaculture practice as integrated technology. The technology envisages combining the research and development in the identified area into the curriculum and capacity development, generation of specialized human resources and industry partnership.
- Three MoUs were signed for co-development of technology, capacity building of students and faculties for research and education. Eleven students were trained in overseas institutes under capacity building programme.
- Eleven Skill Development Programmes (SDPs), eleven webinars and five lectures were conducted for students, scientist and stakeholders.
- A total of 363 participants attended various national and international workshops (offline/online) organized under NAHEP.
- In industry-academia and farmers' meet, a total of 385 students, farmers and industry representatives participated.
- Project web-portal (CIFE-NAHEP) (https://kultivatein. wixsite.com/cife) has been developed & hosted online.
- The Mobile Fish Diagnostic Mobile Van is designed to provide on-site laboratory services, on-farm fish disease diagnosis services to farmers, students and stakeholders. The mobile van has also been used for organising awareness and hands-on training programmes for dissemination of CIFE technologies. This mobile fish diagnostic van was brought under the ICAR-World Bank funded National Agricultural Higher Education Project.

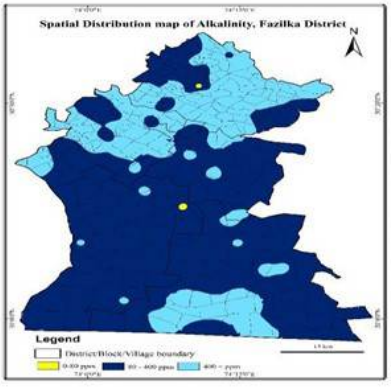
OBJECTIVES

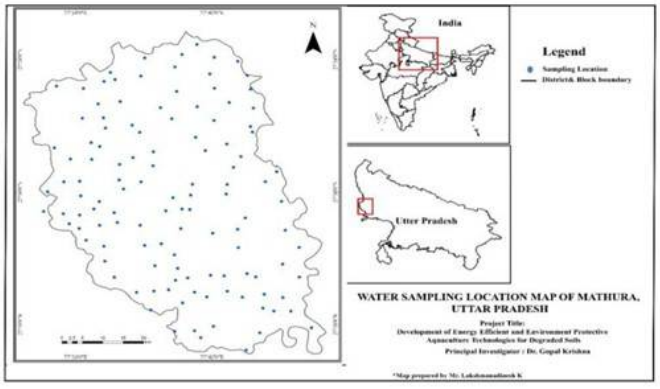
1. Development of energy-efficient and eco-friendly technologies.
2. To design and implement innovative pedagogies and demand-driven capacity building programmes for students, faculty, farmers and entrepreneurs.
3. To strengthen academia-industry interface for preparing industry-ready students, creating entrepreneurs and co-development of technologies.
4. To develop ICT based support system for aquapreneurs and build capacity of fisheries professionals.

Objective -1:
Development of energy efficient and eco-friendly technologies

1a. Resource availability, characteristics and potential of inland saline soil and water

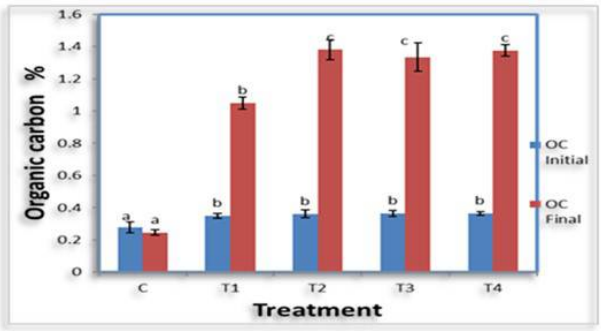
- Spatial distribution maps have been prepared for various physico-chemical parameters of water samples (Salinity, EC, pH, Carbonate, Bicarbonate, Sodium, Potassium, Calcium, Magnesium, Total hardness) from Jhajjar district, Haryana and Mathura district, Uttar Pradesh.
- Similarly, soil samples have been collected from Jhajjar District, Haryana and Mathura District, Uttar Pradesh from a depth of 15cm and 1m for analysis.
- Spatial distribution of groundwater depth has been prepared for Fazilka district, Punjab, Rohtak & Jhajjar district, Haryana and Mathura district, Uttar Pradesh.
- Vegetation indices models (SAVI, NDMI, NDVI) have been prepared to delineate saline soil and bare soil.

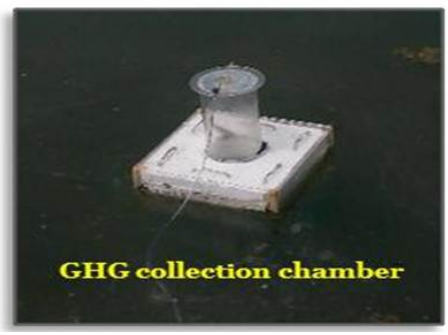




1b. Enriching elemental deficiency, carbon storage and enhancing productivity of the soil

- In a study conducted in GIFT tilapia reared in inland saline system when fed with biochar incorporated feed showed significant improvement in overall growth and immunity of tilapia. There was increase in lysozyme activity from 18.73±0.90 µg/ml to 22.58 ±1.61 µg/ml but had no effect on survival rate of fish. The sediment application of biochar enhanced the availability of potassium ions and a significant increase in the organic carbon content.





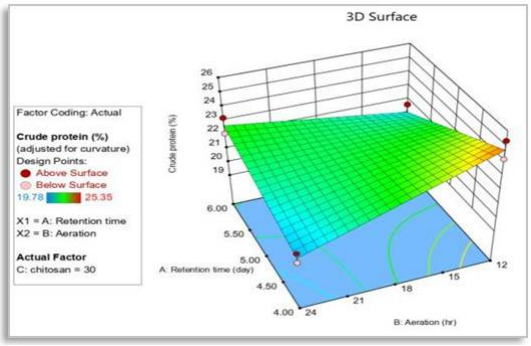
- The pond culture system showed highest GHGs emission viz., nitrous oxide and CO_2 but lowest methane gas emission compared to tank culture system. The application of biochar to water column was effective in controlling the emissions from the pond culture system. The application of biochar to the sediment was more effective in controlling nitrous oxide emission than the application into water column.

- The carbon dioxide equivalent emission in biochar treatment was less (<200 kg/ha/day) as compared to control (>600 kg/ha/day). The carbon sequestration in the culture pond was higher compared to fallow pond.

1c. Biofloc technology for sustainable effluent management in aquafarming

- The biofloc meal production in the biofloc reactor following full factorial design and response surface methodology was optimised with three factors at 2 levels viz., chitosan concentration at 30 and 40ppm, aeration for 12 and 24 hour and sludge retention time (4 and 6 days). The process was optimised with desirability ramp indicating floc volume of 13.25 ml/L, crude protein content of 24.74% and crude lipid level of 2.13% for three factors in the design.

- The supplementation of vitamin mineral mix at the rate of 4g/L along with chitosan and cationic starch (1:1 ratio) in the media at C:N ratio of 15:1 significantly enhanced the growth and immune response of tilapia.



1d. Nutraceuticals for stress mitigation and growth enhancement

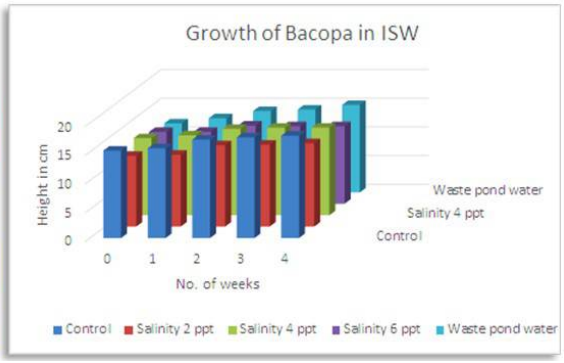
- Studies using stress markers such as SOD activity and NKA alpha subunit expression have been conducted for *P. vannamei* and GIFT Tilapia reared in ISW. Transcriptome analysis exhibited branchial chloride channel-2 (CCL2) as a marker for potassium depletion in the rearing environment of GIFT.

- Experiments were conducted for standardization of suitable nutraceutical for stress mitigation in fish and shellfish reared in ISW and it was found that dietary

supplementation of alanine (up to 1%) proved to be instrumental in enhancing the growth and reducing stress responses of *P. vannamei* in Inland saline water. In relation to weight gain (%), the optimum dietary potassium requirement of GIFT juvenile reared in ISW of 10 ppt was between 0.57 and 0.59%, whereas, it was slightly higher on the basis of branchial NKA mRNA expression. It was also observed that the dietary inclusion of taurine drastically reduced more than 50% of the requirement of dietary potassium without hampering growth and osmoregulatory endpoints. Dietary organic magnesium improves growth and survival of *P. vannamei* reared in ISW of 10 ppt.

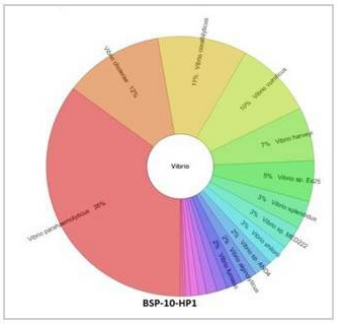
1e. Sustainable fish and shellfish production systems through stocking, harvesting and phyto-bioremediation strategies

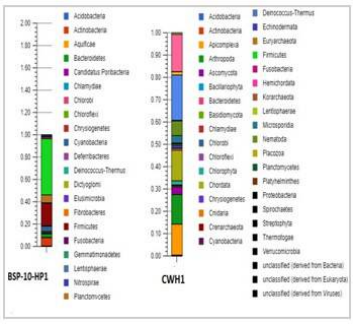
- Data regarding the combined effects of salinity and temperature on GIFT reared in inland saline water has been generated and will be useful to the farmers involved in culturing GIFT in inland saline water.
- Three economically important marine macroalgae, namely *Gracilaria verrucosa, Ulva lobate* and *Sargassum* were cultured in ISW (15ppt). Survival of brown algal species with 51% growth rate in biomass in out-door culture have been achieved. The Cultures of *Bacopa monneri* (Brahmi) were successful at 2 and 4 ppt ISW and in the waste water. When *G. verrucosa* cultured in 15 ppt ISW showed 15% to 20% reduction in hardness, Ca++ and K^+ value.

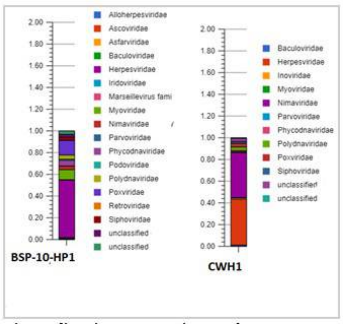


1f. Microbial composition of ISW and interaction with host and environment

- Important water quality parameters of shrimp farms stocked with 30, 45 and 60 no./m^2 of *P. vannamei* were analysed and found that the parameters did not vary significantly during the culture cycle.
- Molecular screening for major shrimp pathogens such as EHP, WSSV, IHHNV, HPV, MBV, VP^{AHPND} and NHP-bacterium showed 20% prevalence of *Enterocytozoon*







hepatopenaei (EHP) in shrimp farmed in ISA. A significant observation is that no viral pathogens have been detected in shrimp farmed in ISW.

- Gut microbiome analysis of inland saline water and brackishwater-reared shrimp revealed differences in the composition and diversity of prokaryotic sequences. More abundant bacterial sequences were found in brackishwater shrimp compared to shrimp reared in inland saline water. *Vibrio* composition was similar and comparable in both the groups and *V. parahaemolyticus* was found to be predominant in both ecosystems. Diverse viral sequences were detected in both inland saline and brackishwater shrimp with Nimaviridae/White Spot Syndrome Virus (WSSV) sequences detected in both the systems.

1g. Economically feasible technology for producing value-added fish products from fish grown in ISW

- Standardized technology for the preparation of fish sausage has been successfully transferred to West Coast Frozen Foods Pvt. Ltd., Mumbai for selling and popularization of the product.
- Shrimps in curry: retort pouches, Shrimp sode, Shrimp in oil canned have been developed.
- Value-added fish products' technologies have been disseminated to 154 participants from self-help groups of Datiware, Palghar district and Rajapur & Lanja, Ratnagiri district, Maharashtra & Rohtak, Haryana.
- Halophilic archaea (*Halococcus dombrowskii*) was used to deproteinize shrimp shell wastes to prepare chitin. Deproteinization of 88% could be achieved while arresting the spoilage and off odour generation.

1h. Genetic evaluation of common carp for multi-stocks in multi inland saline environments

- The common carp from ten different geographical locations of India were assembled. A total of 78 full-sib families were produced. A total of 2200 fish belonging to sixty-two families and 2000 fish belonging to six stocks were PIT tagged and released in two grow-out ponds of two different salinities (< 4 ppt and > 8 ppt).

- The genetic variation both within and between families across the stocks was seen. The stock from Madhya Pradesh showed the highest mean body weight (200 days pond age) of 297.29±6.30 g. compare to overall mean of 194.69±4.04g (19 to 1476g).

Objective 2: To design and implement innovative pedagogies and demand driven capacity building programs for students, faculty, farmers and entrepreneurs

Sl. No.	Name of the programme	Number of participants
1.	Workshop on Flowcytometry and its Applications	70
2.	Students' exposure (Online International Training): Designing and Implementing Genomic Selection	25
3.	Lecture on Liberal Arts Concepts for Higher Education	103
4.	Webinar on Challenges and Opportunities in Post-COVID Era for Human and Shrimp Industry	512
5.	Webinar on Human Centric Innovations	100
6.	Workshop on Emotional Intelligence for Success	100
7.	Workshop on Sexual Harassment at Workplace for Faculty	68
8.	Workshop on Awareness Programme on Sexual Harassment for Students	100
9.	Skill Development Programme on Quality Control and Certificate of Fish & Fishery Products	28
10.	Skill Development Programme on SciCom for Smart Scientist	13
11.	Skill Development Programme on SciCom for Smart Scholars	708
12.	Skill Development Programme on Aadhunik Matsya Palan or Aahar Prabandhan	32
13.	Skill Development Programme on Biochar for Enhancing the Aquaculture Productivity	13
14.	Skill Development Programme on Biofloc Technology for Intensive Farming Practices	27
15.	Skill Development Programme on Hygienic Handling and Value-added Products of Fish and Shellfish	27
16.	Skill Development Programme on Carp Culture Practices and Recent Advances	25
17.	Skill Development Programme on Aquafeed Preparation and Feeding Management for Inland Saline Aquaculture	31
18.	Skill Development Programme on Pedigree Marking Systems in Aquaculture Species	20
19.	Skill Development Programme on Alternate Species Culture Practices in Brackishwater Aquaculture	25
20.	Webinar on Prospects of Inland Saline Aquaculture in the North-Western parts of India	250
21.	Training on Self-defence for Girl Students at Women's Self-defence Centre-WSD, Andheri Sports Complex, Mumbai	14

- Eleven students attended training at globally recognised universities *i. e.* Ghent University, Ghent, Belgium; Asian Institute of Technology, Bangkok, Thailand; University of Porto, Avenida, Portugal; Institute of Marine Research, Bergen, Norway; North Dakota State University, Fargo, USA; Michigan State University, Michigan, USA; Norwegian Institute of Food, Fisheries and Aquaculture Research, Tromso, Norway and National Centre for Genetic Engineering and Biotechnology, Pathum Thani, Thailand.
- An MoU was signed with Institute of Technology and Management University, Gwalior, Madhya Pradesh on 31st January 2020.

Objective-3: To strengthen academia-industry interface for preparin industry-ready students, creating entrepreneurs and co-development of technologies

Sl. No.	Name of the programme	Number of participants
1.	Industry-Farmers' Interaction Meet at ICAR-CIFE Rohtak	200
2.	Lecture on Entrepreneurship Development in Fisheries by Mr. Siyaram Tiwari, MD, Indepth Management India Pvt. Ltd. at ICAR-CIFE, Mumbai	72
3.	Lecture on Entrepreneurship Opportunities in Fisheries by Mr. G.K. Verma, Founder/Entrepreneur of Maxbay Foods Pvt. Ltd. at ICAR-CIFE, Mumbai	82
4.	Industry-Academia Interaction Meet on Industry-Ready Students and Entrepreneurship Development at ICAR-CIFE, Mumbai	121
5.	Industry-Academia Interaction Meet on Quality Seed in Doubling Aquaculture Productivity at ICAR-CIFE, Kolkata Centre	67
6.	Webinar on Economically Feasible Technologies for Producing Value-added Products from Fish and Shellfish	140
7.	Webinar on Challenges in Responsible Utilization of Biodiversity	100
8.	Lecture by an Industry Expert, Dr. Naseem Akhtar on Modern Techniques in Value Addition	60
9.	Webinar on AI & IoT for Smart Aquaculture with Industry Experts	250
10.	Webinar on Aquatic Animal Health with Industry Experts and Academicians	325
11.	Online Farmers Training on Water & Soil Management Practices in Inland Saline Aquaculture	66
12.	Online Farmers Training on Feed Management Practices in Inland Saline Aquaculture	66
13.	Online Farmers Training on Disease Management in Inland Saline Farming of *Litopenaeus vannamei*	66
14.	Webinar on Biofloc Technology in Aqua Farming: Its Prospects in Income Generation with Industry Experts and Academicians	130
15.	Lecture on Implementation of HACCP in Fish Processing by Expert, Mr. Satendranath Tiwari	78

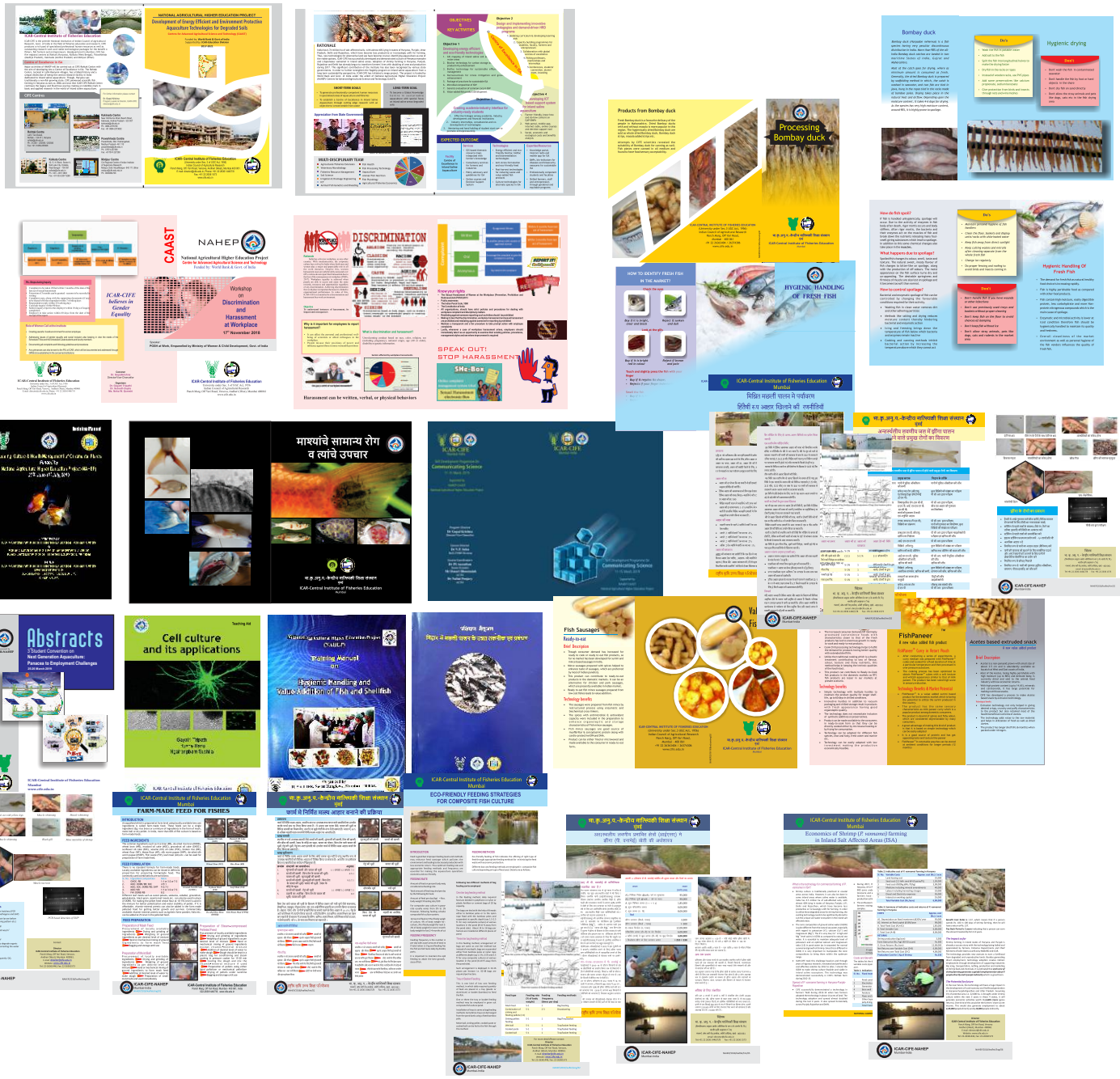
MoU under NAHEP Project

- Erfinden Technologies Pvt. Ltd. regarding "A proof of concept (POC) for the application of Artificial Intelligence (AI) in fish identification, Internet of Things (IoT) and validity studies" on 28 August, 2020.
- Non-Veg Mart (startup) for the validation and up-scaling of selected technologies on 28 August, 2020.

Objective-4: To develop ICT based support system for aquapreneurs and build capacity of fisheries professionals

- A farmer-friendly and illustrated manual "Best Management Practices for *P. vannamei* Farming" has been translated in Hindi and Tamil for a wider reach among diverse audience.
- Project web-portal (CIFE-NAHEP) (link: https://kultivatein.wixsite.com/cife) has been developed & hosted online.
- Indices on perceived social, economic and ecological impacts of ISA have been developed. In addition, a study was conducted to assess the fish consumption behaviour in Punjab and Haryana. The results revealed that income was not a significant variable for fish consumption, while education, occupation (Govt. job) and family type were found to be significantly affecting fish consumption.

Sl. No.	Publications	Number
1.	Research Articles	4
2.	Popular Article	1
3.	Training Manuals	12
4.	Brochures	21



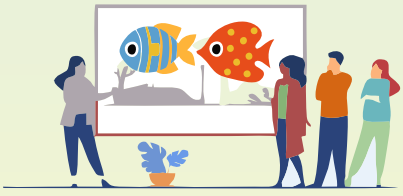
06

Extension Achievements

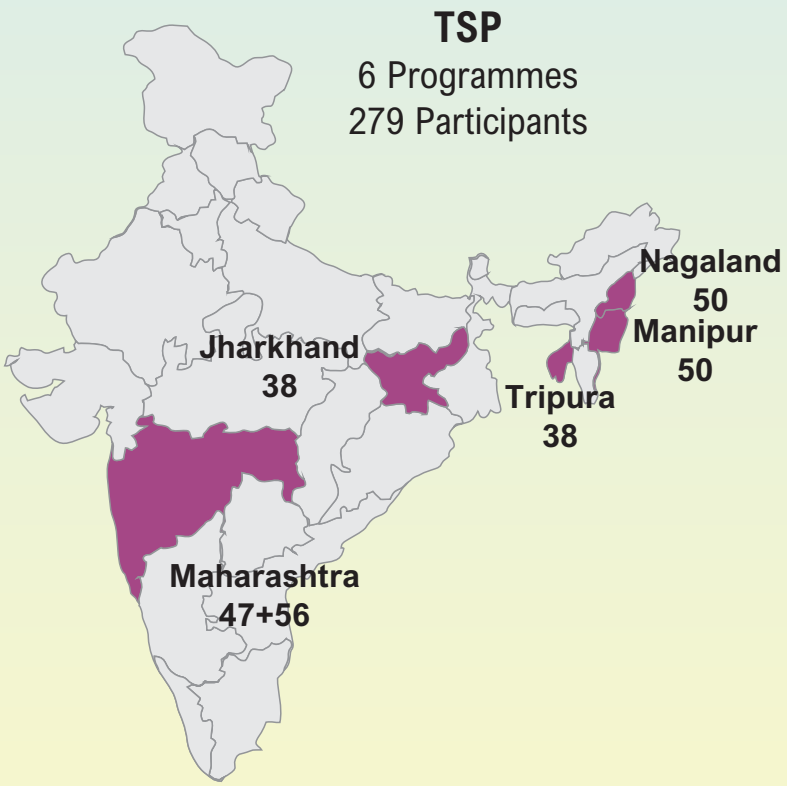
Highlights

Exhibitions - 6

Farmers meet - 8
858 Participants



Visitors
954



6.1. Tribal Sub Plan (TSP)

Under the TSP component, the Institute has undertaken several training programmes along with livelihood improving activities including fish fingerlings, fish feeds, cast nets other aquaculture inputs for the tribal communities of Maharashtra, Jharkhand, Nagaland, Manipur and Tripura. Six training programmes were conducted for 279 beneficiaries during January to December 2020 and their details are given below.

