ICAR-CIFE

2023 वार्षिक प्रतिवेदन Annual Report

ICAR-CIFE

2023 वार्षिक प्रतिवेदन
Annual Report

ICAR-Central Institute of Fisheries Education
Mumbai-India

Credits

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Contents

Preface

India's fish production in both the marine and inland water sectors has grown in parallel with the increasing demand for food fish. With the vast resources available for fish farming, scientific endeavors and entrepreneurship, the country's fish production in 2023 reached an all-time high of 17.54 million metric tons. Aquaculture plays an important role in ensuring food security and economic development, the share of which is almost 65% of the Country's total fish production. Aquaculture sector continued to grow at around 7-8% which is the highest compared to other agriculture-related production sectors in India. Fisheries sector exports are valued at Rs. 60523.89 Crores (US $ 7.38 billion) and account for 1% of the total and 5% of agricultural GDP. The fisheries sector provides livelihood to more than 25 million Indians. The Government of India's key initiative, the Pradhan Mantri Matsya Sampada Yojana (PMMSY), is part of the Atmanirbhar program to develop the fishing sector and strengthen the players in the fishing sector, which is expected to further boost the growth of the sector.

Fisheries growth and sustainability require intensive research, education and extension in all aspects of fisheries, including capture, aquaculture and postharvest management. Education is an integral part of the rapid growth of the fishing industry. As a university, ICAR-ICAR-CIFE has always been at the forefront of fisheries education and research. The institute conducts scientific research in various fields of fisheries and has had a huge impact on the advancement of fishing knowledge, the growth of aquaculture through education, the spread of technology and the development of entrepreneurship.

In Academic year 2023, a total of 96 students were admitted to various Master's degree programs (M.F.Sc), while 61 students were enrolled in Doctoral degree (PhD) programs following successful entrance exams administered by a National Testing Agency. 90 MFSc and 40 PhD students received their degrees in 16th Convocation of ICAR-CIFE.

ICAR-ICAR-CIFE has contributed immensely to the advancement of fisheries research in India. Currently, the institute is engaged in 31 institutional projects and 15 externally funded projects, all focused on priority areas of fisheries research. These encompassed topics such as aquaponics technology optimization, the enhancement of growth and reproduction efficiency of aquaculture species, development of laboratory strains of inbred zebrafish, diagnostics for fish and human pathogens, value addition of fishery products, nanotechnology, alternate feed ingredients, etc. ICAR-CIFE's research findings have been published in 143 national and international publications, in addition to 36 popular articles, 13 books, 38 book chapters and 16 training manuals and other extension publications. In 2023, ICAR-CIFE researchers secured two patents and two copyrights.

The Inland Saline Aquaculture (ISA) project stands as the flagship initiative of ICAR-CIFE, supported under the National Agricultural Higher Education Project (NAHEP) since 2018. This esteemed project has significantly contributed to the promotion and expansion of inland aquaculture in the saline regions of India by developing eco-friendly technologies to ensure the sustainability and profitability of ISA. The NAHEP project centered around comprehensive farmer training, field support activities, innovative agricultural methods, student and faculty training, and the development of industry-oriented curriculum and technology.

The farmer education program has always been a priority of ICAR-CIFE. Short Training Programs (STP) and Skill Development Programs (SDP) are implemented annually at ICAR-CIFE headquarters and centers to introduce fisheries stakeholders to industry advancements and new ways of creating livelihoods and entrepreneurship development. In the year 2023, 78 SDPs were organized that benefited 1497 stakeholders largely farmers from different regions of the Country. The Agribusiness Incubation (ABI) center trained several potential entrepreneurs in the development of a fishery business. There were 11 incubatees in addition to these 3 women SHGs (33 women SHG members) registered in 2023. Under TSP and SCSP, 16 & 19 training programs were organized that benefitted 498 and 372 farmers, respectively to improve their income and livelihood through fisheries and aquaculture technology interventions. About 1042 beneficiaries were received skill development trainings and technology inputs under the 29 NEH programs.

The significant transformation of the training institution into a national university with the highest standards of education in fisheries has been possible due to the diligent and tireless efforts of past and present staff, institute directors, and the continued support of the ICAR headquarters. I thank everyone who built this institute, making it a popular student destination and fisheries research center in India.

I sincerely thank Dr. Himanshu Pathak, Secretary, DARE and DG, ICAR, and Dr. J. K. Jena, DDG (Fisheries Science) for their unstinted support and constant guidance to all our activities. I thank Dr. Shubhadeep Ghosh, ADG (Marine Fisheries), Dr. B. P. Mohanty, ADG (Inland Fisheries), and other colleagues of the Fisheries Department for their cooperation and support. Sincere thanks to the board members, the president and member of the research council, members of the academic council, the research council of the institute, the extension board, the examination committee, and other institute-level committees for their cooperation and support. Special thanks to the ICAR-CIFE family for their contribution and congratulations to the Annual Report-2023 publishing team for bringing this document to showcase ICAR-CIFE's achievements.

(Dr. Ravishankar C.N.)
Director & Vice-Chancellor
ICAR-CIFE

Executive Summary

Fishery education and research have been instrumental in the sector's development over the last six decades and will continue to be an integral part of the national plan to realize the second blue revolution in India. ICAR-CIFE has contributed remarkably to developing the fisheries sector since its inception in 1961, catering to the needs of industry and academia alike. The institute has evolved from a training center to a deemed-to-be-university. Today, the institute, with its highly qualified scientific and technical human resources, offers postgraduate programs in 11 specialized disciplines of fisheries science. About 175 postgraduate students enter the institute annually through national entrance examinations. CIFE has the best research infrastructure and laboratory facilities at the headquarters and its five centers, providing enormous opportunities for scientists and students to develop their research ideas into workable solutions to the problems of the fisheries sector. The institute continues providing trained human resources, who continue contributing to the development of the fisheries sector in various capacities as entrepreneurs, scientists, educationists, consultants, and trainers.

The research activities of CIFE are oriented to serve the dual goal of scientific advancement and the sector's welfare. In 2023, the institute operated 31 institutional projects and 16 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 alternate ingredients for 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, evaluation of the impact of SDPs, and predictive modeling for inland fisheries management. Despite the restrictions on laboratory access during the pandemic, the research achievements were significant in 2023. CIFE published 143 papers in peer reviewed scientific journals. Further, 13 books, 38 book chapters, 36 popular articles, 16 training manuals, and 25 extension materials were also published by CIFE.

The research, training, and extension activities under the National Higher Education Program (NAHEP)-funded research project, which has been 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, the development of innovative technologies, and an ICT-based support system for farmers.

During 2023, CIFE and its centers conducted 78 skill development programs (SDPs) in which 1497 trainees from different parts of the country participated. 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. About 1042 beneficiaries were received skill development trainings and technology inputs under the 29 NEH programs.

Under the Schedule Caste Sub-Plan (SCSP), 19 training programs were conducted for 372 farmers/students on freshwater aquaculture, leaf meal-based fish feed, shrimp farming techniques, and aquafeed preparation. Under the Tribal Sub Plan (TSP), 16 training programs were organized, which involved 498 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 2023, the institute conducted statutory meetings such as the Research Advisory Committee (RAC), Institutional Research Committee (IRC), Academic Council, Extension Council, and Board of Management. The institute celebrated Vigilance Awareness Week, Yoga Day, Swachhta Abhiyaan, Hindi Pakhwada, Industry Day, Farmers' Day, and Republic and Independence Day.

The efforts of ICAR-CIFE in making society-relevant scientific advancement and creating fisheries professionals have been possible owing to its dedicated faculty, students, and administration. The unfailing support from the ICAR headquarters and cooperation from other fisheries institutions have only strengthened the institute's resolve to further fisheries development in the country that envisions a second blue revolution in the near future.

Highlights

- 31 institutional projects and 15 externally - funded projects were in operation in 2023
- 143 research papers were published in national and international journals.
- 36 popular articles, 16 training manuals, and 25 extension materials were published
- 78 skill development programs (SDPs) were conducted with 1497 participants
- 90 Masters and 40 Ph.D. students successfully completed their postgraduate programs
- Under NAHEP-CAAST, 33 scientists and 119 students were trained in overseas laboratories.
- 39 Students received awards in various scientific conferences.
- 2 MoUs were signed, one each with Indian and overseas university
- 2 Patents and 2 copyrights were granted for innovations by the CIFE scientists.

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1 Introduction


Green campus
ICAR-CIFE

ICAR-CIFE: Educating Excellence

ICAR-Central Institute of Fisheries Education (ICAR-CIFE), Mumbai, is the first and leading national University imparting quality Fisheries Education under the ambit of Indian Council of Agricultural Research. It has gained a reputation as a prestigious Institution in the field of fisheries education and research over the past 60 years, producing a talented group of specialized professionals, pioneering researchers, and practical technological solutions for the benefit of fishers, fish farmers, industry and entrepreneurs. CIFE boasts state-of-art facilities in a peaceful setting and has established five regional Centres across different aqua-climatic regions in Rohtak (Haryana), Kolkata (West Bengal), Powarkheda (Madhya Pradesh), Kakinada (Andhra Pradesh), and Motihari (Bihar). Initially established in 1961 under the Ministry of Agriculture, Government of India with support from FAO/UNDP, its mandate was to strengthen the capacity of state fisheries departments and their personnel. In 1979, it became part of Indian Council of Agricultural Research (ICAR), and in 1989, it transformed into a university dedicated to education, research, and extension. The University has educated more than 2500 prominent scholars and developed the professional skills of over 5000 development professionals from India and the Afro-Asian region with a strong focus on quality education. ICAR-CIFE offers post-graduate programs in 11 specialized disciplines in fisheries and aquaculture sciences with around 100 Masters and 75 doctoral seats every year, as well as demand-driven diploma programs, certificate courses, and customized short-term training programs. ICAR-CIFE has developed an ecosystem of teaching and research excellence, making it a preferred destination for students and scholars. Its broad range of disciplines, advanced facilities, research networks within and beyond the country, and supportive work environment provide unparalleled opportunities for exploration, excellence, and leadership in shaping the future of the fisheries sector.

Mission

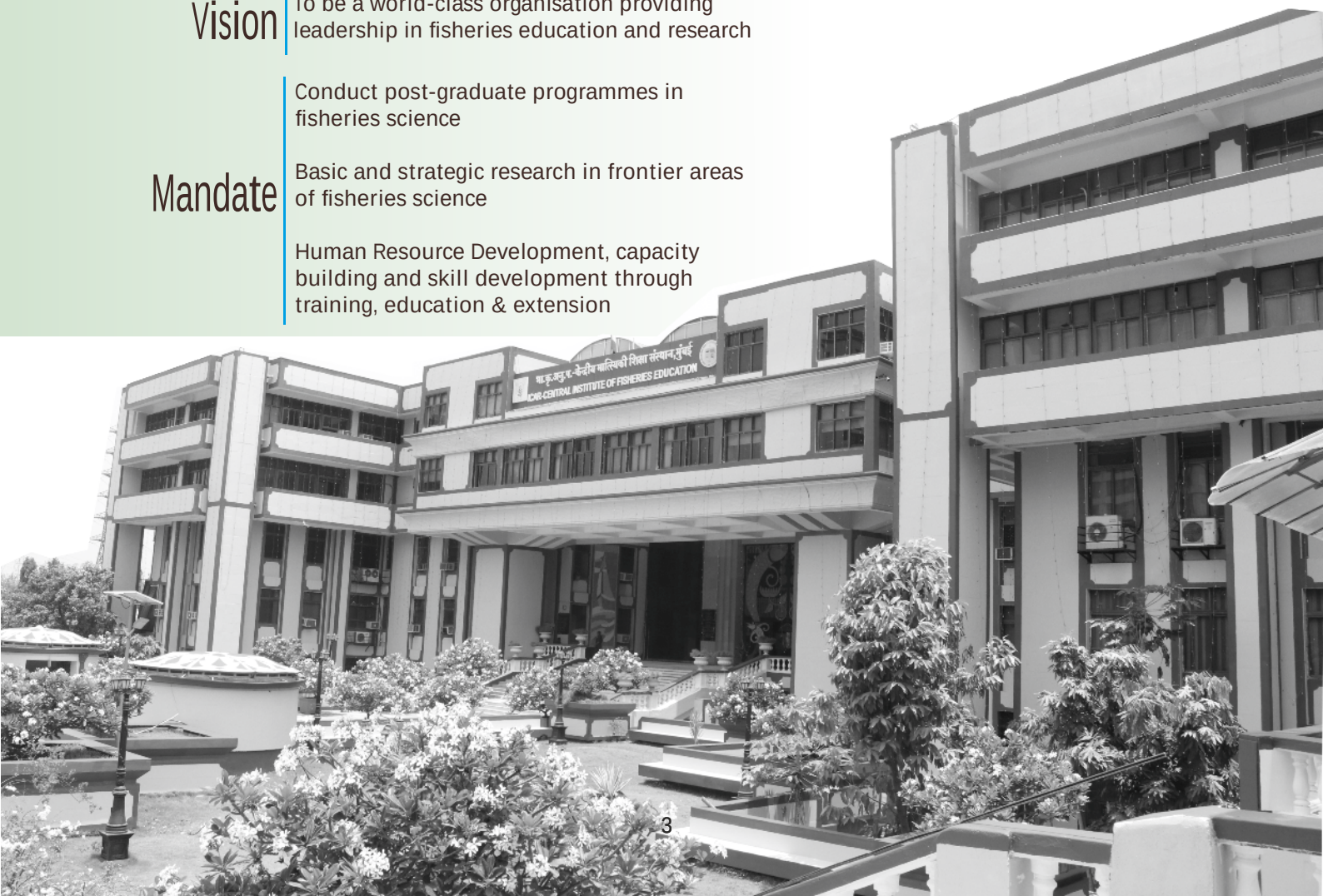
To achieve academic and research excellence

Vision

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

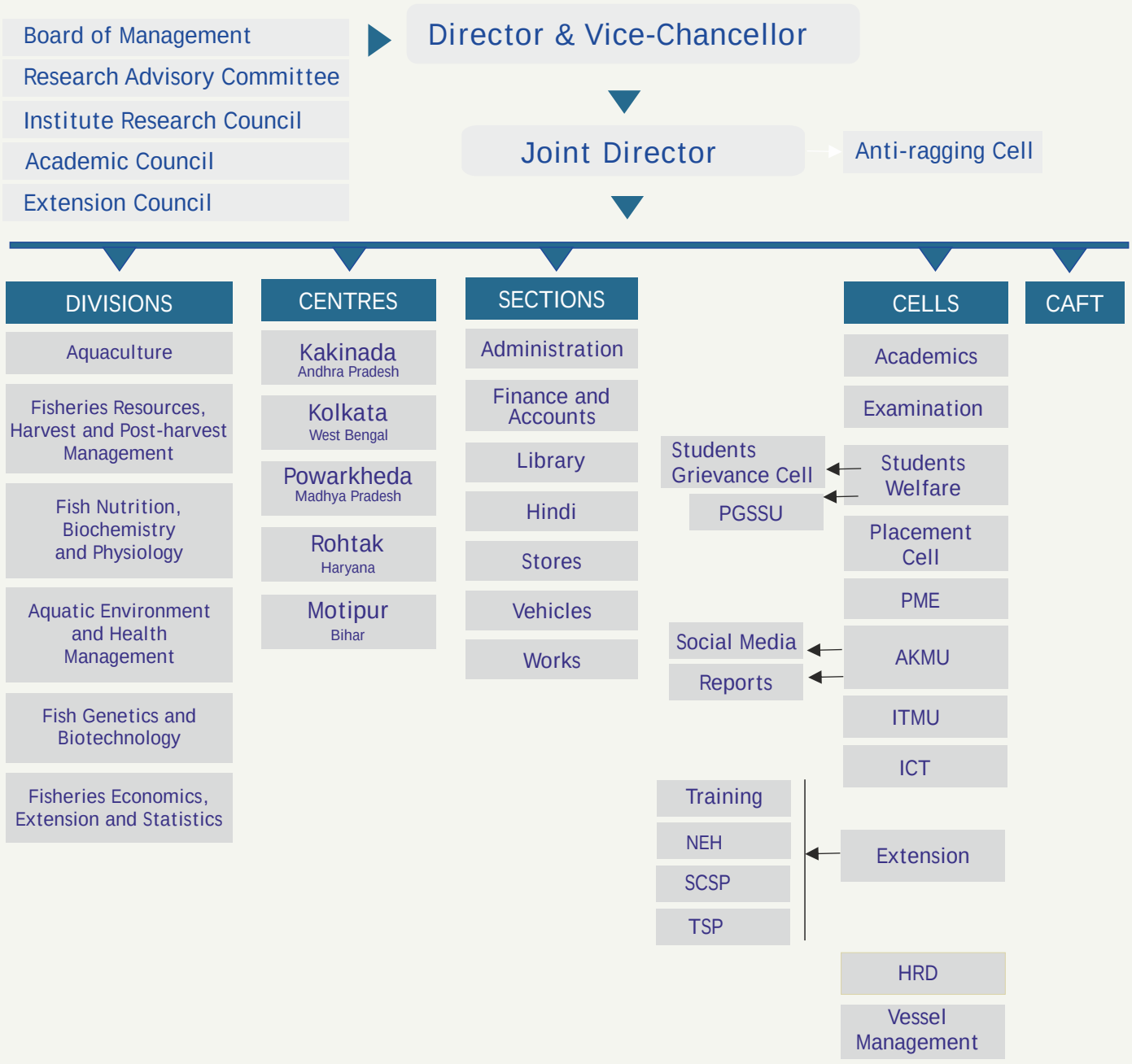
Mandate

- 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



Organogram

ICAR-CIFE, Mumbai



Board of Management

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Dr. N.P. Sahu
Dr. Triveni Dutt
Dr. P.S. Pandey
Dr. Atul Patne
Dr. A. Gopalakrishnan
Dr. Kuldeep Kumar Lal
Dr. R.C. Srivastava
Dr. Gopikrishna
Dr.R.K. Singh
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Dr. B.B. Nayak
Mr. G.P. Sharma
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Dr. Kedar Nath Mohanta
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Mr. B. Kishore Kumar Kundapura
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Member Secretary
Mr. K.L. Meena

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Mr. Atul Patne
Dr. N. P. Sahu
Dr. Kuldeep Kumar Lal
Dr. Geetanjali Deshmukhe
Dr. Sukham Munil Kumar
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Dr. Sanath Kumar
Dr. Murlidhar Ande
Dr. Sunil Kumar Nayak
Dr. Md. Aklakur
Dr. Shivaji Argade

Member Secretary
Dr. Arpita Sharma

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Dr. P. K. Mukhopadhyay
Dr. V. Kripa
Dr. Pravin P.
Dr. Krishna Srinath
Dr. J.K. Jena
Dr. Ravishankar C.N.

Member Secretary
Dr. S.P. Shukla

Academic Council

Chairman
Dr. Ravishankar C.N.

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Dr. N.P. Sahu
Dr. Aparna Chaudhari
Dr. B.B. Nayak
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Dr Swadesh Prakash
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Dr. Sonwane Arvind Asaram
Dr. K. Syamala
Dr. Arun Sharma
Dr. Nazir Ah. Ganai
Dr. A. K. Singh
Dr. G. Sugumar
Dr. K. K. Lal
Dr. P.K. Sahoo
Dr. Triveni Dutt
Dr. S.D. Sawant
President, PGSSU
Student Member, PGSSU
Controller of Examinations

Member Secretary
Mr. K.L. Meena

3.3. Staff Position (2023)

Category Wise

CIFE Sta	Sanctioned	In position	Vacant
RMP	02	02	00
Scientific	107	82	25
Technical	104	37	67
Administrative	80	39	41
Skilled Supporting	46	28	18
Total	339	188	151

3.4. Budget (2023)

Rs. in Lakhs

S. No.	Head	Sanctioned/ Balance C/f	Received	Expenditure Incurred r
1.	Institute Expenditure		10,323.29	10,323.29
2.	CAFT r	-	-	-
3.	SDU r	-	125.50	125.00
4.	Library Strengthening (SDAE)	-	-	-
5.	Scheduled Caste Sub-Plan (SCSP)	-	250	250
6.	NAHEP	85.18	435.40	460.90
7.	Externally Funded Projects	392.68	493.30	439.59
	Total	477.86	11,627.49	11,598.78

Revenue Generation (Rupees in lakhs)

Financial Year	Revenue Target	Revenue Generation
2023-24	140.44	108.62

2 Academic Achievements

Highlights

Number of Students Enrolled
During the Year 2023
(1 January-31 December, 2023)

M.F.Sc. 96

Ph.D. 61

Number of Successful Students
During the Year 2023
(1 January-31 December, 2023)

M.F.Sc. 90

Ph.D. 40

11
Guest Lectures

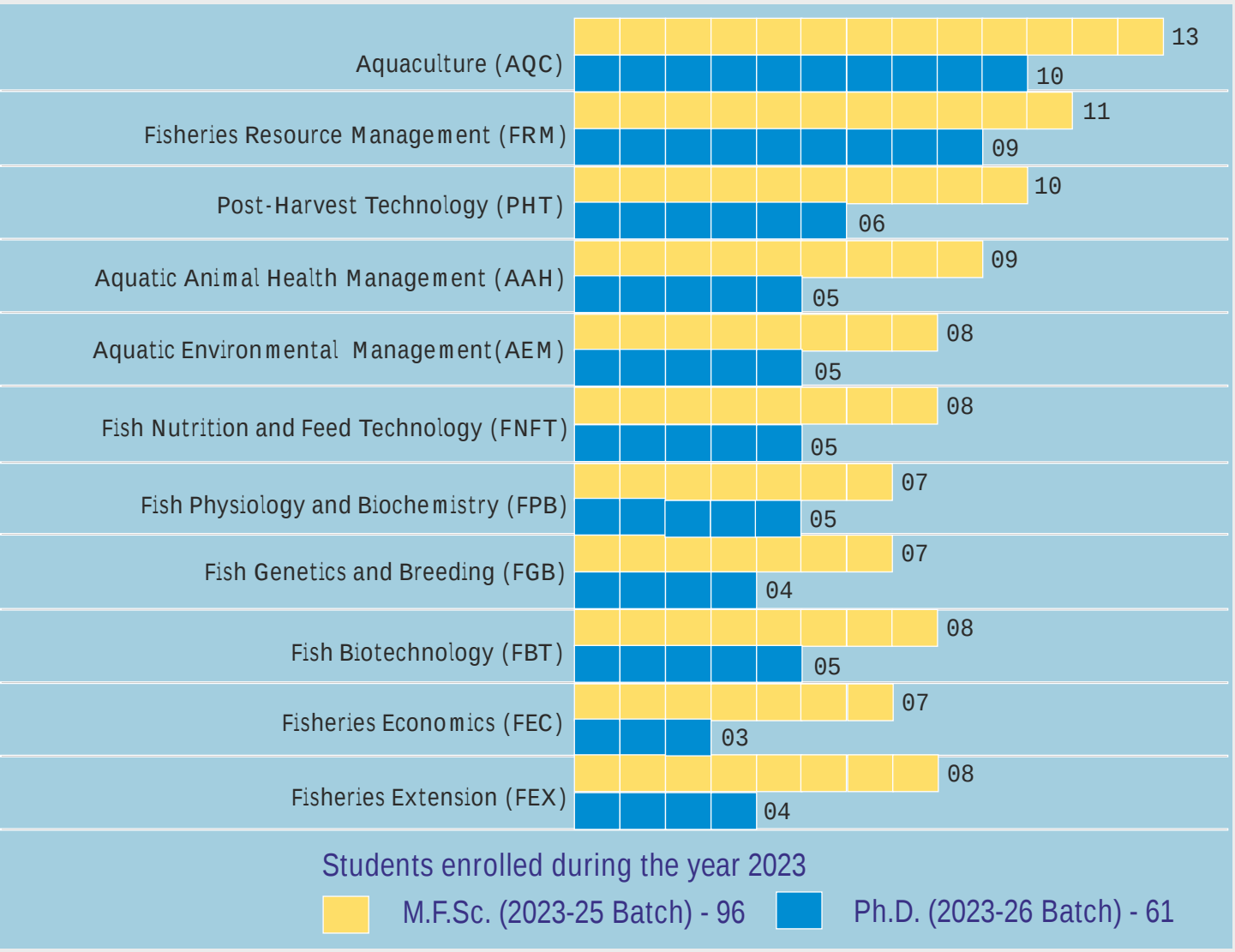
86
Awards Received by Students

135
Overseas Training

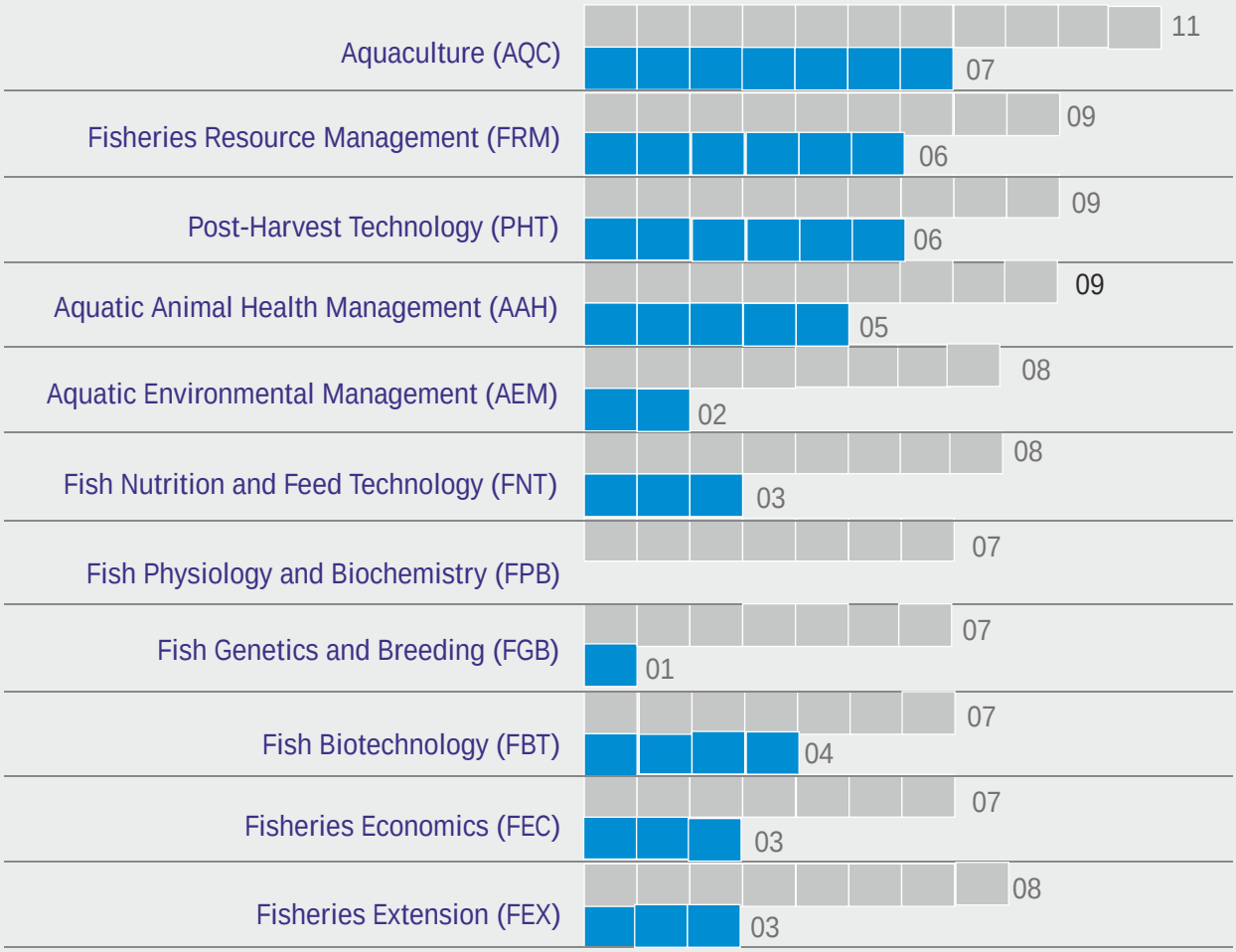
69
Placement

2.1 Enrollments

Enrolments A total of 96 students have enrolled for the programme and 67 have enrolled for the doctoral programme.



2.2 Results



List of dissertations submitted by M.F.Sc. students: 90

No. of students awarded Ph.D. degree : 40

2.3. Students awarded : M.F.Sc (2021-2023 Batch)

Aquaculture

1 Mr. Danve Ashutosh Gajanan
AQC-MB1-01
Assessment of growth performance of freshwater crab, *Barytelphusa cunicularis* (Westwood, 1836) cultured with different shelters
Major Advisor: Dr. Kapil Sukhdhane

2 Ms. Ayushi Bhardwaj
AQC-MB1-02
Development of poultry extract based media for *Moina* sp. (Baird, 1850) production
Major Advisor: Dr. Sukham Munilkumar

3 Ms. Guntapalli Sravani
AQC-MB1-03
Optimization of captive maturation of the indigenous ornamental zebra loach, *Botia striata* (Rao,1920) using selected feeding regimes
Major Advisor: Dr. Paramita B. Sawant

4 Ms. Harini G
AQC-MB1-04
Production performance of *Penaeus vannamei* (Boone, 1931) with seaweed in a co-culture system
Major Advisor: Dr. Madhuri S. Pathak

5 Mr. Jakir Hussain
AQC-MB1-05
Design and development of airlift aeration system for culture of GIFT tilapia in biofloc based aquaculture
Major Advisor: Dr. Chandrakant M.H.

6 Mr. Kamil Akamad D
AQC-MB1-06
Biologically active exogenous FSH administration with shower simulation for previtellogenic oocyte progression in *Clarias magur* (Hamilton, 1822)
Major Advisor: Dr. Thongam Ibemcha Chanu

7 Ms. Na-I-Sabet Dohtdong
AQC-MB1-07
Evaluation of formulated media for the production of *Brachionus calyciflorus*
Major Advisor: Dr. Sukham Munilkumar

8 Mr. Pavithran K
AQC-MB1-08
Bioaugmentation of aquaculture waste in zero-water exchange intensive culture system of *Channa striata* (Bloch, 1793)
Major Advisor: Dr. Upasna Sahoo

9 Ms. Priyanka Arya
AQC-MB1-09
Effect of usage of mineral and bioflocculating agents in biofloc system for rearing of *Penaeus vannamei* (Boone, 1931) in inland saline water
Major Advisor: Dr. Babitha Rani A.M.

10 Mr. Siva N
AQC-MB1-10
Captive maturation patterns in highfin barb, *Oreichthys crenuchoides* (Schafer, 2009) in response to curry leaf, Murraya koenigii extract
Major Advisor: Dr. Gouranga Biswas

11 Mr. Uppalanchi Prasanna Laxmi
AQC-MB1-13
Exogenous FSH administration to elucidate environmental-endocrine relation on gonadal maturation in *Clarias magur* (Hamilton, 1822)
Major Advisor: Dr. Kapil Sukhdhane

Fisheries Resources Management

12 Ms. Akanksha
FRM-MB1-01
Study of juvenile capture and reproductive potential of selected fishes from traditional DoI net fishing grounds of Mumbai coast
Major Advisor: Dr. Asha T. Landge

13 Ms. Anisha M. U.
FRM-MB1-02
Taxonomic evaluation of loaches (Cypriniformes : cobitoidei) from selected rivers of India
Major Advisor: Dr. Sukham Monalisha Devi

14 Mr. Vishal M.
FRM-MB1-04
Ichthyofaunal diversity of upper stretches of the Ulhas river, Maharashtra
Major Advisor: Dr. A.K. Jaiswar

15 Mr. Manabjyoti Barman
FRM-MB1-05
Study on the diversity of species under family danionidae (Teleostei: cypriniformes) from selected rivers of Assam
Major Advisor: Dr. Shashi Bhushan

16 Ms. Naga Kalpitha Shree N. N
FRM-MB1-06
Fisheries Resource Management, Occurrence and diversity of gelatinous zooplankton along the northern coast of Maharashtra
Major Advisor: Dr. Asha T. Landge

17 Ms. Poonam Majumder
FRM-MB1-07
Studies on structural arrangement of bacteria in luminescent gland of *Uroteuthis* (Photololigo) *Duvaucelii* (D'orbigni, 1835)
Major Advisor: Dr. B.B. Nayak

18 Mr. Rajarshi Bandyopadhyay
FRM-MB1-08
Trophic guild structure of fish community in Manori creek, Mumbai, Maharashtra
Major Advisor: Dr. Shashi Bhushan

19 Mr. Rajesh Kumar
FRM-MB1-09
Appraisal and economic evaluation of dol net fisheries of Mumbai coast
Major Advisor: Dr. Karankumar Ramteke

20 Ms. Taniya Chandra
FRM-MB1-11
Ichthyofaunal diversity of Tansa river, Maharashtra
Major Advisor: Dr. A.K. Jaiswar

Post Harvest Technology

21 Mr. Abdul Vajid T.
PHT-MB1-01
Effect of different types of icing media on shelflife extension of fish
Major Advisor: Dr. Layana P.

22 Ms. Crosslin Vinoliya R
PHT-MB1-03
Effect of seaweed (*Kappaphycus alvarezii*) puree on the quality of pangasius mince emulsion sausage
Major Advisor: Dr. A.K Balange

23 Mr. Kamlesh Kumar Dhritlahre
PHT-MB1-04
Preparation and characterization of water soluble chitosan nanoparticles from shrimp shell waste
Major Advisor: Dr. Martin Xavier K.A

24 Mr. Kisun Soren
PHT-MB1-05
Utilization of Acetes spp. for assessment of flavor properties
Major Advisor: Dr. Deepitha R.P

25 Ms. Krishna Veni S.
PHT-MB1-06
Development of a molecular method to study the distribution of emerging antibiotic resistance plastid in *Salmonella* and non-*Salmonella* enterobacterales
Major Advisor: Dr. Sanath Kumar H.

26 Ms. Prerana
PHT-MB1-07
Characterization of plasmid-mediated multidrug resistance in *Escherichia coli* from seafood
Major Advisor: Dr. Sanath Kumar H.

27 Ms. Sanju Nehra
PHT-MB1-09
Development and evaluation of a molecular quantification method for *Cronobacter* spp. in seafood
Major Advisor: Dr. Manjusha L

28 Ms. D. Varsha
PHT-MB1-10
Functional properties of protein extracted from mantis shrimp and development of restructured product
Major Advisor: Dr. A.K Balange

Fish Genetics and Breeding

29 Ms. Kavimathy K. R.
FGB-MB1-01
Phenotyping ornamentation traits and stock delineation of *Botia dario*
Major Advisor: Dr. Shrinivas Jahageerdar

30 Ms. Kotadiya Dhruti Prafulkumar
FGB-MB1-02
Optimising the response to selection in the closed breeding nucleus of *Clarias magur* (Hamilton, 1822)
Major Advisor: Dr. Shrinivas Jahageerdar

31 Ms. Kriti Kumari
FGB-MB1-03
Pharmacokinetics and biodistribution of differently functionalised CNT in *Danio rerio* (Hamilton, 1822)
Major Advisor: Dr. Rupam Sharma

32 Mr. Tamizh Maran M
FGB-MB1-04
Comparative evaluation of growth and survival traits of zebrafish, *Danio rerio* (Hamilton, 1822) at different levels of in breeding
Major Advisor: Dr. Mujahidkhan A. Pathan

33 Ms. Manisha Verma
FGB-MB1-05
Expression profiling of kisspeptin and its receptors in various maturity stages in *Labeo catla* (Hamilton, 1822)
Major Advisor: Dr. Rupam Sharma

34 Ms. Varsha V. V.
FGB-MB1-06
Growth performance and morphometric analysis of different hatchery stocks of *Labeo rohita* (Hamilton, 1822)
Dr. Sunil Kumar Nayak

35 Ms.Yuvasree K.
FGB-MB1-07
Comparative evaluation of toxicity of selected blue dyes in zebrafish, *Danio rerio* (Hamilton,1822)
Major Advisor: Dr. Naresh S. Nagpure

Fish Biotechnology

36 Ms. Ajmeera Usharani
FBT-MB1-01
Molecular characterization of genes associated with vitellogenesis and choriogenesis in the liver tissue of *Channa striata* (Bloch, 1793)
Major Advisor: Dr. Manoj P. Brahmane

37 Ms. Dalini D.
FBT-MB1-02
Identification and characterization of type I growth associated microsatellites in *Clarias magur* (Hamilton, 1822)
Major Advisor: Dr. Aparna Chaudhari

38 Ms. Davu Sushma
FBT-MB1-03
Full-length Characterization and expression profiling of the steroidogenic pathway genes of *Channa striata* (Bloch, 1793)
Major Advisor: Dr. Aparna Chaudhari

39 Mr. Nidarshan N. C.
FBT-MB1-04
Evaluation of RNA guided recombinase (RGR) platform for targeted transgenesis in zebrafish *Danio rerio* (Hamilton, 1822)
Major Advisor: Dr. Arvind A. Sonwane

40 Mr. Sanjeev Kumar Singh
FBT-MB1-06
Development of reference DNA mini-barcodes associated high resolution melting (HRM) profiles for selected fish species
Major Advisor: Dr. A. Pavan Kumar

41 Ms. Shinde Siba Anand
FBT-MB1-07
Molecular characterization and expression profiling of the genes associated with the hypophyseal axis of *Channa striata* (Bloch, 1793)
Major Advisor: Dr. Kiran D. Rasal

42 Ms. Vijay Lakshmi Sahoo
FBT-MB1-08
Development and growth optimization of muscle cell culture derived from genetically Improved farmed tilapia, *Oreochromis niloticus* (Linnaeus, 1758)
Major Advisor: Dr. Mukunda Goswami

Fish Nutrition and Feed Technology

43 Ms. Amirtha Kayalvizhi A.
FNFT-MB1-01
Nutritional evaluation of jojoba (*Simmondsia chinensis*) protein concentrate in the diet of *Labeo rohita* (Hamilton, 1822) fingerlings
Major Advisor: Dr. Manish Jayant

44 Mr. Bhuvaneshwaran T.
FNFT-MB1-02
Nutritional evaluation of black soldier fly larvae (BSFL) raised in environment controlled system in the diet of *Penaeus vannamei* (Boone,1931)
Major Advisor: Dr. N.P. Sahu

45 Mr. Kaleeswaran V
FNFT-MB1-03
Nutritional evaluation of cabbage and cauliflower waste meal in the diet of *Labeo rohita* (Hamilton, 1822) fingerlings
Major Advisor: Dr. Shamna N.

46 Mr. Khalasi Yash Ashokkumar
FNFT-MB1-04
Evaluation of feed intake and growth of *Pangasianodon hypophthalmus* (Sauvage, 1878) fingerlings fed with propylene glycol at low temperature
Major Advisor: Dr. Ashutosh D. Deo

47 Mr. Prashanth B. R.
FNFT-MB1-05,
Comparative evaluation of selected amino acids and their derivatives as feeding stimulants in Indian major carp, *Catla catla* (Hamilton, 1822)
Major Advisor: Dr. Md. Aklakur

48 Ms. Ranju Kumari
FNFT-MB1-06
Effect of dietary propylene glycol on feed intake and growth of *Labeo rohita* (Hamilton, 1822) fingerlings reared at low temperature
Major Advisor: Dr. Ashutosh D. Deo

49 Ms. Rohini Kalyani
FNFT-MB1-07
Evaluation of dietary xylo-oligosaccharide (XOS) as prebiotic and synbiotic combination on growth and immunity of *Labeo rohita* fingerlings
Major Advisor: Dr. Sikendra Kumar

50 Ms. Shalini Sundi
FNFT-MB1-08
Optimization of Tomato pomace meal in the diet of *Labeo rohita* (Hamilton,1822) through fermentation and exogeneous enzyme supplementation
Major Advisor: Dr. Parimal Sardar

Fish Physiology and Biochemistry

51 Mr. Ankit Kumar
FPB-MB1-01
Evaluation of marine microalgae, *Aurantiochytrium limacinum* as a fish oil replacer in the diet of pacific white leg shrimp, *Penaeus vannamei* (Boone,1931)
Major Advisor: Dr. Subodh Gupta

52 Ms. Arsha B
FPB-MB1-02
Physicochemical characterization and bioactivities of protein hydrolysate from blood clam (*Anadara granosa*)
Major Advisor: Dr. Asha K.K

53 Ms. Bhashwati Roy
FPB-MB1-03
Biochemical and hematological profiling of *Cirrhinus mrigala* (Hamilton,1822) in different culture system
Major Advisor: Dr. Sujata Sahoo

54 Mr. Chundru Sri Sai Venkat
FPB-MB1-04
Evaluation of arginine and DMPT (Dimethyl-propiothetin) in plant protein based diet on growth and physiological performance of *Labeo rohita* (Hamilton 1822)
Major Advisor: Dr. Md. Aklakur

55 Ms. Kajal Kumari
FPB-MB1-05
Study of chronic crowding stress on haematology serum biochemistry and scale cortisol levels of *Labeo rohita* (Hamilton, 1822) fingerlings
Major Advisor: Dr. Sujata Sahoo

56 Ms. Selvarani B.
FPB-MB1-06
Effect of environmental isotonicity and high calcium on gift exposed to hyperthermal stress
Major Advisor: Dr. Tincy Varghese

57 Ms. Sruthy R Nair
FPB-MB1-07
Effect of feeding time and photoperiod on the fat deposition of striped catfish *Pangasianodon hypophthalmus* (Sauvage, 1878)
Major Advisor: Dr. Subodh Gupta

Aquatic Environmental Management

58 Ms. Akshaya Suresh
AEM-MB1-01
Mass cultivation of selected microalgae for the extraction of protein hydrolysate
Major Advisor: Dr. S.P Shukla

59 Ms. Anjana A.
AEM-MB1-02
Extraction of biopolymeric compounds from wastewater grown *Spirulina* (*Arthrospira*) *platensis* for utilization in the development of biobased packaging material
Major Advisor: Dr. S.P Shukla

60 Ms. Dharani I
AEM-MB1-03
Evaluation of performance of an electrically charged column bed filtration system for the removal of contaminants from water
Major Advisor: Dr. S.P Shukla

61 Mr. Kurapati Nagendrasai
AEM-MB1-04
Toxicity assessment and detoxification of hexavalent chromium in freshwater cultured with euryhaline fish
Major Advisor: Dr. Kishore Kumar Krishnani

62 Ms. Puja Rani Basak
AEM-MB1-05
Effects of triclosan on microbial enzyme activity in sediment
Major Advisor: Dr. Kundan Kumar

63 Ms. Rishika M. S.
AEM-MB1-06
Study on performance of biochar bed column device for removal of triclosan from aqueous solution containing humic acid
Major Advisor: Dr. Saurav Kumar

64 Mr. Adakney Swaraj Rajendra
AEM-MB1-07
Remediation of tetracycline using Biochar-biogenic iron nanoparticle composite material
Dr. Vidya Shree Bharti

65 Mr. Vipul Singh Badguzar
AEM-MB1-08
A study on immunotoxic effects of triclosan and microplastic in combination on *Pangasianodon hypophthalmus*
Major Advisor: Dr. Saurav Kumar

Aquatic Animal Health

66 Ms. Elina Jose Vettom
AAHM-MB1-01
Screening of selected antimicrobial resistance (AMR) genes from *Escherichia coli* and *Staphylococcus aureus* obtained from shrimp samples of Maharashtra region
Major Advisor: Dr. K. Pani Prasad

67 Ms. Praveena P.
AAHM-MB1-02
Characterization of *Vibrio* spp. associated with different clinical signs of diseases in inland saline water-reared *Penaeus vannamei*
Major Advisor: Dr. Sreedharan K

68 Ms. Sangita Roy
AAHM-MB1-03
Response of acute phase protein genes under various stressors in *Labeo catla* (Hamilton,1822)
Major Advisor: Dr. Gayatri Tripathi

69 Ms. Semeena M
AAHM-MB1-04
Evaluation of the efficacy of a chitin derivative as ligand for innate immune training in nile tilapia, *Oreochromis niloticus* (linnaeus,1758)
Major Advisor: Dr. Jeena K.

70 Mr. Tamal Seth
AAHM-MB1-05
Evaluation of biosafety and selected gene regulation (HSP 70) of common carp (*Cyprinus carpio*) exposed to deltamethrin
Major Advisor: Dr. K. Pani Prasad

71 Ms. Tanushree Bhowmik
AAHM-MB1-06
Synergistic effect of unionized ammonia and *Aeromonas caviae* in *Clarias magur* (Hamilton, 1822)
Major Advisor: Dr. Arun Sharma

72 Ms. Testimona A.
AAHM-MB1-07
Expression profiling of HMGB1 gene in striped catfish *Pangasianodon hypophthalmus* fed with probiotic diet and during bacterial challenge
Major Advisor: Dr. Gayatri Tripathi

73 Mr. Thangadurai K.
AAHM-MB1-08
Development of RT-RPA -CRISPR-Cas12a assay for rapid detection of Tilapia lake virus
Major Advisor: Dr. Megha Kadam Bedekar

74 Ms. Thanuja S.
AAHM-MB1-09
Molecular cloning and characterization of integrin gene of mud crab, *Scylla serrata*
Major Advisor: Dr. K.V. Rajendran

Fisheries Economics

75 Ms. Dave Chandani Prakashbhai
FEC-MB1-01
Impact of climate and land use/land cover change on the ecosystem services and human well-being: A case study of Dimbhe reservoir ecosystem
Dr. Vinod Kumar Yadav

76 Ms. Gobika K.
FEC-MB1-02
Livelihood and economic analysis of Bhavanisagar reservoir
Major Advisor: Dr. Swadesh Prakash

77 Mr. Gulla Gnaneshwar
FEC-MB1-03
Disease economics and social networking analysis of freshwater aquaculture in Andhra Pradesh
Major Advisor: Dr. Neha W. Qureshi

78 Ms. Jayapratha T.
FEC-MB1-04
Assessing role of fisheries stakeholders in coastal village economy of Tirunelveli district in Tamil Nadu
Major Advisor: Dr. Ankush L. Kamble

79 Mr. Kota Saikrishna
FEC-MB1-05
Value chain analysis of white leg shrimp seed production in Andhra Pradesh
Major Advisor: Dr. Swadesh Prakash

80 Mr. Liton Paul
FEC-MB1-06
Disease loss and abnormality analysis in shrimp: IoT and machine learning approach
Major Advisor: Dr. Vinod Kumar Yadav

81 Mr. Thavasi G.
FEC-MB1-07
Value chain analysis of bycatch in Tamil Nadu
Major Advisor: Dr. Neha W Qureshi

Fisheries Extension

82 Ms. Aiswarya Sali
FEX-MB1-01
Fisheries development in Kerala: contours of growth and discontent
Major Advisor: Dr. Ananthan P.S.

83 Ms. Thavai Akshata Alankar
FEX-MB1-02
Evaluating governance in inland primary fisheries cooperative societies of Maharashtra
Major Advisor: Dr. Shivaji Argade

84 Mr. Anurag Singh
FEX-MB1-03
Development of sustainable circular bio-economy do it yourself technology from fish waste
Major Advisor: Dr. Arpita Sharma

85 Mr. Dinesh R
FEX-MB1-04
Evaluating governance in inland primary fisheries cooperative societies of Tamil Nadu
Major Advisor: Dr. Shivaji Argade

86 Ms. Gitashree Thengal
FEX-MB1-05
Assessment of waste management in fish markets of Mumbai
Major Advisor: Dr. Arpita Sharma

87 Mr. Patel Mehulkumar Natavarbhai
FEX-MB1-06
Socio-economic profile of dry fish retailers and quality study of dry fish: case of Gujarat and Maharashtra
Major Advisor: Dr. Arpita Sharma

88 Mr. Rujan J.
FEX-MB1-07
Evaluating governance in marine primary fisheries cooperative societies of Tamil Nadu
Major Advisor: Dr. Shivaji Argade

89 Ms. Shwetha Tony A.
FEX-MB1-08
Fisheries development in Tamil Nadu: contours of growth and discontent
Major Advisor: Dr. Ananthan P. S.

Post-Harvest Technology (Batch 2019-21)

90 Mr. Ramesh Chandra Parmar
PHT-MA9-09
Evaluation of the suitability of different plating media for assessment of bacterial spoilage of iced fish.
Major Advisor: Dr. Sanath Kumar H

2.4. List of students awarded Ph.D. in 2023

1 Mr. Suman Dey
FEX-PA6-01 (2016-2019)
Assessment of Aquaculture Entrepreneurship Development in West Bengal - A Gender Based Approach
Major Advisor: Dr. S.N. Ojha
Viva Voce : 03-01-2023

2 Mr. Chetan Kumar Garg
FNFT-PA8-02 (2018-2021)
Optimisation of Dietary Crude Protein Based on Ideal Protein Concept for GIFT Tilapia Juveniles Reared in Inland Saline Water
Major Advisor: Dr. Parimal Sardar
Viva Voce : 04-01-2023

3 Mr. Satish Chennuri
FRM-PA7-08 (2017-2020)
A study on mangrove status and associated crustacean diversity of Dharamtar Estuarine confluence, Maharashtra
Major Advisor: Dr. Geetanjali Deshmukhe
Viva Voce : 05-01-2023

4 Mr. Rajpal Yadav
FEX-PA8-02 (2018-2021)
Fisheries Development Programmes of Pluralistic Extension Service Providers : Livelihood Impact Assessment in Rajasthan
Major Advisor: Dr. Arpita Sharma
Viva Voce : 10-01-2023

5 Ms. Sreepriya Prakasan
PHT-PA5-01 (2015-2018)
Prevalence, Pathogenic Potential and Genetic Diversity of *Escherichia coli* in Seafood
Major Advisor: Dr. Sanath Kumar H.
Viva Voce : 12-01-2023

6 Ms. Ajina S.M.
FRM-PA6-03 (2016-2019)
Diversity and distribution of fishes of family Lutjanidae in Andaman waters and biology of *Lutjanus decussatus* (Cuvier,1828)
Major Advisor: Dr. S. Dam Roy
Viva Voce : 13-01-2023

7 Mr. Yadav Somnath Ramachandra
AQC-PA8-10 (2018-2021)
Growth and physio-metabolic responses of *Etroplus suratensis* (Bloch, 1790) in biofilm-based rearing system
Major Advisor: Dr. B.R.Chavan
Viva Voce : 18-01-2023

8 Ms. Gunjan Karnatak
AQC-PA7-13 (2017-2020)
Growth and physiological responses of cage reared butter catfish *Ompok bimaculatus* (Bloch, 1974) to stocking densities
Major Advisor: Dr. B.K. Das
Viva Voce : 19-01-2023

9 Mr. Vinay A.
FEC-PA6-01 (2016-2019)
An Assessment of value chain system in marine fisheries of Karnataka
Major Advisor: Dr. Swadesh Prakash
Viva Voce : 20-01-2023

10 Ms. Deepitha R.P.
PHT-PA6-02 (2016-2019)
Quality improvement of *Pangasius* Fillets by different processing interventions
Major Advisor: Dr. A.K. Balange
Viva Voce : 23-01-2023

11 Mr. Mohammed Akram Javith S.
PHT-PA8-03 (2018-2021)
Development of low sodium surimi gel from tilapia with the addition of basic amino acids
Major Advisor: Dr. A.K. Balange
Viva Voce : 24-01-2023

12 Ms. Surya S.
FRM-PA6-09 (2016-2019)
Studies on fishery, biology and exploitation status of selected billfish landed along the Kanyakumari coast of India
Major Advisor: Dr. Prathibha Rohit
Viva Voce : 27-01-2023

13 Mr. Kantharajan G.
AEM-PA6-01 (2016-2019)
Geo-spatial habitat characterization and profiling of ichthyofaunal diversity for conservation prioritization along the Pranhita River, Godavari Basin
Major Advisor: Dr. Kuldeep K. Lal
Viva Voce : 30-01-2023

14 Mr. Santhana Kumar V.
AAH-PA6-02 (2016-2019)
Arsenic Induced Alterations of Fish Health and its Amelioration using Periphyton
Major Advisor: Dr. B.K.Das
Viva Voce : 31-01-2023

15 Mr. Manas Kumar Maiti
FNFT-PA8-01 (2018-2021)
Optimisation of dietary crude protein based on ideal protein concept for *Penaeus vannamei* (Boone, 1931) juveniles reared in inland saline water
Major Advisor: Dr. N.P. Sahu
Viva Voce : 03-02-2023

16 Mr. Vinay Maruti Hatte
FEC-PA5-02 (2015-2018)
Efficiency and performance of marine fish markets in coastal Maharashtra : A study chain approach
Major Advisor: Dr. Swadesh Prakash
Viva Voce : 08-02-2023

17 Ms. Sanchita Naskar
AQC-PA8-08 (2018-2021)
Physiological and immune responses of different cultured species in a brackishwater integrated multi-trophic aquaculture (BIMTA) system
Major Advisor: Dr. Gouranga Biswas
Viva Voce : 09-02-2023

18 Mr. Daniel N.
FBT-PA4-03 (2014-2017)
Molecular Characterization of Reef Associated Fishes from India
Major Advisor: Dr. A. Pavan Kumar
Viva Voce : 23-02-2023

19 Mr. Dhande Kranti Kumar
FEC-PA6-03 (2016-2019)
Economic Assessment of Freshwater Fish Culture Systems vis-a-vis Paddy Cultivation in Andhra Pradesh
Major Advisor: Dr. Rama Sharma
Viva Voce : 06-03-2023

20 Mr. Vikas Pathak
FRM-PA7-03 (2017-2020)
Assessment of Ichthyofaunal diversity of Dharamtar estuarine ecosystem
Major Advisor: Dr. A.K. Jaiswar
Viva Voce : 12-04-2023

21 Mr. Makamguang Kamei
AQC-PA6-09 (2016-2019)
Study on biology and domestication of *Lepidocephalichthys berdmorei* (Blyth,1860)
Major Advisor: Dr. Sukham Munilkumar
Viva Voce : 02-05-2023

22 Mr. Raju Ram
FBT-PA6-03 (2016-2019)
Mining and validation of single nucleotide polymorphic (SNP) loci from *Clarias magur* (Hamilton,1822) transcriptome and association with selected traits
Major Advisor: Dr. A. Pavan Kumar
Viva Voce : 03-05-2023

23 Ms. Dona P.
FEX-PA5-02 (2015-2018)
Exploring social entrepreneurship attitude of change agencies in fisheries, Kerala
Major Advisor: Dr. S.N. Ojha
Viva Voce : 30-05-2023

24 Mr. Utsa Roy
FBT-PA7-01 (2017-2020)
Development of engineered gene promoters for optimized expression in crustaceans
Major Advisor: Dr. Aparna Chaudhari
Viva Voce : 05-06-2023

25 Mr. Ravi Kumar Patel
AQC-PA9-10 (2019-2022)
Conjunctive use of Saline Groundwater and Surface Water for culture of *Labeo rohita* (Hamilton, 1822) at Different Salinities
Major Advisor: Dr. A.K. Verma
Viva Voce : 12-07-2023

26 Mr. Nitish Kumar Chandan
FNFT-PA7-02 (2017-2020)
Effect of dietary lipid on reproductive performance of *Anabas testudineus* (Bloch, 1792)
Major Advisor: Dr. K.N. Mohanta
Viva Voce : 25-07-2023

27 Ms. V.L.Ramya
FGB-PA8-04 (2018-2021)
Population genomics studies on cauvery carp *Barbodes Carnaticus* (Jerdon, 1849)
Major Advisor: Dr. B.K. Behera
Viva Voce : 04-08-2023

28 Mr. Subal Kumar Ghosh
PHT-PA7-05 (2017-2022)
Combined Utilization of fish and Vegetable waste using microbes
Major Advisor: Dr. B.B. Nayak
Viva Voce : 09-08-2023

29 Ms. Anisha V.
AAHM-PA9-01 (2019-2022)
Development of immunodiagnostic assay for Tilapia lake virus (TiLV) and its validation using reverse transcription PCR
Major Advisor: Dr. Megha Kadam Bedekar
Viva Voce : 18-08-2023

30 Ms. Kasturi Chattopadhyay
PHT-PA8-01 (2018-2021)
Interaction studies of chitosan on macromolecules in fish mince emulsion sausage
Major Advisor: Dr. Martin Xavier K.A.
Viva Voce : 23-08-2023

31 Mr. Sudhan C.
FRM-PA8-07 (2018-2021)
Assessment of Health and Valuation of ecosystem services derived from gorai creek, Mumbai, india
Major Advisor: Dr. A.K. Jaiswar
Viva Voce : 25-08-2023

32 Mr. Sathish Kumar K.
PHT-PA8-07 (2018-2021)
Fish Protein Hydrolysate Based Bioactive Edible Coating for Preservation of Fishery Products
Major Advisor: Dr. A.K. Balange
Viva Voce : 25-09-2023

33 Mr. Zahoor Mushtaq
AAHM-PA7-06 (2019-2022)
Moleculer characterization, ontogeny and expression studies of selected innate immune relevant genes in *Cirrhinus mrigala* (Hamilton, 1822)
Major Advisor: Dr. K. Pani Prasad
Viva Voce : 25-09-2023

34 Mr. Manmohan Kumar
AQC-PA7-05 (2017-2020)
Optimisation of Stocking Density and Salinity for *Penaeus vannamei* (Boone, 1931) Culture in Inland Saline Water
Major Advisor: Dr. Gopal Krishna
Viva Voce : 27-09-2023

35 Mr.Pratapa M.G.
AAH-PA9-02 (2019-2022)
Studies on White Spot Syndrome Virus (WSSV) using mud crabs, *Scylla olivacea* and *S. serrate* as experimental hosts
Major Advisor: Dr. K.V. Rajendran
Viva Voce : 27-09-2023

36 Mr. B. Madhusudhana Rao
AAH-PA7-01 (2017-2020)
Studies on Tilapia Lake Virus (TiLV) : Host-Pathogen Interaction and Synergistic Effect of Co-Infection
Major Advisor: Dr. K.V. Rajendran
Viva Voce : 29-09-2023

37 Mr. Pabitra Barik
AEM-PA6-03 (2016-2019)
Enhancement of Bioremediation of Ammonia in Aquaculture Systems using Nanoparticles
Major Advisor: Dr. Neelam Saharan
Viva Voce : 30-10-2023

38 Ms. Hougaina Panmei
AQC-PA7-08 (2017-2020)
Evaluating Survival, Growth and Osmoregulatory Responses of *Penaeus vannamei* (Boone, 1931) in Inland Saline water and Ammonia Challenge
Major Advisor: Dr. Dasgupta
Viva Voce : 29-11-2023

39 Mr. Anwesha Behera
FRM-PA9-01 (2019-2022)
Assessment of Fish Diversity along the selected sites off Maharashtra, Eastern Arabian Sea
Major Advisor: Dr. A.K.Jaiswar
Viva Voce : 20-12-2023

40 Mr. Yashwanth B.S.
FBT-PA9-03 (2019-2022)
Development and Functional Characterization of Muscle Cell Culture from *Labeo rohita* (Hamilton, 1822)
Major Advisor: Dr. Mukunda Goswami
Viva Voce : 22-12-2023

2.5 Lectures delivered by faculty in other universities/institutes

Name of the faculty	Title of lecture delivered	Name of university / place	Date
Dr. Shivaji Argade	Making Extension & Advisory Services Nutrition-Sensitive: Linkages & Capacity Building	ICAR-Central Institute for Women in Agriculture, Bhubaneswar (Online)	10th Jan 2023
Dr. Mujahidkhan A. Pathan	Inbred Lines And Fish Population Genetics	Tata Institute of Fundamental Research, Mumbai	18th Jan 2023
Dr. Shivaji Argade	Women Leadership Development in Agriculture	ICAR-Central Institute for Women in Agriculture, Bhubaneswar (Online)	24th Jan 2023
Dr. G. H. Pailan	Alternative Livelihood Development Of Fisher Folks In Wetland Areas Of South 24 Parganas	Sasya Shyamala KVK, Arapanch, Sonarpur, South 24 Parganas, WB	2nd Feb 2023
Dr. Saurav Kumar	Risk Associated With Biotic & Abiotic Stressors To Fish And Potential Remedial Approach	Faculty of Fisheries and Protection of Waters, University of South Bohemia, Vodnany, Czech Republic	10th Feb 2023
Dr. Muralidhar P. Ande	Azolla as Fish Feed	DST-SEED project training programmePragathi Engineering College, Kakinada	16th Feb 2023
Pankaj Kumar Dr. Sreedharan K	Formulation of SOPs For Inland Saline Shrimp Farming	Demonstration farm cum training centre, Village Enekhera, Sri Muktsar Sahib, Punjab	17th Feb 2023
Dr. G. H. Pailan	Feed and Feeding Management Improved Fish Rearing Practices	WBUAFS, Kolkata, WB	20th Feb 2023
Dr. G. Biswas	1. Better Management Practices (BMP) in Shrimp Farming (*Vannamei* and *Monodon*) 2. Farming of Bhetki	Directorate of Fisheries, Govt. of West Bengal (Online)	23rd Feb 2023
Dr. Satya Prakash	Digestibility Studies In Fish- Understanding The Basic And Applied Aspects	Tamil Nadu Dr. J. Jayalalithaa Fisheries University	13th Mar 2023
Dr. G. H. Pailan	Low-cost Fish Feed Preparation for Ornamental Fish Culture	Sasya Shyamala KVK, Arapanch, Sonarpur, South 24 Parganas, WB	16th Mar 2023

Dr. Suman Manna	Pesticides and their role on Agro-Ecosystem	Sasya Shyamala Krishi Vigyan Kendra, RMKVERI, Sonarpur, South 24 Parganas	21st Mar 2023
Dr. G. Biswas	Indigenous Cultivable Fish Species	Sasya Shyamala KVK, Sonarpur, West Bengal	23rd Mar 2023
Dr. Annam Pavan Kumar	DNA Fingerprinting	Kendriya Vidyalaya Sangathan, Mumbai	11th May 2023
Dr. Babitha Rani A. M	Inland Saline Shrimp Farming: a Technology Transforming Aquaculture Prospects in Northern India	Working Group on Fisheries Haryana Kisan Kalyan Pradhikaran	29th May 2023
Dr. Suman Manna	Use of Different Pesticides and its Effect on Aquatic Ecosystem	Sasya Shyamala Krishi Vigyan Kendra, RMKVERI, Sonarpur, South 24 Parganas	2nd - 3rd Jun 2023
Dr. Rupam Sharma	Nanotechnology: A Novel Tool for Aquaculture and Fisheries	ICAR-NBFGR, Lucknow	14th Jun 2023
Dr. Annam Pavan Kumar	Molecular Taxonomy	Kannur University, Kerala	22nd Jun 2023
Mr. Abuthagir Iburahim S.	Topics in Fisheries Resources Management and Cracking JRF Examinations	College of Fisheries Guru Angad Dev Veterinary and Animal Sciences University GADVASU , Ludhiana PUNJAB	7th – 11th Jul 2023
Dr. Manish Jayant	Strategies to Enhance the Utilization of Cotton Seed Meal in Aquafeed	4th SEA -AICOSCA Cottonseed, Oil and Meal Conclave – 2023 Aurangabad, Maharashtra	7th – 8th Jul 2023
Dr. Babitha Rani A. M	Aquaculture: A Way Forward	International Institute of Veterinary Education and Research, Rohtak	12th Jul 2023
Mr. Dhalongsaih Reang	Hybridoma Technology	Fisheries college and Research Institute, TNJFU, Thoothukudi, Tamil Nadu	13th Jul 23
Dr. Aparna Chaudhari	The Biotechnology Toolkit for Aquaculture and Fisheries	CoF, Kisanganj	20th Jul 2023
Dr. B.B. Nayak	Sustainable Utilisation of Fish Through Value Addition	National conference on transforming rural poverty to prosperity through sustainable fisheries at Kishanganj	20th Jul 2023

Dr. Muralidhar P. Ande	Towards Sustainable Aquaculture	One Day National Conference On “Green Initiatives For Sustainable Aquaculture, P.R. Govt. College, Kakinada	4th Aug 2023
Dr. B.B. Nayak	The exciting World of Aquatic sciences	IASR conference, ICAR-CIFRI	30th Aug 2023
Mr. Abuthagir Iburahim.S	Coral Reefs and their Uniqueness	SEAmposium & Ocean Film Festival, Veeramata Jijibai Bhosale Udayan and zoo, Byculla Mumbai	2nd Sep 2023
Dr. Babitha Rani A. M	Biofloc Aquaculture: The Smart and Green Technology towards Sustainability	Workshop cum training program on Aquaponic system and biofloc technology for income generation and innovations, SKUSAT, Kashmir	4th -11th Sep 2023
Dr. Ashutosh D. Deo	Fisheries Education and Human Resource Management. In National Workshop on “Innovative Approaches for a Sustainable Indian Fisheries and Aquaculture (IASIFA-2023)"	Fisheries Technocrats Forum, Chennai-35 and Department of Marine Science, Bharathidasan University, Tiruchirappalli	12th -13th Sep 2023
Dr. Jeena K.	Immune System of Fish (Online)	Mumbai University	18th Sep 2023
Dr. Neha Wajahat Qureshi	Quantifying Impact of Pollution on Fisheries	Faculty of Fisheries, Sher-e-Kashmir University of Agricultural Sciences and Technology, Kashmir	21st Sep 2023
Dr. B.B. Nayak	Principles and Advances in Preservation Methods	SKAUST Kashmir	22nd Sep 2023
Dr T. K. Ghoshal	Adoption of Brackishwater Aquaculture Technologies by the Marginal Farmers as Livelihood Activity along The Coastal West Bengal	Kakdwip Research Centre, ICAR-Central Institute of Brackishwater Aquaculture, Kakdwip, South 24 Parganas	7th Oct 2023
Dr. Rupam Sharma	Toxicity Studies using Zebrafish as Vertebrate Model	West Goalpara College, Assam	11th Oct 2023
Dr Deepitha R.P	Role of Fish in Human Nutrition in Connection with The World Food Day	College of Fisheries Payyanur	16th Oct 2023
Dr. Arun Sharma	Fish Diseases and Management Practices	KVK, Gomati, Tripura	8th Nov 2023

Mr. Dayal Devadas	Online lecture, Length Based Indicators for the Assessment of Data-Poor Fisheries	FCRI, Tuticorin	21st Nov 2023
Dr. G. Biswas	Indiscriminate Introduction of Invasive Alien Species: Threats to The Native Fish Species	Nature Environment and Wildlife Society, Kolkata (Online)	22nd Nov 2023
Dr. Aparna Chaudhari	1. Whole Genome Projects - Unravelling the Secrets of Life 2. Genetic and Genomic Resources and Databases. 3. Genetic Diversity Assessment and Applications 4. Bioinformatics Tools for Assessing Genetic Diversity 5. DNA Sequencing Methods, Automation and Analysis 6. Use of AI in Applications of Genetic Resources	GADVASU, Ludhiana	5th-7th Dec 2023
Dr. Suman Manna	Pesticides and their Effect Effects on Environment and Aquatic Ecosystem	Krishi Vigyan Kendra, Sonamukhi, Bankura	7th – 8th Dec 2023
Dr. Annam Pavan Kumar	Barcoding and Genetic Conservation	CoF, C.A.U., Lembucherra, Tripra	12th Dec 2023
Dr. G. H. Pailan	Feed and Feeding Management of Freshwater Aquarium Fish for Colour Enhancement	The University of Burdwan, Burdwan, WB	14th Dec 2023
Dr. T. K. Ghoshal	Feed & Feeding Management of Brackishwater Finfishes and Shellfishes	The University of Burdwan, Burdwan, WB	14th Dec 2023
Dr. Shamna N.	Feed Preparation at Farm	Assam	18th Dec 2023
Dr. Layana P.	Trends in Fish Processing and Preservation Technologies	Mumbai Veterinary College, Parel, Mumbai	27th Dec 2023
Dr. Jeena K.	Immunostimulants and Prophylaxis (Online)	Mumbai University	29th Dec 2023
Dr. S. Jahageerdar	Analysis of Research data employing SAS	Dr. B. S. Konkan Krishi Vidyapeeth Dapoli	29th Dec 2023

2.6. Guest faculty invited from other institutions

Name of the faculty	Designation and place	Title of lecture	Date
Prof. Amiya Kumar Tripathi	Professor, Computer Engineering Don Bosco Institute of Technology, Mumbai	AI and Big Data Analytics Course	July, 2023
Prof. Lalith Achoth	Retd. Prof and Head	Advanced Econometrics Course	Aug 2023
Dr. J. Syama Dayal	CIBA, Chennai	Crustacean Nutrition (6 lectures)	August and September, 2023
Dr. Krishna Srinath	Former Director, ICAR- CIWA, Odisha	Discussion With FEES Division Students and Faculty	4th Sep 2023
Dr. Arun K. Dhar	Director Tuscan university, Arizona, USA and Fulbright Fellow	Microsporidium And White Feces Disease: a Threat To Sustainable shrimp farming	5th Sep 2023
Dr. Arun K. Dhar	Director Tuscan university, Arizona, USA and Fulbright Fellow	4 Guest Lectures On (1) Biosecurity in the Context of Small Shrimp Farming Operations (2) Critical Analysis of Research Papers (3) Reverse Genetics Approaches to Study Viral Pathogenesis (4) Developing Viral Vector for Oral Delivery of Therapeutic Molecules in Shrimp	6th -7th Sep 2023
Mr. Hemant V. Karkhanis	Associate Manager, Mangrove Department, Construction Business Unit of Godrej and Boyce Mfg. Co. Ltd.	Mangrove Conservation for Swachh Bharat	17th Oct 2023
Dr Baban Bayan	World Fish	Modern Methods of Data Collection Tools: KOBOT Tool Box	Oct-2023

Lecture Series for students on “Health Management in Shrimp”

A series of lectures on “Health Management in Shrimp” during 5-7th September, 2023. Fulbright Fellow, Prof. (Dr.) Arun K. Dhar, Director of Aquaculture Pathology Laboratory; University of Arizona, Tucson, USA was the expert, who delivered the lecturers on “Microsporidium and white feces disease: A threat to sustainable shrimp farming” to the students of Aquatic environment and health management division on 5th September 2023. On 6th September 2023 a lecture was delivered on “Biosecurity in the context of small shrimp farming operations” to all the students of CIFE, Mumbai followed by another lecture on “Critical analysis of the research paper”. The lecture was designed to provide a holistic idea about the biosecurity issues in shrimp farming. In continuation to this a lecture was arranged for the students of AEHM division on the topic “Reverse genetics approaches to study viral pathogenesis and developing viral vector for an oral delivery of therapeutic molecules in shrimp”. The lecture was followed by discussion and critical analysis. Dr. Dhar explained about the different biosecurity measures to be followed at the field level from hatchery to harvest. A total of 120 participants including 70 males and 50 females from various divisions of ICAR-CIFE attended the lectures. During the lectures, participants got an opportunity to discuss and explore a shrimp farming from policy for export to nutrition aspect and soil and water quality management in aquatic health management, particularly focusing on biosecurity measures and diagnostic techniques for shrimp health.

Dr. Dhar emphasized on building trust with the farmers and industry personnel. Dr. Arun's presentation took students on a remarkable journey through his achievements in this field of shrimp health. The session concluded with an engaging Q&A session, where participants had the chance to seek clarification and gain further insights of the subject. Overall, Dr. Arun's lectures motivated, inspired, and enriched the students through various interactions. The lecture series was coordinated by Dr. Vidya Shree Bharti, Senior Scientist, Aquatic Environment and Health Management Division, ICAR-CIFE.

2.7. Honours and awards received by students

Best Young Researcher Award

Ms. Shamika S. Sawant Was awarded the Best Young Researcher Award for her presentation on "Biochar and *Lemna minor* integrated Hybrid Model for Oxybenzone Remediation: A green Solution for Circular Economy during the 6th International Conference on Aquaculture and Marine Biology, organized during October 13-14, 2023 at Goa.

Marine Biological association award

Ms. Shamika S. Sawant also won the Marine Biological association award Cash Award of 20,000/-.

Research Excellence Award

Ms. Vikas Kumar Ujjania, PhD scholar won the Research Excellence Award by Sidvi Foundation, SPOORTHY-2023.

Best MFSc Thesis Award

Mr. Gowhar Iqbal and Ms. Shamika S Sawant, won the Best MFSc Thesis Award during 5th International conference "Global Insights on Research and Development in Agriculture, Horticulture and Allied Sciences organized during 05-07 October 2023 at M.P.

ZSK Special Research Award

Dr. Santhana Kumar V. AEM- 2016-2019 batch won the ZSK Special Research Award by the Zoological Society of Kolkata on 13th December, 2023.

Best Research Scholar Award

Mr. David Waikhom, AAHM 2020-2023 won the Best research scholar award for his outstanding contribution in the field of Aquatic animal health management on the occasion of International conference on Innovation to transform Agriculture, Horticulture & Allied Sectors from Malla Reddy University, Hyderabad, ISAHRD, Chandigarh during 21 June, 2023-to 23 June, 2023.

Young Researcher Award

Mr. David Waikhom, PhD scholar (2020-2023) won the Young researcher award for his outstanding contribution and recognition in the field of Fisheries (Aquatic animal health management) on the occasion of International conference on Strategies and challenges in Agricultural and Life Science for Food Technology and Sustainable environment (SCALFE-2023) from Agricultural Technology Development Society (ATDS), Ghaziabad, Uttar Pradesh, India during 28-30 April 2023.

Prof. M.C. Nandeesha Memorial Gold Medal 2023

Mr. Ganeshkumar T. & Ms. Rishika MS (2021-23) won the Prof. M.C. Nandeesha Memorial Gold Medal 2023 during the National level innovation competition "Student Science Village" conducted by by CoF, BAU, Kishanganj, Bihar, India National conference on Transforming rural poverty to prosperity on 21 July 2023.

Best MFSc Student of the Year 2022-23

Mr. Ganeshkumar T. was awarded the best student of the year MFSc 2022-23 during the CIFE-Annual Day on 16th June, 2023.

Junior Scientist Award

Soibam Ngasotter, Ph.D (2019-21) won the Junior Scientist award under the Fisheries and Life science awards, 2023 conferred by Society of fisheries and life sciences, College of fisheries, Mangalore World Fisheries Day 2023 on 21st November 2023.

Winner a-idea

Mr. Chanikya Naidu and Sahana M.D. PhD (2020-2023), won the Winner a-idea award in entrepreunerushiip contest conducted by ICAR-NAARM on 20 April 2023.

Agri Entrepreneurship Startup Award

Mr. Chanikya Naidu and Sahana M.D., PhD scholars (2020-2023) won the Agri-entrepreneurship startup Award Winner in the entrepreuneruship contest conducted by ICAR-CCARI, Goa on 20 May 2023.

NAAS sponsorship student award

Mr. Chanikya Naidu and Sahana M.D FRM PhD 2020-2023 batch, won the NAAS sponsorship student award during Agricultural Science Congress held at Kochi on 18 June, 2023.

Awards in various competitions

Model Making Competition for "Waste utilisation for sustainable future", National Science Day on 28.2.2023. ICAR-CIFE, Mumbai

Winners

Mr. Prakash Patekar
Mr. Jebarson Solomon
Mr. Veeramani Maruthi
Mr. Anurag Singh

Quiz Competition

Mr. Prakash Patekar won the First Prize in Quiz Competition National Student Conclave Conducted Maharashtra Animal and Fisheries Science University (MAFSU), Nagpur, Nov 5-6, 2023.

Dr. Hiralal Chaudhuri Award (Gold Medal) - XVI Convocation

Subject / Discipline-wise Topper (2020-2022 batch)

S.No.	Discipline	Name of the student	Batch	Regn.No.
1.	AQC	Ms. Christina Khundrakpam	2020-2022	AQC-MBO-03
2.	FRM	Ms. Silpa R.	2020-2022	FRM-MBO-05
3.	PHT	Ms. Sandhiya V.	2020-2022	PHT-MBO-03
4.	FGB	Mr. Kishor Gowda B.	2020-2022	FGB-MBO-02
5.	FBT	Mr. Darshiny M. P	2020-2022	FBT-MBO-01
6.	FNT	Ms. Atshaya S	2020-2022	FNFT-MBO-01
7.	FPB	Mr. Jebarson Solomon J	2020-2022	FPB-MBO-01
8.	AEM	Ms. Abhirami N	2020-2022	AEM-MBO-01
9.	AAH	Ms. Jancy Robina A	2020-2022	AAH-MBO-04
10.	FEC	Ms. Ahila M S	2020-2022	FEC-MBO-01
11.	FEX	Ms. B. Lalmuansangi	2020-2022	FEX-MBO-02

Shri B.N. Sharma Award (Gold Medal)

Topper of Fisheries Extension Discipline (2020-2022 batch)

S.No.	Discipline	Name of the student	Batch	Regn.No.
12.	FEX	Ms. B. Lalmuansangi	2020-2022	FEX-MBO-02

Shri M.A. Upare Award (Gold Medal)

Topper of Fisheries Economics Discipline (2020-2022 batch)

S.No.	Discipline	Name of the student	Batch	Regn.No.
13.	FEC	Ms. Ahila M S	2020-2022	FEC-MBO-01

Prof. Ravindranath Krothapalli Award (Gold Medal)

Topper of AEHM Division (2020-2022 batch)

S.No.	Discipline	Name of the student	Batch	Regn.No.
14.	AEM	Ms. Abhirami N	2020-2022	AEM-MBO-01

Madhavprasad S. Jahageerdar Award (Gold Medal)

Topper of Fish Genetics & Breeding Discipline (2020-2022 batch)

S.No.	Discipline	Name of the student	Batch	Regn.No.
15.	FGB	Mr. Kishor Gowda B.	2020-2022	FGB-MBO-02

Dr. C.V. Kulkarni Award (Gold Medal)

Overall topper of 2020-22 batch

S.No.	Discipline	Name of the student	Batch	Regn.No.
16.	AEM	Ms. Abhirami N	2020-2022	AEM-MBO-01

Best poster/best paper presentation award

10th International Conference of Fisheries and Aquaculture (ICFA), Bali, Indonesia. 24-26th October, 2023

Ms. Akhila S.

Best oral presentation award for Preferential utilization of energy source in *Oreochromis niloticus* reared at high temperature

National conference on "Fisheries and Aquaculture: An Ecological Perspective," held at GADVASU, Ludhiana, India from 22nd to 24th February, 2023.

Mr. Liton Paul

Best poster award for "Geospatial Analysis for Sustainable Aquaculture Expansion: A case study on water spread area mapping and fish production potential in Dimbhe Reservoir, Maharashtra"

National Science Day 2023 at National Facility for Biopharmaceuticals (NFB) Mumbai on 28 February, 2023

Mr. Kurapati Nagendrasai

Best poster award for 'Evaluation of Potato Peel Extract in Shelf-Life Extension of Chilled Fish

National Conference on Transforming Rural Poverty to Prosperity through Sustainable Fisheries (TRPSF-23) College of Fisheries Kishanganj, July 19-21, 2023

Mr. Diganta Dey

Best poster award for Expression profiling of selected genes confirms neuro-endocrine inhibition of milt release from *Clarias magur* males during induced breeding

Mr. Surya Teja

Best poster award for Characterization, and antibacterial activity of silver nanoparticles synthesized using papaya leaf extract: A promising approach for combating bacterial infections

Ms. Gobika K

Best poster award for Evaluating the effectiveness of CIFE's SCSP trainings on aquaculture in Andhra Pradesh"

Mr. Mohammed Meharoof

Best Oral presentation on "Geospatial Analysis for Sustainable Aquaculture Expansion in Peechi Reservoir, Kerala

Mr. Sharath S.P

Second prize for poster on Application of pH shift method to produce functional protein isolates from Mudskipper *B. dussumieri*

Ms. Silpa R

Best poster award for Phenotypic Plasticity in the Post Embryonic Stages of Silver Pompano, *Trachinotus Blochii* (Lacepede, 1801) In Captivity

Mr. Potluri Saikishore

Best poster award for Effect of Jal Brahmi leaf extract on growth, and digestive parameters of GIFT fingerlings reared in inland saline water

ISG-ISRS National Symposium, Exploring Geospatial Ecosystems, Trends and Innovations during November 28th -30th, 2023

Ms. Kanchi Bhargavi

Best poster award for Mirroring the Magnificent: Digital Twinning, AI, ML and IoT approach to mapping the fish biodiversity of the artificial coral reefs

UN FAO: International Conclave on Mainstreaming Climate Change into International Fisheries Governance and Strengthening of Fisheries Management Measures in the Indo-PaciĜc Region held during 17-18 October 2023 at Mahabalipuram, Tamil Nadu.

Ms. Kanchi Bhargavi

Best poster award for Monetize the Monster-Combat Plastic by Circular Economy for Healthier Oceans"

Mr. Sumanta dey

Best poster award for Reducing coastal and marine pollution in context with fisheries management

Mr. Chanikya B Naidu

Best poster award for Urban ecotourism

ViROCON-2023 – Advancements in Global Virus Research towards One-Health, ICAR-NRCB, Tiruchirappalli during 01-03 December 2023

Ms. Jerusha S

Best poster for Autoinduction of prophage in a multi-drug resistant emergent *Salmonella* Infantis

Amity University on 19-20th October, 2023

Ms. R. Bharathi Rathinam

Best Paper Award (Third position) won the third position for her oral presentation which was awarded by the Amity University on 19-20th October, 2023

INSPIRE (Innovation in Science Pursuit for Inspired Research) Fellowship, Department of Science and Technology (DST), New Delhi

Msr. Venisza Cathy John

Awarded the DST-INSPIRE (Innovation in Science Pursuit for Inspired Research) Fellowship, Department of Science and Technology, New Delhi

National Conference on Transforming Rural Poverty to Prosperity through Sustainable Fisheries 2023 organized by College of Fisheries Kishanganj Bihar, India 19-21 July 2023

Gowhar Iqba, Fish Biotechnology PhD (2022-2025)

Molecular Characterization of Nematode Parasite Infecting Fish of Barvi Reservoir, Maharashtra

Akilandeshwari, A., Fisheries Extension (FEX), 2020-23

Understanding the Dynamics of Fish Production Growth and Instability in Maharashtra

Ms. Beemalla Samatha, Fisheries Extension (2022-25)

Training evaluation of ICAR-CIFE's fish farming and hatchery operation program

XVI Agricultural Science Congress, ICAR-CMFRI, Transformation of Agri-Food Systems for Achieving Sustainable Development Goals, Kochi, Kerala during 10-13 October 2023 Kochi

Dhanush C K, FPT PhD 2022-25

Phylogenetic diversity of quinolone-resistant ESBL-producing *Escherichia coli* isolates from seafood

Talib Mohammed,Fisheries Economics (2022-25)

Impact assessment of academia: Accounting and valuation of human capital in Indian fisheries higher education

Santosh Kumar Panda,PHT MFSc 2020-22

An investigation into the incidence of non-lactose fermenting Enterobacterales in fresh seafood

Sahana M D., PHT, Ph.D 2020-23 Domestic

Market Fish Waste to Green Innovation: recovering high value enzymes as a path to sustainable resource utilisation

Ashmita Pandey, PHT, Ph.D2021-24

Transformation of Agri-Food Systems for Achieving Sustainable Development Goals

Taniya Chandra, FRM MFSc 2021-2023

A taxonomic study on ornamental fishes under Cypriniformes from the Tansa River, Maharashtra

Anisha, M. U., FRM MFSc 2021-2023

Integrated taxonomic tools for the identification of selected loaches from India

Kamei Lanthaimeilu FRM 2018-2021 PhD

Stock structuring of Unicorn leatherjacket, *Aluterus monoceros (*Linnaeus, 1758) from Indian Exclusive Economic Zones (EEZ)

Bejawada Chanikya Naidu, FRM PhD

Unveiling hidden plastic: Investigating the footprint of microplastics in India's cave waters and its implications for heritage sites

Surya S.

Feeding strategy of Indo-Pacific Blue Marlin, Makaira nigricans Lacepede, 1802 caught from the Eastern Arabian Sea.

13th International Conference on Typhoid & Other Invasive Salmonelloses in Kigali, Rwanda during 5-7 December 2023

Parmanand Prabhakar , PHT PhD 2014-17

Distribution Patterns of Seafood-Borne Non-Typhoidal *Salmonella serovars* in Fish Markets and Fish Landing Centres in Mumbai, India

7th International JellyĜsh Blooms Symposium (JBS7, 2023) held at Kerala Arts and Crafts Village, Kovalam, Thiruvananthapuram, Kerala, India during 21 to 25 November, 2023.

Sugumar Ramkumar

Cubozoan blooms and its interaction with commercial fish production activity along the coastal region of Palghar district, Maharashtra, Northeastern Arabian Sea, India

Bejawada Chanikya Naidu

First evidence of microplastics in the Jellyfish along the North West coast of India

Abuthagir Iburahim.S

Drones and Artificial Intelligence for Jellyfish Blooms Monitoring

Sugumar Ramkumar

Cubozoan blooms and its interaction with commercial fish production activity along the coastal region of Palghar district, Maharashtra, Northeastern Arabian Sea, India

International Conference on Aquatic Resources and Sustainable Management at ICAR – CIFRI, Barackpore, West Bengal during 30-31 August 2023

Akanksha

Juvenile Estimation of *Lepturacanthus savala* (Cuvier, 1829) from Dolnet catch at Manori Creek, North Mumbai

Innovations in Ĝshing technologies for sustainable and resilient Ĝsheries" organized by BOBP and NFDB as a part of ICES/FAO working group on Ĝshing technology and Ĝsh behavior (WGFTFB23) held at Taj Gateway hotel, Kochi, Kerala from 13th – 17th February, 2023

Thavasi G, Fisheries Extension (FEX), 2023-26

ISEE National Seminar 2023 on Evolving Extension Science towards Secondary Agriculture for Sustainable Development. University of Agriculture (UAS), Bangalore, June 23-24, 2023

Akilandeshwari, A., Fisheries Extension (FEX), 2020-23

Krishi Vigyan Kendra led Fisheries Extension in Maharashtra

World Environmental Summit, 2023, Galgotias University, Yamuna Expressway, Greater Noida during 4-6th November 2023

Paul Nathaniel T, FNFT, 2021-2024

Enhanced thermal tolerance in GIFT Tilapia acclimated to different environmental salinities and temperature

FISHTECH 2023- Sustainable Blue Revolution: Nutritional Security and Exports Conference. CIDCO Exhibition & Convention Centre, Navi Mumbai during 2-3 March, 2023

Akilandeshwari, A, Fisheries Extension (FEX), 2020-23

38th Annual National Research Conference on Transforming Cooperatives at Gandhigram Rural Institute, Tamil Nadu during October 6-7, 2023

J. Rujan, Fisheries Extension 2021-2023

SWOT analysis of Marine Primary Fisheries Cooperative Societies in Kanyakumari, Tamil Nadu

Dinesh R., Fisheries Extension 2021-2023

Measuring Governance Quality in Inland Primary Fisheries Cooperative Societies of Tamil Nadu.

Abhilash Thapa, Fisheries Economics (2021-24)

Competition organized by Institute Technology Management Unit (ITMU) on National Science Day 2023

Innovative ideas and models developed/demonstrated in exhibitions/fairs/visitors

- Technology of “Manure from Fish Waste” developed by Shri Anurag Singh, Dr Arpita Sharma, Dr Martin Xavier and Shri Shubham Soni was released by Hon'ble Shri Parshottam Rupala, Union Minister of Fisheries, Animal Husbandry, and Dairying in presence of Director/Vice Chancellor of ICAR- CIFE Dr. C. N. Ravishankar during Sagar Parikrama Phase 3 programme on 21st February 2023. The technology has been registered in ITMU, CIFE 23F/PD/0102.
- Subashini V. and Diganta Dey participated in the Waste utilization for sustainable future poster/model making competition organized by Institute Technology Management Unit (ITMU) on National Science Day 2023.
- Anurag Singh participated in 4th Student Convention at ICAR-CIFE, in March, 2023. Presented innovative idea on “Integrated IPF (integrated plant poultry and fish farming) model”
- Mohammed Meharoof participated in the Students' Innovation Competition organised during the International Conference on Responsible Aquaculture and Sustainable Fisheries Interact – 2022 at the College of Fisheries, Central Agricultural University, Lembucherra, Tripura, India and presented the concept on “Fish Culture Area Mapping, Efficient Ranching Assessment and Change Detection for Reservoirs” (FISH CAMERA-CDR) Framework.”
- Liton Paul participated in the Students' Innovation Competition organised during the International Conference on Responsible Aquaculture and Sustainable Fisheries Interact – 2022 at the College of Fisheries, Central Agricultural University, Lembucherra, Tripura, India and presented the concept on “Ornamental Fish Detection and Behaviour Analysis (OFDABA) - Iot and Artificial Intelligence Approach”

FISHERISTIC Future of Fisheries, Imagined Now (CIFEST-ONE 23), during 20-23 March, 2023

The models displayed were appreciated by the honorable DG, ICAR and Secretary, DARE Dr. Himanshu Pathak, Dr. J K Jeena, Director ICAR-CIFE and others.

First Prize to “FisHerd”

Jerusha S. and Sandhiya V. developed FisHerd model, the fully automated AI cage-bots to make cage culture possible in the depths of water to overcome loopholes and flaws in modern mariculture.

Second Prize to “NanoSort”

Micro-algae usage to remove nano plastics from aquatic systems was exhibited under the title NanoSort by Pritam Sarkar, Tanushree Bhowmik and Puja Rani Basak.

Third Prize to “Resilient Hamlet”

A sustainable farming model for circular bio-economy was the brainchild of Sagar Shinde, Ashutosh Danve and Swaraj Adakney.

Appreciation Certificates to other participants

1. LinguaPiscis

Model depicted the fish's language interpretation to sustain them by identifying their breeding ground. The idea was conceived and exhibited by Dhanalakshmi and Shivkumar.

2. FisEerG

Anurag Singh and Mahesh Sharma put forth Fishergy, an idea focused on generating electricity from fish movement.

3. FishBind

Model was about turning fish bone waste into miracle CSD products and was made by Sourav Debnath, Suraj Saha and Subam Debroy.

4. Project SAND

"Project SAND- Strategic AquapoNics in Desert, more fish n crop per water drop" *put forward by* Dr. Bhoomaiah D., A. Venkata Sai, K. Nagendrasai, K. Nikhil and K. Shivarama Krishna *was a strategic AquapoNics model in Desert to make fisheries possible in the horizons of desert.*

5. MAAngrove

B.Chanikya Naidu and Sahana M.D. *crafted skincare solutions and magical healthcare products from mangrove ecosystem waste under the banner MAAngrove.*

6. AquaTHERM

*AquaTHERM, a thermal IR imaging to save aquatic mammals, was designed by S*angita Roy, Liton Paul, Tamal Seth, Pritam Sarkar and Bhashwati Roy. *The model was centered around the concept of thermal IR imaging, a promising technology that carries the abilty to lessen the risk of collision between aquatic creatures and ships.*

7. BioGlo

BioGlo & concept was using bioluminescent bacteria to bring life to the light. Poonam Majumder, Nagakalpitha Shree N.N. and Akanksha made this.

8. GarbageFISH

was created by Naila Majid, Shakir Ahmad Mir, Mohammed Talib, Thavasi G. Ram, Chandani Dave, Dinesh, Khimsali, Nitika, Vijendra, Divya, Khushboo, Pugazhenthi, Sayantar, Zayeema, Benu, Angelina, Ranjana, Gowhar Iqbal, Shahid Gul, Amit *and* Deepes*h* out of waste and discards to sound an alarm to the world of the dangers of marine pollution and unsustainable consumption.