1 Hands-on training on Aquaculture Technologies at Sardar Sarovar, Nandurbar District, Maharashtra

Coordinator: Dr. Kiran Dube Rawat

ICAR-Central Institute of Fisheries Education, Mumbai in collaboration with Department of Fisheries, Govt. of Maharashtra organized a two-days hands-on training on Aquaculture technologies at Manibeli village of Sardar Sarovar, Nandurbar District, Maharashtra during 22-23 January, 2020. Forty seven tribal farmers from five different villages (viz Shelgada, Chickhodi, Manibeli, Bhusa and Chimalkhedi) of Nandurbar district participated in the programme. The programme was jointly coordinated by Dr. Kiran Dube Rawat and Mr. Kiran Padhvi, Assistant Commissioner Fisheries, Nandurbar, Maharashtra.

Dr. Kiran Dube Rawat made her presentation on the prospects of fisheries development in Maharashtra in open water bodies. She showed the technologies of cage and pen culture in open water bodies through pictures and handouts. Mr. K.D. Raju demonstrated different field methods of water quality analysis. Mr. Kiran Padhvi informed the farmers about different types of technologies available for them. Farmers and trainees visited the cage culture unit of Manibeli village of Sardar Sarovar. Cage culture, growth of fish, cage structure etc. were discussed with the farmers. The farmers also discussed different issues faced by them.

Modern Methods of Freshwater Aquaculture at Chandel, Manipur

Coordinator: Dr. S. Munil Kumar r

A three-days Skill Development Training Programme on Modern Methods of Freshwater Aquaculture was organised for the fish farmers of Chandel district, Manipur at Komlathabi Fish Seed Farm during 5-7 February, 2020. The programme was organised by ICAR-Central Institute of Fisheries Education, Kolkata Centre in collaboration with Fisheries Department, Govt. of Manipur. Fifty trainees participated in the Skill Development Programme. The trainees came from different blocks of Chandel District *viz*. Chandel, Chakpikarong, Machi, Moreh and Tengnoupal. r

3 Training on Ornamental Fish Culture at Raipur, Chhattisgarh

Coordinators: Dr. Kiran Dube Rawat and Dr. Madhuri S. Pathak r

Aquaculture division of ICAR-Central Institute of Fisheries Education, organised three-days training programme on Ornamental Fish Culture at Awareness Centre, Raipur, Chhattisgarh for the fish farmers of Chhattisgarh from 29-31 January, 2020. A group of 38 fish farmers along with 5 departmental officials from different districts i.e. Dantewada, Charma, Dhamtari and Raipur participated in the programme. The programme was inaugurated by Shri. N. S. Nag, Joint Director, Dept. of Fisheries in presence of Shri. D. K. Singh, Deputy Director and other officials. The topics covered in the lectures included the present status of ornamental fish farming, fabrication and maintenance of aquarium, accessories, feed and disease management of ornamental fishes. A field visit was organised to show ornamental fishes and facilities near Raipur, Chhattisgarh. During valedictory function, Dr. V. K. Shukla, Director Fisheries, Chhattisgarh addressed the farmers and thanked CIFE for their proactive role in organising the programme.

4 Awareness Programme on Livelihood Improvement of Tribal Farmers Through Improved Technology Interventions in Aquaculture and Fisheries Entrepreneurship at Palghar, Maharashtra

Coordinator: Dr. Kishore Kumar Krishnani

A one-day, awareness-cum-exhibition programme on Livelihood Improvement of Tribal Farmers Through Improved Technology Interventions in Aquaculture and Fisheries Entrepreuenership was organised at Dahivali-Kumbhiste village of Palghar District on 13 March, 2020. Awareness was created among tribal farmers about value-added products/technologies developed by CIFE, farm pond based aquaculture, soil and water quality management, soil health and water quality cards, value addition, Integrated agri-aquaculture and culture based fisheries in small water bodies as allied options for doubling their income. Value-added products developed by CIFE were exhibited. During the interaction, information about existing farming system was discussed. The programme was very successful in creating awareness among tribal farmers about farm pond based IMC aquaculture, soil and water quality management, value-added products, integrated agri-aquaculture and culture based fisheries in small water bodies and also in assessing existing farming system in tribal areas. In this event, 56 tribal farmers participated and majority of the farmers expressed their keenness to integrate fisheries in their existing farming systems for their livelihood improvement.

5 Awareness Programme and Net Distribution at Dhalai, Tripura

Coordinator: Dr. K. A. Martin Xavier

A net distribution programme was organised by the FRHPHM Division of ICAR-Central Institute of Fisheries Education, Mumbai in association with Department of Fisheries Govt. of Tripura on 10 July, 2020. The programme was held at the office of the Fishery Officer, Durgachowmuni Block under Dhalai District of Tripura. The Director and Vice-Chancellor Dr. Gopal Krishna and other officials attended the programme through virtual mode. The programme was attended by Miss Sampa Das, Chairperson, Panchayat Samittee, Durgachowmuni Block. Sri D. Bhowmik, Deputy Director of Fisheries, Dhalai District and Superintendent of Fisheries, Kamalpur Sub Division, Dhalai District, Tripura were the Guests of Honour during the function. Thirty cast nets were distributed among the tribal fishermen (12 from Durgachowmuni RD Block and 18 from Salema RD Block) selected by respective PRA Bodies. This programme was organised by adhering to social distance norms as per COVID 19 guidelines and it ended with a vote of thanks by Dr. Apu Das, Fishery Officer, Kamalapur, Dhalai, Tripura.

6 Modern Methods of Freshwater Aquaculture at Kiphire, Nagaland

Coordinators: Dr. Sujata Sahoo and Dr. B. K. Mahapatra

A Skill Development Training Programme on Modern Methods of Freshwater Aquaculture was organised in Kiphire, Nagaland under TSP programme of ICAR-CIFE, Mumbai during 5-7 March, 2020. The programme was conducted by ICAR-Central Institute of Fisheries Education, Kolkata Centre in collaboration with Department of Fisheries and Aquatic Resources, Nagaland. The training session started with the key note address by Ms. Nyempo Wallin, SDO (Civil), Kiphire l district. She emphasized that aquaculture is one of the most important sectors to provide sustainable livelihood to the tribal fisher folk and is important for economic upliftment of the state and it should not lag behind. She interacted with the participants and urged them to get maximum knowledge from the training and utilize it for their benefit. She also appreciated the efforts made by ICAR-CIFE Mumbai. The training was attended by 50 participants belonging to tribal fishers' folk from Kiphire district, Nagaland. A training manual comprising lectures on different aspects of Modern Methods of Freshwater Aquaculture like pond preparation, importance of water quality, aquaculture monitoring, composite fish culture, integrated aquaculture and aquaculture management etc. was released and distributed to all the participants. The analysis of water quality parameters was also demonstrated using the kits developed by ICAR-CIFE, Kolkata Centre. A field visit programme and demonstration of fish feed preparation was also arranged.

6.2. Scheduled Caste Sub Plan (SCSP) Component -

1 Training programme on Freshwater Aquaculture at Sundarban, West Bengal

Coordinators: Dr. G. H. Pailan and Dr. Sujata Sahoo r

ICAR-Central Institute of Fisheries Education, Kolkata Centre organised three days training programme on Freshwater Aquaculture at Hingalganj, Sundarban, West Bengal from 22-24 January, 2020. A group of 100 fish farmers from nearby areas participated in the programme. Technical sessions were conducted on pond preparation and management, feeding strategy, integrated aquaculture, composite fish culture, live feed organisms, induced breeding, water quality management and control measures for fish diseases. Water quality testing and feed preparation methods were explained and practically demonstrated at the pond site. A manual in Bengali language Freshwater Aquaculture (*Mistijale Macher Chas*) containing all the relevant topics were distributed to the farmers.

2 Demonstration of Leaf Meal based Farm-Made Aqua-Feed Preparation and On-Farm Feeding Management at Chatra, Jharkhand

Coordinators: Dr. Parimal Sardar and Dr. Sikendra Kumar r

A three-days farmer's training on Demonstration of Farm-Made Leaf Meal Based Aquafeed Preparation and On-Farm Feeding Management was organised by ICAR-CIFE, Mumbai in collaboration with State Fisheries Department, Jharkhand at KVK Chatra, Jharkhand during 23-25 January, 2020. About 70 scheduled caste farmers of Lawalaung (Chatra), Jharkhand attended the programme. Dr. Parimal Sardar interacted with the farmers on composite fish culture, locally available fish feed ingredients and scope of leaf meal as aquafeed ingredient, farm-made feed preparation and on-farm feeding strategies. Dr. Sikendra Kumar delivered the lectures on quality control of ingredients and aquafeed, storage of ingredients and aquafeed. Demonstration of leaf meal based aquafeed preparation and feeding methods in composite fish culture system was given to the trainees at the pond site.

3 Training programme on Aquaculture and Aquafeed at Parakode, Kerala

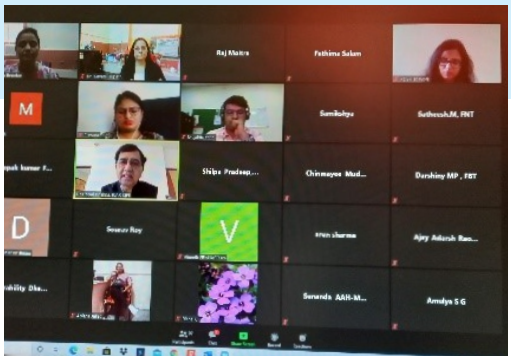
Coordinators: Dr. Shamna N. and Dr. Babita Rani r

ICAR-Central Institute of Fisheries Education, Mumbai and Department of Fisheries, Pathanamthitta jointly conducted a three-day training programme on Aquaculture and Aquafeed from 27-30 January, 2020 at Parakode, Kerala. This training programme was inaugurated by the Block Panchayat President, Mrs. Beena Prabha in the presence of Dr. Prince S., Assistant Director of Fisheries, Pathanamthitta, Mr. S. Radhakrishnan, Vice-president, Parakode Block and Mr. Ravichandran, SC Development Office Representative, Parakode Block. Around 62 farmers belonging to scheduled caste community participated in the programme. The theory and practical classes on basics and advances in aquaculture techniques were taken and demonstration of various types of farm-made feed preparation along with appraising the farmers about knowledge on locally available ingredients and additives used in aquafeed were conducted. As part of the training programme, 2 booklets and 2 leaflets were prepared and circulated amongst the farmers.

4 Training programme on Basics in Shrimp Aquaculture at Guntur, - Andhra Pradesh -

Coordinators: Dr. Muralidhar P. Ande, Dr. P. Srinivasa Rao and Mr. R. Ravi Shankar Patnaik r

A one-day farmer's training on Basics in Shrimp Aquaculture was organised by ICAR-CIFE Kakinada Centre on 7 February, 2020 at Intur village, Amruthalur Block, Guntur District, Andhra Pradesh. The programme was attended by Shri P. Sitaramaiah, Mandal Parishad Development Officer and the Guest of Honour was Shri. Joshi, Extension Officer of Panchayat Raj and Rural Development, Shri Moshe, Ex-Sarpanch, Shri Suresh Reddy, Agriculture Society President, Intur village, Shri Mutta Reddy, Village Head, Intur. About 50 farmers attended the programme. Technical sessions on better management practices in shrimp farming, water quality management in shrimp culture, feed and feeding management, disease control measures, and shrimp culture in low saline waters were conducted. A technical bulletin on Better Management Practices in *P. vannamei* was prepared in the local language (Telugu) and distributed to farmers. Twenty numbers of water analysis kits *viz*., dissolved oxygen, pH and alkalinity were distributed to the scheduled caste trainees. Farmer's interactive session on shrimp culture was also conducted at the end of the training programme.



6.3. Farmers' Meet/Online Webinars organised

18 January, 2020
Farmers' Awareness Programme under NSPAAD project
Valsad (Gujarat)
No. of Participants: 25

5 February, 2020
Fish Farmers' Meet/Industry Meet
ICAR-CIFE, Rohtak Centre, (as part of NAHEP-CAAST)
No. of Participants: 250

11 February, 2020
Field training on Percolation Tank Based Aquaculture
Nasik, Maharashtra
No. of Participants: 15

28 February, 2020
Industry meet on Industry-Ready Students and Entrepreneurship Development
ICAR-CIFE, Mumbai
No. of Participants: 151

13 March, 2020
Industry Meet on Quality Seed in Doubling Aquaculture Productivity
ICAR- CIFE, Kolkata Centre
No. of Participants: 67

10 July, 2020
Fish Farmers' Day
ICAR-CIFE, Mumbai/ Dhalai, Tripura
No. of Participants: 100

15 October, 2020
Rashtriya Mahila Kisan Diwas
ICAR-CIFE, Mumbai
No. of Participants: 100

5 December, 2020
World Soil Day,
ICAR-CIFE, Mumbai
No. of Participants: 150

Mahila Kisan Divas

National Women Farmers' Day was celebrated at ICAR-CIFE, Mumbai on 15 October, 2020 using the online platform Google Meet. The programme was organised under the guidance of Dr. Gopal Krishna, Director CIFE, and coordinated by Dr. Arpita Sharma, Dr. S. N. Ojha and Dr. Aparna Chaudhari. Talks on Women friendly aquaculture and Post-harvest technologies for women were delivered by Dr. K. K. Krishnani, Head, Aquaculture Division, and Dr. A. K. Balange, Senior Scientist, FRHPH Division, respectively. A session was held on experience sharing by the participants and discussion with experts.
The programme was attended by 100 participants including 33 women fish farmers, 13 men fish farmers, 3 women entrepreneurs and students.

6.4. Exhibitions Organized at Various Events

Event	Date	Venue
Marine Ecosystem Opportunity and Challenges (MECOS3) 2020, CMFRI, Kochi	07-10 January, 2020	ICAR-CMFRI, Kochi, Kerala
Bengal Fish Fest 2020	10-12 January, 2020	Nalban Food Park Ground, Kolkata, West Bengal
Vesava Koli Sea Food Festival-2020	17-19 January, 2020	Versova Village Ground, Mumbai
Subhas Mela 2020	23-29 January, 2020	Taldi, Netaji Sangha, Taldi, South 24 Parganas, West Bengal
4th Innovation Festival 2020 under the theme Innovations in Teaching and Learning Methods	05-07 March, 2020	Nehru Science Centre, Worli, Mumbai, Maharashtra
Awareness cum exhibition programme on "Aquaculture as a potential livelihood option for tribal communities" under Tribal Sub-plan	19th September 2020	KVK Narayangaon, Pune Maharashtra
Hoshangabad and Harda *jile ke Agrani Evam Jaivik Krishak Se Paricharcha and Pradarshani*	29 December, 2020	Zonal Agriculture Research Centre, Powarkheda, Hoshangabad, Madhya Pradesh

ICAR-CIFE's participation in the Fourth Innovation Festival-2020 at Nehru Science Centre Mumbai

ICAR-CIFE participated in the Fourth Innovation Festival-2020 at Nehru Science Centre from 5-7 March 2020 under the theme Innovations in Teaching and Learning Methods. Six scientists and 12 students represented the Institute and exhibited various innovative technologies at the event that was inaugurated by Shri A. P. Deshpande, Hon. Secretary, Marathi Vidnyan Parishad, Mumbai and Dr. A. P. Jayaraman, Nuclear Scientist and President STEAM Academy. CIFE team interacted with young innovators, scholars and researchers from various institutions including Indian Institute of Geomagnetism, Indian Institute of Chemical Technology, Mumbai University, CSIR-National Environmental Engineering Research Institute and Indian Institute of Tropical Meteorology.

ICAR-CIFE stall was visited by more than 500 people including entreprenuers, students/teachers and young researchers from several different schools, colleges and research institutes. The visitors were impressed by the aquaculture related technologies and post-harvest products displayed at the stall.

6.5. Print media

Pattiyon se Taiyar Matsya Aahar Paustikta se Bharpur
24 January, 2020
Dainik Bhaskar Newspaper, Jharkhand
Hindi

Matsyakrishi Pariseelanam Nalki
29 January, 2020
Malayala Manorama, Pattanamtitta edition
Malayalam

Vannamei Royyala Saagutho Aadaayam
8 February, 2020
Eenadu, Kakinada edition
Telugu

Low Tide, High on Trash: New Study Identifies Flow of Plastic Into The Sea
3 March, 2020
Hindustan Times, Mumbai edition
English

Gharelu Saman se Feed Taiyar Kar Adhik Profit Kamayen Matsya Palak
28 May, 2020
Dainik Bhaskar Newspaper, Jharkhand
Hindi

Vital Role of Mangroves
23 July, 2020
Loksatta, Mumba edition
Marathi

450 Desi Magur Machali Ka Vajan, Aakar Badhane Kelie Karayenge Breeding, Pit Tagging Se Hogi Pahachan
22 September, 2020
Dainik Bhaskar, Hoshangabad Itarsi edition
Hindi

Mumbai aur Hoshangabad ke Baigyaniko ne kia Prayog, Machalion Ke Mal se Jaibik Khad Banakar Pathron Par Uga Rahe Sabjiyan
11 December, 2020
Patrika, Hoshangabad Itarsi edition
Hindi

Swachh Bharat
19 December, 2020
Eenadu, Kakkinada edition
Telugu

Pahle ki Gaon Main Saf- Safai Phir Bataya Swachata ka Mahatva
20 December, 2020
Patrika, Hoshangabad Itarsi edition
Hindi

Machali Palan ki di Jankari
24 December, 2020
Patrika, Hoshangabad Itarsi edition
Hindi

Pachadanam Parishubrata Pai Rally
31 December, 2020
Sakshi, Kakinada edition
Telugu

Pachadanam Parishrubratha Pai Chitralekana Poteelu
31 December, 2020
Eenadu, Kakinada edition
Telugu

6.6. Visits Coordination

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ICAR-CIFE, Mumbai

4 February, 2020 (55)
Students from University of Horticulture Sciences, Balakot College of Horticulture, Mysuru , Karnataka

4 February, 2020 (25)
Students from Mumbai University, Kalina Campus, Mumbai, Maharashtra

4-5 February, 2020 (21)
Office of the Assistant Director Of Fisheries, Bhuj-Kachchh, Gujarat

13 February, 2020 (40)
Students from Orchid Global Learning Academy, Mumbai, Maharashtra

12 February, 2020 (49)
Students from Indian Institute of Food Processing Technology, Tanjavur, Tamil Nadu

23 February, 2020 (24)
Trainees from Fisheries Industries, Bhopal, Madhya Pradesh

ICAR-CIFE, Kolkata Centre

7-8 January, 2020 (27)
B.F.Sc. students from College of Fisheries, Lembuchera, Tripura

14 February, 2020 (70)
Fish farmers from Raigarh, Chhattisgarh

18 February, 2020 (19)
Fish farmers from Ambikapur, Chhattisgarh

ICAR-CIFE, Kakinada Centre

6 January, 2020 (55)
Students from Aadikavi Nannaya University, Rajahmundry, Andhra Pradesh

29 January, 2020 (12)
Department officials, Govt. of Rajasthan Udaipur, Rajastan

31 January, 2020 (75)
Students from S.K.V.T Degree College, Rajahmundry, Andhra Pradesh

7 February, 2020 (57)
Students from V.S.M College, Ramachandrapuram, Andhra Pradesh

29 February, 2020 (37)
Students from Mother Theresa Degree College, Chittoor, Andhra Pradesh

3 March, 2020 (27)
Students from Viveka Degree College, Tenali, Andhra Pradesh

ICAR-CIFE, Rohtak Centre

4 January, 2020 (02)
National Director,
NAHEP & DDG (Agricultural Education)

22 January, 2020 (06)
NAHEP-CAAST Members and
World Bank Team

ICAR-CIFE, Powarkheda Centre

8 January, 2020 (75)
Pracharya Govt. Higher Secondary School Raipur, Dist. Hoshangabad, Madhya Pradesh

17 January, 2020 (13)
Santiniketan Higher Secondary School, Hoshangabad, Madhya Pradesh

28 January, 2020 (28)
Govt. Middle school, Itarsi, Madya Pradesh

31 January, 2020 (10)
Saskiya High School, Ghatli, Kesla, Hoshangabad, Madhya Pradesh

2 February, 2020 (29)
Ekikrut Govt. School, Irakhapa, Suhagpur, Hoshangabad, Madhya Pradesh

4 February, 2020 (33)
Students from Agriculture, Agri-clinics and Agri-business Centre Scheme, Bhopal, Madhya Pradesh

13 February, 2020 (36)
Farmers from Ganbasoda Tehsil, District Vidhisa, ATMA, Madhya Pradesh

18 February, 2020 (20)
Students from Saifia Science College, Bhopal, Madya Pradesh

18 March, 2020 (25)
Fish farmers from Narsinghpur and Balaghat District, Madya Pradesh

11 November, 2020 (20)
Fish farmers from Sihor District, Madhya Pradesh

27 November, 2020 (12)
Fish farmers from Raisen District, Madhya Pradesh

5 December, 2020 (27)
Farmers from Hoshangabad, Madya Pradesh

9 December, 2020 (25)
Female farmers from Narsinghpur District, Madhya Pradesh

Transfer of Technology

L. vannamei Culture in Salt Affected Inland Saline Water

Demonstrated at

Haryana, Punjab, Delhi, Rajasthan, Western UP region

Beneficiaries

Farmers & stakeholders

Impact

Intensive technology demonstrations and trainings were given to farmers in the three extensively salt-affected states of Haryana, Punjab and Rajasthan in collaboration with their respective State Fisheries Departments. In addition, continual technical guidance and monitoring of each farm by ICAR-CIFE throughout the culture period gave enough confidence to farmers and the lure of big profit resulted in widespread adoption of shrimp farming by 2020. The technology has so far been adopted by 300 farmers in Haryana, 100 in Punjab, 40 in Rajasthan and 2 in Delhi with almost 1000 acres under culture with an average productivity of 2.8 tonnes/acre and a survival rate of 70%. The wide spread adoption of the technology by farmers resulted in the huge production of *L. vannamei* over the years, generating in the cumulative revenue of around 200 crores

District wise details of commercial inland saline shrimp farms demonstrated by ICAR-CIFE Rohtak Centre in 2020

Haryana-Rohtak, Jhajjar, Bhiwani, Jind, Hisar, Fatehabad, Sirsa, Sonipat, Mewat, Gurugram, Charkhi Dadri and Rewari

Delhi - South West Delhi

Punjab - Sri Muktsar Sahib, Fazilka, Batinda, Mansa and Faridkot

Rajasthan - Churu, Hanumangarh

Western UP - Agra, Mathura

Biofloc Technology for Aquaculture

Demonstrated at

Kerala

Beneficiaries

Farmers and stakeholders

Impact

Intensive trainings and technology demonstrations were carried out in all 14 districts of Kerala, in collaboration with the respective district offices of State Fisheries Department, Govt. of Kerala. Fourteen demonstration units and 1840 farmers units were established under Subhiksha Keralam Project for which technical consultancy was provided from time to time. Many biofloc units harvested the stock and obtained 400-500 Kg of GIFT/Chitralada strain of tilapia from 20000L tanks in 3.5-5 months through phased harvesting. It is proved to be a viable model for backyard fish farming for self-reliance in farmed fish production as aimed under Subhiksha Keralam project.