2.8. Overseas visit by students for training under NAHEP

Sl.No	Name of student	Discipline	Host AU/Institute	Period
1.	Thejaswini	MFSc (AQC)	Dept. for Farm Animals and Vet. Public Health, University of Veterinary Medicine, Vienna, Austria	20 Nov-20 Dec 2019
2.	Pranab Dihingia	MFSc (AQC)	Dept. for Farm Animals and Vet. Public Health, University of Veterinary Medicine, Vienna, Austria	20 Nov-20 Dec 2019
3.	Monalisha Kumar	MFSc (AAH)	Dept. for Farm Animals and Vet. Public Health, University of Veterinary Medicine, Vienna, Austria	20 Nov-20 Dec 2019
4.	Chetan Kumar Garg	PhD (FNT)	The University of Idaho, Moscow, Idaho, USA	25 Nov-24 Dec 2019
5.	Mohammed Akram Javith	PhD (PHT)	Department of Food Technology, Faculty of Agro-Industry, Prince of Songkla University, Hat Yai, Songkhla 90112 Thailand	01-31 Dec 2019
6.	Manmohan Kumar	PhD (AQC)	Lab of Aquaculture & Artemia Centre, Ghent University, Ghent, Belgium	13 Jan- 12 Feb 2020
7.	Sanjay C. S	MFSc (AQC)	Asian Institute of Technology (AIT), Bangkok, Thailand	13 Jan-13 Feb 2020
8.	Hougaina Panmei	PhD (AQC)	Interdisciplinary Centre of Marine and Environmental Research of the University of Porto (CIIMAR), Avenida General Norton de Matos, S/N, 4450-208 Matosinhos, Portugal	07 Jan-07 Feb 2020
9.	Prasanta Jana	PhD (FNT)	Interdisciplinary Centre of Marine and Environmental Research of the University of Porto (CIIMAR), Avenida General Norton de Matos, S/N, 4450-208 Matosinhos, Portugal	07 Jan-07 Feb 2020
10.	Vijay Kumar Mannur	MFSc (FNT)	Institute of Marine Research, P.O. Box 1870 Nordnes, No.5817, Bergen, Norway	05 Jan-05 Feb 2020
11.	Nisha Chauphal	MFSc (FNT)	Institute of Marine Research, P.O. Box 1870 Nordnes, No.5817, Bergen, Norway	05 Jan-05 Feb 2020
12.	V. Gomathy	PhD (FEC)	Agribusiness and Applied Economics, Director of Centre for Agricultural Policy and Trade Studies (CAPTS), North Dakota State University, Fargo, USA	20 Feb-20 Mar 2020
13.	Velumani. T	PhD (FEX)	Michigan State University, East Lancing, Michigan, USA	20 Feb-20 Mar 2020
14.	Chittranjan	PhD (AEM)	CIIMAR, University of Porto, Rua dos Bragas 289, Porto, Portugal	28 Feb-17 Mar 2020
15.	Manas Kumar Maiti	PhD (FNT)	Norwegian Institute of Food, Fisheries and Aquaculture Research, Tromsø, Norway	09-12 Mar 2020

16.	Arul Murugan	PhD (AAH)	National Centre for Genetic Engineering and Biotechnology, Pathum Thani, Thailand	01-23 Mar 2020
17.	Siva N	MFSc (AQC)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
18.	Guntapalli Sravani	MFSc (AQC)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
19.	Na I Sabet Dohtdong	MFSc (AQC)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
20.	Harini G	MFSc (AQC)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
21.	Ayushi Bhardwaj	MFSc (AQC)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
22.	Rajarshi Bandyopadhyay	MFSc (FRM)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
23.	M. Vishal	MFSc (FRM)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
24.	Arpitha N	MFSc (FRM)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
25.	Anisha M U	MFSc (FRM)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
26.	Naga Kalpitha Shree N N	MFSc (FRM)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
27.	Sanju Nehra	MFSc (PHT)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
28.	Varsha D	MFSc (PHT)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
29.	Crosslin Vinoliya R	MFSc (PHT)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
30.	Krishna Veni S	MFSc (PHT)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
31.	Kaleeswaran V	MFSc (FNT)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
32.	Bhuvaneshwaran T	MFSc (FNT)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
33.	Ranju Kumari	MFSc (FNT)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
34.	Prashanth B R	MFSc (FNT)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
35.	Sruthy R Nair	MFSc (FPB)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
36.	Selvarani B	MFSc (FPB)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
37.	Kajal Kumari	MFSc (FPB)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
38.	Semeena M	MFSc (AAHM)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
39.	Tamal Seth	MFSc (AAHM)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
40.	Sangita Roy	MFSc (AAHM)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023

41.	Elina Jose Vettom	MFSc (AAHM)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
42.	Thanuja S	MFSc (AAHM)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
43.	Dharani. I	MFSc (AEM)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
44.	Puja Rani Basak	MFSc (AEM)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
45.	Vipul Singh Badguzar	MFSc (AEM)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
46.	Akshaya Suresh	MFSc (AEM)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
47.	K Yuvasree	MFSc (FBT)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
48.	Varsha V V	MFSc (FBT)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
49.	Kriti Kumari	MFSc (FBT)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
50.	Tamizh Maran M	MFSc (FBT)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
51.	Shinde Siba Anand	MFSc (FGB)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
52.	Nidarshan N C	MFSc (FGB)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
53.	Rujan J	MFSc (FEX)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
54.	Aiswarya Sali	MFSc (FEX)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
55.	Anurag Singh	MFSc (FEX)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
56.	Shwetha Tony A	MFSc (FEX)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
57.	Thavasi G	MFSc (FEC)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
58.	Jayapratha T	MFSc (FEC)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
59.	Gobika K	MFSc (FEC)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
60.	Dave Chandani Prakashbhai	MFSc (FEC)	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
61.	Ms. Christina Khundrakpam	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
62.	Mr. Gokul S	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
63.	Mr. Sagar Vitthal Shinde	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
64.	Mr. Vanlaltlankima	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
65.	Mr. Rajesh Kumar	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023

66.	Mr. Sagar Ronad	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
67.	Ms. Swati Choudhary	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
68.	Mr. Vineeth P	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
69.	Ms. Tandel Lataben Vanmali	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
70.	Mr. Dhanush C K	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
71.	Ms. Pragati shetty	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
72.	Mr. Sharath S P	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
73.	Ms. Aimen Firdous	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
74.	Mr. Gokulnath S R	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
75.	Mr. Potluri Sai Kishore	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
76.	Mr. Patekar Prakash Goraksha	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
77.	Mr. Jebarson Solomon J	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
78.	Ms. MADHULIKA	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
79.	Mr. Vasanthakumaran K	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
80.	Mr. B. Surya Chaitanya	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
81.	Mr. Samanthula Surya Teja	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
82.	Mr. Samad Sheikh	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
83.	Ms. Shamika Shantaram Sawant	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
84.	Mr. Angom Baleshwor Singh	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
85.	Mr. Raghul R	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
86.	Ms. Shelke Jayashri Sarjerao	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
87.	Ms. Laishram Soniya Devi	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
88.	Mr. Ad Viralkumar Ganapatsingh	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
89.	Ms. Sangeetha S	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023

90.	Mr. Lukram Sushil Singh	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
91.	Mr. Mani Selvam J	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
92.	Mr. Palsam Karthik Kumar Goud	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
93.	Mr. Talib Mohammad	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
94.	Mr. Beemalla Samatha	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
95.	Mr. Ram Kumar Kurmi	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
96.	Ms. Sindhu Kavi S	PhD 1st year	University of Malaya, Malaysia.	09 to 28 Dec 2023
97.	Ms. Bharda Sheetal Kanubhai	PhD 2nd year	National Taiwan Ocean Univeristy, Taiwan	21 Sept to 26 Oct 2023
98.	Ms. Keisham Geenita	PhD 2nd year	National Taiwan Ocean Univeristy, Taiwan	21 Sept to 26 Oct 2023
99.	Ms. Sonam Angmo	PhD 2nd year	National Taiwan Ocean Univeristy, Taiwan	21 Sept to 26 Oct 2023
100.	Ms. Kalli Vasanthi	PhD 2nd year	University of Ryukyus, Japan	25 Sept to 24 Oct 2023
101.	Mr. Amal C. T.	PhD 2nd year	Kyushu University, Japan	20 Oct to 21 Nov 2023
102.	Mr. Bhautik D. Savaliya	PhD 2nd year	Kyushu University, Japan	20 Oct to 21 Nov 2023
103.	Mr. Tao Kara	PhD 2nd year	Kyushu University, Japan	20 Oct to 21 Nov 2023
104.	Ms. Porkodi M	PhD 2nd year	Kyushu University, Japan	20 Sep to 19 Oct 2023
105.	Ms. Shasti Risha K.	PhD 2nd year	Kyushu University, Japan	20 Sep to 19 Oct 2023
106.	Ms. Subhashini V	PhD 2nd year	Kyushu University, Japan	20 Sep to 19 Oct 2023
107.	Ms. Sakshi Patil	PhD 2nd year	Kyushu University, Japan	20 Sep to 19 Oct 2023
108.	Mr. Maibam M. Meitei	PhD 2nd year	University of Las Palmas De Gran Canary, Spain	13 Oct to 12 Nov 2023
109.	Ms. Kenyum Lollen	PhD 2nd year	University of Las Palmas De Gran Canary, Spain	13 Oct to 12 Nov 2023
110.	Mr. Vikas Kumar Ujjania	PhD 2nd year	University of Las Palmas De Gran Canary, Spain	13 Oct to 12 Nov 2023
111.	Ms. Venisza Cathy John	PhD 2nd year	University of Las Palmas De Gran Canary, Spain	13 Oct to 12 Nov 2023
112.	Mr. Abhilash Thapa	PhD 2nd year	University of Las Palmas De Gran Canary, Spain	13 Oct to 12 Nov 2023
113.	Mr. Radhakrishnan K	PhD 2nd year	University of Las Palmas De Gran Canary, Spain	13 Oct to 12 Nov 2023

114.	Mr. Seenivasan P	PhD 2nd year	University of Las Palmas De Gran Canary, Spain	13 Oct to 12 Nov 2023
115.	Ms. Suvetha V	PhD 2nd year	University of Las Palmas De Gran Canary, Spain	13 Oct to 12 Nov 2023
116.	Ms. Anusha Edla Patel	PhD 2nd year	University of Las Palmas De Gran Canary, Spain	13 Oct to 12 Nov 2023
117.	Ms. Shivangi Bhatt	PhD 2nd year	University of Las Palmas De Gran Canary, Spain	13 Oct to 12 Nov 2023
118.	Ms. Tejaswini K.	PhD 2nd year	University of Las Palmas De Gran Canary, Spain	13 Oct to 12 Nov 2023
119.	Mr. Saiprasad P. Bhusare	PhD 2nd year	University of Las Palmas De Gran Canary, Spain	13 Oct to 12 Nov 2023
120.	Mr. Dheeran P.	PhD 2nd year	University of Las Palmas De Gran Canary, Spain	15 Nov to 15 Dec 2023
121.	Ms. Amulya S.G.	PhD 2nd year	Mahidol University, Bangkok, Thailand	25 Sep to 24 Oct 2023
122.	Mr. Sooraj N S	PhD 2nd year	Mahidol University, Bangkok, Thailand	25 Sep to 24 Oct 2023
123.	Mr. Paul Nathaniel T	PhD 2nd year	NUTRIMU group, Faculty of sciences, University of Porto, Portugal	08 Nov to 13 Dec 2023
124.	Mr. Raghuvaran N.	PhD 2nd year	NUTRIMU group, Faculty of sciences, University of Porto, Portugal	08 Nov to 13 Dec 2023
125.	Mr. Diganta Dey	PhD 2nd year	Nord University, Norway	11 Oct to 12 Nov 2023
126.	Mr. Rathod Sanjaykumar Karsanbhai	PhD 2nd year	Central Fisheries Research Institute, Trabzon, Turkey	06 Oct to 05 Nov 2023
127.	Ms. Gagana T J	PhD 2nd year	Asian Institute of Technology, Thailand	01 to 30 Nov 2023
128.	Mr. Muzammal Hoque	PhD 2nd year	Asian Institute of Technology, Thailand	01 to 30 Nov 2023
129.	Mr. Shubam Soni	PhD 2nd year	Asian Institute of Technology, Thailand	01 to 30 Nov 2023
130.	Mr. Sagarnaik C	PhD 2nd year	Prince of Songkla University, Thailand	03 Oct to 02 Nov 2023
131.	Ms. Dharani M	PhD 2nd year	Prince of Songkla University, Thailand	07 Nov to 06 Dec 2023
132.	Ms. Harshavarthini M	PhD 2nd year	James Cook University, Australia	23 Sept to 22 Oct 2023
133.	Ms. Mukkeri Kranthirekha	PhD 2nd year	James Cook University, Australia	23 Sept to 22 Oct 2023
134.	Ms. Rida Riyaz Allayee	PhD 2nd year	Curtin University, Malaysia	07 to 28 Dec 2023
135.	Ms. Samikshya Mishra	PhD 2nd year	Instituto de Acuicultura Torre de la Sal (IATS), Consejo Superior de Investigaciones Cientificas (CSIC), Spain	25 Nov to 4 Dec 2023

2.9. Placements

S.No	Name of the students	Reg No.	Batch	Position & Place
1.	Ms. Gitanjali Behera	AQC-PB1-02	2021-24	Assistant Fisheries OfĜcer at Govt. of Odisha
2.	Ms. Ashmita Pandey	PHT-PB1-01	2021-24	Assistant Fisheries OfĜcer at Govt. of Odisha
3.	Ms. Samishya Mishra	FPB-PB1-02	2021-24	Assistant Fisheries OfĜcer at Govt. of Odisha
4.	Ms. Archana Muduli	PHT-MB1-02	2021-23	Assistant Fisheries OfĜcer at Govt. of Odisha
5.	Ms. Rojalin Dash	PHT-MB1-08	2021-23	Assistant Fisheries OfĜcer at Govt. of Odisha
6.	Mr. Soumyajit Jena	AQC-MB1-12	2021-23	Assistant Fisheries OfĜcer at Govt. of Odisha
7.	Ms. Banalata Raut	PHT-PB0-07	2020-23	Assistant Fisheries OfĜcer at Govt. of Odisha
8.	Ms. Sushree Akankshya Das	AEM-PB0-03	2020-23	Assistant Fisheries OfĜcer at Govt. of Odisha
9.	Ms. Itishree Das	PHT-MB0-10	2020-22	Assistant Fisheries OfĜcer at Govt. of Odisha
10.	Mr. Samir Kumar Chand	FRM-MB0-11	2020-22	Assistant Fisheries OfĜcer at Govt. of Odisha
11	Mr. Santosh Kr. Panda	PHT-MB0-04	2020-22	Assistant Fisheries OfĜcer at Govt. of Odisha
12	Ms. Swagatika Sahoo	FRM-MB0-07	2020-22	Assistant Fisheries OfĜcer at Govt. of Odisha
13	Mr. Omkar Patra	FNT-MB0-02	2020-22	Assistant Fisheries OfĜcer at Govt. of Odisha
14	Ms. Pragati Padhan	FBT-MB0-06	2020-22	Assistant Fisheries OfĜcer at Govt. of Odisha
15	Mr. Siddhartha S. Sahoo	FPB-MA9-07	2019-21	Assistant Fisheries OfĜcer at Govt. of Odisha
16	Ms. Anwesha Behera	FRM-PA9-01	2019-22	Assistant Fisheries OfĜcer at Govt. of Odisha
17	Mr. Chinmay Nanda	FNT-PA9-04	2019-22	Assistant Fisheries OfĜcer at Govt. of Odisha
18	Mr. Anshuman Panda	FRM-PA9-03	2019-22	Assistant Fisheries OfĜcer at Govt. of Odisha
19	Ms. R. Bharathi Rathinam	AAH-PA8-02	2018-21	Agricultural Research Service
20	Ms. Atufa Regu	FEX-PA9-02	2019-22	Agricultural Research Service
21	Ms. Sruthi Joy	FRM-MB1-10	2021-23	FEO at State Govt. of Kerala
22	Ms. Arpitha N	FRM-MB1-03	2021-23	Assistant Manager, NABARD
23	Ms. Priyanka Arya	AQC-MB1-09	2021-23	Fisheries Inspector, Uttarakhand Fisheries Department
24	Ms. Chandana Dinakaran	AAH-PB0-01	2020-23	Fisheries Extension OfĜcer, State Govt. of Kerala
25	Ms. P. Abinaya	AQC-PA9-09	2019-22	Fisheries Subordinate Service, Inspector of Fisheries, Tamil Nadu
26	Ms. Abisha R	AQC-PA9-07	2019-22	Fisheries Subordinate Service, Inspector of Fisheries, Tamil Nadu
27	Ms. Sathiya Kala A	AQC-PA9-05	2019-22	Fisheries Subordinate Service, Inspector of Fisheries, Tamil Nadu
28	Ms. Affarin Tinku D.M.	PHT-PA9-02	2019-22	Fisheries Inspector & Fisheries Welfare / Fisheries Subordinate Service, Dept. of Fisheries, Govt. of Tamil Nadu
29	Ms. Jancy Robina A	AAHM-PB2-05	2022-25	Fisheries Inspector, State Govt. of Tamil Nadu (Dept. of Fisheries)
30	Ms. Divya Mehta	AQC-PB2-02	2022-25	Fisheries Inspector, Uttarakhand Fisheries Department

31	Ms. Ramya V	AQC-PB2-09	2022-25	Fisheries Inspector & Fisheries Welfare /Fisheries Subordinate Service, Dept. of Fisheries, Govt. of Tamil Nadu
32	Ms. Sandhiya V	FPT-PB2-03	2022-25	Fisheries Inspector & Fisheries Welfare /Fisheries Subordinate Service, Dept. of Fisheries, Govt. of Tamil Nadu
33	Ms. Thanga Anusuya S	FRM-PB2-09	2022-25	Fisheries Inspector & Fisheries Welfare /Fisheries Subordinate Service, Dept. of Fisheries, Govt. of Tamil Nadu
34	Mr. Veeramani Maruthi K.N.	FNFT-PB2-05	2022-25	Fisheries Inspector & Fisheries Welfare / /Fisheries Subordinate Service, Dept. of Fisheries, Govt. of Tamil Nadu
35	Mr. Satheesh M	FNFT-PB2-04	2022-25	Fisheries Inspector & Fisheries Welfare /Fisheries Subordinate Service, Dept. of Fisheries, Govt. of Tamil Nadu
36	Ms. Silpa R	FRM-PB2-07	2022-25	Fisheries Inspector & Fisheries Welfare /Fisheries Subordinate Service, Dept. of Fisheries, Govt. of Tamil Nadu
37	Ms. Angela Brighty R.J.	PHT-PB1-02	2021-24	Fisheries Inspector & Fisheries Welfare /Fisheries Subordinate Service, Dept. of Fisheries, Govt. of Tamil Nadu
38	Ms. Dhivya Kumari	FBT-PB1-02	2021-24	Fisheries Inspector & Fisheries Welfare /Fisheries Subordinate Service, Dept. of Fisheries, Govt. of Tamil Nadu
39	Ms. Unnimaya Udauyan V.U.	FRM-PB1-12	2021-24	Project OfĜcer -I at Kerala State Co-op Federation for Fisheries Development Ltd., Govt. of Kerala
40	Mr. Kuralarasan D	AQC-MB2-06	2022-24	Fisheries Inspector & Fisheries Welfare /Fisheries Subordinate Service, Dept. of Fisheries, Govt. of Tamil Nadu
41	Ms. Nisha Chupal	FNT-PB0-03	2020-23	Fisheries Inspector, Fisheries Department at Uttarakhand
42	Ms. Arya P	FPB-PA8-02	2018-21	Assistant Professor at Kerala University Fisheries & Ocean College, Kerala
43	Anisha V	AAH-PA9-01	2019-22	Inspector of Fisheries and Fishermen Welfare Tamil Nadu
44	Manojkumar C	AAH-MB0-05	2020-22	PhD University of Tasmania
45	Mr. Ganeshkumar T.	AEM-MB0-02	2020-22	Inspector Department of Fisheries and Fishermen Welfare, Govt. of Tamil Nadu
46	Ms. Shilpa Pradeep	AEM-MB0-07	2020-22	Fisheries Extension OfĜcer, State Fisheries Department, Kerala
47	Ms. Sushree A.	AEM-PB0-03	2020-23	Fisheries Extension OfĜcer, Fisheries Department, Govt. of Odisha
48	Semeena M	AAH-MB1-04	2021-23	Inspector of Fisheries Department of Fisheries, Govt. of Tamilnadu

49	Rozirani Behera	AQC-MB0-09	2020-22	Assistant Fisheries OfĜcer, Govt. of Odisha
50	R. Rujan	FEX-MB1-07	2021-23	Assistant Professor, College of Fisheries Science, St. Devasahayam Institute of Fisheries Science and Technology, Kanniyakumari, Tamil Nadu
51	B. Bhavana	FEX-MB0-06	2020-22	Assistant Director of Fisheries, Department of Fisheries, Govt. of Karnataka
52	Nisha Chuphal	FNT-PB0-03		Fisheries Inspector, Fisheries Department, Govt. of Uttarakhand
53	Kaleeswaran	FNT-MB1-03		Fisheries Inspector, Fisheries Department, Govt. of Tamil Nadu
54	Amrutha Gopan	FNT-PA5-01		Fisheries Extension OfĜcer, Fisheries Department, Govt. of Kerala
55	Ankit Kumar	FPB-MB1-03		Relationship Manager, HDFC Bank, Ratnagiri
56	Mir Ishfaq Nazir	FNT		Assistant Professor, SKAUST, Jammu and Kashmir
57	Subal kumar Ghosh	PHT-PA7-05		Assistant Fisheries OfĜcer, Govt. of Orissa
58	Varsha D	PHT-MB1-10		Inspector of Fisheries, Govt. of Tamil Nadu
59	Crosslin Vinoliya R	PHT-MB1-03		Inspector of Fisheries, Govt. of Tamil Nadu
60	Manivannan M	PHT-MA8-04		Inspector of Fisheries, Govt. of Tamil Nadu
61	Devadarshini	PHT-MA8-02		Inspector of Fisheries, Govt. of Tamil Nadu

2.10. Convocation

The Indian Council of Agricultural Research-Central Institute of Fisheries Education (ICAR-CIFE) celebrated its convocation to confer degrees today (March 20, 2023). Director and Vice Chancellor of ICAR-CIFE, Dr. Ravi Shankar CN conferred degrees on 50 Ph.D. and 90 master's students. The Director General, ICAR and Secretary, Department of Agricultural Research and Education (DARE) Dr. Himanshu Pathak, who was the chief guest of the convocation, stated that fisheries provide employment to millions. Speaking on the occasion, he said that, in the future, this sector will play a very important role in meeting the nutritional requirements of the world's growing population. Therefore, considering the importance of this sector, the Government of India has formed a separate Ministry of Fisheries, he stated. The Ministry has launched the *Pradhan Mantri Matsya Sampada Yojana* (PMMSY) in 2019-20, which aims to increase fish production through the adoption of innovations and modern technology, improve the safety and quality of fish, develop post-harvest infrastructure, and modernize the fish value chain, further stated Dr. Pathak. Dr. Pathak also appreciated the significant contribution ICAR-CIFE made in developing energy-efficient and environmentally friendly technologies for inland saline aquaculture. The other initiatives of the institute, which he acknowledged, were related to the genetic improvement of fish, species diversification, vaccines for aquatic animal pathogens, seafood safety and quality testing, larval feed, use of non-conventional feed ingredients, and nutraceuticals; monitoring and remediation of coastal pollution; waste utilization; development of value-added fish products; a mobile app; and a documentary film. He also appreciated that the ICAR-CIFE alumni have achieved great heights both in India and abroad as scientists, entrepreneurs, and policymakers. Secretary, ICAR, stressed that the world needs more food by 2050. Therefore, fisheries research and education will be critical. He also underlined the need for innovative research and extension programs to increase the production and consumption of aquatic food by expanding fish farming, increasing productivity, improving marketing, and reducing post-harvest losses. He urged the institute to promote aspiring entrepreneurs in the fishing sector. Therefore, he emphasized that the university may embark on a focused entrepreneurship program with the assistance of developmental agencies and financial institutions that would not only sponsor the program but also sustain the trained entrepreneurs through financial support and hand holding.

During this convocation period (20-22 March 2023), a fish festival and student convention were also held. Students of ICAR-CIFE also demonstrated for the guests the delicious fish products of different parts of the country. In addition to that, fisheries students from different fisheries colleges showcased their cultures in the cultural program. Finally, the deans of all colleges of fisheries from different parts of the country also met to discuss and improve their fisheries syllabi. ICAR-CIFE is a Center of Excellence in Fisheries Higher Education in the country. It also has the reputation of being the only university in the world that produces master's and doctoral students in eleven highly specialized disciplines of fisheries. It has also developed many technologies to promote the fisheries sector in the country.

2.11. FISHERISTIC-Future of Fisheries, Imagined Now

Novelty Entrepreneurship Future of Fisheries, Imagined Now Symposium An exhibition of game-changing ideas and concepts, that imagines and foresees the future of fisheries, was on display as part of the CIFEST-ONE23 celebrations organised during 20-22 March 2023 at ICAR-CIFE, Mumbai. Thirty young and brilliant student scholars of CIFE showcased 10 of their ideas which were curated by a team of passionate faculty. They sought to reimagine a world of fisheries and aquaculture with a vision that is far-reaching but sustainable, has a mix of certainties and uncertainties, and promises of hope for a better future aided by science. The FISHERIESTIC exhibition was inaugurated by Dr. Himanshu Pathak, Director General, ICAR and Secretary, the Department of Agricultural Research and Education (DARE) in presence of Dr J.K Jena, DDG (Fisheries) and Dr. Ravi Shankar CN, Director and Vice Chancellor, ICAR-CIFE. Notable dignitaries namely Dr. N.P. Sahu, Joint Director, ICAR-CIFE, Dr. Dilip Kumar, Former Director and Vice Chancellor, ICAR-CIFE, Dr. Kuldeep K. Lal, Director, ICAR-CIBA, Dr. P. Krishnan, Director BoBP-IGO and Deans of various fisheries colleges were delighted to be part of the occasion. Nearly 350 fisheries graduates and postgraduates from across the fisheries colleges as well as the faculty and staff had a thrilling experience going through, enquiring, learning and getting inspired from the ideas that were on display as working models and prototypes.

GarbageFISH

To top it all, an art installation called GarbageFISH was created by the students of FEES Division out of waste and discards to sound an alarm to the world of the dangers of marine pollution and unsustainable consumption. The innovative concepts and ideas of the students were much appreciated and applauded by the DG, ICAR and other delegates.

The idea curators

Dr. Bhoomaiah D., Dr. Nalini Poojari, Mr. Abuthagir Iburahim, Dr. Kapil Sukdhane, Dr. Neha W. Qureshi, Dr. Sanath Kumar and Dr. Ananthan P.S.,the faculty at ICAR-CIFE, curated the ideas and mentored the students to sharpen their concepts and come out with brilliant exhibits and displays.

2.12. Second Fish Swad Festival

The second Fish Swad Festival-2023 organized by ICAR-CIFE Mumbai was a resounding success that achieved its objective of promoting the consumption of fish and creating awareness about the fisheries sector's importance in India's economy. The festival was well-attended and provided a platform for the visitors to learn about the different aspects of the fisheries industry. The dishes were well-prepared and received positive feedback from the visitors. It was an excellent opportunity for visitors to learn more about the importance of fish and seafood in their diet, the diversity of fish and sustainable fishing practices. The festival not only provided an entertaining day out for visitors, but it also raised awareness about the importance of fish in diets, need for responsible fishing practices and the conservation of aquatic resources. The Organising Secretary of Fish Swad festival was Dr. Arpita Sharma. Principal Scientist and Head (Acting), FEES Division. A designer menu card prepared by the students and staff master chefs was released by the dignitaries during the cultural programme. Recipe book on 'Indian Fish Cuisines' was distributed to the dignitaries. Dr. Himanshu Pathak, Director General, ICAR and Secretary DARE and Dr. J. K. Jena, DDG Fisheries Science appreciated the efforts of ICAR-CIFE, Mumbai specially the PGSSU, students and staff mentors in organizing the event of such a large scale representing all states of India and making it a grand success.

2.13. Fourth Students' Convention

The fourth Students' Convention, as a part of CIFEST One23, was inaugurated by the Dr. Himanshu Pathak, th Director General, ICAR and Secretary, DARE on 20 March 2023. The convention flagged off with cultural programmess organized by the B.F.Sc. students from 26 fisheries colleges all over India.

Dr. Ravishankar C.N., Director and Vice-Chancellor, ICAR-CIFE welcomed the guests and Dr. N. P. Sahu, Joint Director introduced the theme of the convention based on the concept of One23, comprising of Opportunities, Novelty and Entrepreneurship. The key note address by Dr. J.K Jena, DDG, Fisheries Science on 21 March 2023 and Dr. Dilip Kumar, Former Vice-Chancellor/Director, ICAR–CIFE and Dr. P. Krishnan, Director, BOBP, Chennai were the Guests of Honour. In his key note address, Dr. Jena focussed on the importance of species diversification and blue transformation for the achievement of sustainable development goals. He also emphasised on the role of fisheries students in shaping national fisheries and aquaculture, and contributing to the sector globally.

This was followed by two parallel sessions on "Next Generation Teaching" and "Climate Change", where students from different fisheries colleges presented their ideas in the form of concepts, posters and models, most of them centred around the use of technology and artificial intelligence tools. Majority of the students suggested blended learning with stress on practical exposure and simulation as the Next Gen Teaching method. As part of the convention, an open e-poster competition was also conducted among the fisheries professionals of the country on "How to improve fish consumption in India". In total, 47 posters were received from 32 colleges for the e-poster competition. The messages received from the Deans of various colleges and selected posters were included in the souvenir. A total of 200 students from 26 colleges participated in the event.

The Fourth Students' Convention at ICAR-CIFE concluded with the valedictory session where Dr. J. K. Jena, DDG, Fisheries gave away the prizes for winners of cultural programme, poster and oral presentations, model making and the overall champions.

3 Research Achievements

List of Institutional Projects

S.No	TITLE OF THE PROJECT	PI
1	Evaluating environmental effects on pearl formation in *Lamellidens marginalis* reared inindoor conditions	Shweta Pradhan
2	Techno-economic feasibility and value addition prospects of biofloc technology in inland salineaquaculture	Babitha Rani
3	Strategies for quality fish production throughspecies combination, environmental and nutritional interventions	Gauranga Biswas
4	Role of exogenous hormonal manipulation inenvironmental-endocrine relation in breeding performance and mating behaviour of *Clariasmagur*	Ibemcha Chanu
5	Amelioration of inland saline water for aquaculture use in Maharashtra	Kapil S.
6	Propagation and utilisation of red seaweed, *Gracillaria* spp. for sustainable shrimp aquaculture	Madhuri Pathak
7	Reproductive endocrinology and captive breeding of one-stripe spiny eel, *Macrognathus aral*	Prem Kumar
8	Taxonomical, biochemical evaluation and utilization of order Dictyotales (Phaeophyceae) - brown algae.	Layana P.
9	Modification of dolnet for sustainable fisheries management along Mumbai Coast	Karankumar Ramteke
10	Evaluation of RNA-guided Recombinase (RGR) platform for cell-independent and safer genome engineering in zebrafish vertebrate model	Arvind A. Sonwane
11	Development of reference DNA mini-barcodes and associated high resolution melting (HRM) profiles for authentication of fish species in processed products	Annam Pavankumar
12	Identification of epigenetic markers associated with growth performance in *Clarias magur* (Hamilton, 1822)	Kiran D. Rasal
13	Genetic improvement of growth and breeding efficiency of Clarias magur through selective breeding	S. Jahageerdar
14	Designing optimum cohort breeding programme for mass selection of IMCs	Sunil Kr Nayak
15	Utilization of Jojoba (*Simmondsia chinensis*) and mahua (*Madhua indica*) cake/meals based products in aquafeed	Manish Jayant
16	Screening and evaluation of feed stimulants and attractants for common commercially cultivable fishes	Md. Aklakur
17	Valorization of fruit and vegetable wastes for aquafeed	Shamna N.
18	Evaluation of feeds for improved growth and survival of fishes during the winter season	Ashutosh D. Deo

19	Bioprospecting of thermotolerant freshwater microalgae in climate change scenario	S.P. Shukla
20	Enhancing physiological and metabolic adaptive mechanism of Tilapia to hyper-thermal stress through dietary interventions and environmental manipulation	Tincy Varghese
21	Nano-fertilizer enriched biochar for enhancing the fish growth, water productivity and mitigation of greenhouse gas emission in the aquaculture ponds	Vidyashree Bharti
22	Mapping ecosystem valuation and modelling for simulating sustainability fisheries management scenario in selected reservoir of India	Vinod Kumar Yadav
23	Application of heterologous prime and boost strategies to augment immune-prophylaxis in Nile tilapia Oreochromis niloicus	Jeena K
24	A study on the white faeces syndrome (WFS) in farmed Penaeus vannamei in inland saline areas and development of a management strategy	Sreedharan K
25	Evaluation of non-invasive detection methods for assessing stress response in fish (Fish Welfare part-2)	Sujata Sahoo
26	Assessment of microplastic contamination in fish and fishery products	Monalisa Devi
27	Development of molecular methods for detection and quantification of Cronobacter spp. of human health significance in seafood	Manjusha L
28	Accounting and valuation of professional human capital in Indian fisheries higher education	Neha Wajahat Qureshi
29	Assessing economic feasibility of farm ponds for aquaculture in Maharashtra	Ankush L. Kamble
30	Fisheries and KVKs: Extension strategies for strengthening development and linkages	P.S. Ananthan
31	India's patented technological innovations in fisheries and aquaculture	Arpita Sharma

List of External Funded Projects

Sl No	Title of the Project	Funding agency
1.	Performance Evaluation of AQUALAABH in inland saline Aquaculture systems	Agrocel Industries Pvt. Ltd., Gujarat
2.	Technology demonstration of premium quality Masmin production in Lakshadweep for domestic and export market	NFDB
3.	Distribution of pathogenic microaerophilic *Arcobacter* sp. in seafood and development of a rapid method for its detection	Department of Biotechnology (DBT)
4.	Investigations on ecological status, conservation and enhancement of fisheries in Maharashtra part of Sardar Sarovar reservoir	DoF, Govt. of Maharashtra
5.	Referral Laboratory under the National Surveillance Programme for Aquatic Animal Diseases	MFAH&D, GOI
6.	Application of CRISPR/Cas system in molecular detection of fish and shrimp diseases	ICAR consortia research platform for Vaccine and Diagnostics
7.	Understanding molecular basis of host-pathogen-environment interaction of Tilapia lake virus disease	NASF, ICAR
8.	Consultancy project for evaluation of vaccine	Indian Immunological Pvt Ltd. Hyderabad
9.	Study on the occurrence, impact on biotic communities and development of integrated technologies for remediation of the emerging pollutant triclosan	Department of Science and Technology
10.	Identification and comparative expression analysis of novel immune-related genes against prevalent bacterial infections and development of remedial measures in Asian Seabass, *Lates calcarifer*	Department of Biotechnology
11.	In vitro differentiation and characterization of fish muscle and optimization on plant-based scaffolding towards whole cut seafood production	Good Food Institute, USA
12.	Nanodelivery of conspecific kisspeptin to enhance sexual maturity and gonadal development in *Catla catla*	DST-NANOMISSION
13.	ICAR- Network program on precision agriculture	ICAR
14.	Changing dynamics of labour migration on employment, livelihoods and resource productivity patterns in Indian marine fisheries sector	NASF, ICAR
15.	Agri-drone technology demonstration project	ICAR

16.	Consultancy project on roadmap 2030 for fisheries and aquaculture development in reservoirs ponds tanks of Rajasthan	Govt. of Rajasthan
17.	Technology demonstration of Singhi catfish culture in Recirculatory aquaculture system (RAS) and entrepreneurship development in the region	NFDB
18.	Utilization of micro-algae *Chlorella vulgaris* (CV) in the diet of *Clarias magur* fingerlings	RGSTC, Maharashtra
19.	Evaluation of methanotrophic bacterial meal and extract on growth and immunity of Pacific white shrimp (*Penaeus vannamei*) post larvae	StringBio Pvt Ltd, Bengaluru
20.	Effect of diet containing Black Soldier Fly Larvae (BSFL) raised in environment controlled chambers on growth and immunity of Vanname	Greengrahi Pvt Ltd
21.	Captive breeding of Hilsa, *Tenualosa ilisha*: Phase II	NASF, ICAR
22.	Technology demonstration of emerging fish species in biofloc culture system	NFDB
23.	Establishment of aquatic animal health and environmental management laboratory (AAHEML)	NFDB
24.	Genetic improvement of common carp cyprinus carpio for inland caline aquaculture: strain development for underutilized water resources (Phase I)	DoF, GoI
25.	Establishment of a bio-resource facility of zebrafish (Danio rerio): A national genetic repository for wild type and inbred zebrafish - Phase I	NFDB
26.	Sensor based integrated vertical farming for horticultural crops and aquaponic system	NASF, ICAR
27.	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 region and Western Ghats)	ICAR
28.	NSPAAD Phase II	PMSSY
29.	INFAAR (AMR Project)	ICAR
30.	Network Project on Fish Health	ICAR
31.	Consultancy on Certification of fish hatcheries in Maharashtra	Govt. of Maharashtra

NATIONAL AGRICULTURAL HIGHER EDUCATION PROJECT

Development of Energy Efģcient and Envionment Protective - Aquaculture Technologies for Degraded Soils -

Centres for Advanced Agricultural Science and Technology (CAAST)

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

Duraəon: 2018-2023 Project Code: CIFE/2018/100/EF

Principal Investigator : Dr. N. P. Sahu (from 1.6.2022); Dr. Gopal Krishna (till 31.05.2022)
Nodal O cer: Dr. Rupam Sharma (from 1.6.2022); Dr. Gayatri Tripathi (till 31.05.2022)

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Component 1: Development of Energy EfĜcient and Eco-friendly Technologies

The NAHEP-CAAST Project on "Development of Energy Efficient and Environment protective Aquaculture Technology for Degraded Soils" implemented during 2018-23 at ICAR-Central Institute of Fisheries Education, Mumbai has become a milestone in fisheries higher education as well as in inland saline aquaculture research in India. Comprehensively achieving the objectives set out, the Project has yielded outputs in the form of strategic insights, novel methods, technologies, products, and publications on one hand, and enhanced competency levels and broadened outlook of the fisheries graduates and the faculty, thus making ICAR-CIFE a center of excellence in fisheries science. Following an interdisciplinary approach, the remote sensed data on topography, vegetation, drainage, and transport networks were integrated with the primary data from the analysis of soil and water from salt-affected areas, and the farmers' knowledge and willingness to take up aquaculture through a novel Site Suitability Index for Inland Saline Aquaculture consisting of 14 indicators. Using the SiSI-ISA, the four districts in three states (Rohtak, Jhajjar, Fazilka, and Mathura districts of Haryana, Punjab and Uttar Pradesh) were mapped at the village, Panchayat, and block level in a web-GIS platform and made available in a user-friendly format. This would help planners and development departments, as a ready reference, to identify and promote cluster based inland saline aquaculture development in an eco-friendly and sustainable manner. The application of biochar in inland saline aquaculture was tried successfully for the first time and it was found that biochar application can improve the water quality parameters, and productivity of the system by enhancing the growth and survival of

cultured organisms. Potassium (2%) enriched biochar was found to mitigate not only the potassium deficiency in the shrimp culture system but also the need for water exchange during the culture period.

Biochar incorporated feed was found to enhance the percent weight gain as well as reduce the FCR of candidate aquaculture species genetically improved mono-sex tilapia (GIFT) and the white-leg shrimp *L. vannamei*. A specialized biofloc reactor was designed and fabricated for high intensive tilapia culture using inland saline water. It was a pioneering effort to optimize and standardize the process. Additionally, a novel feed formulation incorporating biofloc as a key dietary ingredient was meticulously developed and subjected to thorough evaluation. This integrated methodology marks a significant advancement in tilapia aquaculture, showcasing a holistic approach from system design to feed formulation for enhanced and sustainable rearing practices in saline water environments. Low Protein High Energy (LPHE) diets were evaluated and optimized for GIFT tilapia and *L. vannamei* juveniles reared in inland saline water without compromising the growth performance. Implementing the Ideal Protein Concept, we could successfully reduce the dietary protein level for these species. Supplementary dose of nutraceutical mixture in LPHE diets has also been evaluated and optimized in relation to stress mitigation and growth enhancement of GIFT tilapia and *L. vannamei* shrimp reared in inland saline water. This novel nutraceutical based feed mix will help in better growth at a reduced cost, thus benefiting the farmers. Phytoremediation is more cost-effective and has fewer side effects than physical and chemical approaches. The strategic cultivation of aquatic plants like *Centella asiatica* (Jalbrahmi) and *Trapa bispinosa* (Trapa) has been found to provide an eco-friendly approach for the reclamation of saline-affected soils by effective treatment of wastewater. They were found to efficiently remove different macro and micronutrients, and adsorb heavy metals thus addressing critical challenges in inland saline aquaculture. For the first time, we comprehensively mapped the bacterial diversity in the inland saline water (ISW) environment as well as in the microbiome in the shrimp gut, in relation to the brackishwater farms and its shrimp. Both were found to be comparable with vibrios as a vital component. Metagenome study revealed the presence of microsporidian parasite Enterocytozoon and viral pathogens such as WSSV in the ISW farms. These findings will help develop ISW-specific scientific management strategies to make inland saline shrimp aquaculture sustainable in the long run. The project developed eight value-added shrimp products, such as shrimp patties, coated shrimps, shrimp pickle, wafer, *chakli, shev, papad* and dehydrated shrimp, and disseminated them to stakeholders through demonstration, training and skill development, benefitting 157 women. Significant breakthrough was achieved in biological waste utilization by the use of halophilic archaea for the deproteinization process. Common carp is one of the widely cultured candidate species in aquaculture, and is also found in natural water bodies.

The geographically diverse stocks of common carp were collected, characterized and genetically evaluated for growth performance in the inland saline environment (4 and 8 ppt). The growth-related traits in the base population exhibited high heritability, and genetic selection based on BLUP was performed to produce the F1 generation. It has laid the foundation for the long term R&D program and has helped secure funding support. For effective technology outreach for responsible and sustainable inland saline aquaculture, an ICT based integrated approach was evolved and implemented. A knowledge product in the form of a multilingual, illustrated and reader-friendly better management practices (BMP) field manual on inland saline aquaculture was prepared and distributed. A bilingual and feature rich mobile app *(mJhinga*) was developed with intuitive user interface, weather and market info, disease diagnostics, pond management, etc. Copyright has been granted for *mJhinga* app. Social media was harnessed with a network of shrimp farmers forming an active *CIFE Jhinga* WhatApp group for knowledge sharing. A web portal on inland saline aquaculture was developed to showcase project activities. Online courses on inland shrimp aquaculture will be hosted on a MOOC platform. The facilities for internet radio have been developed.

CIFE/2023/102/EF

Genetic improvement of common carp *Cyprinus carpio* for inland saline aquaculture: strain development for underutilized water resources

About 101 full-sib families (including 26 half-sib families) were produced in March-April 2023 and reared separately in hapas till they attained taggable size . The PIT tagging was conducted in August 2023. The fish from each family was randomly selected and a total of 5049 fish were PIT tagged and released for grow-out ponds. The growth performance of common carp is genetically evaluated at three geographical locations (Haryana, Madhya Pradesh and Bihar) and at three salinities (Freshwater, 2-4 and 6-8 ppt salinity). The tagged fish were released to grow out as follows: 3030 at CIFE Rohtak centre, Haryana (1974 fish at 6-8 ppt, 1056 fish at 2-4 ppt), 1016 at CIFE Powerkheda centre, Madhya Pradesh (Freshwater) and 1003 at Motipur centre, Bihar (Freshwater). The heritability estimates for growth traits at tagging ranged between 0.66 to 0.74. Further, geographical stocks are assembled at each of the above centres. About 28 thousand advanced fingerlings of F1 generation produced from genetically selected high performing parents were distributed to various fish farmers (10 nos) of Haryana.

Project duration: 2023-25

Principal Investigator
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Funding Agency:

Department of Fisheries, Ministry of Fisheries, Dairying and Animal Husbandry, Government of India

Budget: Rs. 9.28 crore

Techno-economic feasibility and value addition prospects of biofloc technology in inland saline aquaculture

CIFE/2022/103/IF

Project Duration:2022- 2024

Principal Investigator
Babitha Rani A. M.

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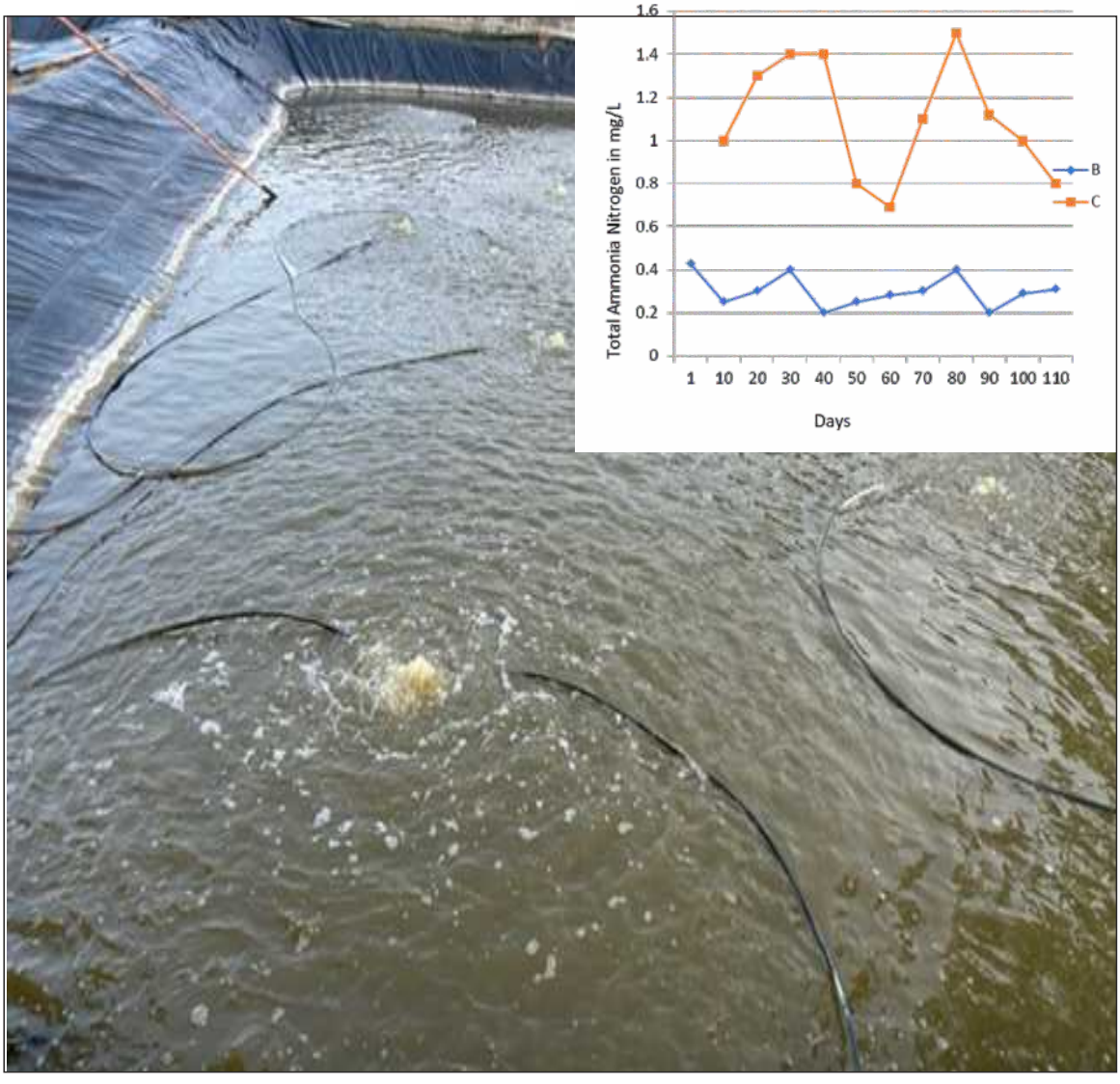
Upasana Sahoo

A total of 6 poly-lined ponds of 200 m^2 were stocked with Pacific white shrimp of average weight of 2.2 g as biofloc treatment (60 No/m^3) and control (40 No /m^3) in triplicates. The trails were carried out for a period of 120 days. The ponds inoculated with the indigenously prepared biofloc consortia through soil enrichment in a bioreactor specific to 15% or 15 ppt salinity and the methodology for inoculation and maintenance of biofloc in open poly-lined ponds were standardised. The biofloc ponds were maintained as a zero water discharge system and control was with limited water exchange. The biofloc consortium was fermented overnight using jaggery/molasses to maintain a carbon: nitrogen ratio of 10:1. The bio-growth parameters were significantly higher in control compared to biofloc, whereas biomass yield and survival were significantly higher in biofloc ponds. There was also a reduction in vibrio load in the biofloc system in addition to considerable reduction in FCR in biofloc (1.09) compared to control.



Amelioration of inland saline water for aquaculture use in Maharashtra

CIFE/2023/104/IF

Project Duration: 2023-26

Principal Investigator
Kapil S. Sukhdhane

Co-Principal Investigators
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India is blessed with vast resources for aquaculture in the forms of 3.15 million ha of reservoirs, 2.41 million ha of ponds and tanks and 0.19 million ha of rivers and canals. In addition to these resources, 9.2 miliion ha of fragile agricultural land, unsuitable for any worthwhile agriculture or allied activities exist in different parts of India. The Government of India has set a target for a country for restoring 26 million ha of degraded lands, including salt-affected soils, by the year 2030 to ensure food security for the people. Most of these resources are fallow and not utilized for any productive activities. Of the 9.2 million ha of saline soils, about 1.0 million ha exist in Maharashtra alone of which about 10% were the rich sugarcane lands of the districts of Maharashtra (Pune, Satara, Sangli and Kolhapur). Under the project, different inland saline sites of Satara, Sangli and Kolhapur district were visited in order to identify the potential sites for the culture. The study showed the ionic imbalance between Ca:Mg:K was identified from different locations. The imbalance ratio between Ca:Mg was found as 1:0.75 whereas Ca:K was found 1:0.15 in inland areas of Maharashtra. The water Hardness Index from these regions was found to be 1.7. The imbalance between other ideal ratios such as Na+: Mg^{2+}: Ca^{2+} : K+ ratio, K : Na ratio, and Ca : Na ratio was also observed. The ion concentrations in milliequivalent L^{-1} (mEq L^{-}) were calculated to check the balance of cations and anions in sampled water and found more than 35% error in chemical equilibrium certification which may limits the growth and survival of shellfishes in the inland waters of Maharashtra. The laboratory based bioassay tests were performed on *Macrobrachium rosenbergii* and GIFT fishes without any specific fortification or alteration by utilizing various water samples sourced from Satara, Kolhapur and Buldhana regions. The bioassay tests were conducted over a span of 15 days, maintaining optimal conditions for the animals in triplicates. Experimental animals were fed twice daily, with a diet comprising approximately 4% of their body weight. The bioassay test on *Macrobrachium rosenbergii* and GIFT fish exhibited notable variations in survival rates, growth parameters, and different stress indicators as compared to control ($p<0.05$). These findings underscore the importance of optimizing mineral compositions to enhance the overall growth and wellbeing of *M. rosenbergii* and GIFT.

CIFE/2022/105/IF

A study on the white faeces syndrome (WFS) in farmed *Penaeus vannamei* in inland saline areas and development of a management strategy

Project duration: 2022-25

Principal Investigator
Sreedharan K

Co-Principal Investigators
Babitha Rani A. M.
Pankaj Kumar
H. Sanath Kumar

Technical Associates
Ashok Kumar
Satyendar Singh

Carried out phenotypical characteristics of the selected vibrios from Rajasthan, and found to be dominated by *Vibrio alginolyticus* and *V. parahaemolyticus*, exhibiting varying degrees of hydrolytic potential. The molecular analysis of 4 representative isolates employing 16S rRNA gene sequencing identified them as *V. alginolyticus.* The representative isolates possessed the virulent gene tlh, and one isolate displayed tdh gene. Moreover, incidence of WFS from three *P. vannamei* farms in the Rohtak District of Haryana was reported. The water quality parameters were found to differ significantly among normal and diseased ponds with respect to ammonia, nitrite and pH. The WFS-affected samples showed higher TVC than the normal ones. Interestingly, analysis of plankton revealed the presence of toxic blue green algae, *Microcystis* sp. in WFS-affected ponds

Strategies for quality Ĝsh production through species combination, environmental and nutritional interventions

CIFE/2022/201/IF

Project Duration
2022-2025

Principal Investigator
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Technical Associate
P. K. Behera

Quality assessment of Indian major carps (IMC) from the beel fisheries was conducted using samples (81-446 g) collected from a beel fisheries of North 24 Parganas, WB yielded higher dressed % in case of larger fish as yield % depends on the size of fish. Irrespective of size, mrigal gave the highest yield of dressed body, i.e above 60% as compared to other species. In case of cooking loss, no particular trend with respect to size was observed in all the fish species. Sensory panelists preferred more catla and rohu in comparison to mrigal.

Quality assessment of IMCs from semi-intensive composite culture system was also carried out

Among the IMC samples (91-1330 g) collected from a semi-intensive composite culture system of Sonarpur, WB, Rohu gave the highest dressed yield of > 56% compared to catla (50-56%) and mrigal (54-58%). Catla generated the highest by-products of about 45%. Cooking loss was highest in rohu followed by in catla and mrigal. Sensory panellists preferred all the three species.

Comparison of fish quality based on cooking loss from semi-intensive and extensive culture systems

Rohu and mrigal samples (200-550 g) collected from semi-intensive and extensive culture systems at Canning, South 24 Parganas, WB were assessed for fish quality based on cooking loss. Cooking loss, which is one of the important indicators of flesh/meat quality, was found to be more for fish from semi-intensive cultures in both rohu and mrigal. Ventral parts showed relatively higher cooking loss in comparison to others body parts (Table 1). Overall, IMCs from natural water (beel) had superior flesh quality in terms of processing parameters, such as dressed percentage, by-products and cooking loss in comparison to fish from semi-intensive and extensive systems. IMCs from semi-intensive system contained marginally higher protein and lipid levels than that of the extensive system and natural water. Assessment of post-harvest fish quality in term of cooking loss of Rohu and Mrigal from semi-intensive and extensive carp culture systems indicated better fish quality in the extensive system.

Table 1. Cooking loss (%) of various body parts of Rohu and Mrigal collected from semi-intensive (SI) and extensive (EX) culture systems.

Body parts	Cooking loss (%)			
	Rohu (SI)	Rohu (EX)	Mrigal (SI)	Mrigal (EX)
Dorsal	26.58±2.54	20.48±2.04	29.81±2.37	19.34±1.97
Ventral	27.14±2.24	23.40±2.20	31.26±2.56	20.13±1.40
Caudal	26.42±1.69	23.22±1.53	29.66±2.46	21.19±0.96

Role of exogenous hormonal manipulation in environmental-endocrine relation in breeding performance and mating behavior of *Clarias magur*

CIFE/2022/202/IF

Project duration:
2023-2026

Principal Investigator
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Technical Associates
Narendra K. Aglave
Hasan Javed

An experiment was conducted to evaluate the effect of biologically active exogenous hormone induction with environmental simulation for previtellogenic oocyte progression in *Clarias magur.* The experiment consists of three treatments and one control where the fish weighing an average weight of 90.91 ± 6.27g were randomly distributed in 3 treatments & 1 control *viz;* Control: No shower and Hormone, T1: Hormone, T2: Shower, T3: Shower with Hormone maintained. The treatments (T2 & T3) having showers (simulation model for artificial rainfall) were turned on at random intervals. The females of two treatments (T1 and T3) were assigned to the hormonal administration for eight weeks based on the oocyte diameter. The ovarian lavage method for administration of hormone in *Clarias magur* was standardized with a catheter used for the hormone delivery. The hormone was administered weekly and dose increased based on progress of the oocytes from the previtellogenesis (~400µm) to the vitellogenesis stage (~1000µm). The oocyte diameter of untreated fish was kept as a base reference for comparison of previtellogenic oocyte progression in the hormone-treated fish. The oocytes were sampled weekly for biopsy (fish) to determine their progression rate and to adjust the hormone administration dose, and their diameter was measured using a stereo zoom microscope. Ultrasonography method for observation of gonadal development and oocyte progression was standardized and used over the sacrifice method to estimate the gonadosomatic index at monthly intervals and oocyte diameter and to know the progress in the maturity stage of fish. The overall reproduction dynamics (hormonal pattern) during the stages of vitellogenesis, post-vitellogenesis and ovulation shows a similar pattern with other fishes except LH hormone which shows higher during vitellogenesis. Initially, the experiment started with previtellogenic oocytes (~0.4mm). At the end of the experiment, the highest diameter of the oocyte (~1.8 mm) was obtained in T-3, followed by T-1 and T-2, and showed a significant difference compared to the control. The intervention in different treatments, the reproductive performance tends to be increased where the highest GSI was reported in T-3 (22.44 ± 2.08%). The breeding performance shows higher in T3 (Shower and Hormone). Output of the trial suggests that synergistic effect of both shower and hormonal induction is significant in captive maturation of *Clarias magur.*

Captive breeding of Hilsa, *Tenualosa ilisha*: Phase II

CIFE/2021/203/EF

Project Duration: 2021-2024

Principal Investigator
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(Till January, 2023)
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Gayatri Tripathi
Mujahidkhan A. Pathan
(Till June, 2023)
Kiran Rasal
(June, 2023 onwards)
T. K. Ghoshal
(August, 2023 onwards)

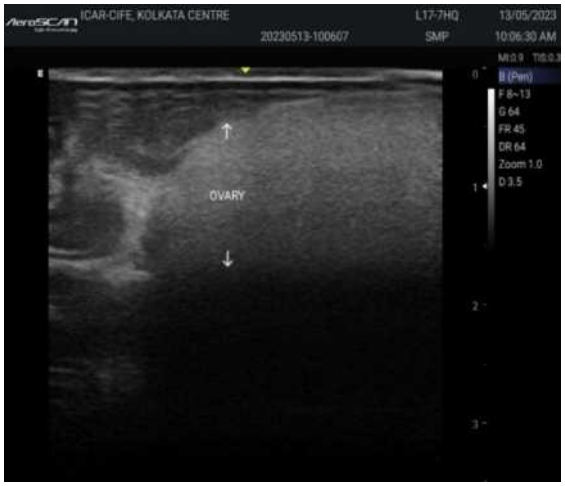
Technical Associate
Hasan Javed

Funding Agency:

NASF, ICAR, New Delhi

Budget: Rs. 69.91 lakh

Determination of gonadal volume of male and female hilsa using ultrasonography was standardized for the riverine samples. Two separate regression equations were established for male and female fish. Using these regression equations gonad volume was calculated. It was found that both real gonad volume and USG calculated gonad volumes were highly correlated with real gonad weight. From the regression equations, the real gonad weight could be calculated and used for calculation of GSI which indicated the respective gonadal maturity stages in both male and female hilsa. Further, supporting histological slides of different maturity stages were compared with the respective fish's ultrasonic image to validate the accuracy of the ultrasonographic method. The same method was field tested for maturity assessment of pond reared hilsa over a period of one year at Kakdwip and Kolaghat, West Bengal (Fig. 1, 2). It was observed that the ultrasound method could accurately measure gonad volume using the shape method and indicate the maturity stages, except for stages I and II for male and female hilsa. Therefore, this non-invasive technique of assessment of sex and maturity stages in hilsa proved to be an accurate and valid tool for field application without sacrificing the precious broodstock. Seasonal assessment of gonad development and changes in sex hormones from wild and pond reared hilsa was performed. It is observed that during April and August months, estradiol (E2) level was higher in riverine females around 5-5.3 ng/ml and during August the concentration of 11-keto testosterone (11KT) was around 9 ng/ml in males . Whereas, in pond reared female hilsa, E2 level was 3.0 and 2.8 ng/ml during April and August and in male, 11KT level was around 7 and 5 ng/ml during July and August, respectively. Both E2 and 11KT levels were different in riverine hilsa than in the pond reared hilsa. Expression analysis of LH gene at different maturity stages using real time PCR was carried out in the pituitary of hilsa male and female. The relative expression level of LH gene was the highest both in female and male at the spawning stage. At the mature and spent stages, expression level of LH gene was low both in female and male. This indicated the surge of LH in the final maturity stage to accelerate the spawning in hilsa.



Network project on ornamental Ĝsh breeding and culture (Technology development on captive breeding and seed production of selected indigenous ornamental Ĝshes native to north eastern hill region and western ghats)

CIFE/2021/202EF

Project Duration
2020-2025

Principal Investigator
Dr. Paramita Banerjee Sawant

Co-Principal Investigators
Dr. Debajit Sarma
Dr. Gouranga Biswas
Dr. Gayatri Tripathi

Diet matrix analysis evaluated based on gut content using the % Index of Relative Importance (% IRI) and the Frequency of Occurrence Method revealed a carni-omnivorous and bottom browsing habit having a preference for animal materials over plant materials. Analysis of the stomach contents reveal a wide feeding range predominated by algae, macrophytes (plants), shrimps, insects, fish, fish parts, sand, mud, unidentified plant matter, unidentified animal matter, nematodes and worms as main ingredients selectively eaten by fishes. Average RGL and HSI value of *B. striata* recorded after 12 months of sampling at source were 1.75 and 0.54 respectively, confirming its carni-omnivorous nature. GSI and Condition factor K were 20.53 and 1.41 respectively. 88.66% of fish sampled from source had food in the stomach while 06 (11.32%) specimens had empty stomach. 30.18% individuals had full stomachs while 33.96%, 13.20% and 11.32% were ¾, ½ and ¼ full respectively.

Optimisation of captive maturation of the zebra loach done using selected feeding regimes i.e. (three selected feeds at two feeding frequencies). Shelf-life of frozen form of live feed revealed no reduction in nutritional qualities upto 12 weeks. If fresh live feed is not available, farmers can feed frozen form for loach upto three weeks when stored at 4°C. Hormone biomarkers indicated mature status of zebra loach fed with semi moist formulation in combination with sandy substrate. A benthopelagic and potamodromous cyprinid, endemic to the western ghats, its alimentary canal found to be comparatively long with the relative gut length (RGL) varying between 1.08 to 3.21. Major food items from the gut revealed dominance of worms (50%), semi digested animal matter (15%), semi digested plant matter (10%), green algae, diatoms, mud and seeds. Nutrient requirement revealed that optimum protein (P): energy (E) ratio for Jerdon's carp varies between 74.52 and 86.87 mg protein/kcal DE. Maturation studies on High fin barb (*Oreichthys crenuchoides)* were carried out using curry leaf extract (CLE) supplementation revealed that out of 0.5, 1.0, 1.5 and 2.0% dietary CLE supplementations, the GSI, HSI values, biochemical parameters (tissue lipids and lipoproteins, antioxidant enzymes, digestive enzymes, liver enzymes and relative glucose content), hormonal biomarkers (11α-KT, 17β E2, DHP and cortisol) and, quality and quantity of gametes showed a substantial improvement on CLE supplementation of 0.5-1% in the diet. Effect of homochromatic lights on growth, stress and pigmentation of Scarlet/Red badis *(Dario Dario)* was evaluated in scarlet badis, *Dario Dario* (Only males were stocked as females are naturally less chromatic). Green spectra caused better growth, chromaticity with least melanin whereas white (w) & ambience (a) had medium effect, blue (b) & dark (d) had poor effect, red (r) had detrimental effect.

Reproductive endocrinology and captive breeding of one-stripe spiny eel, *Macrognathus aral*

CIFE/2023/205/IF

Project duration: 2019-22

Principal Investigator
Dr. Prem Kumar

Co-Principal Investigators
Dr. Sukham Munilkumar
Dr. Rupam Sharma

Macroganthus aral, (Peacock eel) is a commercially important small indigenous fish species (SIS) of wetland of Assam, Bihar, N-E India and West Bengal, where it is locally known as Tora, Latta, Ngaril and Pankal, respectively. This species has high culture potential due to its hardy nature, nutritional value, high consumer demand and market price. Due to lack of seed production technology of *M. aral*, farming of this species is not picking up. Hence the development of a comprehensive seed production package, which includes captive broodstock development, understanding the annual reproductive cycle in captivity is prerequisite. In this connection, Sub-adults (10-15 g and 12-13 cm) of *M. aral* were procured, transported and quarantined for development of captive broodstock. Fish are being reared in FRP tanks (physicochemical parameters-Dissolved oxygen: 5-6 ppm, pH: 7.6-7.9, total hardness: 90-100 ppm) and fed with blood worm twice to the satiation. Around 150 numbers of *M. aral* captive broodstock are developed.

Propagation and utilisation of red seaweed, *Gracillaria* spp. for sustainable shrimp aquaculture

CIFE/2023/206/IR

Project duration: 2023-2026

Principal Investigator
Dr. Madhuri S. Pathak

Co-Principal Investigators
Dr. Sukham Munilkumar
Dr. Ibemcha Chanu
Dr. Kapil Sukhdhane
Dr. Jeena K
Dr. Vaibhav A. Mantri

Seaweeds (macroalgae) are one of the major primary producers in marine ecosystems, comprising about 35 million tonnes of the total world marine aquaculture production by weight in 2020. Species of the genus *Gracilaria* (Red seaweed) are distributed worldwide, but grow mostly in tropical and subtropical water bodies. This species can withstand a wide range of tolerance in all the life stages environmental parameters, such as salinity in a range of from 5 to 40 ppt. Semi-intensive and intensive culture systems can cause water quality deterioration, which leads to sub-optimal culture conditions for shrimp and negatively influences their survival and growth if such waste is not properly controlled. seaweed should be considered as a potential component of shrimp culture for in situ bioremediation. Additionally, a co-culture system can be used efficiently for seaweed growth, ultimately maximizing the economic benefits. Under the project, red seaweeds were collected across the coast of Mumbai. The nutrient uptake efficiency of *Gracilaria foliifera* was found higher compared to *Gracilaria corticata* and other red seaweeds. A short-term experiment was conducted to optimize and to validate the stocking density of selected seaweed (*G. foliifera*) from the first experiment for 5 days (96 hrs). Water quality parameters and nutrient uptake efficiency, *G. foliifera* (T8) showed maximum nutrient uptake when stocked at the rate of 3.5 g/L. The nutrient uptake efficiency of TAN (61.07%), NO_3 (27.02%), NO_2 (48.8%) and PO_4 (72.3%). Growth, biochemical composition and pigment composition of *Gracilaria folifera* also showed higher efficiency when reared in wastewater.

Evaluating environmental effects on pearl formation in *Lamellidens marginalis* reared in indoor conditions

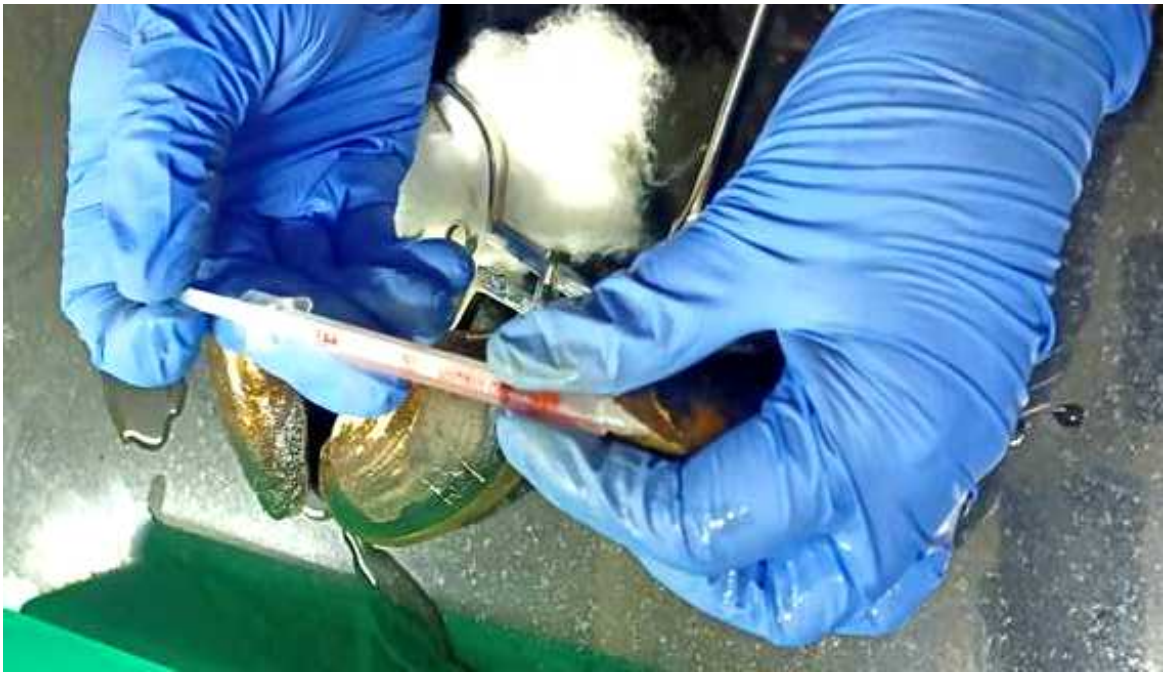
CIFE/2021/207/IF

Project duration: 2021-2023

Principal Investigator
Shweta Pradhan

Co-Principal Investigators
S. Dasgupta(till Jan 2023),
Suman Manna
S.Munil Kumar
(till March, 2023)
G. H. Pailan

A study on the effect of temperature in the pearl formation in freshwater mussels *Lamellidens marginalis* was undergone for mantle cavity method of implantation. The size of the mussel used was 40-50g in weight and 7-10cm in length. The mussels were implanted on both sides of the mantle cavity. The nucleus used was a designer nucleus with 4-5 cm size with 1-2 mm thickness. The nucleus was made up of mussel shell powder. The treatments were C (ambience), T1(24-26°C), T2(26-28°C), T3(28°C), T4 (30°C) T5 (32°C) T6 (34°C). The experimental duration was 12 months. The experiment was done in triplicate. The anterior adductor muscle was visualized near the hinge and penetrated with a sterile needle, directed parallel to the anterior edge of the shell and haemolymph was collected standard way. After hemolymph collection total haemocyte count was evaluated using a haemocytometer with rose bengal stain. Different cells such as granulocytes and agranulocytes. were observed. Stress and immune parameters were also studied during sampling.



Technology demonstration of emerging Ĝsh species in biofloc culture system

CIFE/2022/208/EF

Project duration: 2022-2024

Principal Investigators
Dr. Babitha Rani A. M.

Co-Principal Investigators
Dr. Shamna, N.
Dr. Sreedharan, K.
Dr. Upasana Sahoo

Budget : Rs. 26.0 Lakh

Funding Agency
National Fisheries Development Board, Department of Fisheries (NFDB), Ministry of Fisheries, Dairying and Animal Husbandry, Government of India

The ready to use media for freshwater biofloc production was standardized and ex-situ developed floc was evaluated for a ready to use media for biofloc culture of fish. The floc forming characteristics were evaluated and found that the biofloc starter media is able to produce biofloc in a short span of time. The water quality parameters indicated that the toxic metabolites were within the limits of zero water discharge. The biofloc units (6 nos.) of 15000 L capacity each were stocked with singhi fish at the rate of 120 and 160 No/m^2 for rearing trials in triplicates. The fish were reared in the winter temperature also in thermally controlled atmosphere and they have reached an average of 20 g size, though low temperature is affecting the growth. In a separate experiment, the salinity tolerance of singhi fish was evaluated with varying salinities (0, 4, 8 ppt) and found that the maximum tolerance is 4 ppt. Training and demonstration of the technology was carried out to entrepreneurs in 4 batches as standard operating protocols for rearing singhi catfish in a biofloc system and a total of 36 people got trained.

Technology Demonstration of Singhi catĜsh culture in Recirculatory aquaculture system (RAS) and entrepreneurship development in the region

CIFE/2021/209/EF

Project duration: 2021-2024

Principal Investigator
Md. Aklakur

Co-Principal Investigator
Ashutosh D Deo

Funding Agency:
National Fisheries Development Board

Budget: Rs. 38.95 Lakh

The standardization of different species under the RAS system is being done at the entrepreneur site at Nagri and Ratu Ranchi. Groundwork development of the site at Motipur is done. The tank based culture of Singhi is being standardized at Entrepreneurs site at Vaishali Bihar

ICAR-Network program on precision agriculture (NePPA)

(CIFE/2021/210/EF)

Project duration: 2021-2026

Principal Investigator
Dr. Ashutosh D. Deo

Co-Principal Investigators
Dr. B.B. Nayak, Dr. K. K. Krishnani, Dr. A.K. Verma, Dr. Vinod Kumar Yadav, Dr Vidyashree Bharti, Dr. Layana P., Dr. Karan Kumar K. Ramteke, Dr. Manish Jayant and Dr Arun Sharma

In order to establish Automated Intensive Aquaculture System (IAS) sensor based Intensive culture System was established in three tanks with *Penaus vannamei* at ICAR-CIFE, Mumbai. The larval rearing of *P. vannamei* is going on in 12000L FRP tanks and juvenile shrimp rearing is going on in 10000 L tanks. Water quality parameters like temperature, dissolved oxygen (DO), pH, and TDS analysis are done in real time using sensor based IoT systems, remotely. The sensor data are validated with laboratory analyzed data to maintain the congenial environment for shrimp culture. It was observed that there is insignificant variation in both the recorded data. A sensor based drum filter was also developed which is based on the sensor signaling automatic two step backwash and commercialized. Detection and tracking of the white-leg shrimp in underwater environments has been successfully accomplished in order to develop a decision support system for environmental assessment and health management in the aquaculture system. Object detection (YOLOv8 algorithm, which is based on CNN) was used to monitor shrimps for signs of disease, such as changes in behavior or physical symptoms. This can help quickly identify and respond to disease outbreaks, which can help minimize disease risk. Counting and tracking techniques were used to monitor fish for signs of disease or stress. The shrimp were continuously monitored by the camera to capture their normal behavior and behavioral changes to different stress conditions. The exposure time interval for different parameters (dissolved oxygen, temperature, and pH) increased or decreased by 8 h, 12 h, and 24 h. At a time, fifteen shrimp in each tank were selected for the test, and behavior was recorded. The behavior was recorded along with real-time temperature, pH, and DO. Categorization of four behaviors has been done while watching the recorded video, i.e., gasping, resting at the bottom, erratic, and unbalanced swimming patterns. These four behaviors were recorded along with the change in temperature, pH, and DO to perform some machine learning

Fig. Automated IAS

Fig. Filtration Unit

Fig. Sensor Control Panel

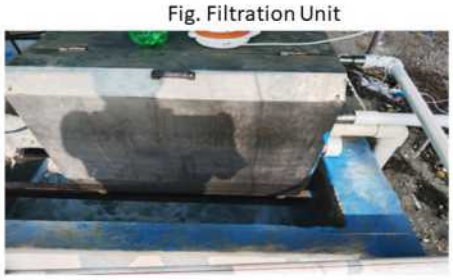
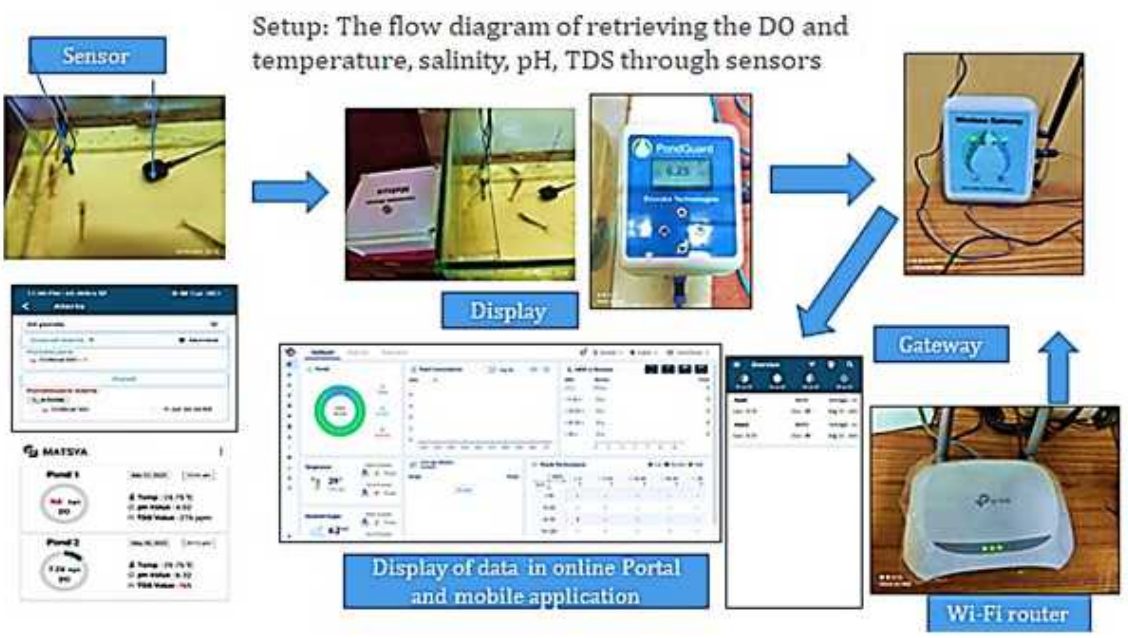
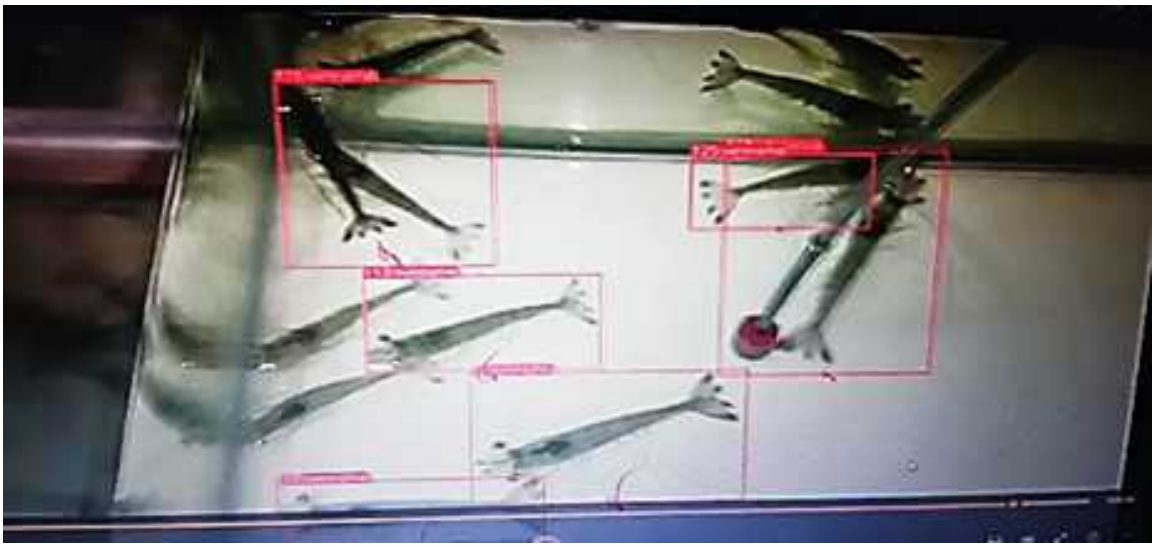


Fig. Sensor Based Drum Filter

classification tools. Three classification tools were used to analyze the data, i.e., decision tree classifier, naïve bayes classifier and K nearest neighbor (KNN). This information can be used to identify and manage fish populations that are at risk of disease or other problems. A comprehensive dataset of disease-related textual information was gathered and classified. This dataset will encompass a wide range of disease descriptions, symptoms, and characteristics. A BERT (Bidirectional Encoder Representations from Transformers) NLP (natural Language Processing) model will be fine-tuned using this dataset for disease classification. The BERT NLP model has undergone extensive training on the collected textual data to enhance its capacity to understand and classify textual descriptions of disease symptoms. The YOLOv8 model and fine-tuned BERT NLP model were seamlessly integrated into the unified Dashboard, enabling it to analyze and categorize textual descriptions provided by users along with behavioral analysis and image based disease classification. Development of a prototype for the detection of normal and infected shrimp. A trial is in the process of developing a shrimp disease detection prototype applying WSSV and Black gill disease.





Sensor based integrated vertical farming for horticultural crops and aquaponic system

CIFE/2023/211/EF

Project Duration
2023-2026

Principal Investigators
Dr. A. K. Verma

Co-Principal Investigators
Dr. Prem Kumar
Dr. Tincy Varghese

Funding Agency
NASF, ICAR

Budget : 38.71 Lakh

A 90-days trial investigated the feasibility of employing organic fertilizer extract as a supplemental nutrient source to aquaculture wastewater of *Channa striata*- lettuce aquaponics. Extracts of four different organic fertilizers, *viz*., vermicompost (28.8 mg/L), cow manure (50 mg/L), chicken manure (50 mg/L) and black soldier fly larvae (BSFL) frass (3.3 mg/L) were applied on a weekly basis in T1, T2, T3 and T4, respectively and compared to control (C). The water quality varied within admissible limits for aquaponics. A significant modulation was observed in total lettuce yield and nutrient content in all organic fertilizer extract supplemented treatment groups than control and vermicompost supplement outplayed other fertilizers in aquaponics production. Another trial was conducted to investigate the effect of different dosages of vermicompost on *Lactuca sativa* L. and *Channa striata* in an aquaponic system. The system was stocked with *Channa striata* at 2.24 kg m^{-3} and Nutrient Film Technique (NFT) hydroponics with lettuce at 28 plants m^{-2}. Based on the 1st experiment, treatments were set as T3 (equivalent to control, adopted from first experiment= 28.8 mg/L) and the range of graded levels of dosages, viz., T1 =14.4 mg/L (50% reduction from T3), T2= 21.6 mg/L (25% reduction from T3), T4= 36.0 mg/L (25% increase from T3) and T5 = 43.2 mg/L (50% increase from T3) was evaluated to determine the most efficient dosage for the aquaponic system. It is revealed from the study that nutrient dearth in aquaponics, a major constraint in aquaponics production, can be alleviated using organic fertilization approaches to substitute the customary practice of inorganic fertilizer application in commercial aquaponics. Different organic fertilizers, *viz*., vermicompost, cow manure, chicken manure and black soldier fly larvae (BSFL) frass used were found to be feasible for potential practical application in aquaponics and vermicompost extract was found to outperform with desirable plant and fish production, water quality, lettuce nutrient content and optimum fish welfare. Vermicompost supplementation as nutrient tea at a dosage of 21.6 mg/L on a weekly basis was found to exhibit exemplary performance for *Channa striata*-lettuce aquaponics.

Study on determination of air puriĜcation capacity in ornamental plants

CIFE/2022/212/EF

Project duration: 2022-2026

Principal Investigators
Kiran P. Bhagat, ICAR-DFR, Pune

Co-Principal Investigators
Paramita Banerjee Sawant (ICAR-CIFE, Mumbai),
P. Naveen Kumar (DFR-Pune),
Gursimran Satsanghi (SPPU, Pune),
Jagadish Rane & A.K. Singh (ICAR-NIASM, Baramati),
K. K. Krishnani (ICAR-IIAB, Ranchi)

Set of fifteen different indoor plants with five replications placed at different levels of air pollution which was initially measured with the help of NDIR Air Pollution Sensor based equipment. The lesser air polluted area was selected as- 1) ICAR-National Institute of Abiotic Stress Management, Baramati (NDIR based Air Pollution Sensor). The different levels of air polluted areas included for experiments are- 2) ICAR-Directorate of Floricultural Research, Pune; 3) Savitribai Phule Pune University, Pune; and 4) ICAR- Central Institute of Fisheries Education, Versova, Mumbai. The air pollution levels were recorded before keeping plants in various populated working rooms, laboratories, seminar halls and sitting cabins of respective Institutes. The indoor plants were then kept and various physiological, biochemical and anatomical parameters were measured at uniform periodic monthly intervals from all the experimental areas. Oxygen release efficiency and carbon di-oxide fixing capacity of fifteen indoor plants were also studied and it was found that three of them were superior in terms of the above parameters. Studies initiated at ICAR-CIFE on phytoremediation capacities of selected aquatic ornamental plants in populated aquariums.

Evaluation of feeds for improved growth and survival of Ĝshes during the winter season

CIFE/2023/303/IF

Project Duration: 2023-2026

Principal Investigator
Dr. Ashutosh D Deo

Co-Principal Investigators
Dr. Shamna N
Dr. Md. Aklakur
Dr. Manish Jayant
Mr. Dhalongsiah Reang
Dr. Subodh Gupta

An experiment was conducted for eight weeks in a low-temperature (18 ± 1 °C) Re-circulatory Aquaculture System (RAS) attached to an online chiller of 6.0 tonnes capacity to understand the growth and physiological changes in striped catfish when fed with propylene glycol(PG). The RAS has inlets and outlets fitted with a mechanical cum biological filtration system and the flow rate was maintained at 1.6 L/min. Five isonitrogenous (37.0%), isolipidic (10.0%), and isocaloric (412 kcal DE/100 g) diets with varying levels of propylene glycol viz. 0, 0.25, 0.50, 0.75, 1.0, and 1.25% were prepared, and the diets were denoted as C, T1, T2, T3, T4, and T5, respectively. The feed intake was significantly ($p<0.05$) higher in all the treatment groups compared to the control. Fish fed with 1.0% propylene glycol showed a higher feed intake. Dietary propylene glycol supplementation significantly enhanced ($p<0.05$) the growth rates (weight gain %, and thermal growth coefficient) of striped catfish, *Pangasianodon hypophthalmus* reared at low temperature. Dietary supplementation of propylene glycol did not affect ($p>0.05$) the feed conversion (FCR, FER and PER), body indices (HSI, ISI & IPF) and survival (%). Digestive enzyme activities (protease, amylase and lipase) were significantly higher at 1% dietary PG supplementation. The MDH and IDH activities significantly ($p<0.05$) differed among the experimental groups. The highest activity was found in the group fed with 1.0% propylene glycol (T4), whereas the lowest levels were in the T1 group with 0.25% and T5 group with 1.25% propylene glycol.

Screening and evaluation of feed stimulants and attractants for common commercially cultivable Ĝshes

CIFE/ 2022/304/IF

Principal Investigator
Md. Aklakur

Co-Principal Investigators
Ashutosh D Deo
D.K. Singh
Tincy Varghese
Manish Jayant
Udipta Roy

Two experiments were carried out to test selected amino acids as feed attractants in carp diets. Feed attractants such as L-amino acids and dimethyl-β-propiothetin (DMPT) can be added in fish feed to improve palatability. In the first experiment, alanine, arginine, glutamic acid, glycine, hydroxyproline, and Lysine were tested for their feed attractant properties in *Catla catla*, whereas in the second experiment, arginine and DMPT (Dimethyl- beta Propiothetin) were tested in *Labeo rohita*. The feed intake study conducted in the Y Maze apparatus showed the feed attraction and stimulation properties of amino acids in the feed. For feed stimulation and attraction response, parameters like the initial response of the animal, number of hits, intensity of response, total time of stay in one arm, and percentage of feed consumed were recorded. The highest feed intake and growth were observed in hydroxyproline (1%), arginine (1.25%), and alanine (1.5%) supplemented feeds in Catla. The combination of 0.5% arginine and 0.01% DMPT and individual supplementation of arginine (1.25%) enhanced feed intake in *L. rohita* fingerlings compared to other individual doses of arginine and DMPT.

Utilization of Jojoba (Simmondsia chinensis) and Mahua (*Madhuca indica*) cake/ meals based products in aquafeed

CIFE/2022/305/IF

Project Duration: 2022-2025

Principal Investigator
Dr. Manish Jayant

Co-Principal Investigators
Dr. Ashutosh D Deo
Dr. Shamna N
Dr. Subodh Gupta
Dr. Parimal Sardar
Dr. Kiran D Rasal
Dr. Arun Sharma

For preparing JPC (Jojoba protein concentrate), finely ground and defatted Jojoba cake was used. Various combinations of alkaline and acidic solutions were used to optimize protein extraction. The highest dry matter recovery and protein percentage were observed in a combination of 12.0 and 5.0. The dissolution was done at pH 12 followed by adjusting the pH to 5.5 to precipitate the proteins. JPC had a higher concentration of protein (51.91%) than JSC (28.93%). It also showed an increase in gross energy value. While the fiber content remained similar, JPC had lower levels of anti-nutritional factors like phytate and saponin than JSC. JPC displayed a well-balanced amino acid profile and a significant increase in most essential amino acids, particularly lysine and methionine. This improvement indicates a better nutritional profile for animal feed. Nutritional quality evaluation of JPC showed higher nutritional indices than JSC, with methionine being the limiting amino acid in both.

Additionally, JPC exhibited better digestibility in *in-vitro* study. The feeding trial was conducted by successfully replacing soybean meal with JPC in fish feed. At an inclusion level of 14%, JPC resulted in the best growth performance and feed conversion for the fish studied. This suggests JPC can be a viable alternative protein source in aquaculture.

Valorization of fruit and vegetable waste for aquafeed

CIFE/2022/306/IF

Project Duration: 2022-2025

Principal Investigator
Dr. Shamna N.

Co-Principal Investigators
Dr. Parimal Sardar
Dr. Manish Jayant
Dr. Subodh Gupta
Dr. Manjusha L
Dr. Babita Rani A.M.
Dr. Jeena K.
Dr. Namrata A. Giri

Solid state fermentation (SSF) of mixed cabbage and cauliflower waste (1:1) meal (CCM) was done using *Aspergillus niger, Chaetomium globosum* and *Saccharomyces cerevisiae* for 14 days. The highest crude protein and lower crude fiber and anti-nutritional factors such as saponin, phytate, tannin and hydrogen cyanide were observed in *A. niger* fermented CCM on day 7 (FCCM). Fermentation of the mixed cabbage and cauliflower waste (FCCM) with *A.niger* increased the crude protein level and decreased the crude fiber by 18.90% and 20.83%, respectively on day 7. The digestibility of dry matter, crude protein, and crude lipid was higher in the FCCM20 and FCCM30 fed groups. Feeding raw cabbage and cauliflower meal (CCM) at 30% level gave a similar weight gain to control, whereas the 20% raw CCM fed group showed a higher ($p<0.05$) growth. Enzyme supplementation to raw CCM further enhanced the growth, while fermented CCM fed groups showed higher weight gain compared to all other groups.

Similarly, SSF of tomato pomace meal with *A. niger* enhanced the crude protein content and reduced the crude fiber in it. The *in vivo* feeding trial showed fermented tomato pomace meal enhanced growth and metabolic well-being of the fish compared to control, raw and enzyme supplemented tomato pomace meal. However, raw tomato pomace meal could replace 100% DORB without compromising growth and health of *L. rohita* fingerlings.

Utilization of micro-algae *Chlorella vulgaris* (CV) in the diet of *Clarias magur* Ĝngerlings

CIFE/2023/307/EF

Project Duration: 2023-2025

Principal Investigator
Shamna N

Co-Principal Investigators
Parimal Sardar
Yogendra Shastri
(IIT-Bombay)

Budget: Rs.11.9 Lakhs

Funding Agency: RGSTC, Govt of Maharashtra

A study was carried out to evaluate the open race-way cultured *Chlorella vulgaris* meal (CVM) as an alternative of fish meal in the diet of *Clarias magur* fingerlings based on growth, body composition, and physio-metabolic changes. The crude protein and ether extract contents in CV was 40.15% and 4.50%, respectively. Five iso-nitrogenous (35% crude protein), isolipidic (6%), and isoenergetic (350 kcal digestible energy/100 g) experimental diets by replacing fish meal (FM) gradually with *Chlorella vulgaris* meal (CVM) on protein equivalent basis viz., C (Control with 20% FM, 0% CVM, T25 (15% FM, 7.30% CVM), T50 (10% FM, 14.60% CVM,), T75 (5% FM, 21.80% CVM), and T100 (0% FM, 29.13% CVM) were formulated. One hundred fifty acclimatized fingerlings (2.01 ± 0.50 g) were randomly divided into five treatments (C, T25, T50, T75, and T100) in triplicate using 15 experimental tanks with the stocking density of 15 fish/200L tank. The fish were fed with respective diet to satiation for 60 days. The weight gain (WG), weight gain % (WG%), specific growth rate (SGR), and protein efficiency ratio (PER) indicated that up to 75% replacement of fishmeal at 21.8% inclusion level is possible by CVM. There was no significant variation ($p>0.05$) in the enzyme activities of amylase, hepatic alanine aminotransferase (ALT), lactate dehydrogenase (LDH), superoxide dismutase (SOD) among the treatments. In contrast, chymotrypsin, alkaline phosphatase (ALP), and acid phosphatase (ACP) activities were higher ($P<0.05$) in higher CVM-fed groups. Protease and muscle aspartate aminotransferase (AST) activities were similar ($P>0.05$) to control in higher CVM-fed groups. The hepatic malate dehydrogenase (MDH) and catalase activities were significantly higher in T50 and T75 groups. Based on the results obtained, the current study concludes that *Chlorella vulgaris* raised in an open raceway system can replace 75% of fishmeal at 21.8% inclusion level in the diet of *Clarias magur* fingerling.