Biofloc in Tank and Poly Lining Pond

Demonstrated at

Golkunda, Bhopal, Madhya Pradesh

Beneficiaries

Farmers, Entrepreneurs

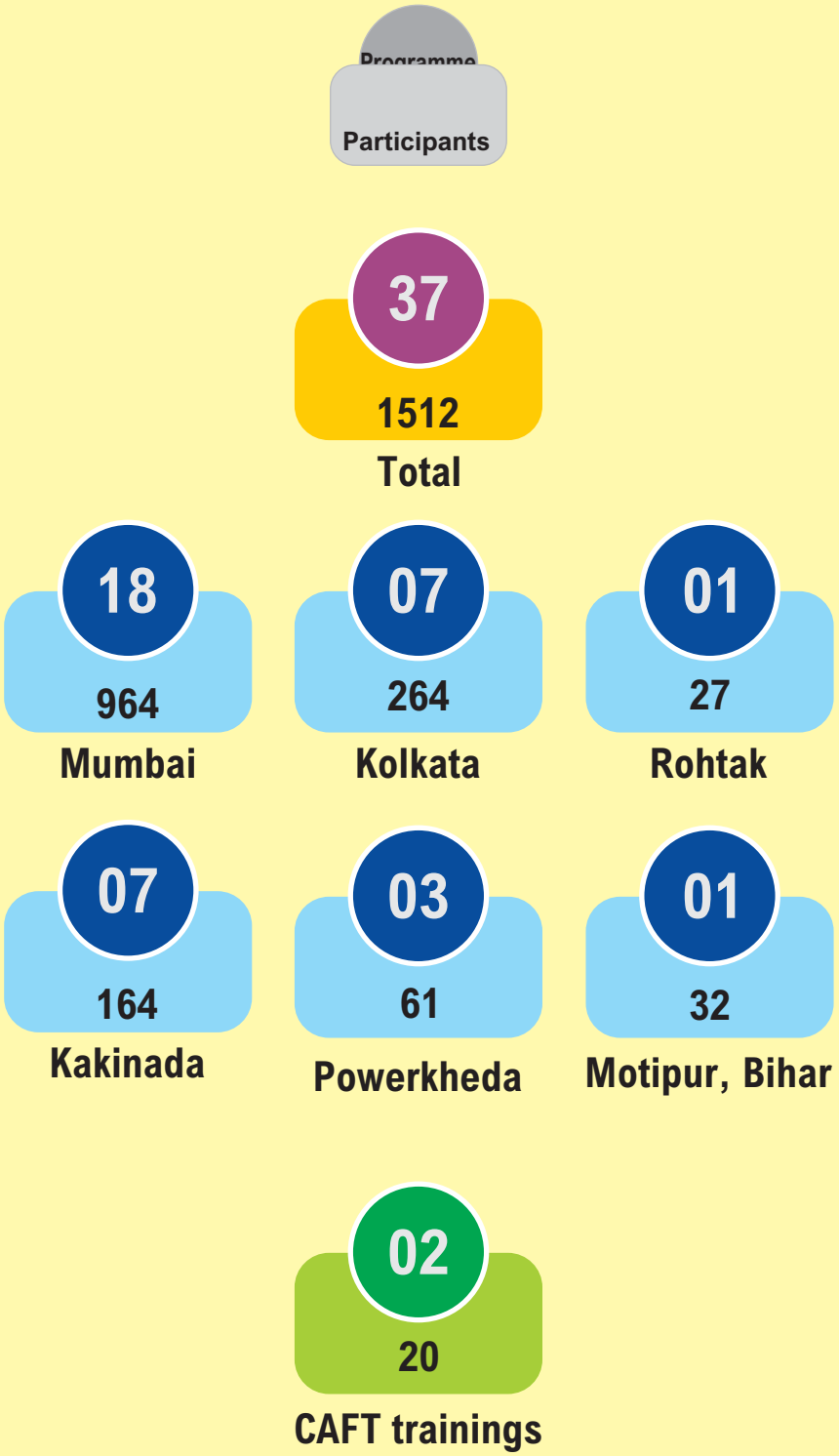
Impact

- Human resource development
- Increase in farming practices

07

Human Resource Development

Summary


Programme
Participants
37
1512
Total
18
964
Mumbai
07
264
Kolkata
01
27
Rohtak
07
164
Kakinada
03
61
Powerkheda
01
32
Motipur, Bihar
02
20
CAFT trainings

16.1. Skill Development Programmes (SDP)/Refreshers Courses

ICAR-CIFE, Mumbai

Quality Control and Certification of Fish and Fishery Products	06-10 January, 2020	27	Maharashtra and Gujarat
Quality Control and Certificate of Fish & Fishery Products	06-10 January, 2020	28	Mumbai, Maharashtra
SciCom for Smart Scientists	14-21 January, 2020	13	Mumbai, Maharashtra
SciCom for Smart Scientists	16-22 January, 2020	13	Mumbai, Maharashtra
Health Management in Freshwater Fish Culture	22-28 January, 2020	10	Maharashtra, Gujarat, Bihar
Hygienic Handling and Value Addition of Fish and Shellfish	03-05 February, 2020	27	Punjab and Haryana
Technical Know-How for Spirulina Biomass Production and Utilization	03-07 February, 2020	06	Andhra Pradesh
Carp Culture Practices and Recent Advances	03-07 February, 2020	25	Madhya Pradesh
Aqua feed Preparation and Feeding Management in Inland Saline Aquaculture	11–15 February, 2020	31	Kolkata, West Bengal
Hygienic Handling of Fish and Conservation Measures for Fisheries	22 February, 2020	26	Palghar, Maharashtra
Biochar for Enhancing the Aquaculture Productivity	03-07 March, 2020	13	Maharashtra, Madhya Pradesh, Bihar and Jammu & Kashmir
Biofloc Technology for Intensive Farming Practices	03-07 March, 2020	27	Maharashtra
Short Course on SciCom for Smart Scholars Batch 1 (Online mode)	05-18 May, 2020	165	All India
Seafood Processing and Quality Control Batch I (Online mode)	01-8 May, 2020	75	All India
Seafood Processing and Quality Control Batch II (Online mode)	10-17 May, 2020	75	All India
Short Course on SciCom for Smart Scholars Batch II (Online mode)	12-25 May, 2020	190	All India
Short Course on SciCom for Smart Scholars Batch III (Online mode)	26 May-8 June, 2020	163	All India
Biofloc Technology in Fish Farming (Online mode)	01-03 December 2020	50	All India

ICAR-CIFE Kolkata Centre

Mithe Pani Me Machli Palan	07-13 January, 2020	22	Madhepura, Purnea, Bihar
Mithe Pani Me Machli Palan	15-21 January, 2020	24	Araria, Kishanganj, Bihar
Modern Methods of Freshwater Aquaculture	22-24 January, 2020	100	24 Parganas, West Bengal
Quality Improvement in Ornamental Fish	01-07 February, 2020	11	West Bengal, Jharkhand and Odisha
Modern Methods of Freshwater Aquaculture	05-07 February, 2020	50	Chandel, Manipur
Aquafeed Preparation and Feeding Management for Inland Saline Aquaculture	11-15 February, 2020	31	West Bengal, Bihar and Odisha
Mithe Pani Me Machli Palan	11-17 February, 2020	26	Bhagalpur, Khagaria, Bihar

ICAR-CIFE, Kakinada Centre

Fish and Prawn Culture	24-30 January, 2020	24	Banka, Bihar
Pedigree Marking Systems in Aquaculture Species	11-13 February, 2020	20	Balabadrapuram, Andhra Pradesh
Fish and Prawn Culture	11-17 February, 2020	25	Patna, Bihar
Alternate Species Culture Practices in Brackish Water Aquaculture	17-21 February, 2020	25	Kakinada Centre
Fish and Prawn Culture	22-28 February, 2020	22	West Champaran, Bihar
Alternate Species Culture Practices in Brackish Water Aquaculture	09-13 March, 2020	25	Andhra Pradesh
Fish and Prawn Culture	13-19 March, 2020	23	Nalanda, Bihar

ICAR-CIFE, Rohtak Centre

Hygienic Handling and Value-Added Products of Fish and Shellfish	03-05 February, 2020	27	Haryana, Punjab and Maharashtra

ICAR-CIFE, Powarkheda Centre

Title	Date	No. of participants	State/region
Fish and Prawn Culture	07-16 January, 2020	18	Kemur, Bihar
Fish and Prawn Culture	18-27 January, 2020	18	Purnia, Bihar
Carp Culture Practices and Recent Advances	03-07 February, 2020	25	Madhya Pradesh

ICAR-CIFE, Motipur Centre, Bihar

Title	Date	No. of participants	State/region
Adhunik Matsya Palan Evam Aahar Prabhandhan	28 September - 02 October, 2020	32	Motipur, Bihar

CAFT programmes/winter school/summer school organised

Title	Period (dates)	No. of Participants
Immunological and Molecular Diagnostics for Rapid Disease Diagnosis	07-27 February, 2020	08
Antimicrobial Resistance with Special Reference to Fisheries and Aquaculture	02-11 March, 2020	12

Training programmes attended by staff

S.No.	Name	Name of the training programme	Date
1.	Dr. Neha Wajahat Qureshi	Animal Disease Economics, organized by ICAR-IVRI , Bareilly	08-10 January 2020
2.	Dr. Shivaji Argade Dr. Neha Wajahat Qureshi	SciCom for Smart Scientists organized by ICAR-CIFE, Mumbai	16-22 January 2020
3.	Dr. Muralidhar P. Ande	Challenges, Opportunities and the Future of Indian Fisheries Post COVID-19 Era organized by College of Fisheries, Veraval, Gujarat	28-30 May, 2020
4.	Dr. Muralidhar P. Ande	Challenges, Opportunities and Future of Agri and Allied Research and Education: Post Covid Era organized by AIASA, New Delhi	30-31 May, 2020
5.	Dr. Neha Wajahat Qureshi Dr. P.S Ananthan Dr. Vinod Yadav	ICAR-NIAP Webinar series on Quantitative Methods for Social Sciences organized by ICAR-NIAP	01- 23 June 2020
6.	Dr. Rathi Bhuvaneswari	Current Trends in Fish Biotechnological Researchorganized by Tamil Nadu Dr. J. Jayalalithaa Fisheries University, Tamil Nadu	09-11 July, 2020
7.	Dr. Muralidhar P. Ande Dr. K. Syamala	Aqua-preneurship development through Seed Production air-breathing fishes, from, organized by College of Fisheries, Tripura	21-25 July, 2020

S.No.	Name	Name of the training programme	Date
8.	Dr. Gayatri Tripathi	International Programme on Recent Advances in Next Generation Sequencing (NGS) organized by Centre for Ocean Research in association with Ministry of Earth Sciences – Earth Science Technology Cell (MoES-ESTC),	27 July-02 August 2020
9.	Dr. Gayatri Tripathi	Applied Computational Techniques in Life Sciences-Bio Tools 2020	10-15 August, 2020
10.	Dr. Gayatri Tripathi	Virtual Workshop on Applied Computational Techniques in Life Sciences-BioTools 2020, organized by SynBiogenica Labs, Ministry of Micro, Small and Medium Enterprises, Govt. of India (Ministry of MSME)	10-15 August, 2020
11.	Dr. Neha Wajahat Qureshi	Faculty Development Program (FDP) in Behavioural Economics, organized by Department of Economics, St Berchmans College, Changanassery, Kerala	22-25 August 2020
12.	Dr. Neha Wajahat Qureshi	Training Programme on Data Analytics in Fisheries organized by Department of Fisheries Extension, Economics and Statistics, Dr. M.G.R. Fisheries College and Research Institute, TNJFU, Thalainayeru	10 August-03 September 2020
13.	Dr. Gayatri Tripathi	BDFACS Master Multicolor flow cytometry training	01-03 September, 2020
14.	Dr. Megha Kadam Bedekar	Fish Health and Disease Management in Tropics organized by College of Fishery Science, NDVSU, Jabalpur (M.P.)	09-14 September, 2020
15.	Dr. Shivaji Argade	Innovative Practices in Extension Research and Evaluation, organized by ICAR-NAARM, Hyderabad	08-28 September, 2020
16.	Dr. Muralidhar P. Ande Dr. Arun Sharma	Virtual Global Summit on Artificial Intelligence (RAISE 2020) organized by Ministry of Information and Technology	05-09 October, 2020
17.	Dr. Neha Wajahat Qureshi	DST sponsored Training on Climate Change: Challenges and Response (for women scientists), organized by Centre for Disaster Management (CDM), Lal Bahadur Shastri National Academy of Administration (LBSNAA)	05-09 October 2020
18.	Dr. Jeena K.	6th World One Health Congress Virtual Edition, 2020 organized by University of Edinburgh during	30 October-03 November, 2020
19.	Dr. Manish Jayant	Analysis of Experimental Data using SAS, organized by ICAR-NAARM, Hyderabad,	09-14 November, 2020
20.	Dr. Gayatri Tripathi	National e-training on Research Ethics and Thesis/Research Paper Writing Skills Development	24- 28 November, 2020
21.	Dr. Jeena K.	Aquatic Epidemiology concepts introduction course organized by WorldFish in collaboration with the Norwegian Veterinary Institute	09-10 December, 2020
22.	Dr. Megha Kadam Bedekar	Advanced Bioinformatics tools and its Applications in Agriculture organized by NAARM, Hyderabad	07-11 December 2020
23.	Mrs. F. G. Fernandes	Government e- Marketplace (GEM) organized by National Academy of Human Resource Development (NAHRD)	17-18 December, 2020
24.	Dr. Nalini Poojary Mr. Avinash Sable Mr. Sagar Suresh Sawant	Motivation, Positive thinking and communication skills for Technical Officers of ICAR institutes organized by NAARM, Hyderabad	17-22 December, 2020
25.	All Girl students	Training on self defense for girl students at women's self defence CentreWSD Andheri Sports Complex, Mumbai (14 participants)	

08

Honours and Awards

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

Ranking of Agricultural Universities 2019

This is to certify that

ICAR-Central Institute of Fisheries Education, Mumbai

is ranked Number **16** amongst Agricultural Universities

(R.C. Agrawal)
Dy Director General (Edn)

5 December 2020, New Delhi

(Trilochan Mohapatra)
Secretary, DARE & DG, ICAR

ICAR Rafi Ahmed Kidwai Award

Dr. K. K. Krishnani, Principal Scientist and HoD (Aquaculture) was honoured with the prestigious Rafi Ahmed Kidwai Award for his outstanding research in Agricultural Sciences (Animal and Fisheries Sciences) from ICAR, New Delhi. The award was conferred on 16 July, 2020 virtually.

Best Faculty Award

Dr. K. Pani Prasad, Principal Scientist, AEHM Division, received the Best Faculty Award from The Society of Fisheries & Life Sciences, College of Fisheries, Mangaluru on 31 October, 2020.

Endowment Awards

Dr. C. V. Kulkarni Best Young Scientist Award

Dr. Martin Xavier K.A., Scientist, FRMPHM Division received the Dr. C. V. Kulkarni Best Young Scientist Award 2017 (on all India basis) from ICAR-CIFE, Mumbai on 31 October, 2020

Dr. Saurav Kumar, Scientist AEHM Division, received the Dr. C. V. Kulkarni Best Young Scientist Award 2020 (on all India basis) from ICAR-CIFE, Mumbai on 31 October, 2020

Dr. Hiralal Chaudhari Award for the Best Young Scientist

Dr. Kundan Kumar, Senior Scientist, AEHM Division, received the Dr. Hiralal Chaudhari Award for the Best Young Scientist 2020 (on all India basis) from ICAR-CIFE, Mumbai on 31 October, 2020.

Best Research Paper Award

Dr. Shivaji Argade received the best research paper award from the Indian Society for Studies in Cooperation, Pune on 28 February, 2020 during the 34th National Conference held at Guwahati

Award for Logo design

The logo designed by **Mr. D. Bhoomaiah**, ACTO was selected as the Best Logo in the competition announced by the Association for Management of Agricultural Research and Agripreneurship a registered professional society, Hyderabad. The award also included a Cash prize of Rs. 10,000/- along with a certificate.

Mr. D. Bhoomaiah, ACTO received the Certificate of Appreciation from The Karnataka Science and Technology Academy, (Department of Science and Technology, Govt. of Karnataka) Bengaluru for designing the KSTA-logo 2020.

Served as Member, Editorial Board

Name of Faculty	Journal
Dr. N. P. Sahu	Animal Feed Science Technology
	Frontier in Physiology Aquatic Physiology
	Turkish Journal of Aquaculture
	The Feed Trend
Dr. Arpita Sharma	Aquaculture and Marine Biology of Journal
Dr. A. K. Jaiswar	Journal of Indian Fisheries Association
Dr. Gayatri Tripathi	Journal of Aquaculture
Dr. Megha K. Bedekar	Scholarena Journal of Biotechnology
Dr. Annam Pavan Kumar	Mitochondrial DNA Part B: Resources
Dr. Saurav Kumar	Frontiers in Physiology

09

Linkages and Collaborations

8.1. Linkages

The Institute maintains linkages and collaborations with various national and international institutions and agencies for education, research and development.

Government of India Organizations r

- Fishery Survey of India, Mumbai
- Central Institute of Fisheries Nautical and Engineering Training, Kochi
- Marine Products Export Development Authority, Kochi
- Zoological Survey of India, Kolkata
- Indian Institute of Technology, Kharagpur
- Department of Earth Sciences, New Delhi
- Department of Science and Technology, New Delhi
- Department of Biotechnology, New Delhi
- Indian National Center for Ocean Information Services, Hyderabad
- Satellite Application Centre, Ahmedabad
- Bhabha Atomic Research Centre, Mumbai
- Tata Cancer Research Center, Mumbai
- Indian Institute of Foreign Trade, Kolkata
- Tata Institute of Fundamental Research, Mumbai
- Krishi Vigyan Kendra, Banswara, Rajasthan
- Nuclear Power Corporation of India Limited, Mumbai
- National Bank for Agriculture and Rural Development, Mumbai

ICAR Institutes r

- ICAR-Central Marine Fisheries Research Institute, Kochi
- ICAR-Central Institute of Brackishwater Aquaculture, Chennai
- ICAR-Central Institute of Freshwater Aquaculture, Bhubaneshwar
- ICAR-Central Inland Fisheries Research Institute, Barrackpore
- ICAR-Central Institute of Fisheries Technology, Kochi
- ICAR-National Bureau of Fish Gentic Resources, Lucknow
- ICAR-Directorate of Coldwater Fisheries Research, Bhimtal
- ICAR - Central Coastal Agricultural Research Institute, Goa
- ICAR Research Complex for Eastern Region, Patna
- ICAR Research Complex for North-Eastern Hill Region, Barapani
- ICAR-Indian Agricultural Research Institute, New Delhi
- ICAR-Central Institute of Agricultural Engineering, Bhopal

CSIR Institutes r

- Central Drug Research Institute, Lucknow
- Central Institute of Medicinal and Aromatic Plants, Lucknow
- Central Food Technological Research Institute, Mysore
- National Institute of Oceanography, Goa
- Centre for Cellular and Molecular Biology, Hyderabad
- Institute of Genomics and Integrative Biology, New Delhi
- Indian Institute of Integrative Medicine, Jammu
- Indian Institute of Chemical Biology, Kolkata

International

- University of Idaho, Idaho, USA
- University of Kentucky, Lexington, KY, USA
- Curtin University, Australia

State Governments r

Department of Fisheries of the following states:
Maharashtra, Haryana, Uttar Pradesh, Bihar, Tamil Nadu, Andhra Pradesh,Tripura, Arunachal Pradesh, Madhya Pradesh, Meghalaya, Nagaland, Assam, Manipur, Mizoram, Sikkim, Punjab and Telangana r

NGOs: r

- Yusuf Meherally Centre, Kutch, Gujarat r
- United Artists' Association, Ganjam, Odisha r

Other Organizations r

- Haryana Kishan Ayog, Chandigarh
- State Institute of Fisheries Technology, Kakinada
- Action Aid International, Port Blair
- M. S. Swaminathan Research Foundation, Chennai
- The Seafood Exporters Association of India, Kolkata
- Nezami Rekha Sea Foods Pvt. Ltd., Kolkata
- IFB Agro Industries Ltd., Aquatic & Marine Products Div., Kolkata
- Shimpo Exports, Kolkata
- Coreline Exports, Kolkata
- Digha Sea Food Exports, Kolkata
- NSZA Sea Food Pvt. Ltd, Kolkata
- Central Calcutta Science and Culture Organization for Youth, Kolkata
- APC Nutrient, Mumbai
- Godrej Agrovet Pvt. Ltd., Vijayawada
- Maharashtra Machimar Kriti Samiti, Mumbai
- Akhil Bhartiya Machimar Sanghatna, Mumbai
- Madhya Pradesh Fish Federation
- CPWD, Bhopal, M.P.
- CPWD, Hoshanagabad, M.P.
- Telecom Department, M.P.
- State Electricity Board, M.P.
- Saguna Baugh Farm, Neral
- Tata Power Co. Mahseer Farm, Lonavla
- Govt. Fish Farm, Khopoli
- Arrey Fish Farm, Mumbai
- Shramajivi Janata Sahayyak Mandal, Mahad, Raigarh, Maharashtra

MoU

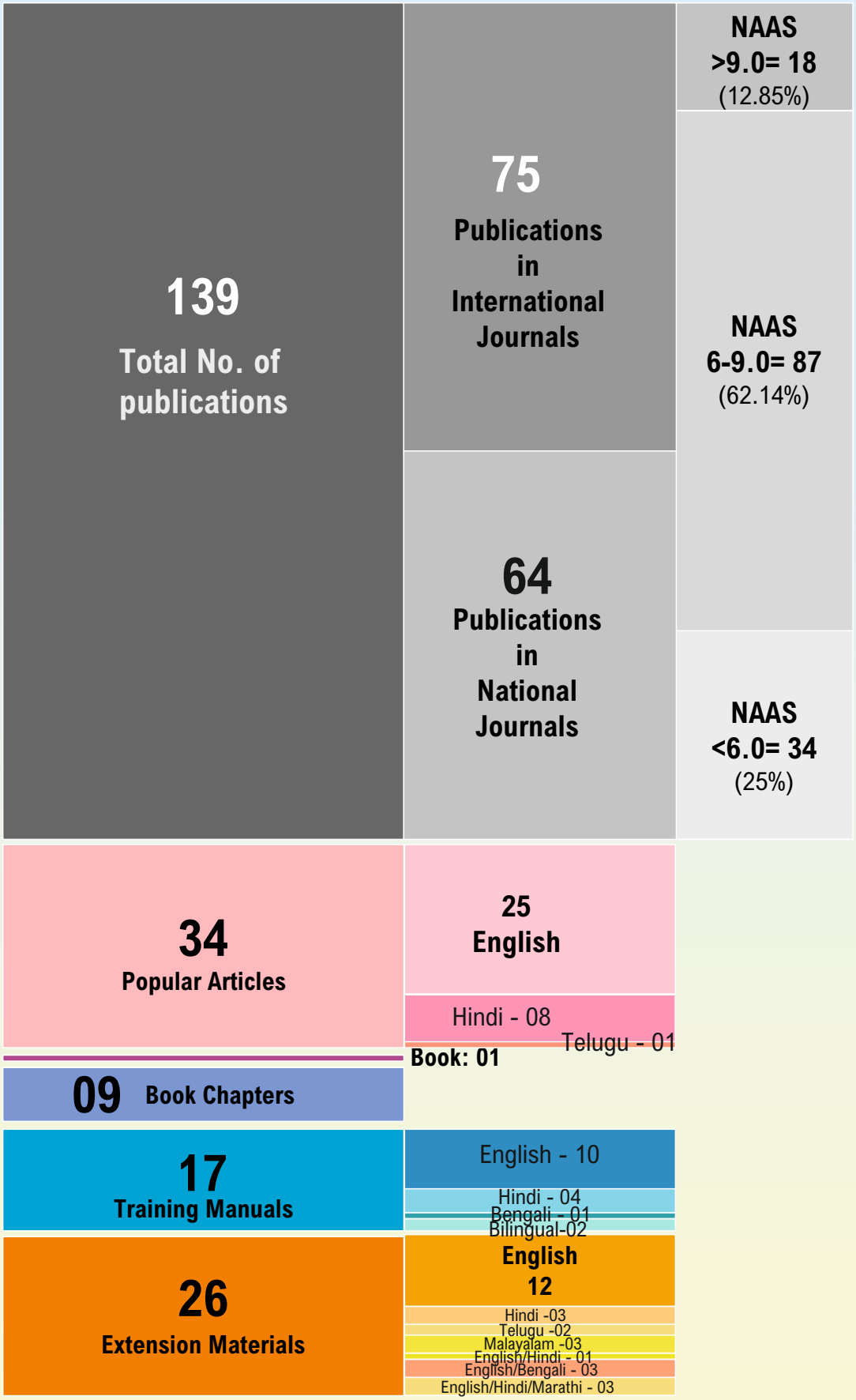
MoU was signed between ICAR-CIFE and Institute of Technology and Management University (ITMU), Gwalior on 31 January, 2020.