Effect of diet containing Black Soldier Fly Larvae (BSFL) raised in environment-controlled chambers on growth and immunity of *Vannamei*

CIFE/2023/308/CR

Project Duration
2023-2025

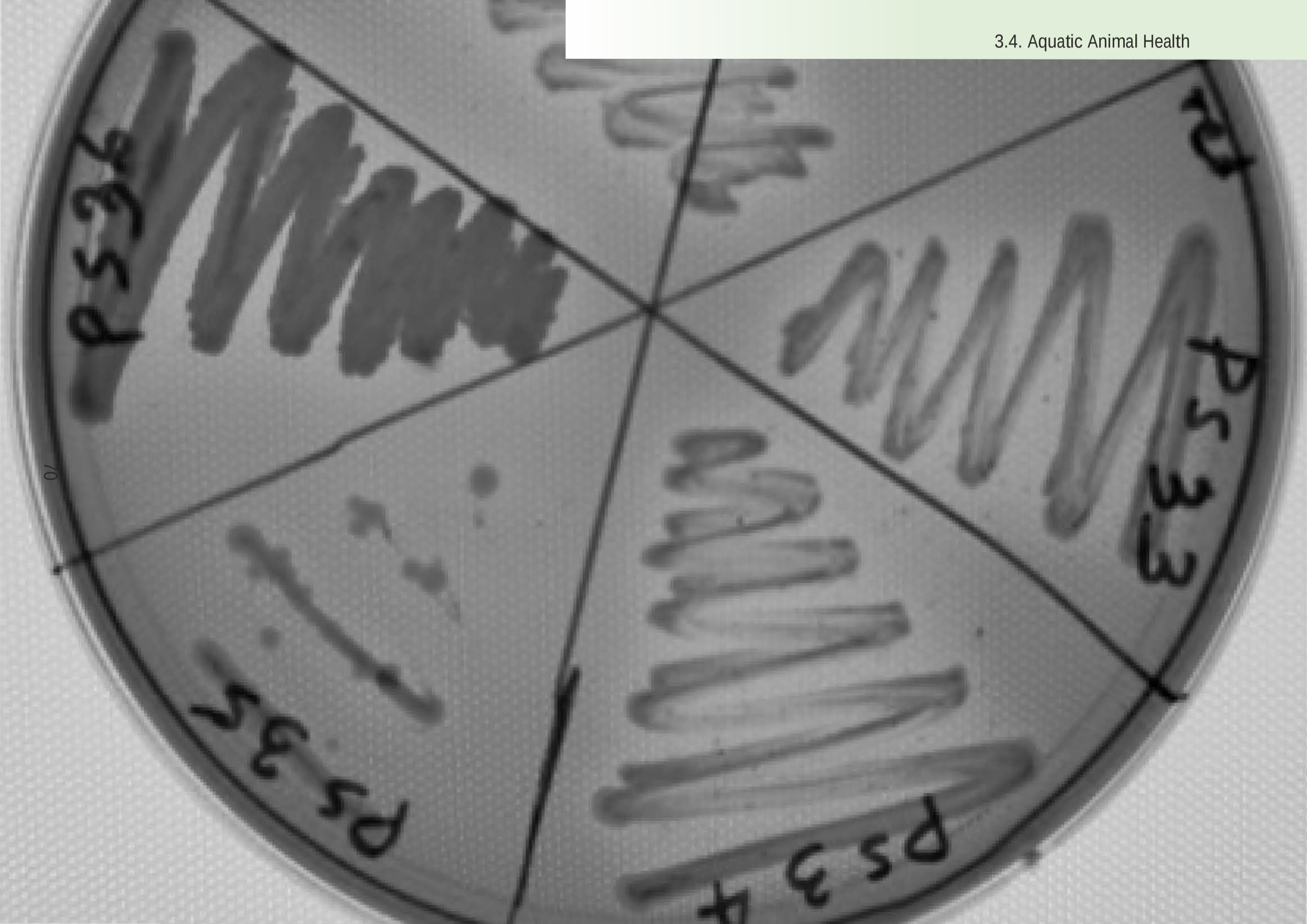
Principal Investigator
Dr. Shamna N

Co-Principal Investigator
Dr. N.P. Sahu

Budget: Rs.6.03 Lakhs

Funding Agency
Greengrahi Pvt Ltd.

The insect meal prepared under controlled conditions had a protein level of 43% and 16% lipid. The chitin levels were estimated to be 4%. A 60-day feeding trial was conducted to test the inclusion level and effect of BSFL raised in environment-controlled chambers on growth, nutrient utilization, physio-metabolic, and immune responses of *Penaeus vannamei* juveniles. Nine iso-nitrogenous (36% crude protein), isocaloric (372.49 Kcal digestible energy /100gfeed) practical diets were formulated by replacing fish meal with graded levels of defatted ECBSFL or OSBSFL viz. Control (0% BSFL), ECBSFL (25%, 50%, 75%, 100%) and OSBSFL (25%, 50%, 75%, 100%). Shrimp fed ECBSFL 75% diet exhibited the highest ($p<0.05$) WG(g), WG (%), SGR, TGC, FER, PER, LER, serum total protein and lower FCR than the other groups. The protease activity was significantly ($p<0.05$) higher in ECBSFL 50% and ECBSFL 75% groups, whereas ECBSFL fed groups showed similar amylase activity with control groups except ECBSFL 100% group. From the study it can be concluded that up to 75% of fish meal could be replaced by using BSFL raised in the environment-controlled system or 50% replacement of fish meal with defatted BSFL raised in an open system without any adverse effects on growth performance, nutrient utilization, physio-metabolic and immune responses of *Penaeus vannamei* reared in brackishwater.


PS36
PS33
PS34
PS35
PS36

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

CIFE/2019/401/EF

Project Duration: 2023-24

Principal Investigator
Megha K. Bedekar
(From February 28, 2023 onwards)
K.V. Rajendran

Co-Principal Investigator
Saurav Kumar

Budget
Rs. 86.34 lakhs

Funding agency
National Agricultural Science Fund, ICAR

The objectives of the present project are to determine the role of microbial co-infection in TiLV disease outbreaks and to develop a high-throughput diagnostic assay for TiLV. During the reporting period, TiLV screening was done in selected districts of Maharashtra state, including Mumbai, Pashane, Kamshet, Karjat, Patas, Talegaon, Khopoli Kamshet, and Kolhapur. Clinical signs of the infected fish were found to be frayed/erosion of the tail, shrunken abdomen, eye hemorrhages, and body discoloration. Samples were complicated with Aeromonas infection. Further, data on Tilapia were collected from 16 tilapia farms/rearing facilities in Maharashtra state. At many places in Maharashtra, Tilapia is being cultured along with other fish species such as pangasius *(Pangasianodon hypophthalmus),* rohu *(Labeo rohita)* , *Catla (Catla catla)* in earthen ponds and climbing perch (*Anabas testudineus*) and pangasius in cages. For TiLV screening, primers targeting segment 1, segment 3, segment 6, and segment 10 were used. Presence of symptomatic and asymptomatic RT-PCR-positive cases from Maharashtra farms needs attention. Pathogenicity of the isolates was confirmed in CPE of TiLV inoculated OnIL cells.

16S rRNA-based Gut microbiome metagenomic analysis of gut samples of clinical and subclinically TiLV-infected *O. niloticus* was studied. Group 1 (clinically infected with TiLV), Family Fusobacteriaceae (50.30%), and Genus *Cetobacterium* (50.20%) covered a higher proportion in the bacterial abundance, while Family Peptostreptococcaceae had the lowest (0.40%). In another Group 2 (sub-clinically infected with TiLV), *O. niloticus* had a higher relative abundance of family Clostridiaceae and genus smb53 at 15.20%. In group 2, Family Enterobacteriaceae marked the lowest relative abundance (0.90%). The result signifies the role of TiLV infection in gut microbiome dysbiosis. Further, a TiLV-specific qRTPCR is developed, efficiently detecting low copy numbers of TiLV.

Application of CRISPR/Cas system in molecular detection of Ĝsh and shrimp diseases

CIFE/2022/402/EF

Project duration: 2022-25

Principal Investigator
Megha K. Bedekar

Co-Principal Investigators
Rajendran K. V.
Jeena K.
Kundan Kumar
Kiran Rasal

Budget: Rs. 10.29 lakhs

Funding agency
ICAR Consortia Research Platform for Vaccine and Diagnostics

The project's objectives are to develop a CRISPR-based diagnostic system for detecting white spot syndrome virus (WSSV) and a CRISPR-based diagnostic system for detecting Tilapia lake virus (TiLV). During the reporting period, the objectives were to identify target sequences in the WSSV genome of the Indian isolate and design guide RNA (crRNA) and to standardize the CRISPR-Cas12a-based detection test for the WSSV isolate of India. A method for one pot, isothermal RPA-CRISPR gRNA based point of care diagnosis of WSSV from field samples is optimized using selected genome segments. The processing time of 1 hour at a constant temperature near 37°C without the use of sophisticated equipment, and the sensitivity of the test is 20 copies of the virus. The test can detect latent WSSV infection. The

developed test is colorimetric and can be performed at a farm from crude tissue extract, it does not need sophisticated equipment like Thermocycler and Gel imaging system and can be detected with the help of a fluorometer or android-based detector.

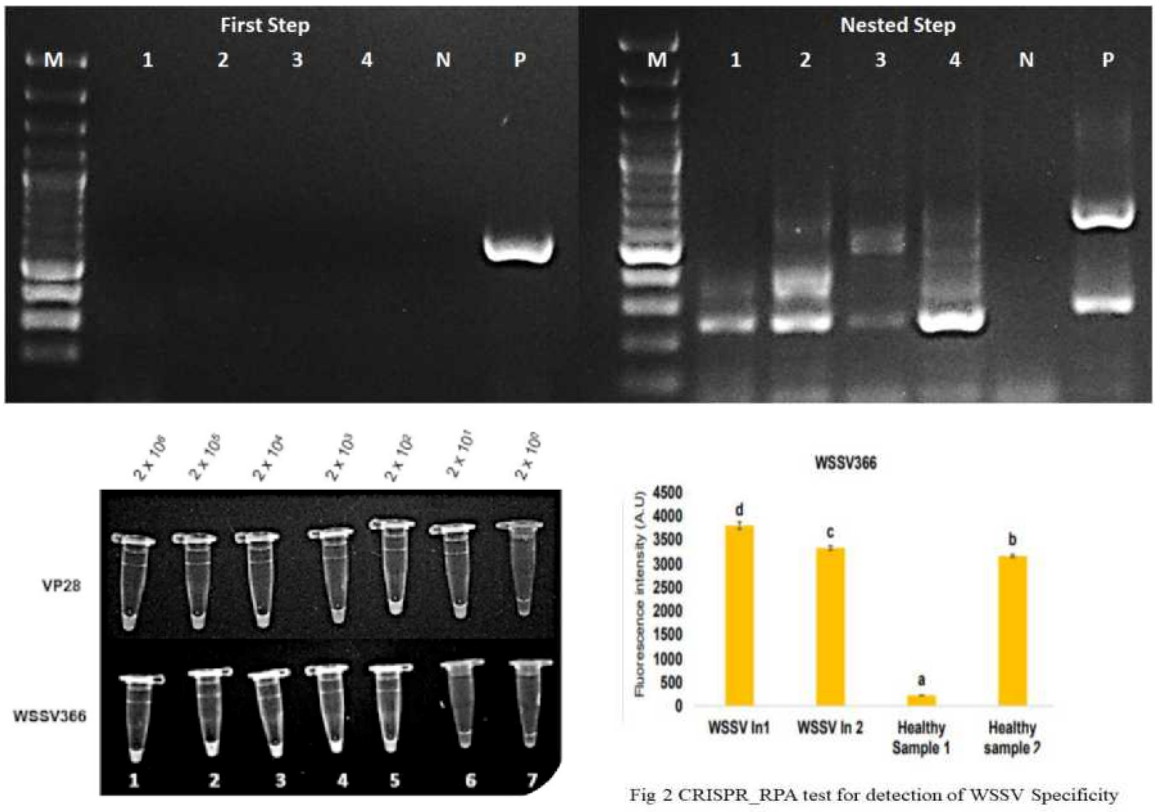


Fig 2 CRISPR_RPA test for detection of WSSV Specificity

Referral Laboratory under the National Surveillance Programme for Aquatic Animal Diseases

CIFE/2022/405/EF

Project Duration: 2022-25

Principal Investigator
Megha Kadam Bedekar

Co-Principal Investigator
Jeena K.

Budget : Rs. 13.24 lakhs

Funding agency
PMMSY, Ministry of Fisheries, Animal Husbandry and Dairying, Govt. of India

The project aims to investigate referred cases from the National Surveillance Programme on Aquatic Animal Diseases (NSPAAD) collaborating centers and validate the report of new diseases. The referred fish and shrimp samples from various aquaculture farms, Department and Fisheries College, were tested for OIE-listed pathogens viz. TiLV, TiPV, and bacterial pathogens. We recorded dominance of co-infections of WSSV and EHP responsible for severe mortality in shrimp farms. Significant cases of IMNV and EHP co-infection-associated mortalities were recorded. Running mortality due to vibrio infection was also recorded. Farmers were given relevant biosecurity advisory. Widespread prevalence of TiLV in cages and wild tilapia were recorded in Maharashtra. Mortality 0% (wild), 20% (adult farmed) to 100% (early fingerlings) were recorded. Focal point for screening of imported aquaculture input samples for presence of OIE listed pathogens submitted by GoI AQCS, Mumbai Processing NABL accreditation for OIE listed shrimp pathogens and TiLV and TiPV. First report of occurrence of TiPV in tilapia farms was recorded.

IdentiĜcation and comparative expression analysis of novel immune-related genes against prevalent bacterial infections and development of remedial measures in Asian Seabass, *Lates calcarifer*

CIFE/2023/403/EF

Project Duration
2023-26

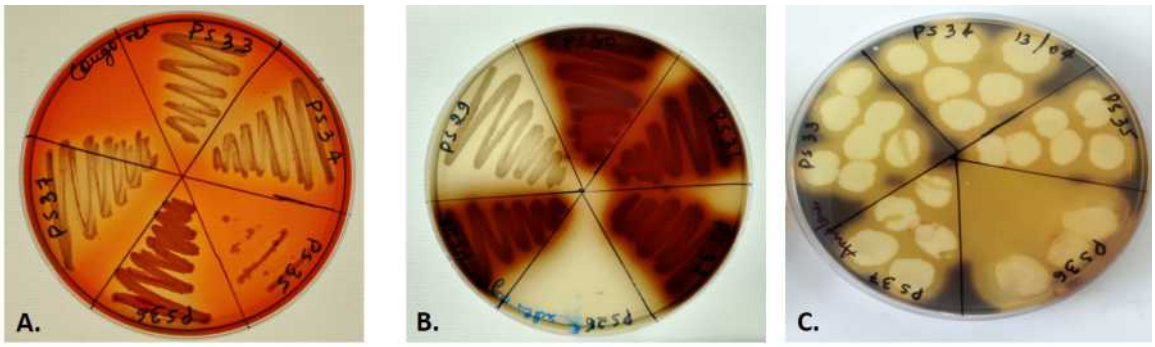
Principal Investigator
Gayatri Tripathi

Co-Principal Investigators
Kiran Rasal
Jeena K.
Manish Jayant

Budget : Rs. 61.06 lakhs

Funding agency
Department of Biotechnology (DBT), New Delhi

Seabass farming is one of the promising commercial aquaculture practices worldwide. Bacterial diseases are considered a serious concern in seabass farming and can cause mortality and economic losses to the farmers. The proposal has been conceptualized to explore the responses of immune genes, pathways involvement, the interplay of virulence factors on gut microbiome during infection, and the role of additives having immunomodulatory properties to combat bacterial infection without using antibiotics. The objectives of the project are (i) To identify and characterize tissue-specific candidate genes associated with immunity in Asian Seabass (*Lates calcarifer*). (ii) To analyze differentially expressed genes (DEGs) profile during prevalent bacterial infection in fish, and (iii) To develop an eco-friendly probiotic-based formulation against bacterial infections in Asian seabass. During the three-month reporting period, the farmed Asian seabass was procured from the Raigad district of Maharashtra State. Lipopolysaccharide Binding Protein (LBP) gene, *which* is a soluble acute-phase protein that binds to bacterial lipopolysaccharide during bacterial infection to elicit immune response, was identified in the kidney tissue and partially characterized. The Probiotic bacteria from the gut of healthy fish was isolated, and presumptive identification was performed.



Isolated potential probiotic bacteria from the gut of healthy Asian seabass (*Lates calcarifer*) fingerlings.
In vitro examination confirming positive results of PS33, PS34 and Ps37.
A. Biofilm formation, B. *Esculin hydrolysis* and C. Starch hydrolysis test.

Improvement of water quality and fish Health in integrated freshwater aquaculture Systems through treatment of animal Manure. (under NEH programme)

CIFE/2019/407/IF

Project duration: 2022-25

Principal Investigator
Arun Sharma

Co-Principal Investigators
Dhalong Saih Reang
T. I. Chanu
Vidya Shree Bharati
A. K. Verma
Megha Kadam Bedekar

The objectives of the programme are to develop and upscale the fish-based integrated farming system, and standardize the strategies to reduce the pathogenic bacterial load of animal manure in laboratory conditions. Further, to establish a demonstration cum training laboratory for farmers, and to conduct a field trial in a selected farmer's field to test the efficacy of laboratory standardized methods in a fish-based integrated farming system.

A fish-based integrated farming model was developed in the farmer's field at Gandacherra, Tripura, NEH region. The models include pig cum fish farming, duck cum fish farming, and poultry cum fish farming. Three front-line demonstrations were conducted in the farmer's field on the aforementioned forms of integrated farming with standard housing systems and species combinations both for animals and fish. Three on-farm trials were conducted to assess the growth and survival rate of fish after the application of processed manure of pig, poultry, and duck in the cultured pond.

Application of heterologous prime and boost strategies for augmentation of immunoprophylaxis in Nile tilapia, *Oreochromis niloticus*

CIFE/2022/404/IF

Project Duration: 2022-25

Principal Investigator
Jeena K.

Co-Principal Investigators
Gayatri Tripathi
Megha Bedekar
Madhuri S. Pathak
K. Pani Prasad

Nile Tilapia (10±5g) were procured from a local aquaculture farm in Maharashtra. Fish were maintained in the wet laboratory of AEHMD with adequate aeration and fed ad-libitum and systematic monitoring of water quality and health. The experiment for immune training of acclimatized Tilapia, *Oreochromis niloticus* using β glucan (@ 20 mg/Kg fish) and a novel ligand, colloidal chitin (10, 20, and 50 mg/Kg fish) was undertaken after standardization of the doses. LD50 of *Streptococcus agalactiae* was determined on the test fishes and was estimated as $7.9x10^7$ cfu/ml. The expression profiles of the markers of trained immunity viz., mTOR, HIF1a, and HDAC11 and cytokines IL-6 and IL-12 and IFNγ and TNFα at different time points post immune training with β glucan and colloidal chitin at different time points *viz.* 0, 6, 12, 24, 48 , 72 and 96 h were performed and analyzed. The immune-trained fish groups were challenged after 28 days of immune training. The β glucan-trained fish group subjected to challenge with LD50 of *Streptococcus agalactiae* showed a survival rate of 60%. The RPS of colloidal chitin-trained fish was calculated as 86.11% at the dose of 50mg/Kg fish on *Streptococcus agalactiae*. The different methods of inactivation viz., heat, formalin and H_2O_2 of the bacterial culture were performed and the maximum yield of the bacterial proteins, post inactivation were evaluated by SDS PAGE. The best method of inactivation was found to be the heat and the immunization program is under progress.

Significant achievements

- Colloidal chitin, validated as a potential ligand for innate immune training in fish-a novel attempt in immune training research.
- Survival rate and relative percent survival of immune trained tilapia with beta glucan and colloidal chitin were elucidated and recorded as 60% and 86.11% respectively.

CIFE/2022/408/CF

Study on the occurrence, impact on biotic communities and development of integrated technologies for remediation of the emerging pollutant triclosan

Project Durtaion: 2023-2024

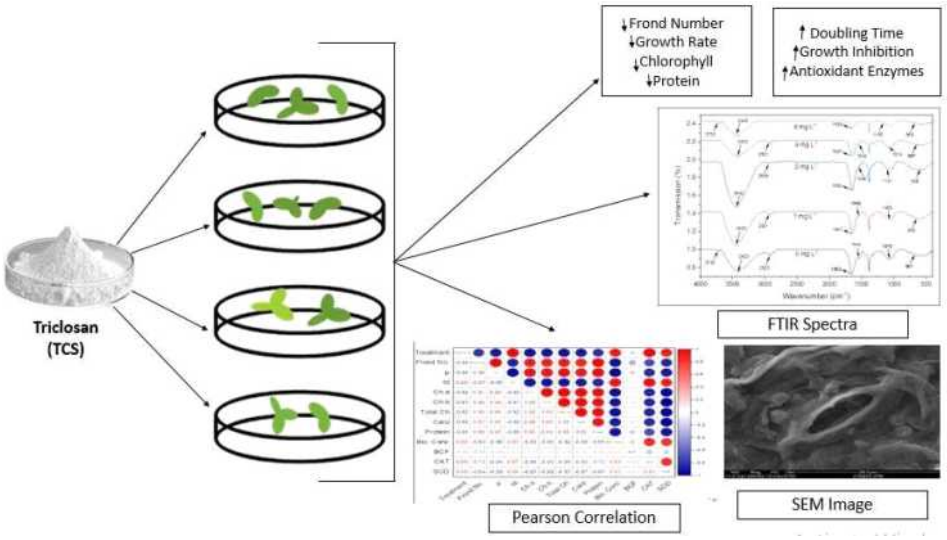
Principal Investigator
Kundan Kumar

Co-Principal Investigators
S. P. Shukla
Saurav Kumar

Budget : Rs. 62.34 Lakhs

Funding Agency
DST, New Delhi

Triclosan (TCS), an emerging pollutant emerges as a notable contributor to adverse impacts on aquatic organisms owing to its widespread use during COVID19 and hydrophobic properties. There is an extensive documented literature of TCS toxicity on commercially important fish species; however, study on aquatic plants remains limited. In this prelude, the present study aims to evaluate the effect of TCS on Lemna minor, a commercially important aquatic plant species for seven days. The results showed dose dependent significant alterations in growth, pigments and stress enzymes of *L. minor* at varied concentrations of TCS (1 to 8 mg L^{-1}). The growth rate reduced with increasing concentrations of TCS and maximum growth inhibition of 60.806% was observed at 8 mg L^{-1} treatment. Median inhibitory concentration (IC50) was found to be 4.813 mg L^{-1}. Chlorophyll a and carotenoid contents were reduced by 74.38 and 81.84 % in highest TCS concentration at the end of experiment. Catalase and superoxide dismutase activities were increased from 1.419 to 9.671 folds in TCS exposed group. Bioconcentration factor was found to be in the range of 5.855 to 37.129 signifying TCS ability to accumulate and transfer through food chain. In addition, scanning electron microscopy (SEM) analysis showed deformation in the cell surface and alteration of stroma morphology of TCS exposed groups. Furthermore, fourier transform infrared spectroscopy (FTIR) study also revealed that higher concentrations of TCS could cause metabolic changes in Lemna minor. The present study confirms that TCS could adversely affect the growth and metabolism of primary producers and provide insights into the potential interaction of TCS with aquatic plants.



Toxicological effect of triclosan on *Lemna minor*: Bioconcentration, growth inhibition and oxidative stress

Conultancy project for evaluation of vaccine

CIFE/2022/409/CF

Project Duration: 2023-2024

Principal Investigator
Megha K. Bedekar

Co-Principal Investigators
Kundan Kumar
Saurav Kumar

Budget: 3.36 Lakhs

Funding Agency
Indian Immunological Pvt Ltd. Hyderabad

Aim of the project is to evaluate two vaccines developed by Indian Immunological Pvt Ltd. Hyderabad Edwardsiellosis vaccine and Columnaris vaccine for fish use. Project initiated in November 2023. 1000 early fingerlings of IMC are vaccinated in three groups *E. tarda* vaccine, *Flavobacterium columnaris* vaccination and dual vaccination. At 14 days of first vaccine fish are given booster. Fish are under observation for immunity. Vaccine experiment is conducted at West Coast Hatchery.

Low cost adsorbents for the removal of phosphate, nitrate and heavy metals from sewage fed aquaculture

CIFE/2021//IF

Project duration: 2021- 2023

Principal Investigator
Suman Manna

Co-Principal Investigators
Subhendu Datta
(till February 2023)
Sweta Pradhan
G.H. Pailan

Due to intensive aquaculture practices and high input use, many chemicals are entering the aquatic environment. Besides domestic effluents and industrial effluents are discharged into the aquatic environment without treatment or with partial treatment. Thus, water quality and other environmental parameters are being degraded day by day due to chemical pollution. Due to erratic rainfall and climate change, the availability of freshwater resources is decreasing daily. Raw sewage or partially treated sewage was entering the pond and deteriorating the water quality. Farmers are reporting high mortality of fish, which might be due to low dissolved oxygen, high ammonia content, high phosphate load, and also the occurrence of parasitic infections in fish. Moreover consumer's acceptance is also very poor for fish cultured in sewage water. Thus, purifying water with simple techniques like adsorption is a very popular, economical, and efficient technique. In our study, we tried to use some synthetic and natural adsorbents for the removal of pollutants like ammonia, nitrate, phosphate, and heavy metals from sewage-fed aquaculture. Low-cost materials like clay minerals are effective in removing organic and inorganic pollutants from aquatic environments. In our study kaolinite and bentonite based adsorbent were synthesized and used in batch adsorption for removing inorganic toxicants from sewage water. Water samples collected from East Kolkata Wetland show high amounts of ammonia, phosphate, total hardness and low dissolved. Water absorbency of the clay-based composites was evaluated and found in the range of 200-400 g/g of dry composite. Kaolinite-based adsorbents were evaluated for their adsorption capacity in removing different toxicant/bad water quality parameters during batch adsorption. The adsorption effectively removed 50-60% of hardness and 70-85% of ammonia and phosphate load from sewage water. To study the breakdown product from the adsorbent, monomer (acrylic acid and acrylamide) and crosslinker were extracted after overnight swelling in distilled water. The solution was filtered and analyzed for the release of monomer from the adsorbent by high-performance liquid chromatography. Acrylamide eluted at a retention time of 3.17 minutes, but in bentonite and rice husk ash-based composite, there was no peak at 3.17 minutes. Thus, there was no release of monomer or breakdown product from the adsorbent.

All India Network Project on Fish Health

CIFE/2022/409/CF

Project Duration: 2023-2024

Principal Investigator
K. Pani Prasad

Co-Principal Investigators
Arun Sharma
Swadesh Prakash

Budget: Rs. 55 Lakhs

Funding Agency
Indian Council of Agricultural Research, New Delhi

- Studied the withdrawal period evaluation of Oxolinic acid as feed additive for marin and fresh water fishes.
- Evaluated the safety of Deltamethrin as bath treatment at different concentration for different duration of exposure. Study reveals that deltamethrin can significantly alter the immunity and physiology of fishes, if it is not used precisely. A dose-dependent immuno suppressive effect on Cyprinus carpio was also found.
- Studied the selected stress related gene (HSP 70) expression associated with the experimental exposure of Deltamethrin on Cyprinus carpio. Relative gene expression of HSP70 confirms that high dosage and long-duration deltamethrin exposure affects the overall physiology of fish and puts fish under stressed conditions for a long.
- Surveyed Aquaculture shrimp farm areas of Maharashtra(50), Gujarat(20), Haryana (35) for Economic impact of aquatic animal diseases occurrence. The data was collected, tabulated and submitted for further analysis.

Network Project on Assessment of AMR in micro-organisms associated with Ĝsheries and aquaculture in India

CIFE/2022/409/CF

Project Duration: 2018-2025

Principal Investigator
K. Pani Prasad

Co-Principal Investigators
K. Jeena

Budget: Rs. 10 Lakhs/Year

Funding Agency
Indian Council of Agricultural Research, New Delhi

Targeted states for shrimp sample collection are Maharashtra (Thane and Ratnagiri districts) and Gujarat (Surat and Valsad). During the reporting period a total of 100 farms were covered. A total of 63 *Escherichia coli*, 94 *Staphylococcus* sp. and 97 *Vibrio* sp. were isolated and biochemically characterized. Characterized isolates were subjected to antibiotic susceptibility testing to a panel of antibiotics as per the CLSI guidelines.

lex
PCR. Lane 1: 100bp ladder, Lane 2-15: Amplicons of LacY (289 bp) and Cyd A (398 bp)

E.coli - Dark centered colonies with green metallic sheen in EMB agar

National Surveillance Programme for Aquatic Animal Diseases

CIFE/2022/409/CF

Project Duration: 2022-2025

Principal Investigator
K. Pani Prasad

Co-Principal Investigators
Gayatri Tripathi
Arun Sharma
Jeena K

Technical Associates

P. Vinay Kumar
Ankita Godavarikar

Budget: Rs. 13.4 Lakhs/year

Funding Agency
PMSSY – Pradhan Mantri Matsya Sampada Yojana

Progress

From January to December 2023, baseline information and shrimp samples were collected from 81 shrimp farms across four districts in Maharashtra (Ratnagiri, Raigad, Thane, Palghar, and Sindhudurg). The focus was on extensive shrimp culture, involving a screening for viruses such as WSSV, HPV, MBV, AHPND, IHHNV, IMNV, YHV, and EHP using PCR methods.

Additionally, fish samples from six farms and crab meat extracts were tested for TiLV, TiPV, and KHV. Diagnostic reports were shared with farmers, who received advice on necessary actions based on the results. Data was updated on the NSPAAD website by ICAR-NBFGR. Emergency harvesting was implemented on disease-infected farms to mitigate economic losses, and farmers were educated on preventing disease recurrence.

Training for Maharashtra state fisheries officers occurred from June 12-14, 2023. Awareness programs were held on February 20, May 4, and June 6, 2023, with bilingual materials distributed to farmers and stakeholders. Regular telephonic follow-ups were maintained to assist farmers in farm management and disease prevention.

Details of surveillance undertaken

Farm details from January 2023- December 2023

State	District	Total No. of farms	Screening done	Total No. of Positive
Maharashtra	Thane	9	WSSV, HPV, MBV, IHHNV, IMNV, YHV, AHPND, TiLV, TiPV, KHV & EHP	2 (WSSV)
	Raigad	24		
	Palghar	53		
	Ratnagiri	1		8 (WSSV) 6 (EHP 2nd & 2 (IMNV)
	Sindhdurg	1		

Genetic improvement of growth and breeding efficiency of *Clarias magur* through selective breeding

CIFE/2022/501/IF

Project Duration: 2022-2027

Principal Investigator
Shrinivas Jahageerdar

Co-Principal Investigators
Thongam Ibemcha Chanu
M.A. Pathan
Shamna N.
Dhalong S. Reang
Sunil Kumar Nayak
Arun Sharma
Muralidhar Ande

Technical Associates
Srinivas Rao P.
Hasan Javed

Through this project, ICAR-CIFE is implementing a genetic selection program for *Clarias magur* to improve harvest body weight, breeding efficiency, and survivability. To effectively carry out this program and disseminate the improved stock for aquaculture at the national level, understanding the reproductive traits of magur is crucial. The low reproductive rate of magur poses a significant challenge to the expansion of magur aquaculture. This study aims to continue genetic selection for growth traits while also enhancing the reproductive performance of magur. Therefore, the selection objectives and criteria will encompass productive and reproductive traits. The analysis revealed that reproductive traits were significantly influenced by spawning age and spawning year. The heritability of these traits to be zero or close to zero. Genetic correlations productive traits ranged from -0.40 to 0.90, while phenotypic correlations ranged from -. The overall reproductive success rate was 45%. Feeding trials were conducted to ffects of dietary lipid levels on the gonadal development of magur. The optimal dietary ement for magur brood stock was 8.53%. Additionally, trials are being conducted to e use of an insect meal-based diet for brooders.

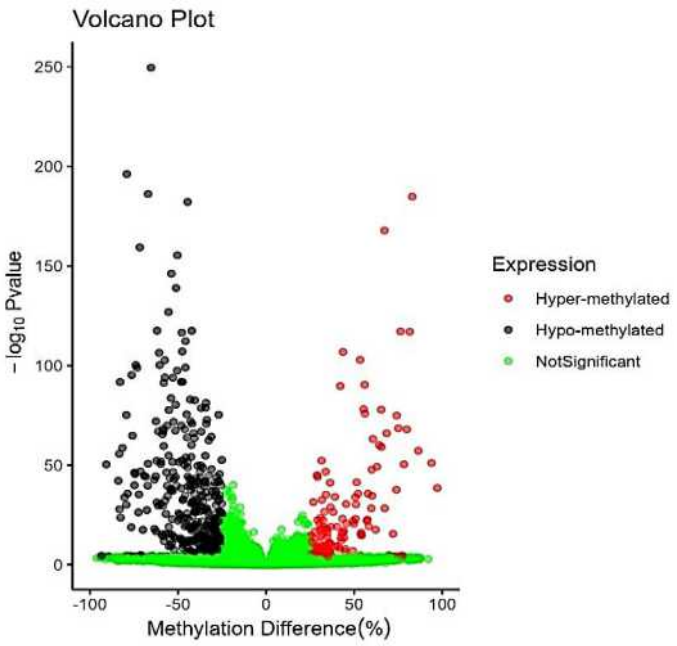
ation of epigenetic markers ed with growth performance in *magur* (hamilton, 1822)

CIFE/2021/502/IF

Principal Investigator
Kiran D. Rasal

Co-Principal Investigators
Aparna Chaudhari
M. P. Brahmane
M. A. Pathan
Dhalong S. Reang

conducted to identify epigenetic markers associated performance in *Clarias magur* (Hamilton, 1822). For this, a total of 194 million clean reads from the transcriptome data from both the groups were generated. Further, the high-quality reads were selected, and 83.44% of them were uniquely mapped against the major genome. Further analysis resulted in the identification of 596 differentially methylated CpG sites (DMCs), and 156 of these were identified as hyper-methylated, and 440 were hypo-methylated. Detailed analysis further identified an average of 111 and 390 mCs in the high-growth and low-growth samples of magur, respectively. The validation of expression analysis of some of these differentially methylated genes (DMRs) and growth-related genes using real-time PCR is being carried out.



Designing optimum cohort breeding programme for mass selection of IMC

CIFE/2022/503/IF

Principal Investigator
Sunil Kumar Nayak

Co-Principal Investigators
Shrinivas Jahageerdar
M.A.Pathan
Dhalongsaih Reang
A.Lenin Singh
H.Haridas
Arun Sharma
Tincy Varghese

The present study was conducted to evaluate the growth performance of different hatchery stocks of *Labeo rohita*. Rohu from six geographical locations of India viz Madhya Pradesh (MP), Maharashtra (MH), Odisha (OD) and Chhattisgarh (CG) were used for the study. Growth traits viz ; body weight (BW) was recorded 30th , 120th, 240th and 390th days of pond age to study the growth performance. Among the stocks, at 390th pond age, for trait body weight the CG stock showed the highest least square mean value of 511.51 a ±6.68 g followed by MH 499.52 a ±5.18 g, MP1 393.34 b ±3.71 g, MP3 328.93 c ±4.64 g, MP2 281.77 d ±3.65 g, and OD 275.33 d ±3.60 g respectively. Broad sense heritability estimates of trait, body weight, and standard length at pond age 390 days are 0.60, and 0.56 are moderate to high. When comparing the growth of Rohu stocks, out of the six stocks assessed for performance, the Chhattisgarh stock exhibited superior performance compared to the others.

Establishment of a bio-resource facility of zebraĜsh (*Danio rario*): a national genetic repository for wild type and inbred zebraĜsh strains

CIFE/2022/504/EF

Principal Investigator
Mujahidkhan A. Pathan

Co-Principal Investigators
Aparna Chaudhari
Angom Lenin Singh
Jeena K.
Chandrkanth M. H

Funding Agency
NFDB, Hyderabad

About 101 full-sib families (including 26 half-sib families) were produced in March-April 2023 and reared separately in hapas until they attained a taggable size. PIT tagging was conducted in August 2023. Fish from each family were randomly selected, and a total of 5049 fish were PIT tagged and released into grow-out ponds. The growth performance of common carp is being genetically evaluated at three geographical locations (Haryana, Madhya Pradesh, and Bihar) and at three salinities (Freshwater, 2-4 ppt, and 6-8 ppt salinity). The tagged fish were released for grow-out as follows: 3030 at CIFE Rohtak centre, Haryana (1974 fish at 6-8 ppt, 1056 fish at 2-4 ppt), 1016 at CIFE Powarkheda centre, Madhya Pradesh (Freshwater), and 1003 at Motipur centre, Bihar (Freshwater). Heritability estimates for growth traits at tagging ranged between 0.66 and 0.74. Further, geographical stocks were assembled at each of the above centres. About 28,000 advanced fingerlings of the F1 generation, produced from genetically selected high-performing parents, were distributed to various fish farmers (10 in total) in Haryana.

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

CIFE/2020/601/EF

Project duration:2020-2023

Principal Investigator
Rupam Sharma

Co-Principal Investigator
Sunil Kumar Nayak
Mujahidkhan Pathan
Gireesh Babu
(ICAR-NRCM, Hyderabad)
Aparna Chaudhari

Budget : Rs. 27.79 Lakhs

Funding agency
DST-Nanomission

Catla catla, a key aquaculture species in India, contributes 50-60% to the total fish production from polyculture systems and commands a high market price. Unlike rohu and common carp, which mature sexually in two and one year respectively, *C. catla* matures after three years, increasing broodstock production costs. Reducing the age at maturity and enhancing gonadal development can address this issue. Kisspeptin, a peptide known for its role in reproductive development, is a potential solution. The Kiss1 and Kiss2 genes for *C. catla* were sequenced by Rather et al. (2014) at ICAR-CIFE's Division of Fish Genetics and Biotechnology. The deduced peptide sequences were synthesized and delivered through chitosan nanoparticles, created using the ionic gelation method. The sizes of chitosan nanoparticle, chitosan nanoparticle connjugated kisspeptin 1(CK1) and chitosan nanoparticle conjugated kisspeptin 2 were 126 nm, 224 nm, and 227 nm respectively, with zeta potentials of 40.1 mV, 34.1 mV, and 24.5 mV. A study was conducted to evaluate the effect of these nanoparticle-conjugated kisspeptins on gonadal development in *C. catla.* Statistical analysis indicated that the treatment significantly increased body weight. Histological examinations revealed enhanced gonadal development in treated fish compared to controls. Testes exposed to KISS1 and KISS2 showed various stages of spermatogenesis, while ovaries treated with these peptides displayed advanced stages of ovum development, including yolk vesicles and granules.Hormonal analysis supported these findings, showing significant increases in levels of luteinizing hormone (LH) and follicle-stimulating hormone (FSH) post-treatment. Before treatment, LH levels were 0.43 mIU/ml in males and 0.54 mIU/ml in females; after two months, these levels increased to 0.61 mIU/ml and 0.92 mIU/ml, respectively. FSH levels rose from 0.36 mIU/ml in males and 0.22 mIU/ml in females to 0.39 mIU/ml and 3.19 mIU/ml, respectively.These results demonstrate the effectiveness of exogenous kisspeptin, delivered via nanoconjugates, in accelerating gonadal development and reducing the age of maturity in *C. catla*. This advancement holds significant promise for reducing production costs and enhancing the efficiency of *C. catla* aquaculture.

In vitro differentiation and characterization of Ĝsh muscle and optimization of plant-based scaffolding towards whole cut seafood production

CIFE/2021/602/EF

Project Duration:2021-2024

Principal Investigator
Mukunda Goswami

Co-Principal Investigator
Reza Ovissi
Lexi Duscher
Virginia Polytechnic Institute and State University (VT), USA

Budget : Rs. 74.70 lakhs ($ 90,000)

Funding agency
Good Food Institute, USA

The LRM continuous cell line developed from *Labeo rohita* has been maintained and cryopreserved in the cell culture facility/National Smart Protein Innovative Hub on Cultivated Seafood (NSPIH-CS). Functional characterisation of the LRM cell line was performed based on gene and protein expression studies. The gene expression studies based on Myf-5, Mrf-4, MyoD revealed the myogenic properties of the cell line. Adipocyte marker was also used to identify adipogenic characteristics of LRM cell line. Comparative proteome analysis was carried out for LR muscle cells using label-free quantitative proteomics. A total of 138 proteins containing ≥ two unique peptides were used for

metaboanlyst software for abundance at different passages. Hierarchical clustering of the top 25 proteins with significantly different abundances was plotted across the different passages with a fold-change of 1.5. Protein-Protein interactions of significant abundant proteins with respective KEGG pathways were represented (based on STRING). The proteins observed across the pathways were correlated with the differentiation of LR muscle cells during myogenesis. The study would provide insights for understanding the in vitro myogenesis for cultivated meat production. Our work has drawn attention from the industry for commercialisation of the characterised cell types for cultivated seafood development. Primary muscle cells from many commercial and popular marine fishes like red snapper, seabream, silver pomfret, skipjack tuna and crustaceans like crab, lobster and shrimp are being developed in NSPIH-CS.

CIFE/2022/603/IF

Evaluation of RNA-guided Recombinase (RGR) platform for cell-independent and safer genome engineering in zebraĜsh vertebrate model

Project Duration: 2022-2025

Principal Investigator
Arvind A Sonwane

Co-Principal Investigator
Aparna Chaudhari
Manoj P. Brahmane
M. A. Pathan
Kiran D. Rasal

A study was conducted to carry out RNA-guided recombinase (RGR) platform-mediated targeted transgenesis of EGFP reporter gene into a putative 'permissive locus', zebrafish Enah-Srp9 intergenic region. For this, RGR platform components were microinjected into the cytoplasm of two to eight-cell stage zebrafish embryos with 10 - 15 nl microinjection solution containing 60 pg of RGR expression plasmid, 20 pg of donor DNA, and 20 pg of gRNA expression plasmid per 10 nl microinjection solution. This microinjection resulted in post-microinjection embryo hatchability of 47.5% and larval survival of 65%. Further, subsequently developed zebrafish larvae were screened for specific EGFP reporter gene expression. Through this, an efficient level of transgenesis of 46.8% was obtained. Variegated, however consistent transgene expression pattern of caudal fin > trunk > caudal peduncle, abdomen > head was observed in this, which suggested that transgene integration happened at one and the same locus throughout the microinjections while expression of the transgene had some position effect. Further characterization of the recombination junctions with targeted PCR, however, resulted in weak or no amplifications. This may be attributed to the non-availability of a specific template for PCR assays because of reasons including, but not limited to, the presence of mosaicism. Overall results of the study revealed efficient RGR platform-mediated targeted transgenesis at the Enah-Srp9 intergenic region of the zebrafish genome, and the transgene expression there had some position effect. However, the characterization of recombination junctions formed through this and an understanding of the detailed basis of the observed position effect on transgene expression need further studies

CIFE/2022/604/IF

Development of reference DNA mini-barcodes and high resolution melting (HRM) proĜles for authentication of Ĝsh species in processed products

Project duration:2022-2025

Principal Investigator
Annam Pavan kumar

Co-Principal Investigator
Aparna Chaudhari
Manjusha
A.K. Jaiswar
Gireesh Babu
P. Pankaj Kishore

The partial mitochondrial Cytochrome c oxidase subunit I (COI) gene, comprising 650 base pairs (bp), was successfully amplified and sequenced bidirectionally from individuals representing 17 fish species. Transitional changes were more prevalent (61) than transversions (45), with an R-value of 1.3. Intra- and inter-specific distance values for finfish were determined to be 0.004 ± 0.0001 and 0.225 ± 0.037, respectively. Neighbour-joining tree analysis demonstrated distinct clustering of conspecific individuals with significant bootstrap support. Subsequently, analysis focused on DNA mini-barcodes, identifying a 200 bp region (nucleotide positions 350 to 550) of the full DNA Barcode region as the most variable through sliding-window analysis. This mini-barcode region was successfully amplified from seven fish and one crab species using designed primers. Transitional changes (22) were more frequent than transversions (16), with an R-value of 1.3. Intra- and inter-specific distance values for the mini-barcode region were calculated as 0.002 ± 0.0001 and 0.252 ± 0.037, respectively. Neighbour-joining tree analysis showed a similar clustering pattern to that observed with full-length barcodes. Additionally, high sequence similarity (99-100%) with sequences in NCBI GenBank/BOLD systems was maintained. A linear relationship was observed between mutations and genetic distance values of the DNA mini-barcode region. Overall, these findings suggest the utility of the identified mini-barcode region for accurate species identification, offering a promising alternative to full-length barcodes in biodiversity studies.

Whole genome sequencing of *Labeo Ĝmbriatus*

CIFE/2022/606/IF

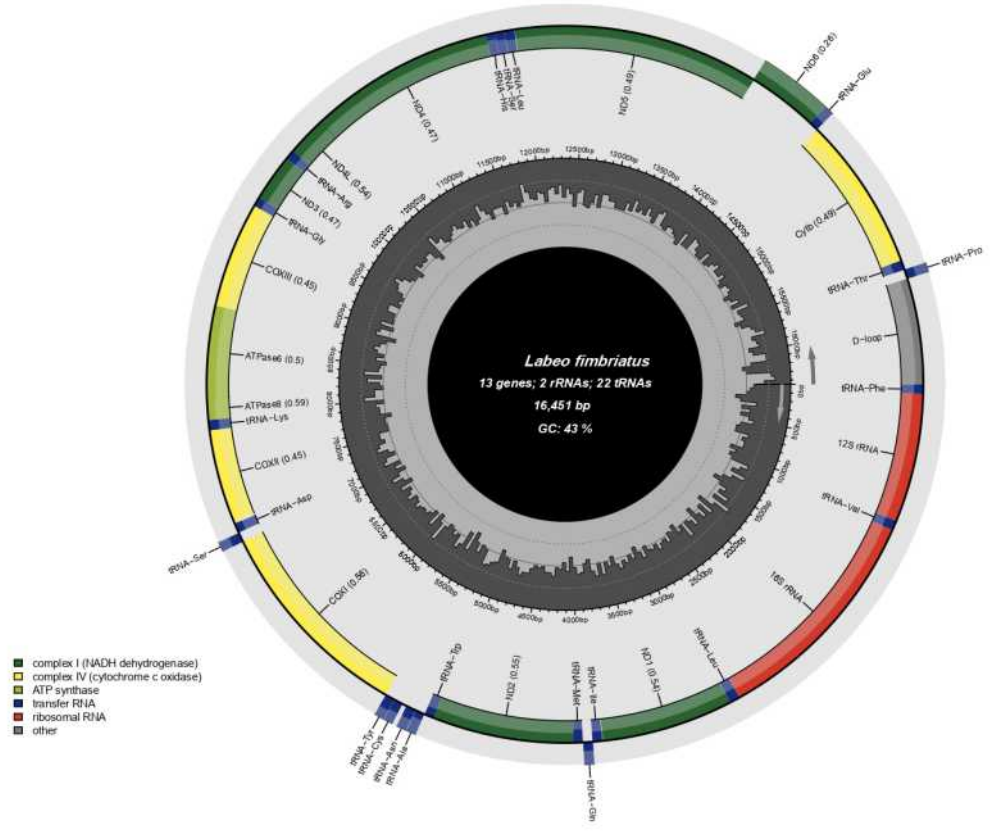
Project duration:2023-2026

Principal Investigator
Aparna Chaudhari

Co-Principal Investigator
A. Pavan Kumar
Kiran Rasal
Manoj P. Brahmane

Funded by: CRP-Genomics Platform, ICAR

A single male Labeo fimbriatus specimen weighing 400 g was collected at ICAR-CIFA, Bhubaneswar and alcohol preserved samples tissue samples (testis, muscle and liver) were transported to ICAR-CIFE. Mumbai on ice. Genomic DNA was isolated from testis tissue and paired-end sequencing was done on Illumina NovaSeq platform at Gujarat Biotech Research Centre (GBRC), Gandhinagar. Libraries were prepared by three methods, (i) enzymatic-Tru-A (Illumina), (ii) enzymatic-Qs (Qiagen), and (iii) manual shearing method (IDP-B), in duplicates. Overall 27,16,86,889 (~27.17 M) reads, 250 bp average read length, QC score >30, and GC of 37% were obtained. All the 4193876 Tru-A library reads obtained post-trimming (Trimmomatic tool in Galaxy server) were used to assemble the mitogenome with Labeo rohita mitogenome as the reference. The assembled L. fimbriatus mitogenome was 16451 bp in length, had 43% GC content, and encoded 13 genes, 2 rRNAs, and 22 tRNAs. Phylogenetic relationship with other Labeo species was assessed using the COX-I region used for DNA barcoding (~650 bp; MEGA software; Fig. 5). The obtained sequence has 100% identity with the voucher sequence in NCBI. Phylogenetic tree made by Neighbor Joining method shows highest homology with L. rohita (99.4%), followed by L. catla (94.5%), L. gonius (93.5%), L. calbasu (93.2%), L. bata (91.3%), L. boggut (91.1%), and L. altivelis (90.8%). Detailed analysis is in progress.



CIFE/2022/701/IF

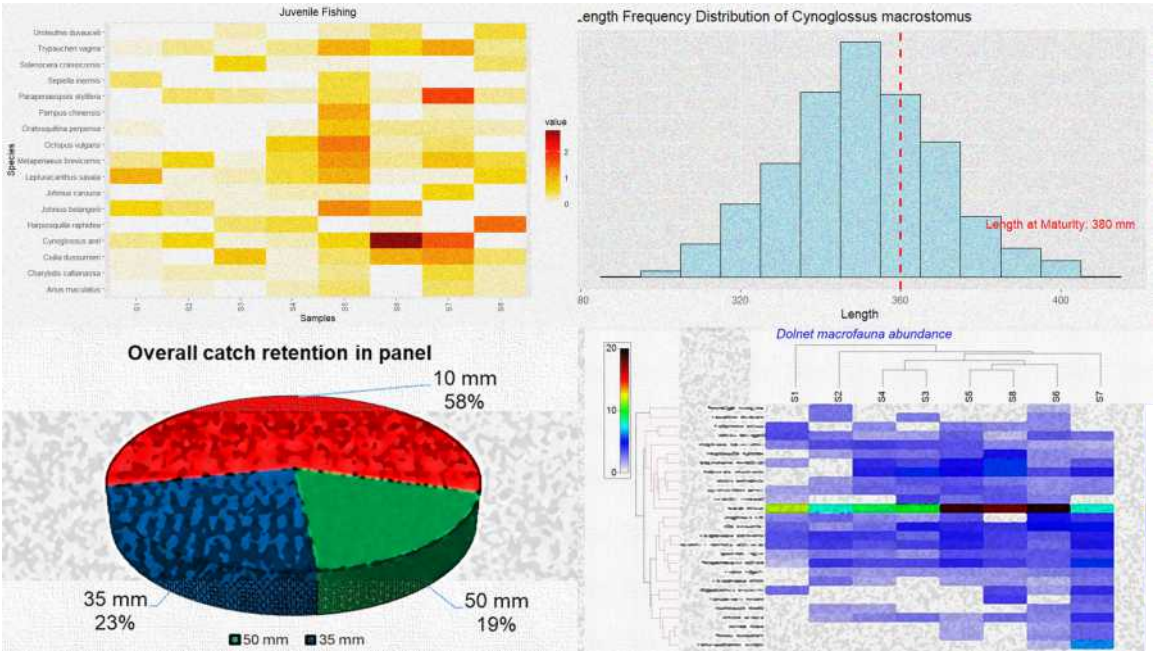
ModiĜcation of Dolnet for sustainable Ĝsheries management along Mumbai Coast

Project duration:2022- 2025

Principal Investigator
Karankumar K. Ramteke

Co-Principal Investigators
Asha T. Landge
Abuthagir Iburahim
Shobha Rawat
Dayal Devadas

During the study three mesh panels with different sizes (50 mm, 35 mm, and 10 mm) were deployed in the dolnet cod end. Over the course of eight experimental fishing operations, conducted between November 2023 and April 2024, fishing depths targeted ranged between 10 to 15 meters. Throughout these fishing operations, a total of 78 species were recorded, representing 38 families and 19 orders. The recorded species included a diverse array of marine life such as *elasmobranchs*, fishes, shrimps, prawns, lobsters, crabs, cephalopods, and mantis shrimp. The performance of the different mesh panels varied, with the upper panel documenting 52 species, the middle panel noting 61 species, and the lower panel registering 54 species. A critical aspect of this study was the analysis of juvenile escapement across the mesh panels. The findings indicated that the upper panel had lower catches primarily due to the higher rate of juvenile escapement. Juveniles constituted 6%, 12%, and 47% of the total catches in the upper, middle, and lower panels, respectively. The study also assessed the juvenile estimation of two economically and ecologically important species, *Lepturacanthus savala* and *Coilia dussumieri,* caught in dolnets along the Mumbai coast. A total of 379 Lepturacanthus savala specimens (ranging from 15.4 cm to 66.2 cm total length) and 461 *Coilia dussumieri* specimens (ranging from 6.6 cm to 19.0 cm total length) were collected from dolnet catches in Madh, Versova, and Manori. Manori consistently exhibited the highest juvenile percentages for both species, ranging from 68.18% to 100% for *Lepturacanthus savala* and 62.97% to 88.46% for *Coilia dussumieri*. The experimental fishing trials yielded significant findings regarding species-specific catches. Notably, the highest catches included *Cynoglossus arel* (6.1 kg), *Metapenaeus brevicornis* (4.3 kg), Coilia dussumieri (4.0 kg), *Trypauchen vagina* (3.7 kg), Johnius belangerii (3.5 kg), *Parapenaeopsis stylifera* (3.5 kg), *Lepturacanthus savala* (3.5 kg), and *Octopus vulgaris* (2.8 kg). The total catch per haul varied significantly across the different mesh panels. The upper panel's catch per haul ranged from 0.99 kg to 5.24 kg, with a mean catch rate of 2.8 kg. The middle panel's catch per haul ranged from 1.13 kg to 6.67 kg, with a mean catch rate of 3.5 kg. The lower panel demonstrated the highest variability, with catches ranging from 2.86 kg to 17.66 kg, and an average catch rate of 8.7 kg per haul.



CIFE/2022/801/IF

Bioprospecting of thermotolerant freshwater microalgae in climate change

Project duration:2022-2025

Principal Investigator
S. P. Shukla

Co-Principal Investigators
Kundan Kumar
Saurav Kumar
Tincy Varghese

The samples from Powai Lake and Rajgir (Nalanda, Bihar) were collected. Isolation of pure cultures initiated. One species of *Scenedesmus* isolated from Powai Lake (will be used as a reference species. Samples from hotwater springs of Vajreshwari were collected and isolation of unialgal culture initiated. C,H,N,S content of *Spirulina* (*Arthrospira*) platensis analyzed at room temperature (24± 2 C) and 40 C. C/N and C/H ratios of *S. platensis* at room temperature and 40 C were calculated. Elemental analysis of carbon, nitrogen, hydrogen, and sulfur contents in the biomass of *Chlorella vulgaris* and *Spirulina* platensis using a CHNS analyzer (Elementary, VarioMICRO) was completed, and data was analyzed. The analytical conditions of CHNS analyzer during operation were: Thermal conductivity detector (TCD) Temperature 59-60 °C, Reduction tube temperature 850°C; Combustion tube temperature 1150°C ; Carrier gas: Helium (flow rate 200±10 ml. min^{-1}); combustion gas- Oxygen: flow rate 10±2°C(no combustion), 30±2°C (combustion). For the study on the effect of higher temperature on the elemental profile of the cyanobacterium Spirulina (*Arthrospira*) platensis and chlorococcalean alga Chlorella vulgaris. The unialgal populations of both the species were exposed to two different temperatures: 24± 2 C and 40 C. A temperature of 40 C was maintained for 120 hours of exposure using a temperature-controlled magnetic stirrer. The findings show that the carbon, nitrogen, and sulphur contents in the biomass exposed to 40± 1 C exhibited a considerable decrease in the values. Further, the C/N ratio also increased at higher temperatures, confirming that metabolic changes due to higher temperatures change the elemental profile and, therefore, the quality of the biomass (Table 1). The change in quality of the biomass of *S. platensis* suggests that the nutritional value of the feed formulated by using *Spirulina* as an ingredient may also be altered, resulting in a drastic change in the production and quality of fish.

Table 1: Elemental Composition of *Spirulina (Arthrospira) platensis* at toom temperature and 40± *1 C* after 120 hr exposure.

Room Temperature (24± 2 C)				
C (%)	N(%)	H(%)	S(%)	C/N
43.61	9.49	6.69	1.069	4.58
Room Temperature At 40± *1 C*				
C (%)	N(%)	H(%)	S(%)	C/N
35.84	6.82	6.15	0.753	5.25

Nano-fertilizer enriched biochar for enhancing the Ĝsh growth, water productivity and mitigation of greenhouse gas emission in the aquaculture ponds

CIFE/2018/802/IF

Project duration
2023- 2026

Principal Investigator
Vidya Shree Bharti

Co-Principal Investigators
Rupam Sharma
A. K. Verma
Saurav kumar
Suman Manna

In Agriculture, it is proven that using nanoparticles as a plant nutrient supplementing source serves as an advanced and sustainable solution to significantly reduce the standard application dosages of conventional fertilizers while enhancing crop health and yield. In view of these achievements, this study was planned to study the potential effect of biochar-nano fertilizer composite effect in aquaculture. In this study, commercially available nano urea as a nitrogen source and nanoDAP as a nitrogen and phosphorus source were tested on water quality parameters. It was observed that nano urea is causing turbidity to the water as compared to the nanoDAP. In the pristine paddy straw biochar, 34.45 % Carbon, 0.45% nitrogen, 1.19% H, 0.23% S, and 63.68% oxygen are available. Nutrient nitrogen is required for phytoplankton growth, and phosphorus is a limiting nutrient in aquaculture. Thus, the application of Nano DAP will meet the nitrogen and phosphorus requirements for phytoplankton. NanoDAP application to the aquatic systems will improve the water quality parameters, e.g., dissolved oxygen, reduced turbidity, and higher electrical conductivity compared to the control. NanoDAP reduces the pH of the system compared to NanoUrea and increases the salinity of the system. In this study nano iron –biochar composite was prepared and characterized for Fourier transform infrared spectroscopy (FTIR), Scanning electron microscopy, HR TEM and CHNS analysis etc. Nanoparticle was characterized by zeta potential, Nano- size analyzer and spectrophotometer. Biogenic green Nano iron was prepared from Spirulina extract. Zeta potential of the nano particle was -26.7mV, more negative the zeta potential more stable the nano particle. Similarly, the spectrophotometer scan of the biogenic iron nanoparticle indicates the maximum absorption around 400 nm. The size of the nano particle obtained was 58.2nm.

Enhancing physiological and metabolic adaptive mechanism of GIFT to hyper-thermal stress through dietary interventions and environmental manipulation

CIFE/2022/803/IF

Project duration
2022- 2025

Principal Investigator
Tincy Varghese

Co-Principal Investigators
S. Gupta
Sikendra Kumar
Md. Aklakur
Saurav Kumar

Global warming poses a threat to the majority of fish species experiencing habitat temperatures near their performance limits. The higher energetic demand associated with the increasing temperatures shifts the nutrient preference of fish from proteins to energy-dense lipids. However, edible oils are expensive, and their high inclusion may increase feed costs. Glycerol, a major byproduct of the bio-diesel industry, is an excellent low-cost, energetic food with great potential to be incorporated into fish diets, owing to its lipogenic capacity and cryoprotectant ability. Accordingly, an experiment was conducted to evaluate the effect of dietary glycerol on the growth, feed utilization and glycerol metabolism of genetically improved farmed tilapia (GIFT) reared at a high ambient temperature. A 60-day feeding trial was performed on fish exposed to two temperatures (28.3 ± 0.022 and 33.3 ± 0.07°C). Three isonitrogenous (34% CP) diets

were formulated, made isocaloric (398.99±1.05 kcal DE/100g) by reducing the dietary lipids (12%,10%,8%), replacing them with graded inclusions of purified glycerol (0%, 4%, 8%), viz. P34L12G0, P34L10G4. P34L8G8. GIFT Tilapia fingerlings (average weight 6.25±0.34 g) were stocked in a freshwater recirculatory aquaculture system. The fish fed P34L10G4 exhibited significantly higher ($p<0.05$) weight gain percentage, specific growth rate and lower FCR. At 4% inclusion levels, glycerol reduced the carcass lipids intraperitoneal fat, increased hepatic glycerol kinase (GK) activity and reduced the glutamate dehydrogenase (GDH) activity at the higher ambient temperature. Hepatic malic enzyme activity was reduced with temperature rise, irrespective of the dietary lipid level and glycerol. From the study, it could be concluded that glycerol could be utilized to meet the higher energetic demand associated with the global warming scenario by sparing the glucogenic amino acids to enhance the fitness and resiliency of GIFT (Oreochromis niloticus). Hence, diet formulations with 4% purified glycerol replacing the dietary lipids could help the fish to optimize its growth and feed utilization in increasing water temperatures associated with global warming.

Mapping ecosystem valuation and modelling for simulating sustainable fisheries management scenario in selected reservoirs of India

CIFE/2021/804/IF

Project duration
2021- 2024

Principal Investigator
Vinod Kumar Yadav

Co-Principal Investigators
Arpita Sharma
Karankumar Rameteke

It has been observed that in history, daily minimum and maximum temperatures have shown significant increases. Meanwhile, precipitation, wind speed, and humidity have shown very negligible decreases, which is not statistically significant. Both the predicted future scenarios, RCP 4.5 and RCP 8.5, have shown similar results. Change in LULC class over the years has shown that significant change has occurred in agricultural land, with almost a 100 percent increase in agriculture, and dense forest has increased by 22 percent. Open forests and barren land have decreased significantly because open forests have converted to dense forests.Over 21 years, a total of 12,333 tons of carbon of around 15 million $ has been sequestered by the Dimbhe watershed area. From the valuation of ecosystem services, the open forest provides more than half of the total ecosystem services values. The second most significant contribution is from the dense forest class. The most prominent change has been observed in soil formation and food production, it has increased by around 57 and 28 percent compared to 2002. Soil formation and food production are mostly correlated with agricultural land along with the other ecosystem services. From this, it has been inferred that the increase in food production and soil formation has resulted chiefly because of an increase in agricultural land, i.e., a 100 percent increase in agricultural land in 2022 compared to 2002. The ecosystem's services, especially sediment retention, have improved, benefiting from the growth of dense forests. Valuation of ecosystem services emphasizes the role of open and dense forests and their contribution to soil formation and food production. A minimum of 812.45 ha WSA (water spread area) remains throughout the year, and the expected potential is 112.88 tons- with a minimum stocking density of 0.56 Million. Fish production in Dimbhe was 32 tonnes, less than the estimated production potential of 112.88 tonnes. Low values of Ecotropic efficiency were observed for Mahaseer (0.471), phytoplankton (0.647), zooplankton (0.750), and macrophytes (0.625). Biomass estimates of Mrigal and Mahaseer were highest and lowest, and most functional groups were confined to trophic levels 2 and 3. It was found that biomass declined with trophic level.

Taxonomical, biochemical evaluation and utilization of order Dictyotales – Brown algal species

CIFE/2021/901/EF

Project Duration: 2021-2024

Principal Investigator
Dr. Layana P.

Co-Principal Investigators
Dr. Pavan Kumar
Ms. Vidya V.

Samples of 11 species of *Padina* collected from Tiruchendur, Mandapam, Hare island, Gulf of Mannar - Tamilnadu coast (East coast) and Ratnagiri, Malvan (Maharashtra coast), and Okha, Shivrajpur (Gujarat Coast) from the west coast of India were analyzed for their antioxidant potential. Hydroalcoholic extracts of these seaweeds were prepared in three different solvents (water, methanol, and a mixture of water and methanol (1:1) and estimated their antioxidant potential by analyzing Total phenolic content, DPPH radical scavenging activity, Ferric reducing power activity, and total antioxidant activity. Among all the *Padina* species studied, *P. fraseri, P. crassa* and *P. tetrastromatica* (Ratnagiri) were found to possess good antioxidant potential and hence can be employed for further food applications.

Among the other Dictyotales studied, *Iyengaria stellata* had higher antioxidant properties than *Spatoglossum asperum*. Based on this observation, 50% ethanolic extract of *P. tetrastromatica* was used to study its effect on quality preservation and shelf life extension of Indian Mackerel during chilled storage. The shelf life of mackerel was extended for five days compared to the control.

Distribution of pathogenic micoraerophilic *Arcobacter* sp. in seafood and development of a rapid method for its detection

CIFE/2021/902/EF

Project duration
2021-2024

Principal Investigator
Binay Bhusan Nayak

Co-Principal Investigators
Sanath Kumar
Manjusha L.

Budget: Rs. 52,92,360/-

Funding agency
DBT, Govt. of India

A total of 86 *Arcobacter* sp. were isolated from 63 seafood and water samples from Mumbai. The identity of the isolates was confirmed by a set of biochemical tests followed by PCR using genus-specific and species-specific primers. *A. butzleri* were predominantly (41.8%) isolated, followed by *A. skirrowii* (19.76%) and *A. cryaerophilus* (16.27%). Selected isolates were subjected to FISH and RFLP for further confirmation. The virulence gene characterization of selected *A. butzleri* isolates showed cadf gene to be predominantly present. A MPN-PCR method was developed and optimised for the detection of *A. butzleri* using species specific primers ButzF and ArcoR, and the sensitivity of the assay was determined to be 10 cells/ml by conventional PCR. Novel primers were designed based on unique regions in *A. butzleri* that were identified using the Proksee gene mapping tool. The specificity of the designed primers was tested in silico using Primer Blast. The primers flaAa and flaAc targeting the flaA gene were found to be highly specific to *A. butzleri*. These primers were selected for PCR detection, and the PCR conditions were optimized. The primers flaAa-F and flaAa-R were used in MPN-qPCR, and these primers were found to be specific for *A. butzleri* with no cross reaction with other closely related species such as *A. skirrowii* and *A. cryaerophilus*.

Development of molecular methods for detection and quantiĜcation of *Cronobacter spp*. of human health signiĜcance in seafood

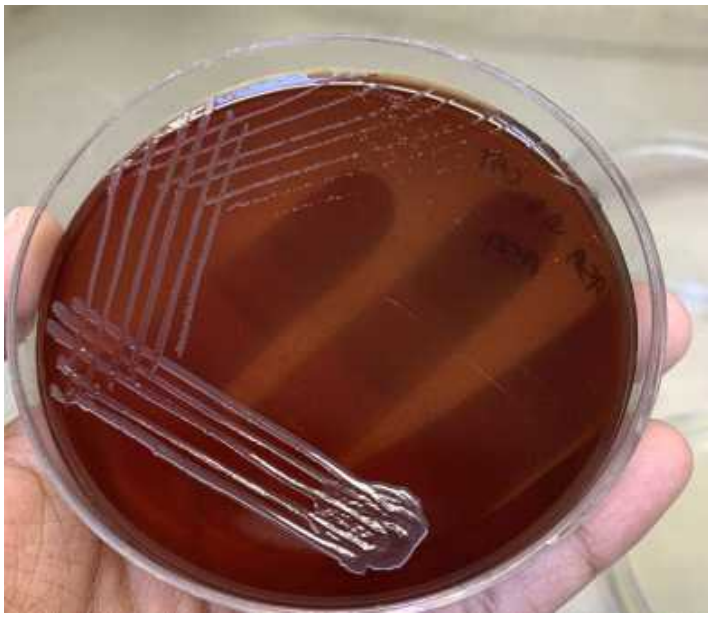
CIFE/2022/903/IF

Project duration
2021-2024

Principal Investigator
Dr. Manjusha L.

Co-Principal Investigators
Dr. Binay Bhusan Nayak
Dr. Sanath Kumar H.

Cronobacter species is an emerging food-borne pathogen with exceptional ability to survive and persist in foods as well as in the environment. The incidence of *Cronobacter* species in fish in India emphasizes the need to further investigate the prevalence of different pathogenic species, virulence potential, health risk and also develop suitable methods to precisely identify as well quantify this pathogen. This project aims to develop a rapid quantification method for the detection of *Cronobacter* spp. in fresh and dried seafood. A total of 60 samples from retail fish markets in different locations were analyzed, that included 20 samples each of finfish, shellfish and dry fish. Indian mackerel, Bombay duck, black pomfret, golden anchovy , and sin croaker constituted the finfish samples, whereas kiddi shrimp, crab, paste shrimp, clam, and cuttlefish constituted the shellfish samples. Dried samples comprised of paste shrimp, kiddi shrimp, golden anchovy, Bombay duck and ribbon fish. Nine different combinations of screening broth, enrichment broth, and selective media were used to screen the market samples of seafood for the presence of *Cronobacter* sp. Forty-five out of 60 samples (75%) were positive for *Cronobacter* sp. presumptively after enrichment and selective plating. Presumptive isolates of *Cronobacter* sp. were obtained from 45 samples by selective plating using the different media combinations, with and without the addition of vancomycin supplement. Biochemical confirmatory tests for *Cronobacter* sp. such as IMViC, malonate, glucose, lactose, nitrate, lysine, ornithine and phenyl alanine tests were used to confirm the presumptive isolates. Out of 45 samples, 62 isolates from 24 samples were confirmed to be *Cronobacter* sp. based on the biochemical confirmatory tests. These isolates were subjected to PCR using different genera and species- specific primers such as SG, SI, Saka, ES, and Csak primers targeting 16S *rRNA, ITS, cgcA* genes. Biochemical and molecular identification results showed 25 isolates confirmed to be *Cronobacter* sp., the majority of which were from dry fish and shellfish samples. 16s rRNA sequencing of 5 isolates confirmed them to be *Cronobacter malonaticus*. Among all the selective media combinations used for screening *Cronobacter* sp., BPW- CSB-ESA (CSB supplemented with vancomycin) yielded better results (9 positive isolates) with less number of false positive results compared to other media combinations. Virulence PCR for the confirmed isolates of *Cronobacter* sp. showed the presence of genes such as *ompA, ompX* coding for outer membrane proteins, flid coding for flagellar protein and *zpx* coding for zinc-containing metalloprotease. Totally, 92% (23/25) isolates carried ompX gene, while the *flid, ompA*, and *zpx* genes were found in 84% (21/25), 56% (14/25), and 40% (10/25) of the isolates respectively.



Assessment of microplastic contamination in Ĝsh and Ĝshery products

CIFE/2021/904/EF

Project duration
2021-24

Principal Investigator
Sukham Monalisha Devi

Co-Investigators
Binaya Bhusan Nayak
Layana Porayil
K. A. Martin Xavier
Amjad Khansaheb Balange

Effect of starvation on *Mystus malabaricus* for different hours: *Mystus malabricus* was collected fresh from Ulhas River Maharashtra for carrying out starvation effect (0hr, 24hr, 48hr). Site of collection and morphometric characteristics provided. A total of 9 fishes were kept at different tanks on starvation for 24hrs and 48hrs, 0 hr fishes were the fresh brought samples on the day of sampling. The microplastics contents in all the fishes were recorded with MPs items present per individual . The maximum MPs during 0hr and minimum during 48hrs when the fishes were exposed to starvation.

Estimation of micro plastics in fermented fishes: Two samples of cured products (fermented fish, Ngari) *Puntius* spp. were analysed for presence of MPs collected from local markets of Manipur. The samples of different brands with the sample code given as PS and Oi. Figures shows the average abundance and percentage distribution of different MPs shape groups and colour-wise incidence of MPs respectively.

Technology demonstration and premium quality Masmin production in Lakshadweep for domestic and export markets

CIFE/2021/905/EF

Project duration
2021-2024

Principal Investigator
Binay Bhusan Nayak

Co-Principal Investigator
Deepitha R.P.

The microbial quality of masmin from Lakshadweep islands was studied by performing the total plate count, total halophilic count, total fungal count, presence of *Staphylococcus aureus*, and presence of *E. coli* Microbial analysis- Total plate count, Total halophilic count. The biochemical qualities of masmin collected from the islands, including pH, salt (% NaCl), and proximate composition, were also examined. Masmin was prepared in laboratory conditions using bullet tuna and little tuna collected from the Mumbai landing center. The initial stage of customization of the tuna smoking unit and the tuna smoking in the customized smoking chamber was carried out. The initial stage of customization of the cooking vat for the preparation of masmin A training cum awareness program was conducted in the Lakshadweep islands on "Hygienic handling and processing of fish for Masmin preparations." A total of 32 participants were trained.

Fisheries and KVKs: Extension strategies for strengthening development and ILinkages

CIFE/2021/10-1/IF

Project Duration: 2021-24

Principal Investigator
Ananthan P.S.

Co-Principal Investigators
Shivaji D. Argade
Neha W. Qureshi

The KVK-led fisheries extension initiative spans seven states—West Bengal, Bihar, Andhra Pradesh, Maharashtra, Haryana, Punjab, and Madhya Pradesh—encompassing 233 Krishi Vigyan Kendras (KVKs) and involving the assessment of 1,010 Subject Matter Specialists (SMS) using the novel Fisheries Extension Intensity Index (KVK-FEII). This methodology has enabled the identification of districts with significant potential for fisheries development, as well as the information and training needs of KVK-SMS.Strategic action plans have been developed for KVK-led fisheries development in six states and are currently being advocated. These plans aim to address the critical gaps identified in the assessment. Notably, there is a 23% vacancy rate among the 233 KVKs in the seven states, with most KVKs operating under State Agricultural Universities (SAUs) except in Maharashtra, where NGOs are prevalent. Only 13% of the KVKs have dedicated fisheries SMS, though 64% have at least one SMS specializing in fisheries, agriculture, or aquaculture, indicating a scope for immediate intervention. The average Fishery Resource Area (FRA) stands at 32,052 hectares, with a productivity rate of 1.8 tons per hectare, highlighting the significant potential for development in many districts. However, there is often a disconnect between the available potential for fisheries in a district and the presence of a fisheries SMS in the corresponding KVK. The KVK-FEII indicates an overall low extension intensity, with a few exceptions: 48% in West Bengal, 36% in Bihar, 34% in Andhra Pradesh, and 39% in Maharashtra. Critical factors contributing to the low extension intensity include the absence of fisheries SMS, inadequate fisheries infrastructure, and insufficient budgets.Priority training areas for KVK-SMS have been identified, focusing on Good Aquaculture Practices (GAPs), Feed Management, Health Management, Seed Production, and recent technologies in aquaculture. Additional priority areas include entrepreneurship development, incubating start-ups, ICT and social media for development, and success story documentation. Addressing these training needs is crucial for enhancing the effectiveness of KVK-led fisheries extension efforts.

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

CIFE/2021/10-2/IF

Project Duration: 2021-23

Principal Investigator
Shivaji D. Argade

Co-Principal Investigators
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Ananthan P. S.
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Md. Aklakur
Dasari Bhoomaiah

Between 2005 and 2022, CIFE conducted 1,147 training programs, focusing mainly on skill development (946), with additional NEH (76), TSP (86), SCSP (25), and CAS/CAFT (14) training sessions. The programs primarily targeted aquaculture, with 950 sessions, followed by FRM/FPH (94). Initially, the programs were geared towards faculty/researchers/scholars, but there was a significant shift towards farmers/fishers, who constituted 4,800 trainees in 2005-2010, 5,246 in 2011-2015, and 14,663 in 2016-2022. Conversely, training for state fisheries officers and faculty/researchers/scholars decreased over time. The growth rate of both the number of training sessions and participants increased significantly in 2016-2022 compared to previous periods. Of the total training programs, 36% lasted over 8 days, while the others were shorter. Bihar, Maharashtra, and West Bengal saw the most training sessions, with minimal training in states like Ladakh, Meghalaya, and others. The skill development programs had a significant positive impact on the skill, knowledge, and attitudes of trainees, scoring high on Kirkpatrick's Reaction (0.91) and

Learning (0.81) levels. However, the effectiveness at Behavior (0.70) and Result (0.68) levels was less satisfactory, indicating a need for better post-training strategies. The study suggests making training programs demand-driven, redesigning them based on stakeholder needs, and adopting a long-term approach for tangible impacts. A dynamic dashboard-based Training Management System and a centralized Training Unit at CIFE are recommended to streamline and enhance the effectiveness of these programs.

Agri-Drone Technology Demonstration Project

CIFE/2021/10-3/IF

Project Duration: 2023-24

Principal Investigator
Ananthan P. S.

Co-Principal Investigators
A. K. Verma
Shivaji Argade
Abuthagir Iburahim,
Gourang Biswas
Muralidhar Ande
Sunil Kumar Nayak
Md. Akhlakur
Pankaj Kumar

Budget: 5 lakhs

Funding agency: ICAR

The specifications for drones useful in fisheries and aquaculture were collected and submitted for the purchase of agri-drones aimed at demonstration, surveillance, and mapping purposes in these sectors. Two drones were procured to facilitate drone application demonstrations on fish farms in Maharashtra and regional centers of ICAR-CIFE. Five CIFE staff members obtained Remote Drone Pilot Certification: Mr. Abuthagir Iburahim S., Dr. Pavan Kumar, Dr. Ananthan P.S., Dr. Shivaji Argade and Mr. Udipta Roy. Several drone demonstration programs were organized for students, staff, and farmers at various locations. These programs aimed to showcase the practical applications of drones in fisheries and aquaculture, enhancing the knowledge and skills of participants in using drone technology for Input dissemination , surveillance and mapping in these fields.

Consultancy Project on Roadmap 2030 for Fisheries and Aquaculture Development in Reservoirs & Ponds/ Tanks of Rajasthan

CIFE/2021/10-4/IF

Project Duration: 2023-24

Principal Investigator
Ananthan P. S

Co-Principal Investigators
Neha Wajahat Qureshi
Munil Kumar

Budget: 5 lakhs

Funding agency: ICAR

Fish production showed a positive annual growth rate of 7.3 % over the last 10 years, only 74% of the projected potential production has been realised. Factors such as inadequate fish seed availability, seasonality of water bodies, topography, unfavorable religious attitude to fishing/fish culture, limited extension effort continue to limit growth. Encouraging private entrepreneurs to run non-functional hatcheries or establishing new hatcheries in potential districts, in-situ seed rearing through pen culture and cage culture, economically viable market linked cage culture, awareness campaigns and field exposure visits for farmers are identified interventions. During 2021-22, only 43% (1061 no.) of waterbodies were leased & Rs. 50 crores revenue collected; >50% of water bodies not formally leased out and no uniform and transparent leasing procedures followed. Revenue based leasing model successful in enhancing fish production & earning revenue, but favoured only large contractors & eliminated small lease holders & cooperatives. Leasing policy and guidelines need to be changed. Sanctioned DoF staff strength is 456; but 309 posts (68%) are lying vacant now, which is 82% in the technical cadre. The vacant posts need to be filled immediately. DoF recruitment guidelines needs to be amended making BFSc as the essential qualification for positions of Fisheries Inspector, AFDO and FDO as sufficient number of professionally qualified candidates are available now.

Assessing Economic Feasibility of Farm Ponds for Aquaculture in Maharashtra

CIFE/2021/11-1/IF

A study surveying 107 farmers through personal interviews and 570 farmers through online forms and phone calls found that depth and plastic lining are the biggest challenges for raising fish in plastic-lined ponds. Despite these difficulties, a small number (8-10) of farmers were able to overcome these constraints and achieve success by adapting their practices to their specific needs. These successful farmers reported benefit-to-cost (B:C) ratios ranging from 1.2 to 1.8. The table below summarizes the existing practices, challenges faced by farmers, and the alternative strategies adopted by successful farmers.

Project Duration
2021-2024

Principal Investigator
Ankush L. Kamble

Co-Principal Investigators
Neha W. Qureshi
P.S. Ananthan
S.N. Ojha
Kapil S. Sukhdhane
K.K. Krishnani

Particular	Practices followed by farmers	Problems faced by farmers	Strategies adapted by successful farmers
Fish seed			
Species	Catla, Rohu, Mrigal, Cyprinus, Tilapia, Pangasius, Amur Carp, Murrel, Roopchand	All fish species are not adapting	Tilapia, Pangasius and Cyprinus adapting in pond environment
Size	Spawn, fry and fingerling	Mortality of seed due to predators, non-conducive water environment	Use of fingerling or advance fingerling or bigger size seed
Timing	Any time	Oxygen deficiency observed in early morning/cloudy condition	Stocking according to less oxygen level
Season	Throughout the year stocking	Harvesting problem when water is more	Adjust stocking according to the water availability – should be minimum water in pond during harvesting
Fish feed			
Natural food	FYM, Jaggary	Growth of unwanted algae	Use of FYM, Jaggary by using Jivamrut preparation method
Supplementary feeds	Crush of Rice, maize, jowar; roti, straw (roughage)	Accumulating on bottom of pond, spoiling bottom water	Recognizing the issue of feed accumulating at the bottom, farmers pioneered alternative feeding methods
Complete feeds	Company feed	More costly	Substituted supplementary feed to complete feed

Dissolved Oxygen (DO)			
Dissolved Oxygen (DO) Management	High costly aerator, electricity issues	Oxygen deficiency observed • Time: 4-7 am (average 5 am) • Situation: early morning, cloudy condition, less sunlight, rainy season • Stage of seed: Early stage of stocking (nursery and rearing) • High density stocking	• Regular exchange of fresh inlet water with outlet bottom water • Pumping bottom water up and down • Dropping water from high • Sprinkler • Water fountains • Netting: to releases bottom level gases (ammonia)
Harvesting			
Harvesting	Difficulties in harvesting due to high depth	• Selective (incomplete) harvesting • High harvesting cost: 20 Rs/kg • Breeding after 6 months (tilapia)	• Adjusting stocking time in such a way that there is minimum water at the time of harvesting • Regular/daily/weekly self-harvesting: to reduces cost of harvesting
Marketing			
Marketing	Wholesaling, lumpsum sale	Low price, price competition with natural reservoir fish: dams / rivers / village ponds fishes	• Live fish marketing • Retailing: on farm retailing / door to door retailing / at market retailing • Pond to Retail outlet • Fish tourism/ Agro-tourism/ Fish restaurant • Sip-Sip marketing: Harvesting fish regularly/weekly, sell in weekly market • WhatsApp group-based marketing

India's patented technological innovations in fisheries and aquaculture

CIFE/2022/11-2/IF

Project duration: 2022-2025

Principal Investigator
Arpita Sharma

Co-Principal Investigator
Vinod K. Yadav

Technologies within the fisheries and aquaculture sector act as a catalyst, propelling the growth of India's fisheries domain. Many of these technological advancements are safeguarded through distinct intellectual property rights (IPRs), predominantly in the form of patents. In India, the trend in applications for various IPRs has exhibited consistent growth, with patents emerging as a cornerstone within the IPR landscape. The exploration of patents in the fisheries and aquaculture sector was initiated by Ninan and Sharma (2005), documenting patented technologies from 1913 to 2000. However, there is a gap in the review of Indian patents post-2000. To address this gap, initial attempts were made to extract patents using keyword-based searches with Boolean operators via InPASS. The results were inaccurate and incomplete due to the vast number of keywords and their synonyms related to fisheries and aquaculture. Patent classification offered little improvement as the sector covered various fields. The Official Journal of the Patent Office, published weekly, provided a comprehensive repository of patent publications. Through examination of this journal available at the Indian Patent Search System, and the adoption of the 'CIFE PatSearch Synthesis Methodology,' patents were accurately and comprehensively extracted, documented, and analyzed. This methodology can be used for patent mining in any sector. Statistics of patents granted in the fisheries and aquaculture sector (1913 to 2021) showed that 53.54% were from fish processing technology, 33.72% from aquaculture, and 12.74% from fishing technology. A statistically significant variance existed in the distribution of patents across these disciplines. Notably, there has been a consistent upward trajectory in patents linked to fish processing technology since 1955. Aquaculture showed a rise in granted patents between 2002 and 2021, while fishing technology displayed variability over the years. In fish processing technology, patents related to fishery by-products were pronounced. Aquaculture patents focused on aqua feed and water quality monitoring, reflecting sustainable practices. Fishing technology patents emphasized net types and improvements in gear enhancements. Geographically, Asia contributed 56.84% of patents, with Europe following at 24.29%. Notably, 48.58% of patent applicants are Indian, while 51.42% represent various nationalities. This study highlights that solely relying on keywords, Boolean searches, AI software for literature reviews, scientometric analysis, and patent data mining can result in inaccuracies. Overlooking this could compromise the integrity of research findings and hinder the development of informed policies and strategic planning. To ensure precision and reliability, the study recommends extracting patent information directly from the weekly official journals and adopting the 'CIFE PatSearch Synthesis Methodology.' This approach aligns with Liu and Croix (2015), who assert that accurate quantification of the strength and scope of patents, alongside other property rights, is essential for effectively characterizing the sector.

Accounting and valuation of professional human capital in indian fisheries higher education

CIFE/2021/11-3/IF

Project Duration: 2021-2024

Principal Investigator
Neha Wajahat Qureshi

Co-Principal Investigators
Ananthan P. S.
Shivaji D. Argade
Ankush Kamble

Technical Associate
Dasari Bhoomaiah

During this reporting period, the methodology developed in this project, titled "HCVaF: Human Capital Valuation Framework for Academia" and granted copyright (Diary number: 2239/2023-CO/L), was applied to study the fisheries colleges in the coldwater regions of India, specifically the College of Fisheries, G.B. Pant University of Agricultural Sciences and Technology (GBPUAT), Uttarakhand, and the Faculty of Fisheries Science, SKUAST-K, Srinagar Kashmir. Utilizing the HCVaF methodology, we calculated the investments made and costs incurred, and assessed the valuation of professional fisheries human capital. The net investment per student over their respective study periods at FoFy, SKUAST-K, was Rs. 96,181 for B.F.Sc., Rs. 5,26,816 for M.F.Sc., and Rs. 6,79,975 for Ph.D., while at CoF, GBPUAT, it was Rs. 3,56,969 for B.F.Sc., Rs. 8,93,046 for M.F.Sc., and Rs. 14,16,129 for Ph.D. Career path mapping of alumni from 2010 onwards revealed that 28% of CoF, GBPUAT graduates joined the Department of Fisheries, and 13% became entrepreneurs, while 26% of FoFy, SKUAST-K graduates joined the Department of Fisheries and 7% joined State Agriculture University. Entrepreneurship had the highest net worth among CoF, GBPUAT graduates at Rs. 13,25,305, followed by the industry/private sector at Rs. 6,23,732, whereas at FoFy, SKUAST-K, entrepreneurship showed the highest net worth at Rs. 5,67,607, indicating promising future prospects. The total expenditure on human capital at CoF, GBPUAT from 2010 to 2020 was Rs. 17.3 crores, with a total student value of Rs. 366 crores, contributing Rs. 348 crores to the nation, approximately 21 times the investment. At FoFy, SKUAST-K, the expenditure was Rs. 11.78 crores with a student value of Rs. 185 crores, contributing Rs. 179 crores, about 15.7 times the investment. In terms of national income, CoF, GBPUAT contributed Rs. 61.89 crores in 2020-21 (assuming 50% contribution of professional fisheries HR to total fisheries HRD) and Rs. 92.84 crores (assuming 75% contribution). FoFy, SKUAST-K contributed Rs. 98.90 crores (assuming 50% contribution) and would amount to Rs. 148.35 crores (assuming 75% contribution), with the realistic scenario likely between 50% and 100%.

4 Extension Achievements

4.1 Programs under Tribal-Sub Plan (TSP)

Nodal OfĜcer: Dr. Sukham Munilkumar

Under the TSP component, ICAR-CIFE has conducted a total of 16 training programs in the States of Jharkhand, West Bengal, Manipur, Bihar, Maharashtra, Arunachal Pradesh, Chhattisgarh, Meghalaya, Assam and Tripura in the year 2023.

1. Technical Know-How for Spirulina Biomass Production and Utilization

Course Coordinator- Dr. K. A. Martin Xavier and Dr. S. P. Shukla

Training program on "Technical Know-how for Spirulina Biomass Production and Utilization" was organized at ICAR-CIFE, Mumbai, from 13-17 February 2023. The training provided hands-on training on spirulina biomass culture and its utilization for value-added compounds. A total of 10 participants (5 males & 5 females; Jharkhand - 5, Manipur- 2, Gujarat- 1, Bihar-1, and Arunachal Pradesh- 1) attended the training program. The practical classes were focused on light microscopy studies on Spirulina, media preparation (Zarrouk's medium and CIFE medium), inoculation of mother culture in indoor and outdoor units, estimation of water quality parameters, batch culture techniques of Spirulina cultivation, techniques for growth measurement using Spectrophotometric methods (turbidity, specific growth rate, Doubling time), Secchi disc, Chlorophyll estimation, cell/filament counting (Sedgwick-R after counting slide), technique for pigments estimation, microbiological techniques for evaluation of biomass purity (TPC method), protein estimation techniques, drying methods (Mechanical and Spray Drying), extraction and estimation of the concentration and purity of Phycocyanin, CHNS analysis of biomass, etc.

2. Genetic Broodstock Management of Common Carp

Course Coordinator-Mr. Angom Lenin Singh

ICAR-CIFE, Mumbai, in collaboration with KVK- Senapati, Hengbung, Manipur, organized a Awareness-cum-Skill Development Programme on "Genetic Broodstock Management of Common Carp" at KVK-Senapati, Hengbung during 16-18 February, 2023. Fifty farmers from Senapati and Kangpokpi districts attended the training program. A training manual on "Genetic Broodstock management of Common carp" was also released to help the farmers practice in the field. The rationale of the program was to give hands-on expertise on induce breeding and brooder management of common carp. This training gave farmers confidence in producing good quality fish seed, which may address the issue of the unavailability of quality fish seed in these hilly districts.

3. Aquaculture & Millet Farming: Potential Livelihood Options for Tribal Communities

Course Coordinator- Dr. Shivaji Argade

The ICAR-CIFE, Mumbai, organized training-cum-awareness program on 'Aquaculture & amp Millet Farming: Potential Livelihood Options for Tribal Communities' on 8 March 2023 at Dimbhe Reservoir (Pune, Maharashtra). The program was attended by 60 tribal fishers (Male-54, Female-6) from

Shivechiwadi and Chikhali villages in the Junnar and Ambegaon blocks. The program aimed to demonstrate cage aquaculture activities, value-added fish products, and millet products as profitable livelihood options for fishers residing near Dimbhe and Manikdoh reservoirs and make them aware of its potential to create employment and income opportunities. The field exposure visit to cage aquaculture unit at Dimbhe Reservoir was organised for the trainees. The training demonstrated the preparation of fish fillet, fish vada, etc., as well as the importance of millet and its nutritional value.

4. Freshwater Prawn Breeding and Seed Production

Course Coordinators- Dr. Madhuri Pathak and Dr. Kapil Sukhdhane

ICAR-CIFE, Mumbai, organized an awareness-cum-skill development program on "Freshwater Prawn Breeding and Seed Production" from 15-19 March 2023. The training program was attended by 12 participants (8 Male and four female) from Amboli, Andheri Suburb Mumbai. The training program aims to impart knowledge about freshwater prawn breeding and seed production to the tribal farmers in different hamlets around Mumbai and Maharashtra. It covered the present status of freshwater prawn aquaculture, freshwater prawn biology, water and soil quality management in freshwater prawn culture, freshwater prawn life cycle, essentials of freshwater prawn hatchery, maturation and breeding, larval rearing and nursery management of larvae. The training gave hands-on experience in broodstock identification, water quality management, feed management- egg custard preparation, and feeding.

5. Exposure Visits of Tribal Fish Farmers at ICAR-CIFE, Kolkata

Course Coordinator- Dr. Hanjabam Mandakini Devi

ICAR-CIFE, Kolkata Centre organized an exposure visit for 20 male fish farmers of Chandel district, Manipur, at Kolkata on 22 -24 March 2023, in collaboration with the District Fishery Office, Chandel, Manipur. The farmers were educated on nursery and rearing pond management techniques for raising carp seed, feed and feeding management, and soil and water quality management. Practical demonstrations on analysis of soil and water quality, artificial feed preparation and live feed culture techniques were conducted. Fish farmers also visited Naihati fish seed market and hatchery, fishing net market at Chetala.