Exchanging the MoU between ICAR-CIFE, Mumbai and ITMU, Gwalior

10

Publications

Publication highlights



Journals (NAAS >9.00)

9.1 Peer Reviewed Publications

1. Abdul AP, Raman M, Rohit P, Shenoy L, Jaiswar AK, Koya KM, Damodaran D (2020) Predicting potential fishing grounds of ribbonfish (*Trichiurus lepturus*) in the North-Eastern Arabian Sea, using remote sensing data. *International Journal of Remote Sensing* 42 (1): 322-342. **(NAAS: 7.65)**

2. Abhilipsa B, Srivastava PP, Manish J, Tincy V, Subodh G (2020) Optimisation of transportation condition of *Labeo rohita* fingerling using potential water additives: based on primary and secondary stress responses and survival. *Journal of Experimental Zoology, India* 23(2): 1219-1226. **(NAAS: 5.51)**

3. Agarwal D, Gireesh-Babu P, Pavan-Kumar A, Koringa P, Joshi CG, Chaudhari A (2020) Transcriptome analysis of *Clarias magur* brain and gonads suggests neuro-endocrine inhibition of milt release from captive GnRH-induced males. *Genomics* 112(6): 4041-4052. **(NAAS: 9.12)**

4. Alam A, Chadha NK, Pavan-Kumar A, Chakraborty SK, Joshi KD, Sawant PB, Das SCS, Kumar J, Kumar T (2020) DNA barcoding and biometric investigation on the invasive *Oreochromis niloticus* (Linnaeus, 1758) from the river Yamuna of Uttar Pradesh. *Indian Journal of Animal Research* 1(54):856-863. **(NAAS: 6.44)**

5. Anand G, Srivastava PP, Varghese T, Sahu NP, Harikriskna V, Xavier M, Jahan I, Patro D (2020) *Sesbania aculeata* leaf meal as replacer of de-oiled rice bran in aquaculture feed: Growth, IGF-1 expression, metabolic and biochemical responses in *Cyprinus carpio* (Linnaeus 1758). *Aquaculture Research* 51(6): 2483-2494. **(NAAS: 7.50)**

6. Anand G, Srivastava PP, Varghese T, Sahu NP, Xavier M, Harikriskna V, Prabhakaran A, Kumari P (2020) Haematological and histoarchitectural alterations in *Cyprinus carpio* (Linnaeus 1758) fed with Sesbania leaf meal. *Journal of Environmental Biology* 41(5): 1082-1088. **(NAAS: 6.56)**

7. Angkha B, Verma AK, Kumar SH, Prakash C, Thomas RM (2020) Mobilization of mica by *Bacillus* sp. and its effect on Nile tilapia (*Oreochromis niloticus*) cum holy basil (*Ocimum tenuiflorum*)–based aquaponic system. *Aquaculture International* 28: 2045-2058. (**NAAS: 7.26**)

8. Balange AK, Nayak BB, Kumar S, Xavier KAM, Deepitha RP (2020) Use of natural additives for improving quality and stability of fish and fish products. *Journal of Experimental Zoology, India* 23(1): 827-832. (**NAAS: 5.3**)

9. Behera A, Roul KS, Pavan-Kumar A, Bhushan S, Gangan S, Jaiswar AK (2020) First report confirming the occurrence of jumping halfbeak *Hemiramphus archipelagicus,* Collette and Parin 1978 (Beloniformes: Hemiramphidae) from the Western Bay of Bengal India. *Thalassas: International Journal of Marine Sciences* 36:239–243. **(NAAS: 6.73)**

10. Bera A, Chadha NK, Dasgupta S, Chakraborty S, Sawant PB (2020) Hypoxia-mediated inhibition of cholesterol synthesis leads to disruption of nocturnal sex steroidogenesis in the gonad of koi carp, *Cyprinus carpio*. *Fish Physiology and Biochemistry*, 46: 2421-2435. **(NAAS: 7.73)**

11. Bera KK, Kumar S, Paul T, Prasad KP, Shukla SP, Kumar K (2020) Triclosan induces immunosuppression and reduces survivability of striped catfish *Pangasianodon hypophthalmus* during the challenge to a fish pathogenic bacterium *Edwardsiella tarda*. *Environmental Research doi.org/10.1016/j.envres.2020.109575* **(NAAS: 11.03)**

12. Bharati H, Deshmukhe G, Das SK, Kandpal BK, Sahoo L, Bhushan S, Singh YJ (2020) Phytoplankton communities in Rudrasagar Lake, Tripura (North-East India) – A Ramsar site. *International Journal of Bio-resource and Stress Management doi.org/10.23910/ijbsm/2020.11.1.2030* **(NAAS: 4.65)**

13. Bhartendu V, Tripathi G, Prasad KP, Bedekar MK (2020) Development and partial characterization of primary cell culture from liver tissue of *Pangasianodon hypophthalmus*. *Journal of Entomology and Zoology Studies* 8(2): 784-789. **(NAAS: 5.53)**

14. Bharti V, Jayasankar J, Shukla SP, George G, Ambrose TV, Augustine SK (2020) Study on sea surface temperature and chlorophyll-a concentration along the south-west coast of India. Indian journal of Geo-marine Science 49 (1):51-56. (**NAAS: 6.30)**

15. Bhat RAH, Thakuria D, Pant V, Khangembam VC, Tandel RS, Shahi N, Sarma D, Tripathi G, Krishnani KK, Krishna G (2020) Antibacterial and antioomycete activities of a novel designed RY12WY peptide against fish pathogens. *Microbial Pathogenesis* 149:104591. doi.org/10.1016/j.micpath. 2020.104591 **(NAAS: 8.58)**

16. Bhutia TP, Qureshi NW, Yadav VK (2020) Factors affecting fish consumption in traditional fish markets of Kolkata city, West Bengal. *International Journal of Pure and Applied Biosciences* 7 (2): 39-43. **(NAAS: 4.74)**

17. Bhutia TP, Yadav VK, Qureshi NW, Kumar NR, Ojha SN (2020) Comparative analysis of consumer behaviour between traditional fish markets and modern retail outlets in Kolkata, West Bengal. *Fishery Technology* 57(1): 51–58. **(NAAS: 5.25)**

18. Biswal A, Srivastava PP, Gupta S, Jayant M, Varghese T (2020) Study on alteration of critical water quality parameters and selected metabolic response of *Labeo rohita* fingerling subjected to transportation stress. *Journal of Animal Research* 10(4): 563-568. (**NAAS: 5.68)**

19. Biswas C, Chakraborty S, Munilkumar S, Gireesh Babu P, Sawant PB, Chadha NK, Krishna G, Dasgupta S (2020) Effect of high temperature during larval and juvenile stages on masculinization of common carp (*Cyprinus carpio*, L). *Aquaculture* 530: 735803. **(NAAS: 9.02)**

20. Chakraborty R, Munilkumar S, Aich N, Biswas P, Mandal SC, Singh SK, Sarkar S (2020) Fishing wisdoms of fisher folks of Sepahijala district of Tripura. *Journal of Krishi Vigyan* 1: 125-129 (**NAAS: 4.41)**

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9.3 Book Chapters

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9.4 Popular Articles

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9.5 Training Manuals

English

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Bengali

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Bilingual (English-Hindi)

Nayak SK, Bhushan S (2020) Carp culture practices and recent advances. ICAR-Central Institute of Fisheries Education, Powarkedha Centre. Pp. 125

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9.6 Technical bulletins/Brochures

English

1. Alternatives to Antibiotics in Aquaculture (2020) ICAR-Central Institute of Fisheries Education, Mumbai.

2. Alternative Species Culture Practices in Brackishwater Aquaculture (2020) ICAR-Central Institute of Fisheries Education, Kakinada Centre.

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5. Covid-19 Precautions in Aquaculture Practices (2020) ICAR-Central Institute of Fisheries Education, Mumbai.

6. Disease Management in Inland Saline Farming of *Litopenaeus vannamei* (2020) ICAR-Central Institute of Fisheries Education, Mumbai.

7. Electrically Charged Column Bed Water Filtration Technology (CIFE AquaClean): An Environmentally Friendly Low Cost Technology for Water Treatment (2020) ICAR-Central Institute of Fisheries Education, Mumbai.

8. Feed Management Practices in Inland Saline Aquaculture (2020) ICAR-Central Institute of Fisheries Education, Mumbai.

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10. Ornamental Fishes of India (2020) ICAR-Central Institute of Fisheries Education, Mumbai.

11. Production of Biomass of *Spirulina (Arthrospira) platensis* and Extraction of Value Added Pigments (2020) ICAR-Central Institute of Fisheries Education, Mumbai.

12. Water and Soil Management Practices in Inland Saline Aquaculture (2020) ICAR-Central Institute of Fisheries Education, Mumbai.

Mobile App

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English-Bengali

1. Fishery Products from Freshwater Fishes (2020) ICAR-Central Institute of Fisheries Education, Kolkata Centre.

2. Guideline for Fish Hatchery Owners to Avoid Coronavirus Infection (2020) ICAR-Central Institute of Fisheries Education, Kolkata Centre.

3. Guideline for Fish Firms to Avoid Corona Virus Infection (2020) ICAR-Central Institute of Fisheries Education, Kolkata Centre.

English-Hindi-Marathi

1. Circular Economy Applied to Integrated Agri-aquaculture for Doubling Farmers Income (2020) ICAR-Central Institute of Fisheries Education, Mumbai.

2. Culture Based Fisheries in Reservoirs for Enhancing Livelihood of Farmers (2020) ICAR-Central Institute of Fisheries Education, Mumbai.

3. Green Water Technology for Bioaugmentation of Shrimp Aquaculture System for Adoption by the Farmers (2020) ICAR-Central Institute of Fisheries Education, Mumbai.

Hindi

१. आर्टेमिया नुप्ली उत्पादन तकनीक एवं मत्स्य आहार के रूप में उपयोग (2020) भा. कृ. अनु. प.- केन्द्रीय मात्स्यिकी शिक्षा संस्थान, मुंबई.

२. जलीय कीड़ों, परभक्षी एवं अवान्छिए मछलियों का उन्मूलन एवं नियंत्रण (2020) भा. कृ. अनु. प.- केन्द्रीय मात्स्यिकी शिक्षा संस्थान, मुंबई.

३. जलीय खरपतवार का उन्मूलन (2020) भा. कृ. अनु. प.- केन्द्रीय मात्स्यिकी शिक्षा संस्थान, मुंबई.

Telugu

1. Covid-19 Precautions in Aquaculture Practices (2020) ICAR-Central Institute of Fisheries Education, Kakinada Centre.

2. *SPF vannamei Saagulo Theesuko Valasina Jaagrattalu* (2020) ICAR-Central Institute of Fisheries Education, Kakinada Centre.

Malayalam

1. *Matsya Krishi Reethikal* (2020) ICAR-Central Institute of Fisheries Education, Mumbai.

2. *Matysa Aaharam Thayyarakkunna Vidham* (2020) ICAR-Central Institute of Fisheries Education, Mumbai. 6 pp.

3. *Matsyakrishiyile Adhika Cheruvakalum Marunnukalum* (2020) ICAR-Central Institute of Fisheries Education, Mumbai.

II

Participation in Workshop/Conferences/ Symposia/ Meetings/Farmers Meet etc.

10. Participation in Workshops/Conferences/Webinars/Symposia/Meetings/ Farmers' Meet

10.1. Participation by Dr. Gopal Krishna, Director/Vice-Chancellor, ICAR-CIFE, Mumbai

SNo	Meeting/ Workshops /Webinar/ Conferences/ Symposia/ Meetings	Venue	Organized by	Date
1	Senior Officers' Committee Meeting	Krishi Bhavan, ICAR, New Delhi	ICAR, New Delhi	06 January, 2020
2	Meeting with DDG (FS), National Director NAHEP and National Coordinator, NAHEP	KAB II, Pusa, New Delhi	NAHEP, ICAR New Delhi	14 January, 2020
3	Project Management Committee Meeting of NAHEP	KAB II, Pusa, New Delhi	ND, NAHEP, and DDG (Edn.)	15 January, 2020
4	Discussion and Meeting at SMD (FS) with DDG (Edu.)	KAB II, Pusa, New Delhi	ICAR, New Delhi	22-23 January, 2020
5	Farmers' Meet and visit of World Bank Team, NAHEP	ICAR-CIFE Rohtak Centre	ICAR-CIFE, Mumbai	04-05 February, 2020
6	Keynote address in the conference on 'Ecosystem Health and Fisheries of Indian Inland Waters: Multiple Stressors Management & Conservation'	College of Fisheries Science, Pant Nagar, Uttarakhand	ICAR-CIFRI Barrackpore and College of Fisheries Science, Pant Nagar, Uttarakhand	16-19 February, 2020
7	Executive Committee Meeting of Indian Agricultural University Association	New Delhi	Secretary, Indian Agricultural Universities Association, New Delhi	23 February, 2020
Online programmes				
8	94th Annual General Body Meeting and National Seminar on Reimmagining Indian Universities		Association of Indian Universities, New Delhi	23-25 March, 2020
9	Research and Academic Development during COVID 19 pandemic		DDG (Fisheries Science), ICAR	16 April, 2020
10	92nd ICAR Foundation Day		Secretary, DARE and DG, ICAR	16 July, 2020
11	Interaction on Network Program on Precision Agriculture		ICAR - Indian Agricultural Research Institute, New Delhi	29 July, 2020
12	Inauguration of the Academic and Administrative building of Rani Lakshmi Bai Central Agricultural University, Jhansi, U.P		Prime Minister's Office, Govt. of India	29 August, 2020

13	Foundation Stone laying of various Academic Facilities and Inauguration of School of Agri-business and Rural Development	Prime Minister's Office, Govt. of India	10 September, 2020
14	Programme on Predatory Journals	National Assessment and Accreditation Council (NAAC), Bengaluru	11 September, 2020
15	RAISE-2020 Virtual Global Summit on Artificial Intelligence	National Institution for Transforming India Aayog, Govt. of India	05-09 October, 2020
16	Webinar on ICAR Research Data Repository for Knowledge Management (KRISHI)	ICAR- Indian Agricultural Statistics Research Institution, New Delhi	21 October, 2020
17	Webinar on Fish Parasitology	Asian Fisheries Society (Fish Health Section)	09 December, 2020

10.2. Participation of faculty in Symposia/Workshops/Seminars/Special assignments etc.

Sno	Name of the Faculty	Name of the Programme	Venue	Organised by	Date
1.	Faculty of ICAR-CIFE, Kolkata Centre	Bengal Fish Fest 2020	ICAR-CIFE, Kolkata Centre	Department of Fisheries, Govt. of West Bengal and Indian Chamber of Commerce	10-12 January, 2020
2.	B. K. Mahapatra	Krishi Samridhi Mela 2020 & National Workshop on Integrated Farming Systems	Ramakrishna Mission Ashrama, Sargachi, Murshidabad	Dhaanyaganga KVK and Ramakrishna Mission Ashrama, Sargachi	10-13 January, 2020
3.	Arpita Sharma	3rd International Symposium on Genomicsin Aquaculture-ISGA III	ICAR- Central Institute of Freshwater Aquaculture, Bhubaneswar	ICAR-CIFA, Bhubaneswar in association with the Association of Aquaculturists	21-23 January, 2020
4.	Megha Bedekar	Annual Review Meeting	ICAR Consortia Platform for Vaccine	ICAR-Central Tuber Crops Research Institute, Thiruvanathapuram	29-30 January, 2020
5.	G. H. Pailan	Workshop Visioning and Engagement Workshop: Initiating a Partnership for Healthy Mangroves, Thriving Coastal Communities and a Robust Aquaculture Value Chain in the Sundarbans: India, Bangladesh and Beyond	Taj Bengal, Kolkata, West Bengal	Nature Environment & Wildlife Society (NEWS), Kolkata	03-04 February, 2020
6.	Arpita Sharma	International Conference on Impact of Climate Change in Hydrological Cycle, Ecosystem, Fisheries and Food Security	CUSAT, Kochi, Kerala	Cochin University Science and Technology	11-14 February, 2020
7.	B. K. Mahapatra	International Conference on Ecosystem Health and Fisheries of Indian Inland Waters: Multiple Stress, Management & Conservation	Pantnagar, Uttarakhand	Govind Ballabh Pant University of Agriculture and Technology, Aquatic Ecosystem Health and Management Society ICAR- Central Inland Fisheries Research Institute	17–19 February, 2020

Sno	Name of the Faculty	Name of the Programme	Venue	Organised by	Date
8.	Sreedharan K, Ashok Kumar	11th National Livestock Championship and Agri-Expo 2020	Batala, Gurdaspur District, Punjab	Department of Animal Husbandry, Punjab	29 February, 2020
9.	All Scientist of ICAR-CIFE, Kolkata Centre	Hatchery-Industry Meet on Quality Seed for Doubling Aquaculture Production	ICAR-CIFE, Kolkata Centre	ICAR-CIFE and Michigan State University (MSU), USA	13 March, 2020
10.	G. H. Pailan	Workshop and Annual General Body Meeting of ISCAR, Canning	Indian Society of Coastal Agriculture (ISCAR), Canning	Canning Town West Bengal	22 August, 2020
11.	N.P. Sahu, P. Sardar, A.D. Deo, S. Gupta, Sikendra Kumar, Shamna N. & Tincy Varghese	Advances in Aquaculture Nutrition-2020	Tamil Nadu J. Jayalalithaa Fisheries University, Chennai	Tamil Nadu J. Jayalalithaa Fisheries University, Chennai	24-25 September, 2020
12.	S. Dasgupta	Budget revision of the project proposal on Captive breeding of Hilsa- phase II under NASF	ICAR-Central Inland Fisheries Research Institute	ICAR-Central Inland Fisheries Research Institute, Baracckpore	21 December, 2020
13.	Pankaj Kumar	Workshop on Fish and Shrimp Farming	Department of Fisheries, Agra	Department of Fisheries, Government of UP.	25 December, 2020

10.2.1. Participation of faculty in online programmes

SNo	Faculty	Meetings/ Workshops /Webinars/ Conferences/ Symposia	Organised by	Date
1.	P. S. Ananthan	Virtual Workshop on Fish, Livelihoods, and Food and Nutrition Security: Leveraging Partnerships to Enhance Knowledge and Practice in Fisheries and Aquaculture	ICAR-CIFE and Michigan State University (MSU), USA	08-09 April, 2020
2.	Ashutosh D. Deo	Workshop on Virtual Teaching Aids by Microsoft	Advent Technology Mumbai	16 April, 2020
3.	P. S. Ananthan Neha W. Qureshi	Webinar on Fisheries Governance in Great Lakes Region, USA	ICAR-CIFE and Michigan State University (MSU), USA	17 April, 2020
4.	Abuthagir Iburahim Vidhya V. Dayal Devadas	Marine and Coastal Biodiversity of India	Kottayam Nature Society	22 April, 2020
5.	Gayatri Tripathi	ISO-Seq on PacBio Sequel 2; the Present and Future of Transcriptome Studies	Dr. Radhika Ananthaneni, Genomics Lab, Nucleome Informatics, Hyderabad	29 April, 2020
6.	Dayal Devadas	Identification of Microplastics using FTIR and Raman Microscopy	Thermofisher Scientific	05 May, 2020
7.	Megha Bedekar	ICAR-AUs Nodal officers	ICAR-Education Division	08 May, 2020
8.	Dayal Devadas	Water Security for Future	Kerala State Council for Science Technology and Environment, Trivandrum, Kerala	08 May, 2020
9.	Gayatri Tripathi	Impact of Scientific Research on Tilapia Aquaculture	Dr. Senapin Saengchan National Science and Technology Development Agency, Thailand	14 May, 2020
10.	Gayatri Tripathi	Aquaculture Genetics	Dr. Greg Lutze, United States Aquaculture Society, USA	15 May, 2020
11.	Abuthagir Iburahim Vidhya V Dayal Devadas	Webinar (Satellite Telemetry)	Mangrove Foundation, Mumbai	15 May, 2020
12.	Dayal Devadas	12th International Forum on Illegal, Unreported and Unregulated (IUU) Fishing	Food and Agriculture Organization of the United Nations, Rome	18 May, 2020
13.	Neha W. Qureshi P.S. Ananthan	FAO Webinar on Extension and Advisory Services at Frontline of COVID 19 Response Ensuring Food Security in Asia	Food and Agriculture Organization of the United Nations, Rome	19 May, 2020

Sno	Faculty	Meeting/ Workshops /Webinar/ Conferences/ Symposia/ Meetings	Organised by	Date
14.	S. Munilkumar S. Dasgupta	Waste Reduction & Circular Economy in the Seafood Industry with Tuna Case Study	World Sustainability Organization, Italy	20 May, 2020
15.	K. Syamala	Webinar on Technology Challenges during COVID Pandemic	NITTE, Mangalore	22 May, 2020
16.	Manjusha L.	MS Secure Remote Work Workshop	Ernst and Young Limited (EY), Pune	22 May, 2020
17.	Abuthagir Iburahim Vidhya V.	Tales of Turtle Conservation, on the occasion of World Turtle Day	Mangrove Foundation, Mumbai	23 May, 2020
18.	P.S.Ananthan	Training Program on e-Learning Methods	College of Fisheries, Lembucherra	27 May, 2020
19.	Sunil Kumar Nayak, Abuthagir Iburahim, Vidhya V. Dayal Devadas Shobha Rawat	National Webinar on Challenges, Opportunities and the future of Indian Fisheries Post COVID-19 ERA	College of Fisheries Science, Veraval, Gujarat, Junagadh Agriculture University	28-30 May, 2020
20.	Gayatri Tripathi	Future Prospects of Automation and Robotics in Indian Agriculture	Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharastra	31 May, 2020
21.	S. Munilkumar	Cyber-Crime Protection Strategies During the Lockdown Era	National Institute of Electronics & Information Technology (NIELIT), Imphal & Cyber Police Station, Manipur	02 June, 2020
22.	Muralidhar P. Ande K. Syamala Abuthagir Iburahim Vidhya V.	Brackishwater Aquaculture Scenario in India with focus on Shrimp Farming during Covid-19: Challenges and Way Forward	ICAR- Central Institute of Brackishwater Aquaculture, Chennai	03 June, 2020
23.	Megha Bedekar	Webinar on Fulbright-Nehru and other Fulbright fellowships	United States – India Educational Foundation	30 June, 2020
24.	K. K. Krishnani	Webinar on Opportunities in Fisheries Sector-Post Lockdown	Fisheries Reliance Foundation, Agrovision	04 June, 2020
25.	K. K. Krishnani	Webinar Panel Discussion on Covid-19: Impacts and New Normal in Agriculture	National Academy of Agricultural Sciences	05 June, 2020
26.	K. K. Krishnani	Biodiversity of Natural Resources	ICAR-CIBA and Commissioner of Fisheries, Govt of Telangana	05 June, 2020