6. Cage Aquaculture: A ProĜtable Livelihood Option

Course Coordinator- Dr. Kapil Sukhdhane

ICAR-CIFE, Mumbai, organized awareness-cum-training program on "Cage Aquaculture: A Profitable Livelihood Option" at Shive village, Rajgurunagar Pune (Maharashtra) on 23 February 2023. The program was attended by 54 tribal fishers (Male – 48, Female - 6) residing near Bhamaskhed reservoir. The cage culture in the reservoir was demonstrated. The trainees were

educated on cage fabrication, net cleaning, net replacement, fish stocking and feed management. Two extension bulletins on cage culture in reservoirs (Marathi & English) were also released on this occasion. Trainees were also enlightened on the role of women in cage farming, the economics of cage farming, and Central & State Government schemes and subsidies for cage aquaculture. Seven floating cages and its accessories for starting cage farming were distributed.

7. Fatty Acid Analysis of Fish and Feed Samples

Course Coordinators - Dr. Layana P. and Martin Xavier K. A.

Short-term training program on 'Fatty acid analysis of fish and feed samples' organized at ICAR-CIFE, Mumbai, from 27-29 March 2023. The training was designed to provide hands-on training on the analysis of fatty acids in fish and feed samples using Gas chromatography- Mass spectrometry (GCMS). Eight student participants (3 males and 5 females) from the States of Jharkhand, Chhattisgarh, Manipur, Arunachal Pradesh & Karnataka attended the training program. An intensive training schedule imparted basic theoretical knowledge on 1. Chromatographic techniques- principles and applications, Different methods of fat extraction, classification of seafood lipids, and structure, classification and nomenclature of fatty acids, Properties of different types of fat etc. Hands- on-practical activities were carried out under the supervision of subject matter experts of Fish processing technology department, ICAR-CIFE. The practical classes were focused on the comparison of fat extraction methods such as Bligh and Dier, Folch, and Soxhlet methods, Fatty acid methyl ester preparation, operation of vacuum rotary evaporator and its working principle, fish, feed, and fish oil FAME analysis by GC, working principle of mass spectrometry, data analysis and interpretation, categorization of fatty acids based on its types, compositional analysis of SAFA, MUFA and PUFA, etc.

8.Cage Farming

Course Coordinators- Dr. Kapil Sukhdane and Dr. Sukham Munilkumar

The one-day workshop on cage aquaculture practices was organized on 14 October 2023 for 15 tribal fishers (13 males, two females) at Shive village, Rajgurunagar (Pune). Three theories and three practical sessions were conducted on different aspects of cage farming in reservoirs.

9. Fish-cum-Piggery Farming

Local Course Coordinator- Dr. Brajamani Meetei

Training Programme on Fish-cum-Piggery Farming was conducted in association with Krishi Vigyan Kendra (KVK), Bishnupur district, Manipur on 17 October 2023 for 25 ST participants (9 males, 14 females) at KVK, Bishnupur district, Manipur. The training covered the importance of integrated fish farming, demonstration of Fish-cum-Pig farming and technical skills/ capacity building of the intended beneficiaries.

10. Fish-based Integrated Farming Systems

Course Coordinator- L. V. Khonglah

The training program was conducted from 14-16 November 2023 in collaboration with Krishi Vigyan Kendra (KVK), East Khasi Hills district, Meghalaya. Technologies on horticultural crops, animal Science, fishery Science, and fodder crops were discussed while distributing planting materials, poultry chicks, and fingerlings to the farming community of the East Khasi Hills district. KVK also demonstrated different IFS models.

11. Fish-based Integrated Farming Systems

Course Coordinator- Dr. Biswajit Bal

The one-day training program was conducted in collaboration with KVK Unakoti, Tripura at KVK Unakoti on 21 December 2023, on “Fish-based Integrated Farming Systems” for 25 female trainees from Unakoti District. Training manuals and extension leaflets/folders related to fish-based integrated farming systems were distributed. They were also exposed to various integrated fish farming demonstration facilities at the KVK, Unakoti farm.

12. Sustainable Freshwater Aquaculture for Livelihood Improvement

Course Coordinator- Dr. Biswajit Bal

A one-day training program was conducted in collaboration with KVK on 22 December 2023, on the topic "Sustainable Freshwater Aquaculture for Livelihood Improvement” for 25 female trainees of Unakoti District. Training manual and extension leaflet/folders related to fish-based integrated farming systems were distributed. They were also exposed to various integrated fish farming demonstration facilities at the KVK, Unakoti farm.

Programs / Events Organized under TSP

S.No.	Title	Date & Place	No. of Participants (Male+ Female)	Name of Coordinator(s)
13.	Development of best managementpractices in aquaculture for increased fish production	20-23 March, 2023 Barwani (MP)	20 (20+0)	S. K. Nayak D. Reang
14.	Fish feed preparation and feeding management	27-29 March, 2023 Mumbai	12 (10+2)	Sikendra Kumar Tincy Varghese
15.	Sustainable fisheries management in Dimbhe reservoir	28 October, 2023 Dimbhe, Pune	99	Vinod Kumar Yadav Karan Ramateke
16.	Genetically improved fish stocks for aquaculture	18-20 December, 2023 , Assam	38	Mukunda Goswami Shrinivas Jahageerdar Angom Lenin Singh

4.2 Scheduled Caste Sub Plan (SCSP) Component

Nodal OfĜcer: Dr. Sukham Munilkumar Co-Nodal OfĜcer: Dr. A. K. Verma

Under the SCSP component, ICAR-CIFE conducted six training and capacity-building programs, benefiting over 372 Scheduled Caste beneficiaries in 2023. The programs were conducted in the States of Jharkhand, West Bengal, Gujrat, Manipur, Bihar, Maharashtra, Arunachal Pradesh, Chhattisgarh, Meghalaya, Andhra Pradesh, and Tripura.

1. Training Programme on Aquaculture Technologies as Livelihood Options

Course Coordinator- Dr. Sujata Sahoo

A three-day skill development training program on "Aquaculture technologies as livelihood options" (in Bengali) was organized from 08-10 February 2023 at ICAR-CIFE, Kolkata Centre. Training covered the integrated fish

farming systems, ornamental fish culture, analysis of water quality parameters using CIFE water testing kits, and demonstration of prophylactic control measures for fish diseases. A total of 20 Scheduled Caste female fish farmers from Malda actively participated and received critical inputs for fish farming.

2.Training Programme on Aquaculture Technologies as Livelihood Options

Course Coordinator- Mrs. Sweta Pradhan

A three-day skill development training program on "Aquaculture technologies as livelihood options" was organized at ICAR-CIFE, Kolkata Centre on 14-16 February 2023 for 20 Scheduled Caste fish farmers of Gosaba, Sunderban, South 24 Parganas districts. The training covered contents on nursery and rearing pond management techniques for raising carp seed, feed, and feeding strategies in composite culture, freshwater aquaculture and culture of magur, homemade feed & common disease problems in aquaculture, monosex tilapia culture, pangus farming, freshwater prawn farming and soil and water quality management using pH kit & DO kit developed by ICAR-CIFE.

3. Freshwater Pearl Farming and Entrepreneurship Development

Course Coordinator- Mrs. Sweta Pradhan

A three-day skill development training program on "Freshwater pearl farming and entrepreneurship development" was organized at ICAR-CIFE, Kolkata Centre on 14-16 March 2023 for 12 fish farmers from Malda, Hooghly, North 24 Parganas, and South 24 Parganas districts of West Bengal. Training covered pond management practices in fish farming, di erent implantation techniques in the pearl culture, preparation of the nuclear beads, physiology, anatomy, and basics of freshwater mussels, harvesting, value addition and marketing of pearl, feeding of the freshwater mussels using algal culture, culture of chlorella & spirulina and soil and water quality management using pH kit & DO kit developed by ICAR-CIFE.

4. Value Added Fish Products

Course Coordinator- Dr. H. Mandakini Devi

The ICAR-CIFE, Kolkata Centre organized a five day entrepreneurship-cum-skill development training program on “Value-Added Fish Products” from 20-24 March 2023 for 12 (9 female. 3 male) SC participants from di erent parts of West Bengal such as Murshidabad, Sonarpur, Canning 1 and Nimpith. The program provided a hands-on

demonstration on preparing di erent value-added fish products such as prawn pickles, prawn spicy masala powder, fish momos, fish sausage, fish cutlets, fish balls, fish fingers, and fish popcorn. The trainees were also given a chance to prepare customized prawn pickles based on the regional preferences of the ingredients. A set of processing equipment (mincer, weighing balance, steamer, and gas burner) was distributed to all trainees to help them start a small food venture.

5. Fish Farming in Plastic-Lined Farm Ponds

Course Coordinator- Dr. Ankush Kamble

ICAR-CIFE, Mumbai organized a discussion forum on “Fish farming in plastic lined farm ponds” at Karjat, Ahmednagar (Maharashtra) on 23 November 2023 for 23 scheduled caste farmers. The discussion with farmers was held on various di culties in plastic-lined farm ponds while doing fish farming, the value and advantages of fish farming in plastic-lined farm ponds, and how to make fish farming successful in plastic-lined farm ponds.

6. Seed Enrichment through Lined Pond-based Semi-Biofloc Technology (In Hindi)

Course Coordinator- Dr. Md. Aklakur

The training on “Seed enrichment through lined pond based semi-bio floc technology" (In Hindi) was organized during 22-28 December 2023 for 20 SC youths at ICAR-CIFE Motipur center. The local farm visit was arranged at Jasaulipakri Dayal and the nearby culture area. For advanced culture, the biofloc-based aquaculture visit was planned to see the farm and operation by Mr. Abhishek Kumar Kanhauli Vaishali. The program was successfully completed, and certificates were distributed to participants and beneficiaries along with seed and cash for travel support.

Programs / Events Organized under SCSP

S.No.	Title	Date & Place	No. of Participants (Male+ Female)	Name of Coordinator(s)
7.	Broodstock management, induced breeding and nursery rearing of common carp in inland saline aquaculture system	21-30 March, 2023 Rohtak (HR)	5 (5+0)	M. A. Pathan, Babitha Rani A. M. Pankaj Kumar Sreedharan K.
8.	On-farm training and demonstration in inland saline aquaculture	9 March - 7 April, 2023 Rohtak (HR)	10 (10+0)	Babitha Rani A.M. Pankaj Kumar
9.	Demonstration and hands-on training on ornamental fish rearing and breeding and aquaculture of pedigreed common carp seed	04- 13 March, 2023 Powarkheda (MP)	15 (12+ 03)	S. K. Nayak D. Reang, H. Haridas
10.	Machali swashthya prabhandhan Powarkheda (MP)	20 December, 2023	15 (13+ 02)	A. Sharma, S. K. Nayak D. Reang, H. Haridas
11.	Shrimp culture	6-15 March, 2023 Kakinada (AP)	10 (10+0)	Muralidhar P. Ande, Karthireddy Syamala P. Srinivasa Rao M. Usha Rani
12.	Seed production and culture techniques of Clarias magur	09-13 October, 2023 Kakinada (AP)	8 (5+3)	Shamna N. , Vidhya V. P. Srinivasa Rao
13.	Feed-based aquaculture technologies as livelihood options	16-18 August, 2023 Kolkata (WB)	40 (38+2)	Parimal Sardar Sweta Pradhan
14.	Freshwater pearl farming and entrepreneurship development	14-16 March, 2023 Kolkata (WB)	14 (7+7)	Sweta Pradhan
15.	Fish breeding and hatchery management	22-24 August, 2023 Lower Dibang Valley (Assam)	20 (17+3)	Dilip Kumar Singh Gouranga Biswas
16.	Freshwater pearl farming and entrepreneurship development	9-13 October, 2023 Kolkata (WB)	20 (18+2)	Sweta Pradhan
17.	Modern methods of freshwater aquaculture	6-8 December, 2023 Sonamukhi, Bankura	50 (43+7)	Suman Manna
18.	Market networking for value added fish products	2-3 February,2023	40	Amjad Balange R. K. Majumdar Avinash Sable
19.	Fatty acid analysis of fish and feed samples	27-29 March, 2023	8	Layana P. Martin Xavier K. A.

4.3 Programs under the North-Eastern Hill (NEH) States Scheme

Nodal OfĜcer: Dr. A. K. Verma

The NEH program, operating in eastern India, encompasses a wide array of initiatives aimed at bolstering fisheries practices and enhancing livelihoods. Its core o erings are comprehensive training programs designed to impart scientific farming techniques explicitly tailored for carp cultivation. These sessions equip participants, predominantly rural farmers, with the knowledge and skills needed to optimize their fisheries output, fostering sustainable practices and bolstering regional food security. The NEH program, by far, covered the eastern and northeastern parts of India. The programs conducted comprised training on scientific farming of carp, training-cum-demonstration program on fish breeding and culture for the rural farmers of lower Dibang Vally, skill Development program on the preparation of value-added fish products, mass scale production of pure fish seed of indigenous commercially important minor carp, Labeo calbasu, for improving livelihood and nutritional security of rural farmers. Skill-oriented training program on aquarium fabrication & ornamental fish keeping for entrepreneurship development, integrated farming systems, sustainable freshwater aquaculture practice for livelihood improvement, ornamental fish culture and aquarium management, integrated fish culture and fish health management. The NEH program extends its reach to address the intricacies of fish breeding and culture, mainly targeting rural communities in areas like the Lower Dibang Valley. Through training and demonstration sessions, farmers are educated on best practices in fish breeding, focusing on indigenous species. By empowering local communities to cultivate fish e ectively, the program enhances livelihood opportunities and contributes to the conservation of native aquatic ecosystems.A total of 1042 individuals benefitted from the NEH programs organized by ICAR-CIFE, with 497 male and 545 female participants.

The NEH programs covered 19 districts insix states. The trainings were conducted in districts such as Lower Dibang Valley, Changlang, Dhemaji, Lakhimpur, Udalguri, Darrang, Dhalai, Gandacherra, Tinsukia, South Garo Hills, Wangbal, Unakoti, Imphal East, Aizwal, Gangtok, Churanchandpur, Thoubal, Moreh, Bishnupur and Nagoan. The states covered under the NEH program are Arunachal Pradesh, Assam, Tripura, Meghalaya, Manipur, and Mizoram. In addition to fostering technical expertise, the NEH program places significant emphasis on skill development to enable rural entrepreneurs to diversify their income streams through value-added fish product preparation. By imparting knowledge on processing techniques and product innovation, the program empowers individuals to capitalize on the market demand for processed fish products, creating sustainable economic opportunities and fostering local entrepreneurship. Furthermore, the NEH program prioritizes distributing fisheries-related inputs among beneficiaries, including essential supplies like fish fingerlings, feed and water testing kits. This comprehensive support infrastructure ensures that participants have access to the resources necessary to e ectively implement the skills and techniques they acquire through the program. Through collaborative e orts with institutes and KVKs, the program strives to maximize its impact, reaching communities across 19 districts and six states in the eastern region of India, ultimately driving positive socioeconomic change and sustainable development. CIFE collaborated with the local Institutes and KVKs to conduct the programs.

4.4 Skill Development Programmes (SDP) / Refreshers Course / Online Courses etc. Organized

Title	Name of Coordinator(s)	Date (Duration)	No. of Participants Total (Male + Female) Place (State/District)
ICAR-CIFE, Aquaculture Division			
Fish and prawn culture	Kapil Shukhdae	13-27 June, 2023	14 (13+1)
Freshwater pearl culture	Upasana Sahoo Paramita B. Sawant	21-23 June, 2023	12 (9+3)
Ornamental fish culture & aquarium management	Debajit Sarma Paramita B. Sawant Upasana Sahoo	18-25 August, 2023	14 (14+0)
Academic and scientific writing of the manuscript workshop	Debajit Sarma Madhuri Pathak	4-5 October, 2023	50 (28+22)
Aquaculture engineering	Debajit Sarma Chandrakant M. H.	9-14 October, 2023	10 (9+1) Meghalaya
Cage aquaculture: Profitable livelihood option	Debajit Sarma Kapil Sukhdhane, Madhuri Pathak, Sukham Munilkumar	27 October, 2023	12 (10+2)
ICAR-CIFE, FEES Division			
Student workshop: Introduction to virtual reality modules	Ananthan P. S. Abuthagir Iburahim	5-7 August, 2023	60
Student workshop: Introduction to virtual reality modules	Ananthan P. S. Abuthagir Iburahim	23-27 August, 2023	60
Geospatial analysis using open source software	Vinod Kumar Yadav Vidya Shree Bharti Arpita Sharma	4-9 September, 2023	25 (9+16)
Aquaculture: Potential income generation option	Shivaji Argade Kapil Sukhdhane	11 October, 2023	27 (20+7) Maharashtra State Agriculture Department Officers, Konkan Region
Student workshop: Introduction to virtual reality modules	Ananthan P. S. Abuthagir Iburahim	29 November - 3 December, 2023	60
Internship on geo-informatics and precision aquaculture for MTech students, IIT Bombay	Vinod Kumar Yadav	4 December, 2023 - 3 January, 2024	3 (3+0)
ICAR-CIFE, FRM&PHM Division			
Role of Taxonomy and biology in conservation and management of fishery resources	Asha T. Landge K.K. Ramteke Shobha Rawat S. Monalisha Dayal Devadas	3-12 January, 2023	11 (5+6)

Antimicrobial resistance in food fish: Challenges & mitigation	Sanath Kumar H. B. B. Nayak Manjusha L.	09-29 January, 2023	16 (10+6)
Dry fish handling and value-added products - Vrutti NGO	A. K. Balange	20-23 February, 2023	29 (0+29)
Value-added fish and shellfish products –Vrutti NGO	A. K. Balange	13-16 March, 2023	37 (0+37)
Dry fish handling and value-added fish products - Vrutti NGO	A. K. Balange	8-10 March, 2023	28 (0+28)
Value-added fishery products - Blue ocean fish cluster	A. K. Balange	17-19 March, 2023	32 (16+16)
Fish processing and value-added fishery products -JNPA	A. K. Balange Lanaya P.	21-27 April, 2023	40 (15+25)
Role of taxonomy in assessment of aquatic biodiversity and management of fisheries resources	Asha T. Landge Shashi Bhushan Abuthagir Iburahim Dayal Devadas	21-30 June, 2023	05 (2+3) Tamil Nadu & Maharashtra

ICAR-CIFE, FN&BP Division

Aquafeed production technology and feeding management for sustainable aquaculture	Sikandra Kumar		
Manish Jayant	11-15 December, 2023	32 (28+4)	

ICAR-CIFE, FGB Division

Advances in molecular taxonomy and phylogenetics	Aparna Chaudhari Annam Pavan Kumar Kiran Rasal	30 January - 8 February, 2023	20 (7+13)
NGS data analysis with special reference to transcriptomics and metagenomics	Mukunda Goswami N. S. Nagpure M. P. Brahmane Arvind Sonwane Kiran Rasal	16-20 October 2023	10 (5+5)

ICAR-CIFE, AE&HM Division

Technical know-how for spirulina biomass production utilization	S. P. Shukla Kundan Kumar Saurav Kumar	16-21 January, 2023	7 (5+2)
PCR-based disease diagnosis	Megha K. Bedekar Jeena K.	16-21 January, 2023	6 (2+4)
Technical know-how for spirulina biomass production utilization	S. P. Shukla Saurav Kumar Kundan Kumar	13-17 February, 2023	10 (5+5)
PCR-based disease diagnosis	Megha Kadam Bedekar Jeena K.	2-4 August, 2023	6 (3+3)
Technical know-how for spirulina biomass production utilization	S. P. Shukla Saurav Kumar Kundan Kumar	18-23 December 2023	6 (5+1)

ICAR-CIFE, Kakinada Centre

Improved fish culture and management practices for f isheries cooperatives	Muralidhar P. Ande Karthireddy Syamala P. Srinivasa Rao M. Usha Rani	25-27 January, 2023	21(21+0) Warangal, Telangana
Machali evam Jhinga Palan ki adhunik vidhiyan	Muralidhar P. Ande Karthireddy Syamala P. Srinivasa Rao	28 January - 03 February, 2023	25 (25+0) Purmea, Bihar
		17-23 March, 2023	23 (23+0) Begusarai, Bihar
Eco-friendly fish feed preparation & marketing	Muralidhar P. Ande Karthireddy Syamala M. Usha Rani	17-23 April, 2023	30 (30+0) East Godavari, Andhra Pradesh
Better management practices for shrimp farming	Muralidhar P. Ande Karthireddy Syamala P. Srinivasa Rao	17-21 July, 2023	28 (11+17) Andhra Pradesh
Carp breeding and hatchery management	Shamna N. Vidhya V. Muralidhar P. Ande Karthireddy Syamala	07-11 August, 2023	34 (27+7) Andhra Pradesh
Machali evam Jhinga Palan ki adhunik vidhiyan	Muralidhar P. Ande Karthireddy Syamala M. Usha Rani	13-19 September, 2023	25 (25+0) Madhubani, Bihar
Seed production and culture techniques of Clarias magur	S. Jahageerdar Shamna N. Vidhya V. P. Srinivasa Rao	9-13 October, 2023	22 (14+8) Andhra Pradesh
Machali evam Jhinga Palan ki adhunik vidhiyan	Muralidhar P. Ande Karthireddy Syamala P. Srinivasa Rao	15-21 December, 2023	25 (25+0) Patna, Bihar

ICAR-CIFE, Powarkheda Centre

Machali evam Jhinga Palan ki adhunik vidhiyan	S. K. Nayak D. Reang H. Haridas Hasan Javed	22 February-03 March, 2023	20 (20+0) Nalanda, Bihar
		23-29 March, 2023	13 (13+0) Patna, Bihar
		10-16 May,2023	15 (15+0) Begusarai, Bihar
		19-25 May,2023	9 (9+0) Nalnda, Bihar
		10-16 July, 2023	13 (13+0) Arwal, Bihar
Carp hatchery management	S. K. Nayak D. Reang H. Haridas	17-22 July, 2023	9 (9+0) Madhya Pradesh
Machali evam Jhinga Palan ki adhunik vidhiyan	S. K. Nayak D. Reang H. Haridas Hasan Javed	14-20 August, 2023	15 (15+0) Kaimur, Bihar
		21-26 August, 2023	10 (10+0) Madhya Pradesh
Hands-on training on	S. K. Nayak	23 August -	12 (8+4) B.F.Sc.

aquafarming and finfish/shell fish breeding	D. Reang H. Haridas Hasan Javed	20 October, 2023	students from Nagpur, Maharashtra
Machali evam Jhinga Palan ki adhunik vidhiyan	S. K. Nayak D. Reang H. Haridas Hasan Javed	3-9 September, 2023	14 (14+0) Madhubani, Bihar
Hands-on training on aquafarming and finfish/shell fish breeding	S. K. Nayak D. Reang H. Haridas H asan Javed	26 September-20 November, 2023	05 (4+1) B.F.Sc. students from Itawah, Uttar Pradesh
Machali evam Jhinga Palan ki adhunik vidhiyan	S. K. Nayak D. Reang H. Haridas Hasan Javed	12-18 October, 2023	15 (15+0) Begusarai, Bihar
		27 November-01 December, 2023	14 (14+0)
		28 November-04 December, 2023	14 (14+0) Alwar, Bihar
		06-12 December, 2023	14 (14+0) Gaya, Bihar
		14-20 December, 2023	14 (14+0) Supaul, Bihar

ICAR-CIFE, Rohtak Centre

Standard operating protocol for singhi catfish rearing in biofloc culture system	Babitha Rani A.M. Sreedharan K.	21-23, August, 2023	8 (5+3) Haryana, Maharashtra & Madhya Pradesh
		24-26, August, 2023	9 (9+0) Maharashtra, Haryana & Delhi
		30 October-1 November, 2023	10 (8+2) Punjab and Maharashtra
		1-4 November, 2023	9 (8+1) Punjab and Gujarat

ICAR-CIFE, Kolkata Centre

Mithe pani me machli palan	Sujata Sahoo	4-10 January, 2023	15 (15+0) Buxar, Bihar
Mithe pani me machli palan	Sweta Pradhan	4-10 January, 2023	15 (15+0) Gaya, Bihar
Mithe pani me machli palan	Gouranga Biswas	11-17 January, 2023	15 (15+0) Banka, Bihar
Mithe pani me machli palan	G. H. Pailan	11-17 January, 2023	15 (15+0) Nalanda, Bihar
Mithe pani me machli palan	D. K. Singh	18-24 January, 2023	15 (15+0) Vaishali, Bihar
Mithe pani me machli palan	H. Mandakini Devi	18-24 January, 2023	15 (15+0) Darbhanga, Bihar
Mithe pani me machli palan	Suman Manna	25-31 January, 2023	15 (15+0) Jehanabad, Bihar
Mithe pani me machli palan	Gouranga Biswas	25-31 January, 2023	15 (15+0) Aurangabad, Bihar

Advances in freshwater aquaculture	Gouranga Biswas Parimal Sardar	13-19 June, 2023	Participants from different place
Fish nutrition and Feeding strategies	Parimal Sardar D. K. Singh	12-18 July, 2023	Participants from different place
Internship programme on entrepreneurship development in ornamental fish breeding, culture & trade	Suman Manna	19 July - 8 August, 2023	College of Fisheries, AAU, Assam
Biotechnological applications in aquaculture	Sujata Sahoo Leesa Priyadarsani	8-14 August, 2023	Participants from different place
Mithe pani me machli palan	Sweta Pradhan	29 August - 4 September, 2023	20 (20+0) Nalanda, Bihar
Mithe pani me machli palan	Gouranga Biswas	19-25 September, 2023	20 (20+0) Jehenabad, Bihar
Fish processing and value added fish products	H. Mandakini Devi G. H. Pailan	3-9 October, 2023	Participants from different place
Mithe pani me machli palan	D. K. Singh	10-16 October, 2023	20 (20+0) Sitamarhi, Bihar
Aquaculture and integrated farming system for rural development	T. K. Ghoshal	7-9 November, 2023	Participants from Tata Steel Foundation, Jamshedpur
Mithe pani me machli palan	Parimal Sardar	27 November - 4 December, 2023	(20 (20+0) West Champaran, Bihar
Entrepreneurship development in ornamental fish breeding & culture	Gouranga Biswas G. H. Pailan	5-11 December, 2023	Fish farmers from Meghalaya
Diagnosis of fish diseases and their management	Suman Manna Leesa Priyadarsani	5-11 December, 2023	Participants from different place
Mithe pani me machli palan	T. K. Ghoshal	12-18 December, 2023	20 (20+0) Siwan, Bihar

CAFT Programmes / Winter School Summer School Organised

Winter school on "Antimicrobial Resistance in FoodFish: Challenges & Mitigation" was organised from 09-29 January, 2023. The winter school was coordinated by Dr. Sanath Kumar, Dr. B. B. Nayak, and Dr. Manjusha L. This was attended by 16 (10M+6F) participants from different States of India. This winter school program was designed to emphasize on the issue of antibiotic resistance in in seafood pathogens, mechanisms, spread and different approaches for its mitigation through the “One Health” approach. The target participants included faculty members and scientists working in the level of Assistant Professor and above. A total of 16 trainees participated in this hands-on training programme. The trainees included assistant professors and scientists from various state agricultural universities and research institutes in Jammu and Kashmir, Punjab, Bihar, Madhya Pradesh, Tamil Nadu, Kerala, and Maharashtra. The topics covered in training included theory and practical classes on the status of antimicrobial use in food systems, antibiotic resistance and spread, fish-borne pathogens of public health significance, known and emerging, mechanisms of antibiotic resistance, genotypic and phenotypic methods for detection of antibiotic resistance, antimicrobial resistance in aquaculture systems and the environment, One Health approach for mitigation of antibiotic resistance, mechanisms of dissemination of resistance traits, microbiome, and AMR gene mining. The training systematically covered the basic and advanced molecular techniques for the detection of AMR in bacteria from seafood. The trainees were given exposure to the international guidelines for testing antimicrobial resistance in bacteria, standard methods of antimicrobial susceptibility testing, bacteriophage techniques, gene cloning, and transformation. Lectures on infographics and phylogenetic evolution of antimicrobial resistance were also arranged.

4.5. Workshops, Seminars, Farmer Meets, etc. Organised

Title	Organising Team	Date & Place	In Association with	No. of Participants (Male+Female)
Innovative symposium-cum-Exhibition-FISHERISTIC: Future of fisheries, imagined now	Ananthan P. S. Neha Qureshi Sanath Kumar Kapil Sukhdhane Nalini Poojary Dasari Bhoomaiah	20-22 March, 2023 Mumbai	NA	> 100
Student-led symposium on enhancing fish consumption brings out imaginative and pragmatic pathways	Ananthan P. S. Neha Qureshi Sanath Kumar Kapil Sukhdhane Nalini Poojary Dasari Bhoomaiah	22 March, 2023 Mumbai	NA	45
Workshop on women led development	All staffs of ICAR-CIFE, Rohtak Centre	27 March, 2023	NA	25
Stakeholders consultation workshop on fisheries development in Rajasthan: Status, challenges and way forward	Ananthan P. S. Neha Qureshi Sukham Munilkumar	10 May, 2023 Udaipur	Department of Fisheries, Rajasthan	59
Agriculture & fisheries doordarshan program advisory workshop	Shivaji Argade Ankush Kamble Arpita Sharma	09 June, 2023 Mumbai	Doordarshan Kendra, Worli	45 (38+7)
Panel discussion on Vaccine trials : aquaculture perspective	Megha K. Bedekar Saurav Kumar Kundan Kumar	16 August, 2023 Mumbai	Indian Immunological Limited (IIL), Hyderabad	18 (12+6)
Personal interview skill workshop	Arpita Sharma Manish Jayant Kapil Sukhdhane Deepitha Abuthagir Iburahim	28 August, 2023& 01 November, 2023 Mumbai	NA	30 (15+15)
Interaction workshop with Dr. Arun K. Dhar, Director tuscan university, Arizona, USA and fulbright fellow and other scientists of CIFE	S. P. Shukla & team	5 September, 2023 Mumbai	The University of Arizona, USA	75
Workshop on climate change and its impact on reproductive and mental health of women	Paromita Banerjee Sawant Vidya Shree Bharti	6 September, 2023 Mumbai	NA	70
NAHEP Workshop on techniques in animal health management	Megha K. Bedekar Saurav Kumar	7 September, 2023 Mumbai	NA	99 (48+ 51)

Interactive Meet (Hybrid mode) With All ICAR Fisheries Institute Scientists' with Dr. Arun K. Dhar, the University of Arizona, USA	Megha K. Bedekar Nalini Poojary & team	7 September, 2023 Mumbai	The University of Arizona, USA	60
Agri Education Fair- 2023	S. Jahageerdar Rupam Sharma Sunil Kumar Nayak Shashi Bhushan Shamna N. Dhalongsiah Reang Harsha Haridas	09 September, 2023 Powarkheda		350 (200+150)
One-day international workshop on writing winning proposals to secure international grants	Kundan Kumar Jeena K.	12 September, 2023 Mumbai	The University of Arizona, USA	100
International workshop on diagnostics of future: Precision diagnostics in aquaculture	Megha Bedekar Team AEHM	13 September, 2023 Mumbai	The University of Arizona, USA	154 (90+64)
Write shop on fish and shrimp health management for increased productivity and sustainability	Gayatri Tripathi Jeena K.	14 September, 2023 Mumbai	The University of Arizona, USA	11
Interactive meet with young scientists on building career of a young scientists	Saurav Kumar	15 September, 2023 Mumbai	The University of Arizona, USA	24 (14+10)
Workshop on self-management for success and harmony and psychology of winning	Vidya Shree Bharti Nalini Poojary	25 September, 2023 Mumbai	Brahmakumari's	40
Workshop on ornamental fish disease management	Megha Bedekar Team AEHM	04 November, 2023 Mumbai	NA	150
NAHEP concluding workshop	N. P. Sahu NAHEP team	14-15 December, 2023 Rohtak	ICAR & World Bank	300 (279+21)
Workshop on fish health management	Arun Sharma Sunil Kumar Nayak Dhalongaih Reang Harsa Haridas	20 December, 2023 Powarkheda	NA	15 (13+2)
Machali swashthya prabhandhan	A. Sharma S. K. Nayak D. Reang H. Haridas	20 December, 2023	NA	15 (13+02)

Fishers/Farmers' Meet Organised

Title	Name of Coordinators	Date and Place	No. of farmer participants (Male+Female)
Live feed culture	S. Munilkumar Kapil Sukhdhane Upasana Sahoo	14 June, 2023 Mumbai	77 (72+5)
National fish farmers day	S. K. Nayak D. Reang H. Haridas	10 July, 2023 Powarkheda	40 (40+0)
National fish farmers day	Suman Manna	10 July, 2023 Kolkata	75 (55+20)
Farmer's meet in connection with the visit of Secretary, Fisheries, Govt. of India	Babitha Rani. A.M M. A. Pathan Pankaj Kumar Sreedharan K.	29 September, 2023 Rohtak	100 (90+10)
Awareness-cum-training program on Health Management of Tilapia	Megha Kadam Bedekar K Pani Prasad Gayatri Tripathi	9-11 October, 2023 Mumbai	5 (5+0) farmers 3 Officials from DoF, Mumbai
CIFE technology awareness programs	Asha Landage Kapil Sukhdane Avinash Sable	19 October, 2023 Palghar	15 (15+0)
World soil day	Suman Manna	5 December, 2023 Kolkata	40 (32+8)
Farmer's meet on NAHEP concluding workshop	NAHEP team	15 December, 2023 Rohtak	300 (279+21)
Kisan Diwas	S. K. Nayak D. Reang H. Haridas	23 December, 2023	50 (48+2)

Interactive meeting of Prof. Arun K. Dhar with Scientists

An interactive meeting of Prof. (Dr.) Arun K. Dhar (Director of Aquaculture Pathology Laboratory; University of Arizona, Tucson, USA) Fulbright Fellow, with the Scientists of ICAR-CIFE was organized on 5th September, 2023. Dr. Dhar delivered a presentation on his area of expertise, focusing on recent developments, emerging trends, and their relevance to the research outputs. The presentation was followed by a discussion on potential areas for collaboration between University of Arizona, USA and CIFE through joint research projects and knowledge sharing initiatives. The session was coordinated by Dr. S.P. Shukla, Principal Scientist, AEHM Division.

Interactive Meet (Hybrid mode) With All ICAR Fisheries Institute Scientists and an Online lecture

ICAR-CIFE Mumbai organized the Interactive Meet (Hybrid mode) with All ICAR Fisheries Institute Scientists' and an Online lecture by Dr. Arun K. Dhar on the topic “Overview of shrimp diseases world wide” on 7th September 2023. The event was conducted in a hybrid mode. The lecture and interactive session was designed to transcend boundaries, facilitating the sharing of valuable insights in aquatic animal health. The lecture was attended by over 60 scientists from Fisheries institutes of India.

The interactive session provided an opportunity for knowledge exchange for addressing issues from the farmer's perspective and to look above and beyond science. The program was coordinated by Dr. Nalini Poojary, CTO, AEHM division.

NAHEP sponsored workshop on “Techniques in Health Management”

ICAR-Central Institute of Fisheries Education, Mumbai conducted a workshop on “Techniques in Health Management” on 7th September 2023 under the aegis of National Agricultural Higher Education Project (NAHEP). Full Bright Fellow, Prof. (Dr.) Arun K. Dhar, Director of Aquaculture Pathology Laboratory, University of Arizona, Tucson, USA delivered the lecturers on “Diagnosis for aquatic animal diseases” and “Troubleshooting in molecular diagnostics”. The workshop was designed to provide an idea about the various diagnosis techniques started from conventional to rapid and sensitive molecular that employed in the health management practices of aquaculture. A total of 99 participants including 48 males and 51 females from different divisions of ICAR-CIFE attended the workshop. During the workshop, participants had the opportunity to explore a wide range of tools used in aquatic health management, particularly focusing on advanced diagnostic techniques for shrimp and fish diseases. Dr. Dhar also shared valuable insights into virology and demonstrated how to enhance our understanding of genome sequences from histology blocks. He provided guidance on interpreting histology slides and using advanced tools such as PCR, RT-PCR, Western blotting, and ELISA. The session concluded with an engaging Q&A session, where participants had the chance to seek clarification and gain further insights. Overall, the workshop motivated, inspired, and enriched the students through various interactions. The workshop was organized by Dr. Megha K. Badekar, Principal Scientist & Head, Aquatic Environment and Health Management Division and Dr. Saurav Kumar, Scientist, AEHM Division, ICAR-CIFE.

One-day International Workshop on “Writing Winning Proposals to Secure International Grants”

An International workshop was organized by ICAR-Central Institute of Fisheries Education, Mumbai on 'Writing Winning Proposals to Secure International Grants' on 12th September 2023 from 2.30 PM onwards in hybrid mode. The workshop was conceptualized to build confidence and to discuss the directions and know-hows on writing impactful proposals for winning external grants. Four distinguished speakers, Prof. Dr. Indrani Karunasagar, Head, Projects and DST-TEC, NITTE University, Head, FAO Reference Centre for Antimicrobial Resistance and Aquaculture Biosecurity, Director, UNESCO Resources Centre for Biotechnology; Prof. Dr. Riji John, Former Vice Chancellor, Kerala University of Fisheries and Ocean Studies, Kochi; Dr. P. Krishnan, Director BOBP-Intergovernmental Organization and Prof. Dr. Arun K. Dhar, Director, Aquaculture Pathology Laboratory , School of Animal & Comparative Biomedical Sciences, the University of Arizona, Tucson, Arizona were the invited resource persons of the workshop. Dr. Indrani Karunasagar delivered a comprehensive talk on

'Internationalization ad research grants' which emphasized on the significance of international collaborations and research partnerships and how to internationalize the research. She also emphasized on the importance of consistency and perseverance and threw light on the major funding agencies available globally. Prof. Riji John spoke on the 'Grant Opportunities for Life Sciences Research' and the importance of preparedness for exploring the opportunities and best out of it. 'Developing grant winning proposals-building right perspectives' was the topic covered by Dr. P. Krishnan. He shared his insights on right perspectives, strengths of our country and the responsibility of researchers in attracting funds. He elaborated on the importance of specialization, building project teams and on the duration of projects. Prof. Arun Dhar spoke on the topic 'Evaluation and Assessment criteria for proposals, funding cycle'. He elaborated the topic using his experiences in winning grants and fulfilling it. The session was attended by 20 participants in person and 100 participants online. The workshop was live streamed in YouTube as the limit of the online attendees crossed the maximum. The program was concluded by summing up by Dr. N.P. Sahu. The organizing secretaries of the program were Dr. Kundan Kumar, Senior Scientist and Dr. Jeena K., Scientist AEHM Division.

NAHEP sponsored International workshop on "DIAGNOSTICS FOR FUTURE: PRECISION DIAGNOSTICS IN AQUACULTURE"

ICAR-Central Institute of Fisheries Education, Mumbai conducted an international workshop on "Diagnostics for future: precision diagnostics in aquaculture" on 13th September 2023 under the aegis of National Agricultural Higher Education Project (NAHEP). The objective of the workshop was to illustrate the importance and execution of precision diagnostics in aquatic animal health management to augment sustainability and security of the aquaculture sector to meet global demands of aquatic food production. Under the theme of precision diagnostic in aquaculture there were seven invited talks of focused on the theme delivered by eminent scientists. The workshop had Session 1 on Pathogen discovery and precision diagnostics covered four talks and session 2 on Future diagnostic for field application covered three talks. Dr. P. K. Sahoo, Director, ICAR-Central Institute of Freshwater Aquaculture, Bhubaneswar and Chairman of the Workshop emphasized on the prerequisite for developing need based precise diagnostics for suitable therapeutic development and enhancing the fish production. Dr. Sahoo commenced the first Session by delivering a talk on "Overview on freshwater fish diseases with emphasis on emerging pathogens" followed by Fulbright Fellow Dr. Arun K. Dhar, Professor and Director, Aquaculture Pathology Laboratory, School of Animal and Comparative Biomedical Sciences, The University of Arizona who delivered a talk on "Expediting pathogen discovery pipeline to prevent disease pandemics in shrimp aquaculture". The first session ended by a talk on "Precision diagnostics in context of pathogen discovery" delivered by Dr. Shyam Sunder Nandi, Scientist E/Deputy Director ICMR-National Institute of Virology, Mumbai Unit, Haffkine Institute Compound, Parel, Mumbai.

The second session began with the "Challenges in disease diagnosis in aquatic systems" presented by Dr. K.V. Rajendran, Professor Dept. of Zoology, School of Biological Sciences, Central University of Kerala, Kasaragod followed by a talk on "Versatility of CRISPR-Cas technology for diagnosis and management of the virus: A plant virus perspective" by Dr. Anirban Roy, Principal Scientist Division of Plant Pathology, ICAR-Indian Agricultural Research Institute, New Delhi. Further Dr. M. Makesh, Principal Scientist ICAR-Central Institute of Brackishwater Aquaculture, Chennai spoke on "Field level diagnosis for aquaculture" The session ended with the talk by Dr. Megha Bedekar HoD and Principal Scientist AEHM Division, ICAR- Central Institute of Fisheries Education, Mumbai who delivered her talk on "Revolution of aquaculture health: Future machine learning and IoT for disease diagnosis".

A total 154 participants including 90 males and 64 females actively participated in the workshop including faculty and students of ICAR-CIFE attended in person and faculty from sister ICAR institutes through online mode. The workshop generated lot of intensive discussion among the faculty and the students and the following key points emerged from the questions raised during the workshop which were summarized by the Chairman of the workshop, Dr. P. K. Sahoo, Director ICAR-Central Institute of Freshwater Aquaculture.

- Disease prediction is need of the time and important at field
- Robust database will be the future of disease diagnosis
- Histopathology and other conventional tools are non-replaceable and should be use to comprehend the diagnostic tests
- Farmers requirement should be the base of all inventions
- While designing futurist tools like AI and machine-learning based small scale farmers must be considered
- Disease diagnosis in field level not only in quarantine system
- Developing new pathogen detection tools need to be prioritized based on economy impact of the pathogen in terms of time and money
- Diagnosis should be comprehensive, holistic and system specific

The International workshop was coordinated by Faculty of Aquatic Environment and Health Management Division Dr. Megha K. Badekar, Principal Scientist & Head, Dr. K Pani Prasad, Principal Scientist; Dr. S.P. Shukla, Principal Scientist; Dr. Vidya Shree Bharti, Senior Scientist; Dr. Kundan Kumar, Senior Scientist; Dr. Arun Sharma Scientist, Dr. Jeena K., Scientist; Dr. Saurav Kumar, Scientist and Dr. Nalini Poojary, CTO, ICAR-CIFE.

Writeshop on
Fish and Shrimp Health Management for Increased Productivity and Sustainability

A writeshop on “Fish and Shrimp Health Management for Increased Productivity And Sustainability “was organized at the Aquatic Environment and Health Management Division on 14th September, 2023. The purpose of the 'Writeshop' was to provide an update based on the best available scientific information to be compiled and brought out in the form of a book in the relevant thrust area of the division. The consolidated source of information on the diverse facets of shrimp and fish health would be useful for the students, scientists, research scholars and entrepreneurs. Dr. C.N. Ravishankar, Director & Vice Chancellor and Dr. N.P. Sahu, Joint Director, ICAR-Central Institute of Fisheries Education, Mumbai were the Patrons for the Writeshop. Dr. Megha K. Bedekar, Head, Aquatic Environment and Health Management Division was the Program Director and the Writeshop was chaired by Prof. Dr. Arun Dhar, Director, Aquaculture Pathology Laboratory, School of Animal and Comparative Biomedical Sciences, The University of Arizona. Dr. Gayatri Tripathi, Principal Scientist and Dr. Jeena K., Scientist, AEHM Division were the Organizers. Faculty members of the AEHM division constructively contributed in deliberations and decision making on the topics to be covered in the book. A total of 21 chapters were discussed for the compilation. Following faculty members were the resource persons of the Writeshop.

Dr. Megha K. Bedekar, Head, AEHMD
Dr. K. Pani Prasad, Principal Scientist, AEHMD
Dr. Gayatri Tripathi, Principal Scientist, AEHMD
Dr. S. P. Shukla, Principal Scientist, AEHMD
Dr. Vidyshree Bharti, Senior Scientist, AEHMD
Dr. Kundan Kumar, Senior Scientist, AEHMD
Dr. Arun Sharma, Scientist, AEHMD
Dr. Jeena K, Scientist, AEHMD
Dr. Saurav Kumar, Scientist, AEHMD
Dr. Nalini Poojary, Chief Technical Officer, AEHMD

Panel discussion on “Vaccine Trials: Aquaculture Perspective”

Panel discussion on “Vaccine Trials: Aquaculture Perspective” on 16 August 2023 at ICAR-CIFE was conducted. Panel discussed their opinion, inputs and strategies for bringing vaccine from industry to farms in the Indian aquaculture. Following were the members for panel discussion.

1. Dr. Ravishankar C. N. (Director/Vice-Chancellor)
2. Dr. N. P. Sahu (Joint Director)
3. Dr. Megha Bedekar (Convener and consultant)
4. Dr. Kundan Kumar (Consultant)
5. Dr. Saurav Kumar (Consultant)
6. Dr. Aparna Chaudhari (FGB)
7. Dr. Gayatri Tripathi (AEHM)
8. Dr. Ashutosh Deo (FNBP)
9. Dr. Manjusha L (FRHPHM)
10. Dr. Neha Qureshi (FEES)
11. Dr. Kapil Sukhdhane (Aquaculture)
12. Dr. Arvind Sonavne (ITMU Member)
13. Dr. S. P. Shukla (ITMU Chairperson)
14. Mr. Nitin Nikam (Entrepreneur)
15. Members from Indian Immunologicals, Hyderabad

Major points related to vaccine economic viability, safety, food safety etc were discussed.

Interactions meet between Young Scientists with Fulbright Fellow Dr. Arun K Dhar

ICAR-Central Institute of Fisheries Education, Mumbai organised an interaction meet between young scientists (below 40 years) with Fulbright Fellow Dr. Arun K. Dhar, Professor and Director, Aquaculture Pathology Laboratory, School of Animal and Comparative Biomedical Sciences, The University of Arizona on 15th September, 2023. He delivered an inspirational talk on various dynamics of how to "Build career of a young scientist". He underlined the quality of publications in early career but also mentioned about "Publication should not be your primary goal, rather it should be to develop technology, products that farmers/industry can use and then only high-quality publication will come. Dr. Dhar illustrated some key theme to work for the young scientist as think positively, do not be afraid to dream big and very big, learn from your failure even if it was not your mistake, and do not be cynical. Career goal should be long, mid and short goal. Set up collaboration with scientists, set up goals for international fellowship at least 6 months or 1 year.