SNo	Faculty	Meetings/ Workshops /Webinars/ Conferences/ Symposia	Organised by	Date
27.	Abuthagir Iburahim Dayal Devadas	Business Opportunities in Fish-Post Harvest	ICAR-Central Institute of Post-Harvest Engineering and Technology, Ludhiana	05 June, 2020
28.	S. Munilkumar	Launch of The State of the World Fisheries and Aquaculture	Food and Agriculture Orginization, Rome	08 June, 2020
29.	Abuthagir Iburahim	World Environment Day FEST Marina-2020	Mangrove Foundation, Mumbai	08 June, 2020
30.	Dayal Devadas	Voice of Youth for Oceans	Department of Aquatic Biology and Fisheries, University of Kerala, Trivandrum.	08 June, 2020
31.	Babitha Rani. A. M	Consultation meeting on Biofloc fish farming under Subhiksha Keralam Project (in 2020)	Department of Fisheries, Government of Kerala	12 June 11 July 15 August 15 October 28 November 29 December
32.	K. K. Krishnani	Webinar on Challenges, Opportunities and Future of Inland Fisheries	Agrovision Foundation, Maharashtra	12 June, 2020
33.	Neha W. Qureshi	Webinar on Agriculture during COVID-19, Economic Package and Reforms	ICAR- National Institute of Agricultural Economics and Policy Research (NIAP), New Delhi	16 June, 2020
34.	Megha Bedekar	DBT-Onboarded Schemes-Configuration of Service Plus Software	ICAR-Education Division, New Delhi	19 June, 2020
35.	Abuthagir Iburahim	Webinar series on Quantitative Methods for Social Sciences	ICAR- National Institute of Agricultural Economics and Policy Research (NIAP), New Delhi	01-20 June, 2020
36.	Neha W. Qureshi	Webinar on Contempory issues in Agricultural Development by Ramesh Chand and Harsh Bhanwala	ICAR- National Institute of Agricultural Economics and Policy Research (NIAP), New Delhi	24 June, 2020
37.	Abuthagir Iburahim	Innocena June Webinar Series	Innoceana, Australia	01-30 June, 2020
38.	Parimal Sardar	Agriculture Extension Priorities During COVID Times	Rapid Rural Community Response Centre, New Delhi	03 July, 2020

SNo	Faculty	Meetings/ Workshops /Webinars/ Conferences/ Symposia	Organised by	Date
39.	K. K. Krishnani	Webinar on New Chemistry and Physics in Magnetic Oxides	Department of Biotechnology, New Delhi	03 July, 2020
40.	G. H. Pailan	Executive Council Meeting of ISCAR, Canning	Indian Society of Coastal Agricultural Research, ICAR-CSSRI, Regional Research Station, Canning Town, West Bengal	09 July, 2020
41.	K. K. Krishnani	Agriculture Startups - Opportunities & Challenges	Agrovision Foundation Maharashtra	10 July, 2020
42.	Sanath Kumar H.	MDP on Implementation of Access and Benefit Sharing (ABS) Regulations in Agriculture Research: Awareness-cum-Sensitization Workshop	ICAR- National Academy of Agricultural Research Management (NAARM), Hyderabad	07-10 July, 2020
43.	Abuthagir Iburahim	Webinar on Shark Around Us (Marine Matters Lecture Series)	Mangrove Foundation, Mumbai	14 July, 2020
44.	P. S. Ananthan	FAO Webinar on Unlocking the Potential of Fisheries and Aquaculture Value Chains: FISH4ACP Broadcast	Food and Agriculture Organization of the United Nations, Rome	16 July, 2020
45.	Sanath Kumar H.	Online EDP for Master Trainers on Access and Benefit Sharing (ABS) Regulations in India and Nagoya Protocol (Conducted as part of the UNDP-GEF Global ABS Project)	ICAR-National Academy of Agricultural Research Management (NAARM), Hyderabad	15- 17 July 2020
46.	Gayatri Tripathi	NAHEP Post Procurement Review Webinar with all CAAST Agricultural Universities	ICAR, NAHEP, New Delhi	16 July, 2020
47.	Manjusha L.	NeGD LMS Workshop for Agricultural Universities in ICAR	Indian Council of Agricultural Research, New Delhi	18 July, 2020
48.	Sanath Kumar H. Manjusha L.	Video Lecture on NABL Accreditation of ICAR Laboratories	ICAR, New Delhi	22 July, 2020
49.	Megha Bedekar Shashi Bhushan Bhoomaiah Dasari	Interactive Dashboard using Excel	Xanthus College, Goa	25 July, 2020

SNo	Faculty	Meetings/ Workshops /Webinars/ Conferences/ Symposia	Organised by	Date
50.	Gayatri Tripathi	Advances in Aquatic Animal Health Management	Department of Aquatic Animal Health Management, Tamil Nadu Dr. Jayalalithaa Fisheries University, Tamil Nadu	27 July, 2020
51.	S. Munilkumar	Virtual Dialogue: Building Forward Better with Aquatic Foods	The World Fish Centre, Malaysia	29 July, 2020
52.	Gayatri Tripathi	Online International Programme on Recent Advances in Next Generation Sequencing	Centre for Ocean Research in association with Ministry of Earth Sciences – Earth Science Technology Cell	27 July-02 August, 2020
53.	Gayatri Tripathi	Status of Ornamental Fish Culture in Tamil Nadu during Pandemic	Department of Aquaculture, Dr. M.G.R. Fisheries College & Research Institute, Ponneri, Tamil Nadu	30 July, 2020
54.	Gayatri Tripathi	Hands-on Virtual Workshop on Applied Computational Techniques in Life Sciences-BioTools 2020	SynBiogenica Labs, Ministry of Micro, Small and Medium Enterprises, Govt. of India (Ministry of MSME)	10-15 August, 2020
55.	S. Munilkumar	Leveraging Institutional Synergy for Technology-led Freshwater Aquaculture Development	ICAR-CIFA, Bhubaneshwar and NFDB, Hyderabad	19-21 August, 2020
56.	S. Munilkumar	Seafood in the Diet: Consumption Patterns at Retail and Food Service	Infofish, Malaysia	21 August, 2020
57.	S. Munilkumar	Perspectives of Private Sector Stakeholders & Developmental Agencies in Accelerating Freshwater Aquaculture Development	ICAR- Central Institute of Freshwater Aquaculture, Bhubaneshwar	25 August, 2020
58.	Abuthagir Iburahim	Webinar on Enhancing Conservation of River Dolphins through Sub-Regional Cooperation	ICAR-Central Inland Fisheries Research Institute, Professional Fisheries Graduates Forum (PFGF) and Inland Fisheries Society of India	24-25 August, 2020
59.	Jeena K.	3rd Annual Review meeting of Indian Network of Fishery and Animals Antimicrobial Resistance (INFAAR)	Food and Agriculture Organization of the United Nations, Rome and Indian Council of Agricultural Research, New Delhi	28 August, 2020

SNo	Faculty	Meetings/ Workshops /Webinars/ Conferences/ Symposia	Organised by	Date
60.	Abuthagir Iburahim	National Webinar on Capture Fisheries in Post-Pandemic (COVID-19) Situation	West Bengal University of Animal & Fishery Sciences	28 August, 2020
61.	All Faculty	Inauguration of Academic and Administrative Building of Rani Lakshmi Bai Central Agriculture University, Jhansi	Indian Council of Agricultural Research, New Delhi Government of India, New Delhi	29 August, 2020
62	Megha Bedekar	National Workshop on Fish Health and Disease Management in Tropics	College of Fishery Science, Nanaji Deshmukh Veterinary Science University, Jabalpur (M.P.)	09-14 September, 2020
63.	S. Munilkumar	Effects of COVID 19 on US Aquaculture, Aquaponics, and Allied Businesses	US Aquaculture Society (WAS)/ Auburn University	04 September, 2020
64.	Muralidhar P. Ande K. Syamala P. Srinivasa Rao Parimal Sardar	National Webinar on New Trends in Aquaculture	Kisan Flex, Kolkata, Smart Agri Post, New Delhi and ICAR- Central Institute of Freshwater Aquaculture Bhubaneswar	05 September, 2020
65.	S. Munilkumar	3rd Tuna Webinar Series: Certification and Technology	Infofish, Malaysia	09 September, 2020
66.	Sujata Sahoo	International Webinar on Small Scale Fisheries	ICAR-Central Inland Fisheries Research Institute, Barrackpore	09-10 September, 2020
67.	Neha W. Qureshi	Webinar on Harnessing Pradhan Mantri Matsya Sampada Yojana (PMMSY) Scheme for Squapreneurship Development	Tamil Nadu Dr. J. Jayalalithaa Fisheries University, Ponneri	10 September, 2020
68.	Sujata Sahoo Neha W. Qureshi	Awareness Programme on Predatory Journals	National Assessment and Accreditation Council (NAAC), Bengaluru	11 September, 2020
69.	S. Munilkumar Manish Jayant	Functional Aquafeed: the Sustainable Solution for the Industry	Infofish, Malaysia	24 September, 2020
70.	Megha Bedekar	5th Meeting of the Technical Expert Committee on Aquaculture and Marine Biotechnology	Department of Biotechnology New Delhi	23-24 September, 2020

SNo	Faculty	Meetings/ Workshops /Webinars/ Conferences/ Symposia	Organised by	Date
71.	Sujata Sahoo	Webinar on Practical Pond Management for Disease Free Operations	Blue Aqua International	25 September, 2020
72.	Satya Prakash	Data Analytics in Fisheries	Tamil Nadu J. Jayalalithaa Fisheries University, Chennai	24-25 September, 2020
73.	S. Munilkumar	Conference on Livestock Resources	Confederation of Indian Industries, Kolkata	29 September, 2020
74.	Sujata Sahoo	International Webinar on Challenges and Opportunities for Fisheries under the COVID Pandemic - Country Perspectives	College of Fisheries, Central Agricultural University, Imphal	29 September, 2020
75.	S. Dasgupta	Choosing the right NGS Approach: Whole Genome Sequencing (WGS) vs. Whole Exome Sequencing vs. Targeted Sequencing	Science/American Association of The Advancement of Science	30 September, 2020
76.	Megha Bedekar Saurav Kumar	National Webinar on Advances in Fish Vaccines and Prophylaxis	Fisheries College and Research Institute, Thoothukudi	30 September, 2020
77.	G. H. Pailan	XXV Meeting of ICAR Regional Committee-II	ICAR-National Rice Research Institute, Cuttack	08 October, 2020
78.	All faculty	Marine Fisheries and Resources of West Coast: Food and Economic Security of the Traditional Fishermen	National Bank for Agriculture and Rural Development (NABARD), ICAR-Central Marine Fisheries Research Institute, Cochin	08 October, 2020
79.	All faculty	Global Summit on Responsible AI for Social Empowerment (RAISE 2020)	Ministry of Information and Technology Govt. of India	05-09 October, 2020
80.	All faculty	FAO Foundation Day Vaibhav 2020 Modern Fisheries, Aquaculture and Seed Production	VAIBHAV in Collaboration with ICAR-CIFA, Bhubaneswar	16 October, 2020
81.	All Staff	World Food Day Seminar	Govt. of India	16 October, 2020
82.	All staff	ICAR Research Data Repository for Knowledge Management (KRISHI)	ICAR-Indian Agricultural Statistics Research Institute (IASRI), New Delhi	21 October, 2020

SNo	Faculty	Meetings/ Workshops /Webinars/ Conferences/ Symposia	Organised by	Date
83.	Jeena K.	Biosafety & Biocontainment – A Discussion on Basics, Facility Design & Operational Requirements	Kewaunee, India	28 October, 2020
84.	Muralidhar P. Ande K. Syamala	FAO Global Regional Aquaculture Reviews 2020	Food and Agriculture Organization of the United Nations, Rome	29 October, 2020
85.	Megha Bedekar	Direct Benefit Transfer (DBT)	ICAR-Education Division New Delhi	25 November, 2020
88.	Jeena K.	6th World One Health Congress Virtual Edition, 2020	University of Edinburgh	30 October-03 November, 2020
86.	N.P. Sahu P. Sardar A.D. Deo S. Gupta Sikendra Kumar Shamna N. Tincy Varghese Manish Jayant	Indian Fish Nutritionist Forum Online Meet-1	ICAR-CIFE, Mumbai ICAR-Central Institute of Freshwater Aquaculture, ICAR- Directorate of Coldwater Fisheries Research	07 November, 2020
87.	S. Munilkumar	Claude Boyd Aeration Theory and Practice	U.S. Aquaculture Society, National Aquaculture Association and the Alabama Cooperative Extension	21 November, 2020
88.	S. Munilkumar	World Fisheries Day – 2020, Can Aquaculture Become the Blue Biotechnology of the Future?	ICAR-Directorate of Coldwater Fisheries Research, Bhimtal	21 November, 2020
89.	All Staff	World Fisheries Day Lecture 2020	ICAR- Central Institute of Freshwater Aquaculture	21 November, 2020
90.	Jeena K.	Webinar on Let's Talk Superbugs: Making Sense of Antimicrobial Resistance	DBT Welcome Trust India Alliance in Partnership with Centre for Cellular & Molecular Biology, Hyderabad	24 November, 2020
91.	Jeena K.	Performing Viricidal Efficacy Studies under GLP	Kewaunee, India	27 November, 2020
92	Babitha Rani A.M.	7th International conference on Fisheries and Aquaculture	International Institute of Knowledge Management	26-27 November, 2020

Sno	Faculty	Meetings/ Workshops /Webinars/ Conferences/ Symposia	Organised by	Date
93.	Megha Bedekar	Demonstration FS - CIFE - Institutional Fellowship) configured in Service Plus by IASRI Technical Team	ICAR-Education Division	07 December , 2020
94.	Sujata Sahoo	XVI National Online Conference of Indian Association of Women Veterinarians (IAWV-2020) on Sustainable Contribution of ATMANIRBHAR Women	College of Veterinary and Animal Sciences, MAFSU, Parbhani	09-10 December, 2020
95.	Megha Bedekar	Physio-Biochemical and Biotechnological Approaches for Optimization of Health and Reproduction in Animals	College of Veterinary Science & A. H., Mhow, NDVSU, Jabalpur M.P.	15 December, 2020
96.	Megha Bedekar	Workshop on Gender Sensitization 7th Year of the Notification of Act 2013	Indian Council of Agricultural Research, New Delhi	15 December, 2020
97.	S. Munilkumar	World Aquaculture 2020	World Aquaculture Society, USA	14-16 December, 2020
98.	S. Munilkumar	Stay Connected-Stay Informed - Shape the Future: Cricket - Interactive Session Between Australian Alumni & the Australian High Commissioner	Australian High Commission, New Delhi	17 December, 2020
99.	Sujata Sahoo	India International Science Festival (IISF) 2020	Government of India, New Delhi	22 December, 2020
100.	All Staff	Address by Hon'ble Prime Minister of India to the farmers and releasing PM Kisan money to farmers	Government of India, New Delhi	25 December, 2020
101.	Vinod K Yadav	National Online Hands-on Training on Machine Learning	NAHEP, Sher-e-Kashmir University of Agricultural S & T of Kashmir	15 December, 2020-03 January, 2021

10.2.2. Participation of Faculty in Online Programmes Organised by ICAR-CIFE

SNo	Meeting/ Workshops /Webinars/ Conferences/ Symposia/ Meetings	Date
1	Webinar on Challenges and Opportunities in the Post-Covid Era	20 May, 2020
2	Webinar on Human Centric Innovations	21 July, 2020
3	Development of Concept Note for ICAR Network Project on Internet of Things/ Artificial Intelligence-based Applications in Aquaculture and Fisheries	30 July, 2020
4	Experience Sharing of Students and Faculty on International Training under NAHEP	10 August, 2020
5	New Education Policy and Post COVID-19 Scenario in Agriculture lecture by Prof. Ashish M. Paturkar, Vice-Chancellor of Maharashtra Animal and Fishery Sciences University, Futala Lake Road, Nagpur	11 August, 2020
6	Webinar on Higher Education and Entrepreneurship in Post-Corona Environment	18 August, 2020
7	Webinar on The Perspective of the Technology-driven Aquaculture for Bihar and Jharkhand	15 September, 2020
8	Webinar on Entrepreneur Led Extension for Aquaculture Development	22 September, 2020
9	Meeting and Discussion on National Education Policy	24 September, 2020
10	Webinar on Next-Generation Aquaculture for Madhya Pradesh and Chhattisgarh	29 September, 2020
11	Institute Research Council Meeting	06-07, 13-14 August, 30 September, 2020
12	Webinar on Plastic Pollution in the Sea	30 September, 2020
13	Relevance of Gandhian Ideologies in Today's World on 151st Birth Anniversary of Mahatma Gandhi	02 October, 2020
14	Webinar on Aqua Envision: Towards Aquaculture Sustainability and Resilience	26 October, 2020
15	Webinar on Prospects of Inland Saline Aquaculture in the North-Western parts of India	31October, 2020
16	Webinar on Emotional Intelligence for Success	31 October, 2020
17	Draft Bill Meeting of Fishery Council of India	2 November, 2020
18	Webinar on Artificial Intelligence & IoT for Smart Aquaculture	11-12 November, 2020
19	World Fisheries Day Celebration	21 November 2020
20	Webinar on Aquatic Animal Health	24 November, 2020
21	Webinar on Sexual Harassment at Workplace	17-18 December, 2020
22	Webinar on Waste to Wealth	22 December, 2020
23	Training Programme on ICAR-DoF Convergence	26 and 28 December, 2020
24	QRT Meeting	26-27 February 2020
25	RAC Meeting	6 March 2020

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Workshops/Symposia/Conferences/Seminars/ Meetings etc. Organised

11.1. Workshops/Symposia/Webinars/Conferences/ Seminars/Meetings Organised

S.No.	Title	Date	No. of Participants
1.	Workshop-cum-Demonstration on Flowcytometry and its Applications	15 February, 2020	70
2.	International Women's Day	07-08 March, 2020	70
3.	The 60th Foundation Day of ICAR-CIFE	06 June 2020	350
4.	6th International Yoga Day	21 June, 2020	179
5.	Fish Farmers' Day	10 July, 2020	100
6.	Meeting and Discussion on National Education Policy	24 September, 2020	81
7.	Hindi Pakhwada	14-28 September, 2020	150
8.	Entrepreneurship Development in Aquaculture Sector for Youth Towards Atmanirbhar Bharat (ICAR-CIFE Centre, Kolkata)	26 September, 2020	115
9.	Webinar on Next Generation Aquaculture for Madhya Pradesh and Chhattisgarh State Fisheries Department Madhya Pradesh and Chhattisgarh (ICAR-CIFE Centre, Powarkheda)	29 September, 2020	160
10.	Relevance of Gandhian Ideologies in Today's World on 151st Birth Anniversary of Mahatma Gandhi	02 October, 2020	153
11.	Mahila Kisan Divas	15 October, 2020	150
12.	Workshop for Formulation of Course Content for Course on Entrepreneurship Development in Ornamental Fish Breeding & Culture (ICAR-CIFE Centre, Kolkata)	21 October, 2020	24
13.	Aqua Envision: Towards Aquaculture Sustainability and Resilience	26 October 2020	100
14.	Rashtriya Ekta Diwas (National Unity Day)	31 October, 2020	175
15.	Draft Bill Meeting on Fishery Council of India	02 November, 2020	55
16	IDEAthon Poster Competition (42 posters from 12 colleges)	11-12 November 2020	42
17.	World Fisheries Day Celebration	21 November, 2020	100
18.	World Soil Day	05 December, 2020	175
19.	Webinar on Carp Culture Practices and Recent Advances under ICAR-DoF Convergence State Fisheries Department Madhya Pradesh (ICAR-CIFE Centre, Powarkheda)	28 December, 2020	87

11.2. Webinars/Seminars/Workshops etc. organised Under NAHEP

Sponsered by
NAHEP-CAAST
ICAR-CIFE

S.No.	Title	Date	No. of Participants
1.	Seminar on Liberal Arts Concept for Higher Education	31 January, 2020	100
2.	Industry Meet on Industry-Ready Students and Entrepreneurship Development	28 February, 2020	121
3.	Workshop Industry-Academia Meet on Quality Seed for Doubling Aquaculture Production ICAR-CIFE Centre, Kolkata	13 March, 2020	67
4.	Webinar on Challenges and Opportunities in Post-Covid Era for Human and Shrimp Industry	20 May, 2020	600
5.	Webinar on Human Centric Innovations	24 July, 2020	100
6.	Higher Education and Entrepreneurship in Post-Corona Environment	18 August, 2020	150
7.	Workshop-cum-Webinar on Avenues of Technology Led Fisheries for Bihar and Jharkhand	15 September, 2020	150
8.	Workshop-cum-Webinar on Entrepreneur Led Extension for Aquaculture Development	22 September, 2020	24
9.	Webinar on Plastic Pollution and its Impact on Fishing and Marine Life	30 September, 2020	77
10.	Workshop-Training on Designing and Implementing Genomic Selection	12-16 October, 2020	37
11.	Workshop on Emotional Intelligence for Success	15 October, 2020	100
12.	National Webinar on Prospects of Inland Saline Aquaculture in the North-Western parts of India	31 October, 2020	250
13.	Webinar on Artificial Intelligence and IoT for Smart Aquaculture	11-12 November, 2020	115
14.	Webinar on Biofloc Technology in Aquafarming: its Prospects in Income Generation	15 December 2020	130
15.	PoSH (Prevention of Sexual Harassment) online Workshop on Discrimination and Harassment at Workplace	17-18 December, 2020	168
16.	Webinar on Waste to Wealth	22 December, 2020	157

11.3. Important meetings

1.	Board of Management Meeting	04 July 2020
2.	Meeting and Discussion on National Education Policy	24 September, 2020
3.	Draft Bill Meeting on Fishery Council of India	02 November, 2020
4.	Academic Council Meeting	04 January, 2020
5.	Quinquennial Review Team Committee Meeting	26-27 February, 2020
6.	Research Advisory Committee Meeting	06 March, 2020
7.	Institute Research Council Meeting	06-07, 13-14 August, 30 September, 2020

11.4. Workshop-cum-demonstration on Flowcytometry and its Applications

A Workshop-cum-demonstration on Flowcytometry and its Applications was organised on 15th February, 2020 by Aquatic Environment and Health Management Division, ICAR-CIFE, Mumbai, under the aegis of National Agricultural Higher Education Project (NAHEP). Dr. Gayatri Tripathi, Course Coordinator welcomed the M.F.Sc. and Ph.D. students along with the scientists of ICAR-CIFE, Mumbai. The workshop began with a lecture conducted by application specialist of BD Biosciences. The lecture design was very comprehensive and covered all fundamental aspects of flowcytometry. The lecture and demonstration covered the basic structure of the instrument, theoretical principles, its working in detail, sample preparation, software analysis and its applications in various fields of biology.

11.4. CIFE Celebrates Industry Day

ICAR-Central Institute of Fisheries Education celebrated the Annual Industry Meet on 28th February, 2020. This programme was conducted under the aegis of National Agricultural Higher Education project (NAHEP) with the theme Industry-Ready Students and Entrepreneurship Development. The panel consisted of 17 representatives from different sectors of fisheries such as shrimp hatchery, fish breeders, feed company, additives, corporate farming, ropes and cages company, seafood processing and exports, certification systems, EIC, ICAR-CIFT, MPEDA, etc.

Dr. K. V. Rajendran (Head, Aquatic Environment & Health Management Division, CIFE), Dr. Aparna Chaudhari (Head, Fish Genetics and Biotechnology Division, CIFE) welcomed the guests and opened the floor for discussion. Dr. B. B. Nayak (Head, FRHPHM Division, CIFE) conducted the programme.

In the forenoon, in a select group meeting, discussions on common agenda & mutual cooperation were undertaken to make Indian fisheries sector more profitable, equitable and sustainable. In the afternoon session, students were provided a platform for interaction with the industry to pick up the application-oriented research and shape up their thoughts for a career with the industry. An unanimous message for the students was to navigate towards the flourishing aquaculture and fisheries industry for lucrative job prospects and challenging entrepreneurial ventures. The program ended with concluding remarks and vote of thanks by Dr. B. B. Nayak.

11.5. Workshop-cum-webinar on Avenues of Technology Led Fisheries for Bihar and Jharkhand organised at Motipur Centre

A One-day workshop-cum-webinar was organised on 15 September, 2020 entitled Avenues of Technology Led Fisheries for Bihar and Jharkhand at ICAR-CIFE Regional Research and Training Centre, Motipur. About one hundred fifty farmers and entrepreneurs participated in this webinar. The programme was divided into four sessions. In the first session, Director, CIFE, Mumbai, Dr. Gopal Krishna gave the welcome address and expressed his commitment to the farmers and entrepreneurs for providing cooperation of the institute.

Shri N. Shravan Kumar, Secretary , Animal Husbandry and Fisheries Department, Government of Bihar discussed various schemes for the farmers in the state. He also spoke about advanced techniques such as biofloc, RAS and cage culture in the state. Special Secretary of Fisheries, Animal Husbandry and Cooperation Department, Jharkhand also presented detailed views on fisheries. He emphasied on encouragement of prolonged goals and adherence in this area as well as value addition and processing. He urged the entrepreneurs to adopt the various business models. Mr. Rizwan, Technical Head, Godrej Agrovet was also present in the technical session. He mentioned the efforts of the industry for technical support to the farmers. A special talk on Feed Additives for the benefit of farmers in the industry was presented by Dr. A. K. Pal, Ex-Joint Director, ICAR-CIFE, Mumbai.

Hon'ble Minister of Agriculture and Animal Husbandry and Fisheries, Government of Bihar, Dr. Prem Kumar, highlighted the special scheme for fisheries development in the state. He congratulated ICAR-CIFE, Mumbai and its Motipur Centre for the webinar. The fourth session of the programme was focused on sharing the experience and expectations of the entrepreneurs. Shri Abhishek Kumar from Vaishali and Mr. Nishant Kumar from Ranchi shared their experiences of rearing fish in pond and by biofloc method. Concluding remarks were given by Dr. Gopal Krishna, Director, ICAR-CIFE and Vote of thanks was presented by Dr. S. N. Ojha, HoD, FEES Division.

11.6. Webinar on Entrepreneur Led Extension for Aquaculture Development organised at Motipur Centre

A one-day Workshop-cum-webinar on Entrepreneur Led Extension for Aquaculture Development was organised on 22 September, 2020 at ICAR-CIFE Regional Research and Training Centre, Motipur. About 120 farmers and entrepreneurs participated in this webinar. The programme was divided into four sessions. In the first session, all invitees discussed about the entrepreneurship and vision for development in the sector. Dr. Gopal Krishna, Director, ICAR-CIFE, Mumbai, gave the welcome speech and appealed to the entrepreneurs to play their key role to achieve the goal of Blue Revolution in the region. He expressed his commitment to support the entrepreneurs in every way. He also spoke about the activities of the institute and technical support in the region by its Motipur Centre.

Shri Pradeep Hazari, Special Secretary Fisheries, Animal Husbandry and Cooperative Department of Jharkhand spoke on processing,value addition and fish marketing. He emphasised on the importance of organised effort in fish marketing, value addition, live marketing etc. along with long-term goals and adherence to the business principle and discipline. He called on entrepreneurs to emphasize different business models and the entire value chain in fisheries.

In the technical session, Dr. Akalakur discussed the expectations of entrepreneurs in different group as input, production and marketing and measures to improve the interrelationship between them. Dr. S. N. Ojha discussed about the possibility and opportunity of entrepreneurial advancement. Dr. G. H. Pailan discussed about seed quality and supply chain. Dr. A. K. Pal, former Jt. Director and industry advisor, presented a discussion on opportunity to new start-ups in aquaculture input supply.

An experience sharing session of entrepreneurs was held in which they expressed their views and made all participants aware of their problems. Dr. Prem Kumar, Hon'ble Minister of Agriculture and Animal Husbandry and Fisheries, Government of Bihar, highlighted the special plan of the State and praised the new type of extension technology and entrepreneur led extension. He said that such efforts are very important for the entrepreneurs of the State to move forward. He appreciated the work of Regional Research and Training Centre, Motipur and ICAR-Central Institute of Fisheries Education, Mumbai. The concluding remarks were given by Dr. Gopal Krishna, Director, ICAR-CIFE, Mumbai. Vote of thanks was extended by Dr. Akalakur, In-charge, Regional Research and Training Centre, Motipur.

11.7. Webinar on Entrepreneurship Development in Aquaculture Sector for Youth Towards Atmanirbhar Bharat

A Webinar was organised by ICAR-CIFE, Kolkata Centre on Entrepreneurship Development in Aquaculture Sector for Youth towards Atmanirbhar Bharat (in Hindi) on 26 September, 2020. In the inaugural session, Dr. Gopal Krishna, Vice-Chancellor & Director, ICAR-CIFE, Mumbai welcomed all dignitaries and participants and briefly explained the aim of the Webinar.

Dr. M. V. Rao, I.A.S., Additional Chief Secretary, Panchayat & Rural Development Department, West Bengal, Chief Guest of the Webinar shared his experiences and success stories of food fish and ornamental fish farmers through effective intervention in respect of marketing of farm produces in some districts of West Bengal.

Dr. Dilip Kumar, Former Vice-Chancellor & Director, ICAR-CIFE, Mumbai in his keynote address discussed scope and opportunities of both inland and marine aquaculture. He encouraged youth and entrepreneurs to utilize the opportunities of huge budget allocation by the Govt. of India by submitting appropriate schemes to the financial organisations. He explained advantages of aquaculture over agricultural operations in respect of price, non-consumptive use of water, harvesting in different stages of farming, wide range of culture option through stocking of various species, integration with agriculture and animal husbandry etc. He also advised farmers and entrepreneurs to take advantage of scientific farming and adoption of newer technology like RAS and Biofloc System for indoor aquaculture to enhance production and income.

The technical session of the webinar started with a lecture on Entrepreneurship Development Through Feed Based Aquaculture by Dr. N. P. Sahu, Principal Scientist & HOD, Fish Nutrition, Biochemistry and Physiology Division, ICAR-CIFE, Mumbai. He highlighted the necessity of farm made feed to reduce production cost in aquaculture. He shared the idea of developing smaller units for soil, water and feed processing using unconventional ingredients and techniques.

Dr. G. H. Pailan, Principal Scientist & OIC, ICAR-CIFE, Kolkata Centre delivered a lecture on Development of Entrepreneurship in Organic and Integrated Fish Farming. He emphasized on the scope for income generation through organic farming in aquaculture and integration of animal husbandry, crop production and vegetable production.

Dr. M. Karthikeyan, Director, The Marine Products Export Development Authority, Kochi, discussed on Institutional Support for Entrepreneurship Development in Aquaculture. He informed the audience about various schemes seafood processing and other schemes related to aquaculture development.

Mr. Parvez Ahmed Khan, S. A. Exports (Global Seafood Exports), Kolkata elaborated on Entrepreneurship Avenues in Post-Harvest and Value Chain Development. He encouraged entrepreneurs to come forward with positive mindset for income generation in Post-Covid 19 period. He briefly discussed the steps of value chain development and scope of marketing and income generation of value added products.

Dr. Bijan Mondal, Fisheries Consultant, Panchayat & Rural Development Department, West Bengal presented the various activities of training and demonstration organised by the Govt. of West Bengal for entrepreneurship development of rural women and also encouraged the audience to visit their unit for training and future guidance.

Dr. B. K. Mahapatra, Principal Scientist, ICAR-CIFE Centre, Kolkata on his lecture on Entrepreneurship in Ornamental Fish Culture, highlighted the tremendous scope for income generation through culture of various species like Rosbora, Gaurami, Albino Magur etc., in Eastern and North-Eastern States of India.

Dr. S. Munilkumar, Principal Scientist, ICAR-CIFE Centre, Kolkata in his discussion on Entrepreneurship in Seed Production Technology highlighted employment generation through seed production of various fish species.

Dr. Aklakur, Scientist & OIC, ICAR-CIFE, Motipur Centre delivered a talk on Aquaculture for promoting Atmanirbhar Bharat and encouraged the audience to establish of start-ups by availing financial assistance from different banks and financial institutions of Govt. of India to achieve the goal of Atmanirbhar Bharat.

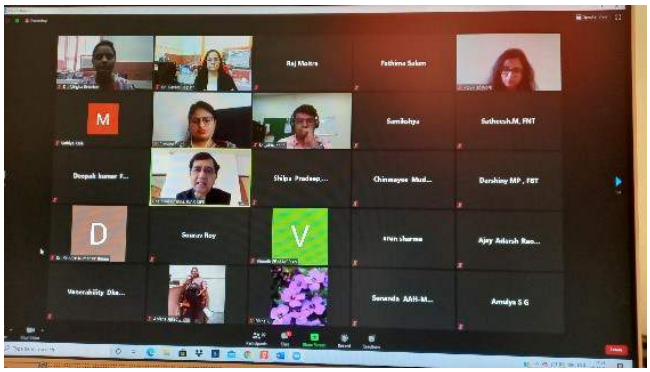
In the question and answer session farmers shared their success as well as failure of their aquaculture units and the experts answered the queries. A total of 150 participants participated in the webinar.

In the concluding remarks Dr. Gopal Krishna, Director, ICAR-CIFE, Mumbai thanked the dignitaries for their valuable suggestions and participants for their active participation and for making the webinar a success. He assured that every possible step will be taken for development of need-based and area-specific HRD programme.

The webinar ended with the vote of thanks presented by Dr. D. K. Singh, Scientist, ICAR-CIFE, Kolkata Centre

11.8. Workshop on Sexual Harassment at Workplace

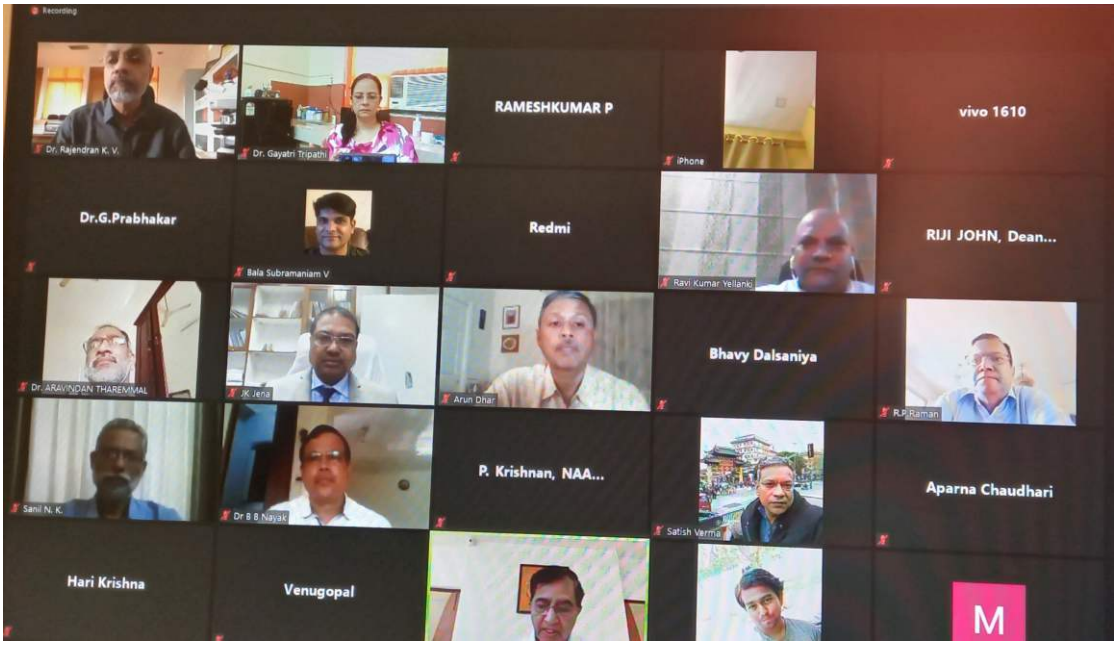
Under the aegis of National Agricultural Higher Education Project-Centre for Advanced Agricultural Science and Technology (NAHEP-CAAST), ICAR-CIFE, Mumbai organised a Workshop on Sexual Harassment at Workplace during 17-18 December, 2020 with the assistance of PoSH (Prevention of Sexual Harassment) at work, empaneled by Ministry of Women and Child Development, Govt. of India. Dr. Gayatri Tripathi, Programme Director welcomed the guest speakers and participants. Dr. Megha Bedekar, Programme Coordinator briefed about the programme. The speakers conducted online sessions for two consecutive days-the first one for scientific, administrative and technical staff of ICAR-CIFE on 17 December, 2020 and second one exclusively for ICAR-CIFE students on 18 December, 2020. The sessions were oriented towards understanding the instances of harassment, its impacts and consequences. The POSH Act was enacted as comprehensive legislation to provide a safe, secure and enabling environment to everyone. They explained the power of the Act which recognizes that sexual harassment results in the violation of a woman's fundamental Right to Equality under Articles 14, 15 and 21.

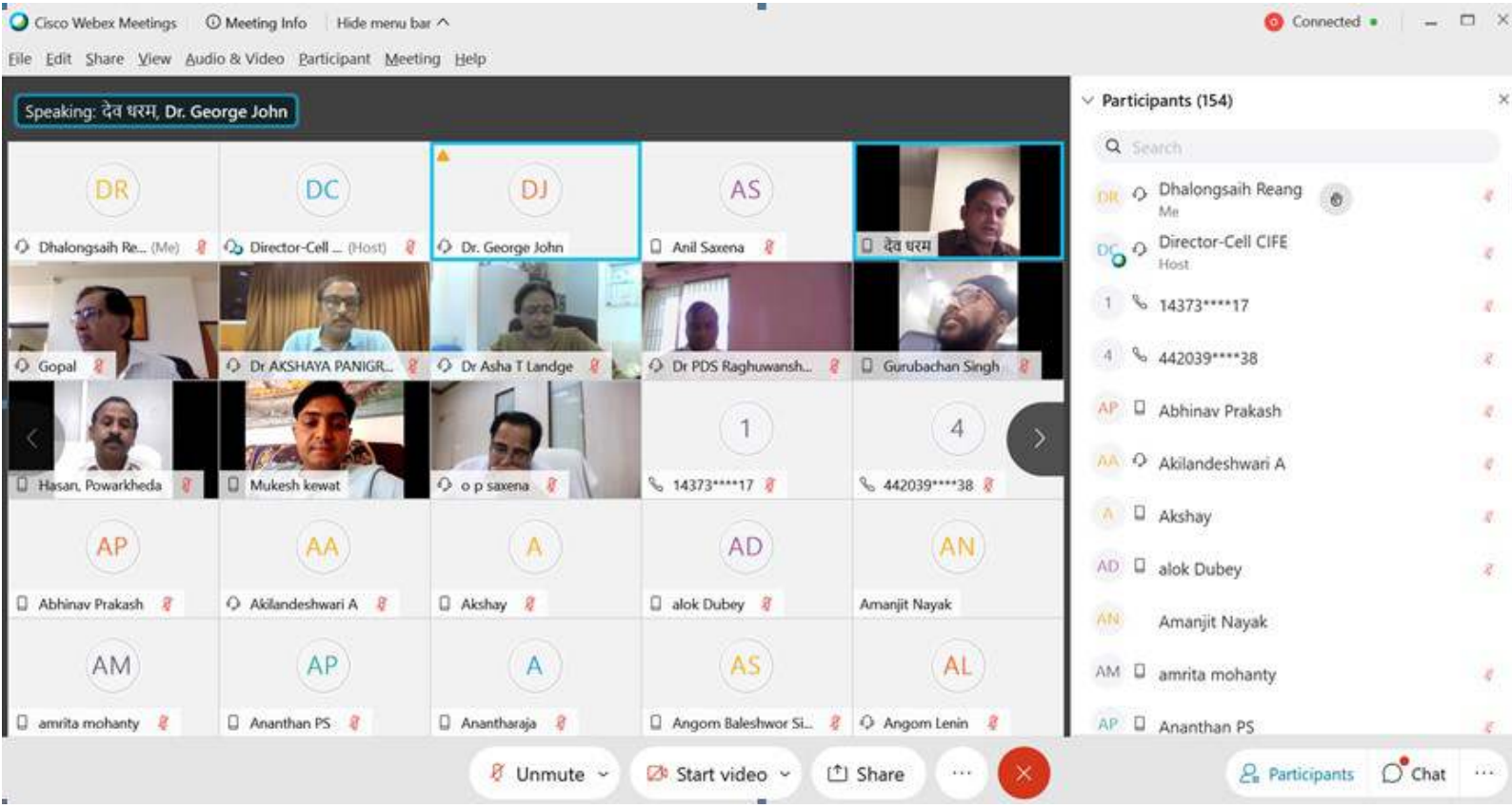


11.9. Webinar on Aquatic Animal Health

The Aquatic Environment & Health Management Division of ICAR-Central Institute of Fisheries Education, Mumbai under the aegis of National Agricultural Higher Education Project (NAHEP), organised a one-day webinar on Aquatic Animal Health on 24 November, 2020. The webinar was inaugurated by Dr. J. K. Jena, Deputy Director General (Fisheries), ICAR, New Delhi. Prof. Iddya Karunasagar, Rtd. Senior Fisheries Officer (The Food and Agriculture Organization, United Nations) chaired the Technical Session. Four key speakers from India and overseas delivered their talk on different aspects of aquatic animal health. These include Dr. Arun K. Dhar, Director, Aquaculture Pathology Laboratory, School of Animal and Comparative Biomedical Sciences, The University of Arizona, USA (Expediting Pathogen Discovery in Shrimp by Combining Histopathology and Genomics; Dr. Sudheesh P. S., Project Leader (Aqua-USA), Merck Animal Health, USA (Aquaculture Vaccines: Path from Lab to Vial); Dr. C. V. Mohan, Principal Scientist, World Fish, Malaysia (Aquatic animal health within the larger one health framework); Dr. Chumporn Soowannayan, Senior Researcher, Center of Excellence for Shrimp Molecular Biology and Biotechnology, Faculty of Science, Mahidol University, Bangkok, Thailand (Control of Acute Hepatopancreatic Necrosis Disease (AHPND) Through the Use of Biofilm Inhibitors); and Dr. Y. Ravi Kumar, Managing Director, Vaishaki Bio-Marine Pvt. Ltd., Visakhapatnam, Andhra Pradesh, India (Indian Shrimp Aquaculture 2020: Caught Between the Pandemic and Epidemics). The talk was followed by a panel discussion on the topic Aquatic Animal Health: Issues/Challenges and Way Forward. The panellists included Dr. Riji John, Dr. Sahul Hamid, Dr. P. K. Sahoo, Dr. T. J. Abraham, Dr. Gaurav Rathore; Dr. K. Pani Prasad, Dr. A. Uma, Dr. B. K. Behra, Dr. N. K. Sanil. Dr. S. V. Alavandi, Head, Aquatic Animal Health and Environment Division, ICAR-Central Institute of Brackishwater Aquaculture, Chennai co-chaired the session.

Dr. Gopal Krishna, Director, ICAR-CIFE and the Convenor of the programme presided over the function and Dr. K. V. Rajendran, Head, Aquatic Environment & Health Management Division, ICAR-CIFE and the Co-convenor provided the brief background of the programme. Dr. Gayatri Tripathi, Principal Scientist, ICAR-CIFE and Organising Secretary delivered the vote of thanks. A total of 325 participants from India and overseas attended the webinar.





11.10. A Webinar on Next Generation Aquaculture

A webinar on Next Generation Aquaculture for Madhya Pradesh and Chhattisgarh was organised on 29 September, 2020 in Hindi language at ICAR-CIFE, Powarkheda Centre under the guidance of Dr. Gopal Krishna, Director, ICAR-CIFE, Mumbai. This webinar was organised keeping in view the present need of technical knowledge in advanced fish farming system, that can be adopted by fish farmers and entrepreneurs to enhance productivity and profitability. Shri Devendra Kumar Dharam, Asst. Director, Raj Bhasha moderated the programme. Farmers, entrepreneurs, students, state government officials especially from the State of Madhya Pradesh and Chhattisgarh, participated in this webinar. A total of 160 participants benefitted from this webinar.

Dr. Gopal Krishna, Director, CIFE, Mumbai emphasised on the role of CIFE Powarkheda Centre in the development of aquaculture in Madhya Pradesh and Chhattisgarh in his inaugural address. The invited lectures were from Shri O. P. Saxena, Director, State Fisheries Department, Govt. of Madhya Pradesh and Shri. V. K. Shukla, Director, State Fisheries Department, Govt. of Chhattisgarh. Both the directors highlighted the status of fisheries in their respective states and future prospects with special emphasis on latest aquaculture technology. Dr. George John, Former Vice-Chancellor, Birsa Agriculture University, Ranchi, Jharkhand presented his lecture on Technology Led Aquaculture Development and shared his experience on aquaculture and overall development of farming community. Dr. A. K. Panigrahi, Principal Scientist, ICAR-CIBA, Chennai, gave insights on Biofloc in Freshwater Aquaculture. Faculty of CIFE, Dr. A. K. Verma, Senior Scientist, Dr. Sunil Kumar Nayak, Scientist, Dr. Muralidhar Ande, Senior Scientist, and Mr. Dhalongsaih Reang, Scientist delivered lectures on Aquaponics, IMTA, Pangas breeding and status of genetically improved fishes in India.

Scientist-farmer interaction session was conducted at the end of the lecture session and farmers from Madhya Pradesh and Chhattisgarh put forward their doubts on issues in their own aquaculture farms. The programme was concluded with vote of thanks by Shri Laxmi Prasad Bamaliya, ACTO, ICAR-CIFE, Powarkheda Centre.

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Distinguished Visitors




Distinguished Visitors

Mr. Suresh Chandel r
Former Member of Parliament and Member, Governing Body, ICAR r
02 January, 2020 r

Dr. R. C. Agrawal r
National Director, NAHEP & DDG (Agricultural Education) r
04 January, 2020; 22 January, 2020
ICAR-CIFE, Mumbai r
and r
05 February, 2020 r
ICAR-CIFE Rohtak Centre r

Dr. P. K. Ghosh r
National Coordinator, CAAST r
22 January, 2020 r
ICAR-CIFE, Mumbai r
and
05 February, 2020 r
ICAR-CIFE Rohtak Centre r

Dr. Prabhat Kumar r
National Coordinator, PME r
22 January, 2020 r
ICAR-CIFE, Mumbai r
and
05 February, 2020 r
ICAR-CIFE Rohtak Centre r

Dr. David Nielson r
Economist, NAHEP-World Bank Team r
22 January, 2020 r
ICAR-CIFE, Mumbai r
and
05 February, 2020 r
ICAR-CIFE Rohtak Centre r

Dr. Mansoor Ahmed r
Economist, NAHEP-World Bank Team r
22 January, 2020
ICAR-CIFE, Mumbai r
and
05 February, 2020
ICAR-CIFE Rohtak Centre r

Dr. Edward Bresnyan r
Task Team leader, NAHEP-World Bank Team r
22 January, 2020 r
ICAR-CIFE, Mumbai r
and
05 February, 2020 r
ICAR-CIFE Rohtak Centre r

Shri O. P. Saxena r
Director, State Fisheries Department, Government of Madhya Pradesh r
07 February, 2020 r
ICAR-CIFE Powarkheda Centre r

Dr. Sanjeev Kumar Balyan r
Minister of State for Animal Husbandry, Dairying and Fisheries r
08 December, 2020 r
ICAR-CIFE Powarkheda Centre r

Dr. R. C. Agrawal, DDG (Agricultural Education) & National Director (NAHEP) visit to ICAR-CIFE

Dr. R. C. Agrawal, National Director, NAHEP & DDG (Agricultural Education) visited ICAR-CIFE, Mumbai on 04 January, 2020. Dr. Agrawal held a detailed discussion with the PI, Co-PIs and research scholars on the progress of NAHEP-CAAST project currently underway at ICAR-CIFE. He also presided over the Annual Academic Council Meeting. Dr. Agrawal visited the NAHEP laboratory and the NAHEP office. He appreciated the publications, teaching aids, manuals, technical bulletins, NAHEP achievments coffee table book and brochures published under the project. He engaged in a detailed discussion with the CIFE team about the fish & shellfish products developed under the project. Dr. Gopal Krishna, Director, ICAR-CIFE & Principal Investigator NAHEP project thanked Dr. Agrawal for his visit to CIFE and his valuable guidance to CIFE-CAAST faculty. r

NAHEP-World Bank Team Visit and Review Meeting

A team comprising of five members visited ICAR-CIFE on 22 January, 2020. The team included three members from World Bank, Dr. Edward Bresnyan (Task Team leader), Dr. David Nielson (Economist), Dr. Mansoor Ahmed (Economist) and two members from PIU, New Delhi, Dr. P.K Ghosh, National Coordinator (CAAST) and Dr. Prabhat Kumar, National Coordinator (PME). The team's agenda to review the progress and assess the constraints of NAHEP-CAAST. All activity leaders (Co-PIs) working under NAHEP were present in the meeting. Director ICAR-CIFE and PI, NAHEP-CAAST, Dr. Gopal Krishna, welcomed the guests and the meeting began with a formal introduction. In the introductory remarks, Dr. Edward mentioned that the aim of the CAAST programme is to find out new ways to engage universities, novel ways to co-operate and come out with eco-friendly and sustainable technologies. Dr. K. V. Rajendran, HoD, AEHM Division & Co-PI, presented the achievements of the project. The World Bank team appreciated the work done under different objectives and applauded the Director/PI for his untiring endeavors and team leadership in making the project a success. Dr. P. K. Ghosh also congratulated and appreciated the project team suggested to maintain the high standards and to make a solid effort to achieve the set targets. After the formal interaction with Co-PIs, the team visited the NAHEP office and lab, interacted with RA's and SRF's working under the project and also with the participants of an on-going SDP programme. Dr. Gayatri Tripathi, Nodal Officer & Co-PI coordinated the visit of the World Bank team. Overall the meeting and visit were very fruitful and the World Bank team congratulated the ICAR-CIFE team. The meeting was concluded with the formal vote of thanks by Dr. N. P. Sahu, HoD, FNBP Division & Co-PI of the project. r

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Others

13. Other activities

International Women's Day Celebration

ICAR-CIFE celebrated the International Women's Day on 08 March, 2020. Students actively participated in various competitions held during 01-08 March, 2020. The final day's programme was chaired by Dr. K. V. Rajendran, Head, Aquatic Environment and Health Management Division, ICAR-CIFE, Mumbai. He congratulated all the women scientists and students. He also expressed his appreciation and respect for the multivalent potential of women.

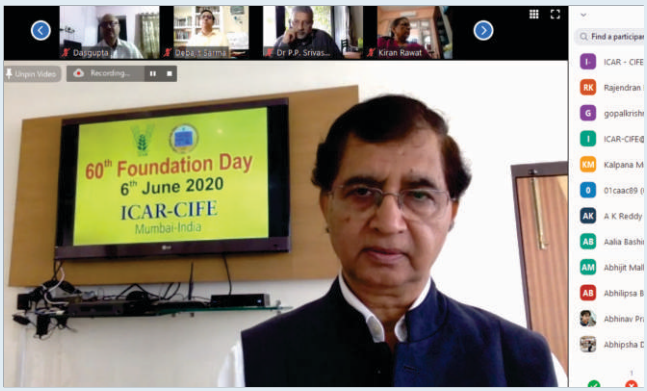
Celebration of the 74th Independence Day of India

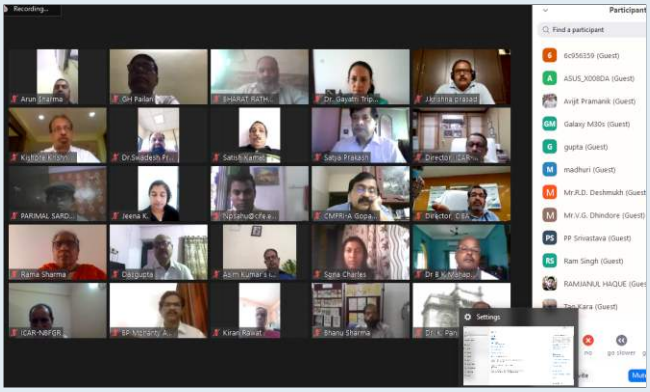
The 74th Independence Day of India was celebrated by the ICAR-Central Institute of Fisheries Education, with earnest patriotic spirits, conforming to social distancing protocol at the Mumbai Headquarter and its five centres at Kolkata, Kakinada, Rohtak, Powarkheda and Motipur. Dr. Gopal Krishna, Director & Vice-Chancellor hoisted the National Flag followed by the rendition of the National Anthem. During his address, he proudly proclaimed that with dedicated attempts towards achieving excellence in academics, research and outreach activities, this institute has created a niche for itself in the international and national arena. He highlighted that the targets envisioned by him are being achieved with the concerted efforts of staff and students, who have joined hands to take this national Institute to greater heights. Patriotic songs and recitation by staff members and plantation program (reinforcing our pledge for a healthier green campus), were among the other solemn events to commemorate the day with a promise to excel in our future endeavors.

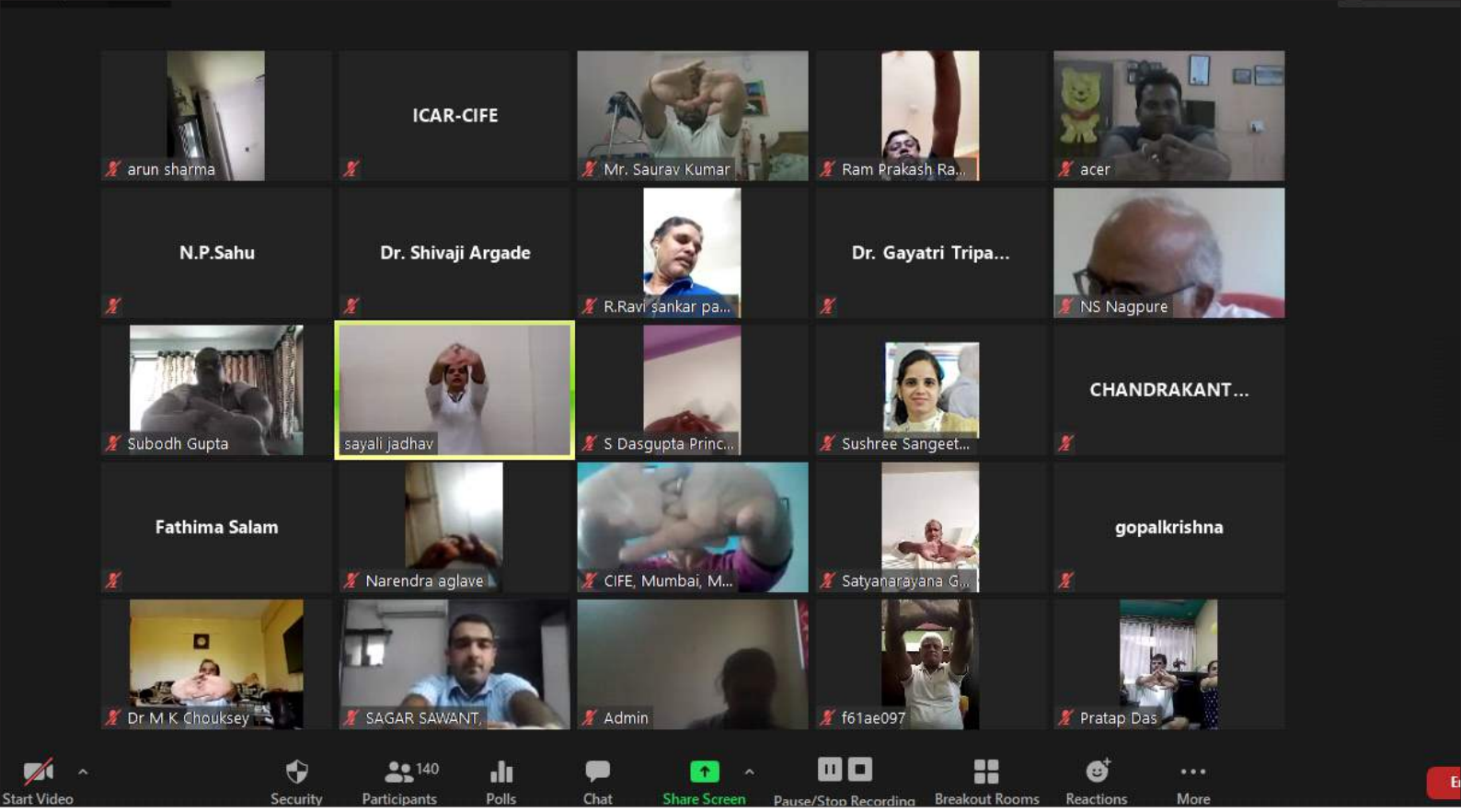
ICAR-CIFE 60th Foundation Day Celebrations – 2020

The 60th Foundation Day of ICAR-CIFE, Mumbai was celebrated on 6 June, 2020 amidst enthusiasm and was hosted over the online Zoom App platform. The programme was graced by Dr. Trilochan Mohapatra, Secretary DARE, and Director General ICAR, as Chief Guest and Dr. J. K. Jena, Deputy Director General (Fisheries Science) as the Guest of Honour. Dr. Gopal Krishna, Director/Vice-Chancellor, welcomed the guests on the occasion and enlightened the audience about the journey of ICAR-CIFE, Mumbai from a training institute to a Deemed-to-be-University with several laurels to its credit. He congratulated the faculty, staff, and students for their untiring efforts in bringing accolades to the University.

The highlight of the event was the release of a new logo for its 60th Foundation Day.

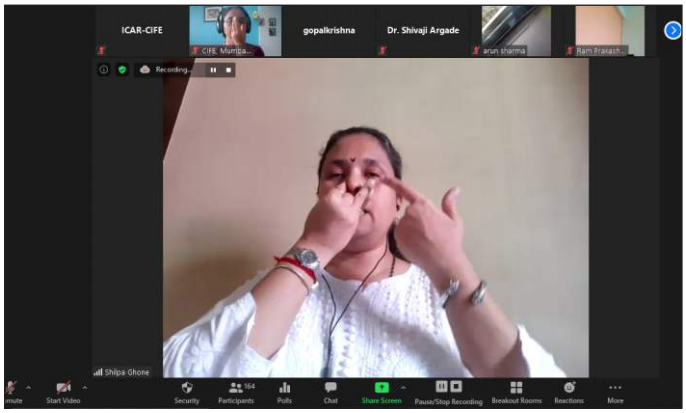






Celebration of 6th International Day of Yoga

ICAR-Central Institute of Fisheries Education, Mumbai, observed the 6th International Day of Yoga – 2020, which was celebrated on 21 June, 2020 with full enthusiasm. The Yoga Day was celebrated through video conferencing. A total of 179 participants, including faculty, technical officers, administrative staff and students of ICAR-CIFE participated in the programme. The theme of the programme was Yoga for Health-Yoga at Home. The Programme was inaugurated by Dr. Gopal Krishna, Director and Vice-Chancellor. He emphasised on creating a positive environment and healthy atmosphere through practicing yoga. The program was coordinated by Dr. N. S. Nagpure, Nodal officer and Dr. Megha Bedekar. Yoga experts Mrs Shilpa Ghone, Senior yoga instructor explained the importance of yoga to reduce stress for maintaining good mental and emotional health. A session on pranayama and meditation was also conducted. Other guest expert, Mrs. Sayali Jadhav, Yoga instructor emphasised on practicing yoga for improving immunity. Sukshama vyayam like tratak asana, asana for neck and shoulder, trikon asana, and vruksha asana were practiced by all the participants. The workshop ended with 'Gurumantra' and 'Omkar' chanting.



Hindi Pakhwada- 2020

Hindi Pakhwada–2020 was inaugurated online on 14 September, 2020 at ICAR-CIFE, Mumbai under the chairmanship of Dr. Gopal Krishna, Director/Vice-Chancellor. On this occasion, Dr. Gopal Krishna while wishing everyone on Hindi Day said that language plays a pivotal role in the development of unity and integrity of any nation. Hindi is the link language and is the most spoken language across the country. He emphasised on qualitative and quantitative growth of Hindi and also reiterated to ensure the use of computers in our official work. He said that on this day, we must resolve to remain loyal to the provisions of the official language mentioned in the constitution of our country and must be determined to increase the progressive use of Hindi in our official work. Subsequently, the Heads of the Divisions, Dr. Kishore Krishnani, Dr. S. N. Ojha and Dr. B. B. Nayak delivered their lectures in Hindi. Webinars in Hindi were also organised on 15 and 22 September, 2020 at Motipur Centre and on 26 September, 2020 at Kolkata Centre of the Institute. Competitions like elocution, essay writing, painting, quiz, song, poem recitation etc. were organized during Hindi Pakhwada-2020. Women's Day and Science Club lectures were also organised. Dr. A. K. Shrivastava, Vice-Chancellor, Dr. Rajendra Prasad Agricultural University, Pusa, Bihar, was the Chief Guest of the valedictory function. The function concluded by virtually awarding prizes to all the participants.

Vigilance Awareness Week

All the staff of ICAR-CIFE, Mumbai and its Centres participated in the Rashtriya Ekta Diwas (National Unity Day) via Zoom platform on 31 October, 2020 on the birth anniversary of Sardar Vallabhbhai Patel.

World Soil Health Day

ICAR-CIFE-Mumbai along with its Centres (Powarkheda, Kakinada, Rohtak, and Motipur) jointly celebrated World Soil Day, on 5 December, 2020 through an online platform as a means to focus attention on the importance of healthy soil and water quality for sustainable management of soil and water resources and also to highlight the provisions made under the Pradhan Mantri Matsya Sampada Yojana (PMMSY) being executed through State Governments and NFDB. About 150 participants including farmers, students, and faculties attended the programme. CIFE Centre, Powarkheda facilitated the joining of a group of 30 farmers and Shri G. S. Bele, Assistant Soil Testing Officer, Department of Agriculture, Govt. of Madhya Pradesh was the chief guest. CIFE Centre, Kolkata organised a program in Bengali language for the farmers associated with them. A total of 17 farmers across West Bengal attended the programme. The programme was organized by Dr. K. K. Krishnani, Head, Aquaculture Division and Dr. Aparna Chaudhari, Head, FGB Division.

Swachhta Pakhwada

Staff and students of CIFE and its Centres participated in Swachhta Pakhwada organised during 16-31 December 2020. This year, cleanliness drives were organised keeping in mind the ongoing pandemic. Apart from this, various other programmes related to cleanliness were organised every month from the time the office had reopened after the lockdown. Various safety measures were taken, along with sanitization, which was being done every alternate day. An oath-taking ceremony and other events like competitions and lectures were organised in online and offline modes so that off-campus students could also participate in the events. Cleanliness drives were organised in neighbouring villages wherein CIFE staff staged a march to nearby villages for spreading awareness among the people about segregation of dry and wet waste. Also, sanitation drives were conducted in villages adopted under Mera Gaon Mera Gaurav by staff from CIFE Regional Centres. The villagers were made aware of the use of masks & social distancing and sanitizers were distributed among them. Hostels, guest house, administrative office and

residential quarters were cleaned thoroughly. Placards and banners with cleanliness slogans were displayed in the institutional area and in the residential compound. Discussions on segregation of wet and dry waste were held and families staying on the campus were informed to follow the same. Webinars (on Waste to Wealth by Mr. Manoj Mishra from Sampurn Earth Solutions Pvt. Ltd.) and awareness campaigns on waste minimization and recycling, water saving and recycling of waste water were arranged. Students and faculty from other colleges also attended these lectures. During this Pakhwada, the institute celebrated Kisan Diwas in the villages adopted under Mera Gaon Mera Gaurav. A programme was organised wherein the Sarpanch and villagers were informed about the Pradhan Mantri Matsya Sampada Yojana. Drawing competitions were organized for children from neighbouring areas and for children of CIFE staff. The Institute increased its capacity of wet waste composting and this compost is being used as manure for lawns and gardens. Lastly, the Pakhwada ended with plantation drives at Mumbai and all Regional Centres. The overall programme was coordinated by Dr. Aparna Chaudhari (Head, FGB Division) and all the OICs of CIFE Centres. Scientists and staff of the Institute participated whole-heartedly by coordinating and organising individual events.

Celebration of 151st Gandhi Jayanti Saptaah

Gandhi Jayanti Week was celebrated from 24 September to 02 October, 2020 at ICAR-CIFE, Mumbai. Events were organised to commemorate the 151st Birth Anniversary of Mahatma Gandhi. In webinar Dr. Rakesh Chandra, Professor and Former Head, Department of Philosophy, University of Lucknow, gave a lecture on Gandhian thoughts on woman's role in human development which was attended by the faculty, staff and students. Keeping in mind the pandemic of Covid-19, cleanliness drives and tree plantation drives were carried out at the CIFE headquarters as well as the Centres. Poetry / song competitions, essay writing and drawing competitions were organised for the staff and their children. Online lectures titled Plastic pollution and its impact on fishing and marine life for fishermen and students, and Yoga's contribution to stress management for CIFE staff and students were organised. Webinar on Relevance of Gandhian Ideologies in Today's World was organised in collaboration with ICAR-NBFGR, Lucknow on 02 October, 2020. Experts delivered lectures on Relevance on re-creation of Gandhi's idea of Gram Swaraj during this Covid time, Life Values of Gandhi ji and Relevance of Gandhian ideologies in modern times. The overall programme was coordinated by Dr. Aparna Chaudhari, Head, FGB Division and all the OICs of CIFE Centres.

Constitution Day

ICAR-CIFE observed the Constitution Day on 26 November 2020 by joining the Hon'ble Prime Minister through the Government of India online portal link. All the staff read out the Preamble of the Indian Constitution shared online.

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Personalia

CIFE Headquarters, Mumbai -

RMP

Director

Dr. Gopal Krishna

Scientific Staff

Head of Division

Dr. N. K. Chadha (upto 19.02.2020)
Dr. Kiran Dube Rawat
(Acting w.e.f. 20.02.2020-30.06.2020)
Dr. Kishore Kumar Krishnani
(Acting w.e.f. 1.07.2020)
Dr. K. V. Rajendran
(Acting w.e.f. 20.11.2020)
Dr. (Mrs.) Aparna Chaudhari
(Acting w.e.f. 10.12.2020)
Dr. B. B. Nayak
Dr. S. N. Ojha (Acting)
Dr. N. P. Sahu (Acting)

Principal Scientist

Dr. N. K. Chadha
Dr. (Mrs.) Kiran Dube Rawat
Dr. Naresh S. Nagpure
Dr. (Ms.) Geetanjali Deshmukhe
Dr. P. K. Pandey (on deputation)
Dr. Kishore Kumar Krishnani
Dr. S. Jahageerdar
Dr. (Mrs.) Arpita Sharma
Dr. K. Pani Prasad
Dr. P. P. Srivastava
(On deputation w.e.f. 22.09.2020)
Dr. R. P. Raman
Dr. Parimal Sardar
Dr. Ashok Kumar Jaiswar
Dr. Rupam Sharma
Dr. (Mrs.) Gayatri Tripathi
Dr. Satya Prakash Shukla
Dr. Swadesh Prakash
Dr. Subodh Gupta
Dr. Mukunda Goswami
Dr. Ashutosh D. Deo
Dr. (Mrs.) Megha Kadam Bedekar
Dr. P.S. Ananthan (w.e.f. 18.10.2017)
Dr. Sanath Kumar H.
(w.e.f. 28.12.2017)
Dr. A. K. Balange (w.e.f. 26.04.2018)
Dr. (Mrs.) Rama Sharma
(w.e.f. 16.03.2020)
Dr. Manoj Pandit Brahmane
(w.e.f. 28.09.2020)

Senior Scientist

Dr. (Mrs.) Zeba Jaffer Abidi
Dr. (Mrs.) Asha T. Landge
Dr. Ajit Kumar Verma
Dr. (Mrs) Paramita Banerjee Sawant
Dr. (Mrs) Vidyashree Bharati
Dr. (Mrs.) Babita Rani A. M.
Dr. A. Pavan Kumar
Dr. Gireesh Babu Pathakota (upto 13.08.2020)

Scientist

Dr. Kundan Kumar
Dr. Vinod Kumar Yadav
Dr. (Mrs.) Manjusha L.
Dr. Martin Xavier K. A.
Dr. Arun Sharma
Dr. (Mrs.) Thongam Ibemcha Chanu
Dr. Sikendra Kumar
Dr. (Mrs.) Jeena K.
Dr. Saurav Kumar
Dr. (Mrs.) Tincy Verghese
Dr. Mujahidkhan Ajamalkhan Pathan
Dr. Shashi Bhushan
Dr. (Mrs.) Shamna N.
Dr. Dhamotharan K.
Mr. Karankumar K. Ramteke
Mr. Kiran Dashrath Rasal (w.e.f. 03.08.2020)
Dr. (Mrs.) Rathi Bhuvaneswari G.
Dr. Shivaji Dadabhau Argade
Dr. (Mrs.) Layana P.
Dr. Manish Jayant
Dr. (Mrs.) Neha Wajahat
Dr. Sukhdhane Kapil Sukhdeo (w.e.f. 03.08.2020)
Mrs. Husne Banu
Mr. Angom Lenin Singh
Dr. Upasana Sahoo
Dr. Suman Manna (w.e.f 10.08.2020-25.11.2020)
Dr. Madhuri Pathak
Ms. Shobha Rawat (w.e.f. 04.04.2020)
Mr. Abuthagir Iburahim S. (w.e.f. 04.04.2020)
Ms. Sona Charles (w.e.f. 04.04.2020-27.07.2020)
Ms. V. Vidhya (w.e.f 04.04.2020)
Mr. Dayal Devadas (w.e.f. 04.04.2020)

Technical Staff

Chief Technical Officer (T-9)

Dr. S. K. Pandey
Dr. M. K. Chouksey
Mr. S. S. Kamat
Mr. D. R. Khogare (upto 20.03.2020)
Mr. S. K. Sharma (upto 31.12.2020)
Mr. Ram Singh

Asstt. Chief Technical Officer (T-7/8)

Dr. Chandrakant M.H.
Mr. Dasari Bhoomaiah
Mr. P. K. Das
Dr. (Mrs.) Nalini Poojary
Mr. Subhash Chand
Ms. Revati B. Dhongde
Mrs. Rekha Nair

Sr. Technical Officer (T-6)

Mrs. Rajani H. Khandgale
Mr. Sanjeevan Kumar

Technical Officer (T-5)

Mr. B. G. Mandhare
Mr. S. Maity
Mr. B. J. Rathod
Mr. N. K. Aglave
Mr. S. R. Bandkar
Mrs. Bharati Ghagare
Mr. Avinash Sable
Mr. Suryakant L. Koli
Mr. B. T. Phande
Mr. Anil Kumar Kulsange
Mr. Sagar Suresh Sawant

Sr.Technical Assistant (T-4)

Mr. Rajarshee Moitra
Mr. Yogesh Jadhao
Mr. K. Dhana Raju (upto 19.04.2020)
Dr. Pawan Kumar
Mr. Mohd. Baqar
Mr. Sikandar S. Hussain (upto 30.09.2020)
Mr. K. V. Rajendran
Mr. V. G. Dhindore (upto 11.09.2020)
Mr. Arun Puri Gosavi
Mr. R. D. Deshmukh
Mrs. Reshma K. Raje
Mr. Dhanpat Singh Rawat

Technical Assistant (T-3)
Mr. V. K. Bhave

Sr. Technician (T-2)
Sh. Pranaya Kumar Biswal
Mr. Mohd Sadiq M. Mulla
Mr. Abhijeet Vijay Jadhav
Mr. T. G. Gaikwad

Technician (T-1)
Mr. G. B. Kamble

Non-Ministerial Staff
Cook
Mr. S. Kamaraju

Adminstrative Staff

Chief Finance & Accounts Officer
Mr. Prashant Sharma

Sr. Administrative Officer
Mr. P. J. Davis

Dy. Director (Official Language)
Dr. R. P. Uniyal (upto 31.05.2020)

Asstt. Director (Official Language)
Mr. Devendra Kumar Dharam

Finance & Accounts Officer
Mr. Rahul Kumar (upto 29.10.2020)

Asstt. Finance & Accounts Officer
Mr. Deepak M. Bhokse

Asstt. Admn. Officer
Mrs. Poonam N. Behl
Mrs. F. G. Fernandes
Ms. C. S. Khundol
Mr. D. S. Ingale
Mrs. Swati S. Koli

Private Secretary
Mr. P. R. Ninawe
Mrs. Pragati R. Gadre

Stenographer (Grade – III)
Mr. Amey A. Sakpal

Assistant
Mr. R. R. Kadam (upto 05.01.2020)
Mr. V. S. Kuveskar
Mr. Suraj Gupta
Mr. D. V. Raorane
Mrs. A. U. Joshi
Mr. A. G. Kolambkar
Mrs. S. V. Pawar
Mrs. Sanyuja S. Parab
Mr. B.P. Chauhan
Mr. N. L. Ghane
Mr. P. G. Angne
Mr. M. B. Waghela (w.e.f. 06.01.2020)

Upper Division Clerk
Mrs. C. C. Raut
Mrs. Anu Grover
Mr. S. H. Bhosale
Mr. Shirish P. Malvankar
Mr. Prasenjit P. Sonawane
Mr. R. N. Kamble (w.e.f. 06.01.2020)

Lower Division Clerk
Mr. Ram A. Shinde
Mr. Ninad V. Kandalgaonkar
Mr. Sambhaji S. Shelke
Ms. Ujjawala V. Tiwari
(w.e.f. 18.03.2020)

Skilled Support Staff
Mr. G. G. Zendekar
Mr. Surajbali R. Jaiswar
Mr. B. S. Tamankar (upto 31.07.2020)
Mr. Ashok R. More
Mr. D. B. Gaikwad
Mr. Sitaram B. Padyal
Mr. J. K. Makwana
Mr. Bandu R. Chavan
Mr. Ankush R. Dore
Mr. M. P. Kotian
Mr. Ashok R. Shingade
Mr. Jagdish N. Dhanu
Mr. Vasant N. Ondkar
Mr. Arvind M. Lavande
Mr. Vinod Kumar Yadav
Mrs. R. H. Chavan
Mr. Ankush N. Joyashi
Mr. Ganesh N. Zendekar
Mr. Anil D. Sonawane
Mrs. Reshma Naik
Mrs. Sabita Devi

CIFE Kakinada Centre -

Scientific Staff

Officer Incharge/Senior Scientist
Dr. Muralidhar P. Ande

Scientist
Dr. (Mrs.) Karthireddy Syamala

Technical Staff

Chief Technical Officer (T-9)
Dr. J. K. Prasad (upto 31.10.2020)
Dr. P. Srinivas Rao

Asstt. Chief Technical Officer (T-7/8)
Mr. R. R. S. Patnaik

Technical Assistant (T-3)
Mr. A. Gurraiah

Sr. Technician (T-2)
Mr. V. Shivaji

Technician
Mr. Sheikh Valisha
Mr. G. V. V. Satyanarayana

Adminstrative Staff

Assistant
Mr. B. Laxman Rao

Upper Division Clerk
Mrs. M. Rama Mani

Skilled Support Staff
Mr. O. Veera Raju
Mr. T. Satyanarayana
Mr. P. V. K. Reddy
Mr. P. D. Reddy
Mr. S. S. Reddy
Mr. Y. Buchilingam
Mr. M. Govindu
Mr. Kurru Suresh
Mr. M. Kondala Rao (w.e.f. 24.09.2020)

CIFE Kolkata Centre

Scientific Staff

Officer Incharge/Principal Scientist
Dr. G. H. Pailan

Principal Scientist
Dr. B. K. Mahapatra
Dr. Shubendu Dutta
Dr. S. Munil Kumar
Dr. S. Das Gupta

Scientist
Dr. (Mrs.) Sujata Sahoo
Mr. Dilip Kumar Singh
Dr. Suman Manna (w.e.f. 26.11.2020)

Technical Staff

Chief Technical Officer (T-9)
Dr. Asok Biswas

Sr. Technical Assistant (T-4)
Mrs. G. Aruna Devi
Mr. Prakash Kumar Behera
Mr. Tapas Kumar Ghosh

Adminstrative Staff

Private Secretary
Ms. Kaberi Biswas

Assistant
Mr. C. N. Sahani
Mr. P. K. De (upto 30.06.2020)

Upper Division Clerk
Mr. Kishore Bose
Mr. Ram Milan Singh

Skilled Support Staff
Mr. Ramesh Chowdhary
(upto 31.08.2020)
Mrs. Suman Pandey
Mr. Rajesh Mahato

CIFE Powarkheda Centre -

Scientific Staff

Officer Incharge/ Scientist
Dr. Sunil Kumar Nayak
Mr. Dhalongsaih Reang

Technical Staff

Asstt. Chief Technical Officer
Mr. L. P. Bamalia

Sr. Technical Officer (T-6)
Mr. Hasan Javed

Technical Officer (T-5)
Mr. Gurubachan Singh

Sr. Technical Assistant (T-4)
Mr. Anup Singh (upto 31.12.2020)

Sr. Technician (T-2)
Mr. Raghuvir Prasad

Technician (T-1)
Mr. S. Prajapati

Administrative Staff

Asstt. Administrative Officer
Mrs. Asha Dhurve

Skilled Support Staff

Mr. Lallu Prasad
Mr. Vishnu Lal
Mr. Mangli Prasad
Mr. Sambhu Dayal
Mr. Hari Singh
Mr. Manohar Lal
Mr. Ram Swarup
Mr. Deepak Kumar Kushwaha

CIFE Rohtak Centre -

Scientific Staff

Officer Incharge/Scientist
Mr. Hari Krishna

Scientist
Mr. Arun Sudhagar S.
Dr. Pankaj Kumar
Dr. Sreedharan K.
Mr. Satya Prakash

Technical Staff

Sr. Technical Officer (T-7/8)
Mr. Ashok Kumar

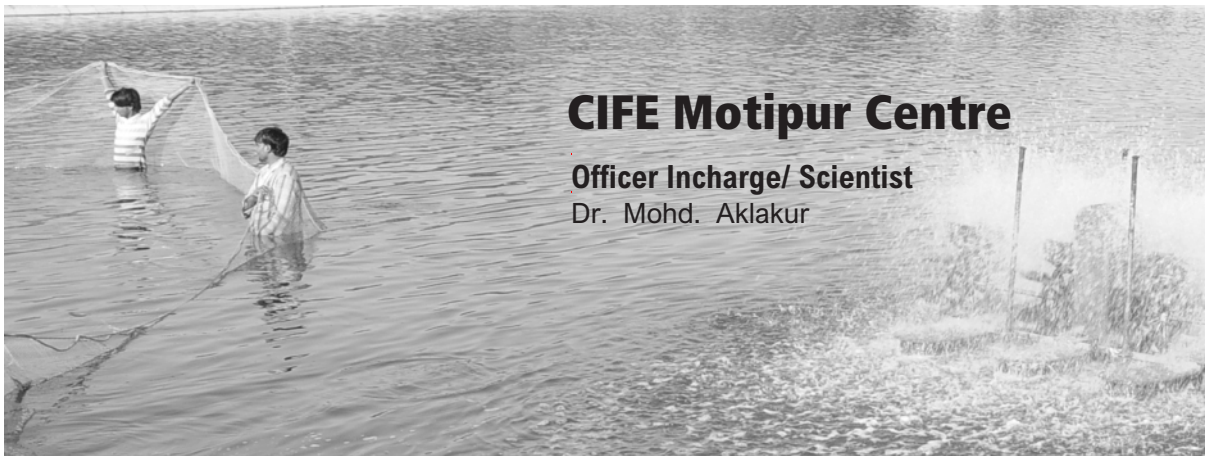
Sr. Technical Assistant (T-4)
Mr. Satyendra Singh
Mr. Lokesh Kumar

Technical Assistant(T-3)
Mr. Krishan Kumar

Technician (T-1)
Mr. Lavesh Kumar

Skilled Support Staff

Mr. Gyani Ram
Mr. Gyan Chand



CIFE Motipur Centre

Officer Incharge/ Scientist
Dr. Mohd. Aklakur

14.2. Appointments

Sl. No.	Name of the Officials	Designation	Date of Joining
1	Ms. Shobha Rawat	Scientist	4 April, 2020
2	Mr. Abuthagir Iburahim S.	Scientist	4 April, 2020
3	Ms. V. Vidhya	Scientist	4 April, 2020
4	Mr. Dayal Devadas	Scientist	4 April, 2020
5	Mr. M. Kondala Rao	Skilled Support Staff	24 September, 2020

14.3. Retirements/Termination/Resignation

Sl. No.	Name of the Employee	Date of Retirement
1	Mr. Ravindra R. Kadam, Assistant	05 January, 2020 (VRS)
2	Dr. R. P. Uniyal, Dy. Director (OL)	31 May, 2020
3	Dr. Kiran Dube Rawat, Principal Scientist & HOD (Acting)	30 June, 2020
4	Mr. P. K. De, Assistant, CIFE Kolkata Centre	30 June, 2020
5	Mr. B. S. Tamhankar, Skilled Support Staff	31 July, 2020
6	Mr. Ramesh Choudhary, Skilled Support Staff, CIFE Kolkata	31 August, 2020
7	Mr. Sikendra Hussain Shaikh, Sr. Tech. Asstt. (Driver)	30 September, 2020
8	Dr. J. K. Prasad, Chief Tech. Officer, CIFE Kakinada Centre	31 October, 2020
9	Mr. S. K. Sharma, Chief Tech. Officer	31 December, 2020
10	Mr. Anup Singh, Sr. Tech. Asstt., CIFE, Powarkheda Centre	31 December, 2020

14.4. Transfers to CIFE

Sl. No.	Name of the Employee	Transfer from	Date of Joining
1	Mr. Kiran Dashrath Rasal Scientist	ICAR – CIFA, Bhubaneshwar	03 August, 2020
2.	Dr. Sukhdane Kapil Sukhdeo Scientist	ICAR – CMFRI, Verawal	03 August, 2020
3	Dr. Suman Manna Scientist	ICAR – IARI, New Delhi	10 August, 2020
4	Dr. Manoj Pandit Brahmane Principal Scientist`	ICAR – NIASM, Baramati	28 September, 2020

14.5. Transfers from CIFE

Sl. No.	Name of the Employee	Transfer to	Date of Relieving
1	Dr. Gireesh Babu P., *Senior Scientist*	ICAR – NRCM, Hyderabad	13 August, 2020
2	Mr. Rahul Kumar, *FAO*	ICAR – NIPB, New Delhi	29 October, 2020

14.6. Promotion under the Career Advancement Scheme

Sl. No.	Name of the Employee	From	To	w.e.f.
1	Dr. P. S. Ananthan	Senior Scientist	Principal Scientist	18 October, 2017
2	Dr. Sanath Kumar	Senior Scientist	Principal Scientist	28 December, 2017
3	Dr. Amjad K. Balange	Senior Scientist	Principal Scientist	26 April, 2018
4	Dr. Rama Sharma	Senior Scientist	Principal Scientist	16 March, 2020

14.7. MACP for financial upgradation

Sl. No.	Name of the Employee	From (Grade Pay)	To (Grade Pay)	w.e.f.
1	Mr. C. N. Sahani, Assistant	4200	4600	07 January, 2019
2	Mrs. Swati S. Koli, A.A.O	4200	4600	21 August, 2019
3	Mr. Vijay S. Kuveskar, Assistant	4200	4600	29 August, 2019
4	Mr. D. V. Raorane, Assistant	4200	4600	12 October, 2019
5	Mrs. Sujata V. Pawar, Assistant	4200	4600	13 October, 2019
6	Mr. P. K. De, Assistant	4200	4600	18 October, 2019
7	Mrs. Anagha U. Joshi, Assistant	4200	4600	23 October, 2019
8	Mr. Ankush Joyashi, SSS	1900	2000	04 November, 2019
9	Mr. Ashok G. Kolambkar, Assistant	4200	4600	19 December, 2019
10	Mr. Jayanti K. Makwana, SSS	2000	2400	23 December, 2019
11	Mr. P. V. K. Reddy, SSS	2000	2400	25 January, 2020
12	Mr. P. D. Reddy, SSS	2000	2400	25 January, 2020
13	Mrs. Sanyuja S. Parab, Assistant	4200	4600	30 January, 2020
14	Mr. Sambhu Dayal, SSS	2000	2400	16 April, 2020

14.8. Five Yearly Assessment (Meeting held between January 2020 to December 2020)

Sl. No.	Name of the Employee	From	To	w.e.f.
1	Mr. S. Maity, Bosan	Technical Officer	Sr. Tech. Officer	22 March, 2019
2	Mr. Raghubir Prasad	Sr. Technician	Technical Assistant	01 January, 2019

14.9. Promotions (Meeting held between January 2020 to December 2020)

Sl. No.	Name of the Employee	From	To	w.e.f.
1	Mr. Mahesh B. Waghela	Upper Division Clerk	Assistant	06 January, 2020
2	Mr. Raju N. Kamble	Lower Division Clerk	Upper Division Clerk	06 January, 2020
3	Ms. Ujjwala V. Tiwari	Skilled Support Staff	Lower Division Clerk	18 March, 2020

14.10. Obituary

Mr. Deepak R. Khogare
Chief Technical Officer
20 March, 2020

Mr. K. D. Raju
Sr. Tech. Assistant
19 April, 2020

Mr. Vinod G. Dhindore
Sr. Tech. Asstt. (Driver)
11 September, 2020

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हिन्दी प्रगति प्रतिवेदन

हिन्दी प्रगति प्रतिवेदन - 2020

भा.कृ.अनु.प.- केन्द्रीय मात्स्यिकी शिक्षा संस्थान, मुंबई का दिनांक 1 जनवरी, 2020 से 31 दिसम्बर, 2020 तक समाप्त अवधि में संस्थान में हिन्दी में किए गए उल्लेखनीय कार्यों का विवरण निम्नलिखित है -

हिन्दी जलवाणी

भा.कृ.अनु.प.-केन्द्रीय मात्स्यिकी शिक्षा संस्थान में देश-विदेश से आये छात्र-छात्राओं के लिए मात्स्यिकी से संबंधित उच्च शिक्षा प्रदान की जाती है । इस देशी-विदेशी छात्र-छात्राओं का हिन्दी में ज्ञान बढ़ाने हेतु इस संस्थान के एम.एफ.एससी. के प्रथम वर्ष के छात्र-छात्राओं के लिए वर्ष 2002 से नियमित रूप से हिन्दी जलवाणी नामक हिन्दी पाठ्यक्रम प्रारंभ किया गया है । इस पाठ्यक्रम की रचना इस प्रकार की गई है कि हिन्दी का कार्यसाधक रखने वाले और नहीं रखने वाले छात्र-छात्राएं अलग-अलग समूहों में इसका अध्ययन कर सकें । चूंकि वर्ष 2019-2020 में विश्व में फैली महामारी कोविड-19 के कारण वर्ष 2020 से एम.एफ.एससी. (सत्र 2020-2022) के प्रथम वर्ष के छात्र-छात्राओं हेतु संचालित की जानेवाली हिन्दी जलवाणी एक क्रेडिट कोर्स की कक्षाएं नवम्बर 2020 से नियमित रूप से ऑनलाइन संचालित की जा रही है।

हिन्दी पखवाड़ा - 2020

भा.कृ.अनु.प.-केन्द्रीय मात्स्यिकी शिक्षा संस्थान, मुंबई एवं उपकेन्द्रों में दिनांक 14 से 28 सितम्बर, 2020 तक हिन्दी पखवाड़ा का आयोजन किया गया । दिनांक 14 सितम्बर, 2020 को संस्थान के निदेशक महोदय, डा. गोपाल कृष्णा की अध्यक्षता में हिन्दी पखवाड़ा - 2020 का उद्घाटन ऑनलाइन किया गया । निदेशक महोदय ने अपने अध्यक्षीय भाषण में सभी को हिन्दी दिवस की शुभकामनाएं दी और हिन्दी के महत्व बताते हुए हिन्दी को कम्प्यूटर प्रयोग के माध्यम से सुनिश्चित करने पर बल दिया । उन्होंने कहा कि आज के दिन हम संकल्प कर भारत के संविधान में वर्णित राजभाषा के प्रावधानों के प्रति निष्ठावान रहेंगे तथा सरकारी कामकाज में हर संभव हिन्दी के प्रगामी प्रयोगों को बढाएंगे ।

निदेशक महोदय के अध्यक्षीय भाषण के बाद संस्थान के तीन विभागध्यक्षों ने हिन्दी में व्याख्यान प्रस्तुत किए। इस कार्यक्रम में संस्थान के लगभग 90 स्टाफ ने आनलाइन जुड़कर इस समारोह में भाग लिया । व्याख्यान के उपरांत परिचर्चा सत्र भी आयोजित किया गया ।

हिन्दी पखवाड़ा - 2020 के अन्तर्गत विभिन्न विषयों पर निम्नलिखित चार वेबिनार आयोजित किए गए -

1. दिनांक 15 सितम्बर, 2020 को संस्थान के मोतीपुर केन्द्र द्वारा 'बिहार एवं झारखंड के लिए प्रौद्योगिकी चलित जलकृषि की संभावनाएं' विषय पर एक वेबिनार का आयोजन किया गया। इस ऑनलाइन वेबिनार में लगभग 200 प्रतिभागी जुड़े।
2. दिनांक 22 सितम्बर, 2020 को संस्थान के मोतीपुर केन्द्र द्वारा 'उद्यमी अग्रमिता विस्तार से मछली पालन कर विकास' विषय पर वेबिनार का आयोजन किया गया । जिसमें लगभग 120 उद्यमी किसानों ने भाग लिया एवं अपने विचार प्रस्तुत किए ।
3. दिनांक 26 सितम्बर, 2020 को कोलकाता केन्द्र से 'आत्मनिर्भर भारत के लिए जलकृषि क्षेत्र में युवा उद्यमशीलता विकास' विषय पर वेबिनार का आयोजन किया गया । इस वेबिनार का लगभग 120 लोगों ने लाभ उठाया ।
4. दिनांक 29 सितम्बर, 2020 को संस्थान के पवारखेड़ा केन्द्र द्वारा 'नेक्स्ट जनरेशन एक्वाकल्चर' विषय पर वेबिनार का आयोजन किया गया ।

- साथ ही, दिनांक 24 सितम्बर, 2020 को के.मा.शि.सं. के सायन्स क्लब की ओर से प्रो. राकेश चन्द्रा, दर्शनशास्त्र विभाग, लखनऊ विश्वविद्यालय ने 'मानव विकास एवं महिला' विषय पर एक व्याख्यान प्रस्तुत किया गया ।
- इसी के साथ, दिनांक 26 सितम्बर, 2020 को महिला दिवस कार्यक्रम के अन्तर्गत डा. नितांता शेवडे ने 'तनाव प्रबंधन एवं संवादात्मक भाषण' विषय पर आनलाइन व्याख्यान प्रस्तुत किया ।

- इस हिन्दी पखवाड़ा - 2020 के अंतर्गत उपरोक्त चार वेबिनार और सायन्स क्लब-व्याख्यान के साथ ही समय-समय पर संस्थान के स्टाफ एवं संस्थान परिवार के बच्चों हेतु भाषण, चित्रकला, लेखन, प्रश्नोत्तरी, गीत-कविता प्रतियोगिताओं और महिला दिवस कार्यक्रम का भी आयोजन किया गया था । जिनमें संस्थान के लगभग सभी अधिकारियों एवं कर्मचारियों ने उत्साहपूर्वक भाग लिया।

राजभाषा कार्यान्वयन

- संस्थान की राजभाषा कार्यान्वयन समिति की 95 वीं बैठक दिनांक 28 सितम्बर, 2020 को निदेशक महोदय डा. गोपाल कृष्णा की अध्यक्षता में संपन्न हुई ।
- संस्थान की राजभाषा कार्यान्वयन समिति की 95 वीं बैठक की अनुवर्ती कार्रवाई संबंधी कार्यवृत्त समस्त सदस्यों को उपलब्ध कराया गया ।
- भा.कृ.अनु.प.-केन्द्रीय मात्स्यिकी शिक्षा संस्थान में हिन्दी में मूलरूप से काम करने एवं हिन्दी टाइपिंग करने वाले अधिकारियों / कर्मचारियों हेतु हिन्दी प्रोत्साहन भत्ता- (2019-20) प्रदान किया गया ।
- संस्थान के अधिकारियों एवं कर्मचारियों से संबंधित रोस्टर (2019-20) अद्यतन किया गया ।
- संस्थान के हिन्दी वेब साइट को अद्यतन किया गया ।
- कर्मचारी टेलीफोन डायरेक्टरी को अद्यतन किया गया ।

प्रकाशन

- भा.कृ.अनु.प.-केन्द्रीय मात्स्यिकी शिक्षा संस्थान का वार्षिक प्रतिवेदन - 2019
- भा.कृ.अनु.प.-केन्द्रीय मात्स्यिकी शिक्षा संस्थान की वार्षिक गृह पत्रिका - जलचरी का अंक - 24
- भा.कृ.अनु.प.-केन्द्रीय मात्स्यिकी शिक्षा संस्थान की वार्षिक गृह पत्रिका 'जलचरी' का 25 वां अंक रजत जयंती विशेषांक
- भा.कृ.अनु.प.-केन्द्रीय मात्स्यिकी शिक्षा संस्थान की तिमाही पत्रिका 'मत्स्य दर्पण' (जुलाई - सितम्बर 2020) का ई - प्रकाशन
- भा.कृ.अनु.प.-केन्द्रीय मात्स्यिकी शिक्षा संस्थान के मुख्यालय एवं उपकेन्द्रों में आयोजित निम्नलिखित चारों वेबिनार के प्रतिवेदनों को संकलित किया गया ।
    - 'बिहार एवं झारखंड के लिए प्रौद्योगिकी चलित जलकृषि की संभावनाएं' - मोतीपुर केन्द्र
    - 'उद्यमी अग्रमिता विस्तार से मछली पालन कर विकास' - मोतीपुर केन्द्र
    - 'आत्मनिर्भर भारत के लिए जलकृषि क्षेत्र में युवा उद्यमशीलता विकास' - कोलकाता केन्द्र
    - 'नेक्स्ट जनरेशन एक्वाकल्चर' - पवारखेड़ा केन्द्र

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