A total 24 young scientists of ICAR-CIFE including 14 males and 10 females actively participated in the interaction meet attended in person and online mode. The meet generated lot of intensive discussion among the faculty and overall, the meet makes participants feeling motivated, inspired, and enriched through various interactions. The interaction meet coordinated by Faculty of Aquatic Environment and Health Management Division Dr. Saurav Kumar, Scientist, ICAR-CIFE.

Aquatic Environment and Health division organized a Three Day Awareness cum-training program on "Health Management of Tilapia" jointly organized under National Referral Laboratory Project and National Surveillance Program on Aquatic Animal Disease (NSPAADII). Five tilapia farmers and three officials from state fisheries department, Maharashtra attended the program. The aim of the training program was to create awareness and provide the technical knowhow about fish health management. Program was inaugurated by Dr. N P Sahu, Joint Director, CIFE, who emphasized on the importance of the training on aquaculture and health management practice for farmers. Farmers shared their concerns and challenges being faced in tilapia farming. In three days training basics in presumptive disease diagnosis, important fish pathogens, best aquaculture and fish health management practices were covered. The training included lectures and practical on emerging and challenging fish pathogens, overview of national disease surveillance program, biosecurity measures, best aquaculture management practices, sampling for bacterial, fungal and parasitic disease diagnosis as well as protocols for disinfection and sanitization at tilapia site sampling, and water and soil analysis.

4.6. Invited lectures delivered

Invited Lectures Delivered (Online & Offline) in other Universities/Institutes			
Name of the Faculty	**Title of Lecture**	**Name & Place of University/ Institute**	**Date**
ICAR-CIFE, AE&HM Division			
Dr. Arun Sharma	Fish diseases and management practices	KVK, Gomati, Tripura	8 November, 2023
Dr. Saurav Kumar	Risk associated with biotic & abiotic stressors to fish and potential remedial approach	University of South Bohemia , Vodnany, Czech Republic	10 February, 2023
Dr. Jeena K.	Immune system of fish (Online)	University of Mumbai, Mumbai	18 September 2023
	Immunostimulants and prophylaxis (Online)	University of Mumbai, Mumbai	29 December 2023
ICAR-CIFE, FGB Division			
Dr. Mujahidkhan A. Pathan	Inbred lines and fish population genetics	Tata Institute of Fundamental Research, Mumbai	18 January, 2023
Dr. Rupam Sharma	Nanotechnology: a novel tool for aquaculture and fisheries	ICAR-NBFGR, Lucknow	14 June, 2023
	Toxicity studies using Zebrafish as vertebrate model	West Goalpara College, Assam	11 October, 2023
Dr. S. Jahageerdar	Analysis of research data employing SAS	Dr. BBKKV, Dapoli	
Dr. Annam Pavan Kumar	Barcoding and genetic conservation	CoF, C.A.U., Lembucherra, Tripra	12 December, 2023
	Molecular taxonomy	Kannur University, Kerala	22 June, 2023
	DNA fingerprinting	Kendriya Vidyalaya Sangathan, Mumbai	11 May, 2023

Dr. Aparna Chaudhari	The Biotechnology toolkit for aquaculture and fisheries	CoF, Kisanganj	20 July, 2023
	Whole genome projects - Unravelling the secrets of life Genetic and genomic resources and databases.	GADVASU, Ludhiana	5-7 December, 2023
	Genetic diversity assessment and applications.		
	Bioinformatics tools for assessing genetic diversity		
	DNA sequencing methods, automation and analysis.		
	Use of AI in applications of genetic resources.		
ICAR-CIFE, FN&BP Division			
Dr. Ashutosh D. deo	Fisheries Education and Human Resource Management	Department of Marine Science, Bharathidasan University, Tiruchirappalli	12-13 September, 2023
Dr. Manish Jayant	Strategies to enhance the utilization of cotton seed meal in aquafeed	Aurangabad, Maharashtra	7-8 July, 2023
ICAR-CIFE, FEES Division			
Dr. Shivaji Argade	Making extension & advisory services nutrition-sensitive: Linkages & capacity building	ICAR-Central Institute for Women in Agriculture, Bhubaneswar (Online)	10 January, 2023
	Women leadership development in agriculture	ICAR-Central Institute for Women in Agriculture, Bhubaneswar (Online)	24 January, 2023
Dr. Neha Wajahat Qureshi	Quantifying impact of pollution on fisheries	Sher-e-Kashmir University of Agricultural Sciences and Technology, Kashmir	21 September, 2023
ICAR-CIFE, FRM&PHM Division			
Dr. Layana P.	Trends in fish processing and preservation technologies	Veterinary College, Mumbai	27 December, 2023
Dr. Deepitha R. P.	Role of fish in human nutrition	College of Fisheries, Payyanur	16 October, 2023
Mr. Abuthagir Iburahim S.	Topics in fisheries resources management and cracking JRF examinations	College of Fisheries Ludhiana	7-11 July, 2023
	Coral reefs and their uniqueness	Jijibai Bhosale Udayan and Zoo, Mumbai	2 September, 2023

Dr. B. B. Nayak	Dry fish quality : The commercial and regulatory requirement	Krishi Odisha	13 January, 2024
	Challenges in developing science-based standards for Indian seafood within the framework of global food standards	IFAF, Kolkata	23 February, 2024
	The exciting world of aquatic sciences	IASR conference, ICAR – CIFRI	30 August, 2023
	Principles and advances in preservation methods	SKAUST, Kashmir	22 September, 2023
	Sustainable utilisation of fish through value addition	College of Fisheries, Kishanganj	20 July, 2023
ICAR-CIFE, Rohtak Centre			
Dr. Pankaj Kumar Dr. Sreedharan K.	Formulation of SOPs for inland saline shrimp farming	Demonstration Farm-cum-Training Centre, Sri Muktsar Sahib, Punjab	17 February, 2023
Mr. Satya Prakash	Digestibility studies in fish-understanding the basic and applied aspects	Dr. J. Jayalalithaa Fisheries University, Tamil Nadu	13 March, 2023
Dr. Babitha Rani A. M.	Inland saline shrimp farming: A technology transforming aquaculture prospects in Northern India	Kisan Kalyan Pradhikaran, Haryana	29 May, 2023
	Aquaculture a way forward	International Institute of Veterinary Education and Research, Rohtak	12 July 2023
	Biofloc aquaculture: The smart and green technology towards sustainability	SKUSAT, Kashmir	4-11 September, 2023

ICAR-CIFE, Powarkheda Centre			
Dr. Sunil Kumar Nayak	Fishery: Entrepreneurship and job opportunity for ELP students	College of Agriculture, Powarkheda, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur	27 February, 2023
	Integrated fish farming and Entrepreneurship and opportunities in fish farming	College of Agriculture, Powarkheda, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur	27 March, 2023
	Freshwater aquaculture: hatchery, seed production and grow-out technologies	LINAC-NCDC, Gurugram, Haryana	03 April, 2023
	Best management practices in aquaculture	Chief Minister House, Shyamala hills, Bhopal, MP	15 May, 2023
	Freshwater aquaculture: hatchery, seed production and grow-out technologies	LINAC-NCDC, Gurugram, Haryana	07 June, 2023
	Freshwater aquaculture: hatchery, seed production and grow-out technologies	LINAC-NCDC, Gurugram, Haryana	02 August, 2023
	Fishery, Package of practices in Aquaculture and schemes of PMMSY	ACABC, IECCI NGO, Chuna Bhati, Bhopal	09 November, 2023
	Freshwater aquaculture: hatchery, seed production and grow-out technologies	LINAC-NCDC, Gurugram, Haryana	01 December, 2023
ICAR-CIFE, Kakinada Centre			
Dr. Muralidhar P. Ande	Azolla as Fish Feed	Pragathi Engineering College, Kakinada	16 February, 2023
	Towards sustainable aquaculture	P. R. Govt. College, Kakinada	4 August, 2023
Dr. Shamna N.	Feed preparation at farm	Assam	18 December, 2023

ICAR-CIFE, Kolkata Centre			
Dr. G. H. Pailan	Alternative livelihood development of fisher folks in wetland areas of South 24 Parganas	Sasya Shyamala KVK, Arapanch, Sonarpur, South 24 Parganas, WB	2 February, 2023
	Feed and feeding management improved fish rearing practices.	WBUAFS, Kolkata, WB	20 February, 2023
	Low-cost fish feed preparation for ornamental fish culture	Sasya Shyamala KVK, Arapanch, Sonarpur, South 24 Parganas, WB	16 March, 2023
	Feed and feeding management of freshwater aquarium fish for colour enhancement	The University of Burdwan, Burdwan, WB	14 December, 2023
Dr. G. Biswas	Better management practices in shrimp farming Farming of bhetki	Directorate of Fisheries, Govt. of West Bengal (Online)	23 February, 2023
	Indigenous cultivable fish species	Sasya Shyamala KVK, Sonarpur, West Bengal	23 March, 2023
	Indiscriminate introduction of invasive alien species: Threats to the native fish species	Nature Environment and Wildlife Society, Kolkata (Online)	22 November, 2023
Dr. Suman Manna	Pesticides and their role on agro-ecosystem	Sasya Shyamala Krishi Vigyan Kendra, RMKVERI, Sonarpur, South 24 Parganas	21 March, 2023
	Use of different pesticides and its effect on aquatic ecosystem	Sasya Shyamala Krishi Vigyan Kendra, RMKVERI, Sonarpur, South 24 Parganas	2-3 June, 2023
	Pesticides and their effect effects on environment and aquatic ecosystem	Krishi Vigyan Kendra, Sonamukhi, Bankura	7-8 December, 2023
Dr. T. K. Ghoshal	Adoption of brackishwater aquaculture technologies bythemarginal farmers as livelihood activity along the coastal West Bengal	Kakdwip Research Centre, Kakdwip, South 24 Parganas, WB	7 October, 2023
	Feed & feeding management of brackishwater finfishes and shellfishes	The University of Burdwan, Burdwan, WB	14 December, 2023

4.7. Technology Transfer, Consultancy and Advisory Services

4.7.1. Technology Licensed:

Sr. No.	Date of Signing	Licensed to	Title of the Technology	Revenue Generated (Rs.)
1.	18 April, 2023	SHARP Engineering Associates (SEA), Pune	Mechanical-cum-Biological Drum filter	1 Lakh

4.7.2. Contract Services: 2

Sr. No.	Date of Contract	Contracted to	Title of the Technology	Revenue Generated (Rs.)
1.	2 August, 2023	String Bio, Bengaluru	Probiotic medicines	2,35,044/-
2.	4 August, 2023	Indian Immunodiagnostics Limited, Hyderabadand	Testing of CIFE-Flavac CIFE-Ed-vac	2,85,368/-

4.7.3. Consultancy Service:

Sr. No.	Date of Consultancy	Consultancy to	Title of the Technology	Revenue Generated (Rs.)
1.	28 December, 2023	M/S Phoenix Agrotech LLP, Borivali, Mumbai	Consultancies on Production of phycocyanin and purification	0.50 Lakh

4.7.4. Fishery Advisory Services / Consultancy etc.

- Technical support and advisory for Fish Vaccine Development provided to IIL, Hyderabad on 4 August, 2023. The advisory is provided on the mass production of vaccines for *Flavobacterium columnare* and *Edwardsiella tarda*, as well as the immunization procedure and schedule (AE&HM).
- Water health cards of 5,500 numbers were generated and necessary advisories were given to inland saline shrimp and fish farmers; Technical Advisory services to biofloc fish farmers through the feedback and problems reported through the Fisheries Department, Govt. of Kerala; Provided the technical guidance to the farmers on culture and disease aspects fish and shrimp & technical guidance to the biofloc farmers in the states of Haryana and Punjab (Rohtak Centre).
- Provided advisory to MAFA, Maharashtra, regarding ornamental fish farming and ornamental fish feed (AQC).
- Provided advisory service/Technical support to Pond, tank Biofloc farmer and setup aquarium and ornamental fish culture at Maharshi Nagar, Sonakshi Naka, Itarsi and Kalaghar, Suktawa, Narmadapuram, MP from March 2023 to December 2023 (Powarkheda).
- Provided technical advisory to Mr. Abhishekh Deshmukh and Shraddha Bashetti , two young entrepreneurs from Pune, during 2023, which helped them grab a grant worth 50 lakhs from BIRAC, DST and start their venture (FEES).
- Provided technical guidance to farmers from Sundarban areas, West Bengal, and farmers from Bihar over the telephone related to soil and water quality management (Kolkata).
- Provided technical guidance to farmers (10) from Bihar and Andhra Pradesh regarding IMC culture, feed, etc., plankton production & measurement, water quality problem & plankton Production, IMC hatchery, plankton development in pond water, unwanted fish removal & controlling green color in pond, argulus infection control, ornamental fish breeding/culture and pangas fish disease control (Kakinada Centre).

4.8. TV Talks/ Radio talks/ YouTube videos/Exhibitions/ Print Media

4.8.1. TV Talk / Radio Talk / YouTube Videos, etc.

Name of faculty	Topic	Date	Language	Program Aired on (channel etc.)
Dr. Geetanjali Deshmukhe	Freshwater Microalgae: Uses and Conservation	March 29, 2023	Marathi	Krishi darshan DD Sahyadri
Dr. Karan Kumar Ramteke	Code of Conduct for Responsible Fishing and Aquaculture	April 03, 2023	Marathi	Krishi darshan DD Sahyadri
Dr. Nalini Poojari	Digital Marketing - An excellent option to increase income for fish farmers	October 04, 2023	Marathi	Amchi Mati Amchi Mansa DD Sahyadri
Dr. T. K. Ghoshal	Climate change and disaster management in respect to fisheries	August 04, 2023	Bengali	Celebration of India's G20 Presidency Akashvani Kolkata
Mr. Ashok Kumar	Inland saline shrimp farming	October 19, 2023	Hindi	DD Kisan Studio KrishiB havan New Delhi DD Kisan
Mr. Abuthagir Iburahim. S. Dr. Neha W. Qureshi	CIFE: India's No. 1 Fisheries University	October 02, 2023		English YouTube ICAR-CIFE YouTube channel
Mr. Abuthagir Iburahim. S.	Exploring the enchanting museum of CIFE: Your ultimate virtual adventure!	May, 2023	English	YouTubeICAR-CIFE YouTube channel

4.8.2. Exhibitions Organized (Offline & Online)

Sl. No.	Name of Program	Dates	Venue	Organizer	Visitors
1.	Farmers' Fair-cum-Exhibition	3 -5 January, 2023	ICAR- National Institute of Natural Fibre Engineering and Technology, Kolkata	ICAR-NINFET, Kolkata	200+
2.	Exhibition program "Zero to Hero"	January 09, 2023	The Park Hotel, Narmadapuram, Madhya Pradesh	Narmada Jewn Dayini NGO, Narmadapuram, Madhya Pradesh	400+
3.	Versova Koli Sea Food Festival	20-22 January, 2023	Versova Koli Grounds, Mumbai	Vesava Machhimar Vividh Karyakari Sahakari Society Limited, Mumbai	1000+
4.	Innovation Festival	1-3 February, 2023	Nehru Science Centre, Worli, Mumbai	Nehru Science Centre, Mumbai	3000+
5.	Krishi Mela	14-16 February, 2023	Sasya Shyamala Krishi Vigyan Kendra (KVK), Ramakrishna Mission Vivekananda Educational and Research Institute (RKMVERI), South 24 Parganas	Sasya Shyamala KVK, RKMVERI, South 24 Parganas	300+
6.	Fish Tech Conference	2-3 March 2023	CIDCO Convention Centre, Navi Mumbai	Maharashtra Economic Development Council, Mumbai	200+
7.	Acharya Prafulla Chandra Roy Smarak Vigyan Mela Pradarshani	16-18 March, 2023	West Bengal University of Animal and Fishery Sciences, Kolkata	WBUAFS, Kolkata	200+
8.	Mahila Koli Sea food Festival	17-19 March, 2023	Versova Welfare School Ground, Mumbai	Versova Koli Mahila Samajik Sanstha, Mumbai	1000+
9.	Fish Swad	March 20, 2023	ICAR-CIFE, Mumbai	ICAR-CIFE, Mumbai	500+
10.	North East-Livestock-Aqua-Poultry Exhibition	18-20 April, 2023	Maniram Dewan Trade Centre at Guwahati, Assam	Government of Assam	200+
11.	Matsya Sampada Jagrukta Abhiyan	September 15, 2023	Brilliant convention centre, Indore, Madhya Pradesh	Department of Fisheries, Govt. of India	2000+

12.	Global Fisheries Conference 2023 and World Fisheries	20-22 November, 2023	Science City Ahmedabad, Gujarat	Coastal Aquaculture Authority, Chennai	2000+
13.	3rd International Conference on Aquatic Animal Epidemiology (AquaEpi III)	November 29 - December 01, 2023	ICAR- National Bureau of Fish Genetic Resources (NBFGR), Lucknow	ICAR-NBFGR, NFDB, ABCS & ISAAE	235+
14.	9th International Food Convention (IFCoN)	7-10 December, 2023	CSIR- Central Food Technological Research Institute (CFTRI), Mysore	CSIR-CFTRI, DRDO-DFRL, CSIR-IITR	1000+
15.	NAHEP farmer's meet	December 15, 2023	ICAR-CIFE, Rohtak Centre	ICAR-CIFE, Mumbai	300+

5 HRD


भा.कृ.अनु.प.-केन्द्रीय मात्स्यिकी शिक्षा संस्थान,मुंबई
ICAR-CENTRAL INSTITUTE OF FISHERIES EDUCATION

5.1. Faculty & Staff

CIFE Head Quarters, Mumbai

RMP

Director
Dr. Ravishankar C.N.

Joint Director
Dr. N.P. Sahu

ScientiĜc Staff

Heads of Division
Dr. Debajit Sarma (wef 26.06.2023)
Dr. Kedar Nath Mohanta (wef 10.07.2023)
Dr. Arpita Sharma (wef 10.07.2023)
Dr. Mukunda Goswami (wef 10.07.2023)
Dr. Megha Kadam Bedekar (wef 10.07.2023)
Dr. B.B. Nayak (wef 13.11.2023)
Dr. Naresh S. Nagpure (Acting) (wef 1.1.2023)
Dr.(Mrs.) Geetanjali Deshmukhe (Acting)
(wef 1.1.2023 to 31.03.2023)
Dr. Subodh Gupta (Acting) (upto 09.07.2023)
Dr. Sukham Munil Kumar (Acting) (wef 09.07.2023)

Principal Scientists
Dr. Naresh S. Nagpure
Dr.K.V.Rajendran (upto 28.02.2023)
Dr. (Mrs.) Aparna Chaudhari
Dr. S.N. Ojha (upto 31.07.2023)
Dr. P.K. Pandey (upto 12.05.2021)
Dr. Kishore Kumar Krishnani (upto 8.8.2023)
Dr. S. Jahageerdar
Dr. (Mrs.) Arpita Sharma (upto 09.07.2023)
Dr. K. Pani Prasad
Dr. P.P. Srivastava (On deputation)
Dr. R.P. Raman (upto 31.07.2023)
Dr. Ashok Kumar Jaiswar
Dr. Rupam Sharma
Dr.(Mrs.)Gayatri Tripathi
Dr. Satya Prakash Shukla
Dr. Swadesh Prakash
Dr. Subodh Gupta
Dr. Sukham Munil Kumar
Dr. Mukunda Goswami (upto 09.07.2023)
Dr. Ashutosh D. Deo
Dr.(Mrs.) Megha Kadam Bedekar (upto 09.07.2023)
Dr. P.S. Ananthan
Dr. Sanath Kumar H.
Dr. Manoj Pandit Brahmane
Dr. A.K. Balange (upto 28.06.2023)
Dr. (Mrs) Paramita Banerjee Sawant
Dr. Ajit Kumar Verma (wef 21.4.17) (order issued on 12.03.2024)
Dr.(Mrs.) Asha T. Landge (wef 17.6.21) (order issued on 10.05.24)

Senior Scientists
Dr. (Mrs.)Vidya Shree Bharti
Dr. (Mrs.)Babitha Rani A.M.
Dr. Sonwane Arvind Asaram
Dr. A. Pavan Kumar
Dr. Prem Kumar (wef 23.03.2023)
Dr. Kundan Kumar
Dr. Vinod Kumar Yadav
Dr. Ankush Lala Kamble
Dr. (Mrs.)Manjusha L.
Dr. Sangeeta Mandal (wef 27.12.2023)
Dr. (Mrs.) Sukham Monalisha Devi
Dr. Martin Xavier K.A. (upto 29.03.2023)

Scientists
Dr. Arun Sharma
Dr.(Mrs.) Thongam Ibemcha Chanu
Dr. Sikendra Kumar
Dr. Shashi Bhushan
Dr. Mujahidkhan Ajamalkhan Pathan (upto 06.08.2023)
Dr. Saurav Kumar
Dr.(Mrs.) Tincy Verghese
Dr. Shivaji Dadabhau Argade
Dr.(Mrs.) Shamna N. (upto 14.05.2023)
Dr.(Mrs) Jeena K.
Dr. Dhamotharan K.
Dr. Karankumar K. Ramteke
Dr. Kiran Dashrath Rasal
Dr.(Mrs.) Neha Wajahat Qureshi
Dr.(Mrs.) Layana P.
Ms. Saloni Shivam (wef 18.12.2023)
Dr. Manish Jayant
Dr. Sukhdhane Kapil Sukhdeo
Dr. (Mrs.) Upasana Sahoo

Dr.(Mrs.) Madhuri Pathak
Mr. Angom Lenin Singh
Ms Deepitha R.P
Mr. Dayal Devadas
Ms. Shobha Rawat
Mr. Abuthagir Iburahim S.
Ms. V. Vidhya (upto 15.05.2023)
Ms. R. Bharathi Rathinam (wef 11.12.2023)

Technical Staff

Chief Technical OfĜcers (T-9)
Dr. M.K. Chouksey (upto 28.02.2023)
Mr. Dasari Bhoomaiah
Mr. P.K. Das
Dr. (Mrs) Nalini Poojary
Mr. Subhash Chand (wef 09.07.2022)

Asst. Chief Technical OfĜcers (T-7/8)
Dr. Chandrakant M.H.
Mrs. Rekha Nair
Mrs. Rajani H. Khandgale

Sr. Technical OfĜcers (T-6)
Mr. Sanjeevan Kumar (upto 31.05.2023)
Mr. S. Maity

Technical OfĜcers (T-5)
Mr. B.J. Rathod
Mr. N.K. Aglave
Mrs. G. Aruna Devi
Mr. Avinash Sable
Mr. Sagar Suresh Sawant
Mr. Rajarshee Moitra
Dr. Pawan Kumar
Mr. Mohd. Baqar

Sr. Technical Assistants (T-4)
Mrs. Reshma K. Raje
Mr. Dhanpat Singh Rawat

Technical Assistant (T-3)
Sh. Pranaya Kumar Biswal

Sr. Technicians (T-2)
Mr. Mohd Sadiq M. Mulla
Mr. Abhijeet Vijay Jadhav
Mr. T.G. Gaikwad
Mr. G.B. Kamble

Administrative Staff

Chief Administrative OfĜcer (SG)
Mr. Kishan Lal Meena (wef 20.04.2023)

Comptroller
Mr. Rajneesh Kumar Sing

Sr. Administrative OfĜcer
Mr. Navin Kumar (wef 27.03.2023)

Law OfĜcer (Zone 3)
Mr. Jitender Khanna (wef 01.03.2023)

Administrative OfĜcer
Mrs. Poonam N. Behl
Mr. Yogesh R. Pathare

Finance & Accounts OfĜcer
Mr. S.V. Kasabe

Joint Director (OfĜcial Language)
Mr. De

Asstt. Admn .OfĜcer
Mrs. F.G. Fernandes (upto 30.06.2023)
Ms. C.S. Khundol
Mrs. Swati S. Koli
Mr. V.S. Kuveskar
Mr. Suraj Gupta
Mr. Devendra V. Raorane
Mrs. Sanyuja S. Parab
Mr. A.G. Kolambkar (wef 4.7.2023)

Principal Private Secretary
Mr. Sureshbhai S. Patelia (upto 20.11.2023)
Mr. B. M. Chavan

Private Secretary
Mr. Pravin Ninawe (upto 28.06.2023)
Mrs. Pragati R. Gadre

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

Assistant
Mrs. Anagha U. Joshi
Mr. A. G. Kolambkar (upto 5.7.2023)
Mr. B.P. Chauhan
Mr. N.L. Ghane
Mr. M.B. Waghela
Mrs. Anu Grover (wef 29.03.2023)

Upper Division Clerk
Mrs. C.C. Raut
Mrs. Anu Grover (upto 28.03.2023)
Mr. S.H. Bhosale
Mr. Shirish P. Malvankar
Mr. Prasenjit P. Sonawane
Mr. Raju N. Kamble

Lower Division Clerk
Mr. Ninad V. Kandalgaonkar
Mr. Sambhaji S. Shelke
Ms. Ujjawala V. Tiwari

Skilled Support Staff
Mr. G.G. Zendekar
Mr. Ashok R. More (upto 31.01.2023)
Mr. D.B. Gaikwad (upto 30.09.2023)
Mr. J.K. Makwana
Mr. Bandu R. Chavan (upto 20.01.2023)
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
Mr. Akhtar Fakirmiyan Mullaji

CIFE Kakinada Centre

ScientiĜc Staff

OfĜcer Incharge / Senior Scientist
Dr. Muralidhar P. Ande
Scientist
Dr. Karthireddy Syamala
Dr.(Mrs.) Shamna N. (wef 15.5.2023)
Ms. V. Vidhya (upto 13.12.2023)

Technical Staff

Chief Technical OfĜcer (T-9)
Dr. P. Srinivas Rao
Technical Assistants (T-3)
Mr. A. Gurraiah (upto 31.1.2022)
Mrs. Usharani Maradana
Sr. Technicians (T-2)
Mr. Sheikh Valisha (wef 16.5.2022)
Mr. G.V.V. Satyanarayana (16.5.2022)

Administrative Staff

Asst. Administrative OfĜcer
Mr. B. Laxmana Rao
Upper Division Clerk
Mrs. M. Rama Mani

Skilled Support Staff
Mr. T. Satyanarayana
Mr. P.V.K. Reddy (upto 31.05.2023)
Mr. P.D. Reddy
Mr. M. Govindu (upto 28.02.2023)
Mr. Kurru Suresh
Mr. M. Kondala Rao

CIFE Kolkata Centre

ScientiGc Staff

OfGcer Incharge / Principal Scientist

Dr.Tapas Kumar Ghoshal (wef 21.07.2023)

Principal Scientist

Dr. G.H. Pailan

Dr. Parimal Sardar

Dr. Subrata Dasgupta (upto 31.01.2023)

Dr. Shubendu Dutta (upto 13.02.2023)

Dr. S. Das Gupta

Sr. Scientist

Dr. Gouranga Biswas

Dr. Sujata Sahoo

Scientist

Dr. Dilip Kumar Singh

Dr. Suman Manna

Dr. Hanjabam Mandakini Devi

Ms Sweta Pradhan

Dr. Leesa Priyadarsani (wef 23.03.2023)

Technical Staff

Sr. Technical OfGcer (T-6)

Mr. Sanjeevan Kumar (wef 1.06.2023)

Technical OfGcer (T-5)

Mr. Prakash Kumar Behera (upto 4.5.2023)

Mr. Tapas Kumar Ghosh

Administrative Staff

Assistant Administrative OfGcer

Mr. C.N. Sahani

Private Secretary

Ms. Kaberi Biswas

Upper Division Clerk

Mr. Kishore Bose

Mr. Ram Milan Singh

Skilled Support Staff

Mrs. Suman Pandey

Mr. Rajesh Mahato

CIFE Powerkheda Centre

ScientiGc Staff

OfGcer Incharge/ Scientist

Dr. Sunil Kumar Nayak

Scientist

Mr. Dhalongsaih Reang

Dr. Harsha Haridas

Technical Staff

Asstt. Chief Technical OfGcer

Mr. Hasan Javed

Technical Assistant (T-3)

Mr. Raghuvir Prasad

Sr. Technician (T-2)

Mr. S. Prajapati

Administrative Staff

Asstt. Administrative OfGcer

Mrs. Asha Dhurve

Skilled Support Staff

Mr. Sambhu Dayal

Mr. Hari Singh

Mr. Manohar Lal

Mr. Ram Swarup

Mr. Deepak Kumar Kushwaha

Scientiĝc Staff

Ofĝcer Incharge/ Scientist

Dr. Babitha Rani A.M.
Scientist
Dr. Mujahidkhan Ajamalkhan Pathan (wef 07.08.2023)
Dr. Pankaj Kumar
Dr. Sreedharan K.
Sh. Satya Prakash (study leave wef 1.04.2021)
Dr. Harsha Haridas

Technical Staff

Sr. Technical Ofĝcer (T-7/8)
Mr. Ashok Kumar
Technical Ofĝcer (T-5)
Mr. Satyendra Singh
Sr. Technical Assistant (T-4)
Mr. Krishan Kumar
Sr. Technician (T-2)
Shri Kuldeep Singh

Administrative Staff

Private Secretary
Mr. Pravin Ninawe (upto 30.11.2023)
Skilled Support Staff
Mr. Gyan Chand

CIFE Rohtak Centre

CIFE Motipur Centre

Scientiĝc Staff

Ofĝcer Incharge/ Scientist

Dr. Mohd. Aklakur
Mr. Udipta Roy (wef12.04.2023)

5.2. Appointments and Promotions

Appointments

Sl. No.	Name of the Officials	Designation	Date of Joining
1	Shri Jitender Khanna	Law Officer (Zone 3)	01.03.2023
2	Dr. Prem Kumar	Senior Scientist	23.03.2023
3	Dr. Leesa Priyadarshani	Scientist	23.03.2023
4	Shri Navin Kumar	Sr. Administrative Officer	27.03.2023
5	Shri Udipta Roy	Scientist	12.04.2023
6	Shri Krishan Lal Meena	Chief Admn. Officer (Sr. Grade)	20.04.2023
7	Dr. Debajit Sarma	Head, Aquaculture Division	26.06.2023
8	Dr. Kedar Nath Mohanta	Head, FNBP Division	10.07.2023
9	Dr.(Mrs.) Arpita Sharma	Head, FEES Division (Tenure Basis)	10.07.2023
10	Dr. Mukunda Goswami	Head, FGB Division (Tenure Basis)	10.07.2023
11	Dr. Megha Kadam Bedekar	Head, AEHM Division (Tenure Basis)	10.07.2023
12	Dr. Tapas Kumar Ghoshal	Head, Kolkata Centre	21.07.2023
13	Dr. B.B. Nayak	Head, FRHPHM Division (Tenure Basis)	13.11.2023
14	Ms. R. Bharathi Rathinam	Scientist	11.12.2023
15	Ms. Saloni Shivam	Scientist	18.12.2023
16	Dr.(Mrs.) Sangeeta Mandal	Sr. Scientist	27.12.2023

Promotions

Sl. No.	Name of the Employee	From	To	w.e.f.
1	Mrs. Anu Grover	UDC	Assistant	29.03.2023
2	Mr. Ashok G. Kolambkar	Assistant	Asstt. Admn. Officer	05.07.2023

Five Yearly Assessment Meeting

Library / Information / Documentation Meeting held on 13.03.2023

S. No.	Name of the Employee	From	To	w.e.f.
1	Shri Subhash Chand	ACTO (T-7/8)	Chief Tech. Officer (T-9)	09.07.2023

MACP for financial upgradation (Meeting held on 13.10.2023)

Sl. No.	Name of the Employee	From(Grade Pay)	To(Grade Pay)	w.e.f.
1	Smt. Suman Pandey	1800	1900	01.03.2023
2	Shri Anil D. Sonawane, SSS	2000	2400	05.07.2023
3	Shri Arvind Lavande, SSS	2000	2400	16.09.2023

Transfers from CIFE

Sl. No.	Name of the Employee	Transfer to	Date of Relieving
1	Dr. K.V. Rajendran, Principal Scientist	Central University of Kerala	28.02.2023
2	Dr. Martine Xavier K.A., Scientist	ICAR-CIFT, Regional Centre of Mumbai	29.03.2023
3	Shri Prakash Kumar Behera, Technical Officer	ICAR-CIFA, Bhubaneswar	04.05.2023
4	Dr. Amjad K. Balange, Principal Scientist	ICAR-IARI, Assam	28.06.2023
5	Dr. Kishore Kumar Krishnani Principal Scientist	ICAR-IIAB, Ranchi	08.08.2023
6	Dr. Rathi Bhuvaneswari	ICAR-CCMFRI	30.09.2023
7	Shri S.S. Patelia, Principal Private Secretary	ICAR-DMAPR, Anand	20.11.2023
8	Shri Pravin R. Ninawe, Private Secretary	ICAR-CCRI, Nagpur	30.11.2023
9	Ms. V. Vidhya, Scientist	ICAR-CMFRI, Tutucorin	13.12.2023

Transfers to CIFE

Sl. No.	Name of the Officials	Transfer from	Date of Joining
1	Shri Jitender Khanna, Law Officer (Zone 3)	ICAR, Hqrs	01.03.2023
2	Dr. Prem Kumar, Sr. Scientist	ICAR-CIBA, Kakdwip	23.03.2023
3	Ms. Leesa Priyadarshani Scientist	ICAR-CIBA, Kakdwip	23.03.2023
4	Shri Navin Kumar, Sr. Admn. OfficerI	ICAR-NBAIM, Mau	27.03.2023
5	Shri Krishan Lal Meena, Chief Admn. Officer(Sr. Grade)	ICAR-NDRI. Karnal	20.04.2023
6	Dr. Debajit Sarma, Head	ICAR-DCFR, Bhimtal	26.06.2023
7	Dr. Kedar Nath Mohanta, Head	ICAR-CIFA, Bhubaneswar	10.07.2023
8	Dr. Tapas Kumar Ghoshal, Head	ICAR-CIBA, Kakdwip	21.07.2023
9	Ms. R. Bharathi Rathinam, Scientist	ICAR-IARI, Jharkhand	11.12.2023
10	Ms. Saloni Shivam, Scientist	Karwar Regional Station of CMFRI	18.12.2023
11	Dr. Sangeeta Mandal, Sr. Scientist	ICAR-NBFGR, Lucknow	27.12.2023

Retirements/Termination/Resignation

Sl. No.	Name of the Employee	Date of Retirement
1	Shri Bandu Chavan, Skilled Support Staff	20.01.2023 (VRS)
2	Shri Ashok R. More, Skilled Support Staff	31.01.2023 (VRS)
3	Dr. Subrata Dasgupta, Principal Scientist, Kolkata Centre	31.01.2023
4	Dr. M.K. Chouksey, Chief Technical Office	28.02.2023
5	Shri M. Govindu, Skilled Support Staff, Kakinada Centre	28.02.2023
6	Dr. Geetanjali Deshmukhe, Principal Scientist Asstt.	31.03.2023
7	Shri P.V.K. Reddy, Skilled Support Staff, Kakinada Centre	31.05.2023
8	Mrs. Francisca G. Fernandes, Asstt. Admn. Officer	30.06.2023
9	Dr. S.N. Ojha, Principal Scientist	31.07.2023
10	Dr. R.P. Raman, Principal Scientist	31.07.2023
11	Shri D.B. Gaikwad, Skilled Support Staff	30.09.2023

Obituary

Sl. No.	Name of the Officials	Designation	Date of Death
1	Dr. Subhendu Datta	Principal Scientist, Kolkata Centre	13.02.2023

Details of the Meeting held During January to December 2023

Five Yearly Assessment Library/Information/Technology	:	13th March 2023
DPC Meeting for the post of Assistant under LDCE Quota	:	29th March 2023
DPC Meeting for the post Asstt. Administrative Officer	:	22nd June 2023
DPC for MACP for Skilled Support Staff	:	13th October 2023
Probation Clearance & Confirmation of Scientific Staff	:	26th October 2023
49th Board of Management Meeting	:	29th November 2023

5.3 Training & Capacity Building of Faculty

Name of the faculty	Name of the training programme attended	Organizer and Place	Period
Dr. Arvind A. Sonwane	Workshop on zebrafish facility management and research methodologies	TIFR, Mumbai	16th to 20th January 2023
Dr. Annam Pavan Kumar	4th World Environment Summit	Galgotias University, Greater Noida, U. P. Environment and Social Development Association (ESDA) Delhi (INDIA), Galgotias University, Greater Noida, U.P.	4-6th November 2023
Dr. Annam Pavan Kumar	Genetic Improvement of Performance Traits: A Genome-wide Selection Perspective	CIFA Bhubhaneshwar, Odisha	28 October 2023
Mr. Angom Lenin Singh	XVI Agricultural Science Congress	ICAR-Central Marine Fisheries Research Institute	10-13 October, 2023
Dr. Megha Kadam Bedekar	Recent Biotechnological Advances in Health, and Management of Livestock Poultry and Companion Animals	Society for Veterinary Science & Biotechnology	5- 7th October 2023
Dr. Megha Kadam Bedekar, Dr. Gayatri Tripathi, Dr. K. Pani Prasad, Dr. Nalini Poojary	International Conference on Aquatic Animal Epidemiology (AquaEpi III)	Indian Council of Agricultural Research (ICAR), Lucknow	29 November – 1 December 2023
Dr. Megha Kadam Bedekar	VIROCON-2023	Indian Virological Society and ICAR-NRCB, Trichy	1-3rd December 2023
Dr. Arun Sharma	3 Days International Conference "On Impact of Climate Changes on Global Food, Livestock, Livelihood and Environmental Security: Advanced Approaches and Mitigation Strategies" ICCGFLLES-2023"	Navsari Agricultural University (NAU) Navsari, Gujarat & National Agriculture Development Cooperative Ltd, Baramulla, J&K	28-30th Dec 2023
Dr. Gayatri Tripathi and Dr. Vidya Shree Bharti	Concluding workshop of NAHEP	CIFE, Rohtak Centre	14-15 December 2023
Dr. Gayatri Tripathi	Stakeholder consultation-cum-consultative Workshop on "Fish conservation and ranching in River Ganga"	NMCG at ICAR-CIFRI, West Bengal	26.09.2023
Dr. Gayatri Tripathi	Stakeholder consultation-cum-consultative Workshop on "Hilsa fisheries improvement in the middle stretch, of river Ganga through broodfish release and captive broodstock development"	NMCG at ICAR-CIFRI, West Bengal	27.09.2023

Dr. Gayatri Tripathi	5th Online International Conference on Aquaculture and Fisheries" and presented paper on "Therapeutic potentials of fish gut microbiota in management of bacterial diseases".	Coalesce Research Group, National Institute of Oceanography and Fisheries, Egypt	April 17-18, 2023
Dr. Gayatri Tripathi	4th Edition of World Congress on Infectious Diseases	Magnus Group, USA, Rome Italy, Hybrid mode	June 21-22, 2023
Dr. Jeena K.	One Health Aquaculture Workshop on 'Innovative Technologies in Support of a Safe and Sustainable Aquatic Food Supply'	CEFAS, UK and ICAR-CMFRI, Kochi	20-22 February, 2023
Dr. Jeena K	Consultation workshop for MAHASAPCAR (Maharashtra State Action Plan for Containment of Antimicrobial Resistance	Intercontinental Hotel, Marine Drive Mumbai, Government of Maharshtra	8-9 June, 2023
Dr. Jeena K.	Inception Meeting of FAO–Government of India Project Under Global Health Security Programme (GHSP) in India	FAO & USAID , Inspire Hall, Hotel Le Meridian, New Delhi	11 April 2023
Dr. Jeena K.	Writeshop on Development of Educational Materials for AMU	FAO, ICAR CIFE, Mumbai	29 March 2023
Dr. S. Munilkumar	Mesocosm-based larval production of fish -	ECOAQUA, University of Las Palmas de Gran Canaria (ULPGC), Spain	12-26 December 2023
Dr. Prem Kumar	Aquatic animal breeding and Farming,	Asian Institute of Technology (AIT), Thailand	18th September to 17th October, 2023
Dr. Kapil Sukhdhane	Faculty of Science and Engineering School of Molecular and Life Sciences, Curtain University, Perth, Australia	Curtin University, Australia	1 to 29 December 2023
Dr. A. K. Verma	Automation in Aquaculture	ECOAQUA, Aquaculture Research Group, ULPGC, Canary Islands, Spain	20 November to 26 December 2023
Dr. Tincy Varghese	Professional Faculty Training	AIT, Bangkok, Thailand	11 January 2023 to 8 February 2023
Dr. Tincy Varghese	Panel discussion and paper presentation on Inland Saline Aquaculture of India	World Aquaculture, Darwin Australia, Darwin, Australia	31st May 2023
Dr. Sikendra Kumar Dr. Manish Jayant	Professional Faculty Training	AIT, Bangkok, Thailand	18 September 2023 to 17 October 2023

5.4. Conference / Symposium / Workshop Attended by Scientists

Name of the faculty	Name of the Conference / Symposium / Workshop	Organized by	Date
Shashi Bhusan	Online Workshop on: Pannel Discussion on Tuna Fisheries in BOBP Region: Emerging challenges under changing climate and BBNJ regime	Bay of Bengal Programme, Chennai	02.03.2023
Karankumar Ramteke	ICES/FAO Working Group on Fishing Technology and Fish Behaviour (WGFTFB23) Symposium on Innovations in Fishing Technologies for Sustainable and Resilient Fisheries	ICES/FAO, Taj Gateway Hotel, Kochi, India	13.02.2023 – 17.02.2023
Pankaj Kumar Sreedharan K	International Conference on "Blended Learning Ecosystem for Higher Education in Agriculture" (ICBLE-2023)	NASS Complex Delhi	21-23.03.2023
Ananthan P.S Neha W. Qureshi Munil Kumar S.	Stakeholders Consultation Workshop on Fisheries Development in Rajasthan: Status, Challenges and Way Forward	Department of Fisheries, Rajasthan	10.05.2023
ShivajiArgade Kapil Sukhdhane Madhuri Pathak	Agriculture & Fisheries Doordarshan Program Advisory Workshop	ICAR- CIFE, Mumbai	09.06.2023
Ankush L. Kamble	International Conference on Current Advances in Agriculture, Animal Husbandry and Allied Sciences" CAAAAS-2023	Shri Mata Vaishno Devi University, Katra (India	10-11.07.2023
Ankush L. Kamble	International Seminar on Accounting, Finance, Business and Social Sciences (ISAFBS 2023)	Assam University, Silchar (India)	14-16.07.2023
Megha K. Bedekar Saurav Kumar	Panel discussion on "Vaccine Trials : Aquaculture	Indian Immunologicals Limited (IIL)	16.08.2023

Name of the faculty	Name of the Conference / Symposium / Workshop	Organized by	Date
Kundan Kumar	Perspective"	Hyderabad	
Naresh Nagpure Arpita Sharma Debajit Sarma Shashi Bhushan Kiran Rasal Kapil Sukhdhane Madhuri Pathak	First National Conference on Kisan Credit Card	Ministry of Fisheries, Animal Husbandry and Dairying, Government of India	04.09.2023
Megha K. Bedekar Saurav Kumar	Workshop on “Techniques in Animal Health Management” for Students Under aegis of NAHEP	ICAR-CIFE, Mumbai	07.09.2023
Kundan Kumar Jeena K.	One-day International Workshop on “Writing Winning Proposals to Secure International Grants”	ICAR-CIFE, Mumbai	12.09.2023
Gayatri Tripathi Jeena K.	A write shop on “Fish And Shrimp Health Management For Increased Productivity And Sustainability “was organized at the Aquatic Environment and Health Management Division	ICAR-CIFE, Mumbai	14.09.2023
Sujata Sahoo Angom Lenin A. K. Verma Prem Kumar	XVI Agriculture Science Congress 2023 & ASC Expo	NAAS, New Delhi and ICAR-CMFRI	10-13 October, 2023
Megha Kadam Bedekar Gayatri Tripathi K. Pani Prasad Nalini Poojary	International Conference on Aquatic Animal Epidemiology (AquaEpi III)	Indian Council of Agricultural Research (ICAR), Lucknow	29.11.2023 – 1.12.2023
Suman Manna Sweta Pradhan	Webinar on Indiscriminate Introduction of Invasive Alien Species: Threats to the Native Fish Species	ICAR-CIFE Kolkata and Nature Environment and Wildlife Society	22.11.2023
T.K. Ghoshal	International Conference On “Sustainable Innovation in Food Safety, Health & Nutrition” (SInFoCoN-23) under the aegis of ICAR -World Bank funded National Agricultural Higher Education Project (NAHEP) - Innovation Grant.	Biswa Bangla Convention Centre, Newtown, Kolkata, West Bengal, WBUAFS, Kolkata	22-23.12.2023

Name of the faculty	Name of the Conference / Symposium / Workshop	Organized by	Date
Dr. Mukunda Goswami	Good Food Conference 2023; Path to 2030	Good Food Institute, San Francisco, USA	September 18 – 20, 2023
Dr. Aparna Chaudhari	Exposure visit under ICAR-NAHEP	University of Malaya, Kuala Lumpur, Malaysia	10th to 24th September, 2023
Dr. Arvind A. Sonwane	Training under ICAR-NAHEP	Kyushu University, Japan	20-09-2023 to 19-09-2023
Dr. A. Pavan Kumar	Training under ICAR-NAHEP	Bangor University, UK	30.09.2024 to 31.10.2024
Dr. Kiran D. Rasal	Training under ICAR-NAHEP	University of Aberdeen, Scotland	1st to 30th October, 2023
Mr. Angom Lenin Singh	Exposure visit under ICAR-NAHEP	University of Tasmania, Australia	16/10/23 - 31/10/23
Dr. B.B Nayak, Dr.Sanath Kumar H, Dr. Manjusha L, Dr.Deepitha R.P	Shrimp retail conference	CIDCO Convention centre, Navi Mumbai, Vashi	22nd to 23rd November 2023
Dr. Manjusha L, Dr.Layana P, Dr Deepitha R P,	National Conference on Food Fortification and Nutraceuticals – The way forward for achieving nutritional security	ASSOCHAM, India, Worli, Mumbai	1st September 2023
Dr. Manjusha L., Dr Deepitha R P	16th Agricultural Science Congress	ICAR-CMFRI, Kochi	10-13 October 2023
Dr. Manjusha L.	Webinar on Trends in Seafood Certification	TNJFU	07 December 2023
Dr. Manjusha L. Dr. Layana P	Workshop on “Writing Winning Proposals for Securing International Grants”	ICAR-CIFE, Mumbai	12 September 2023
Dr. Manjusha L.	International workshop on ‘Diagnostics of Future: Precision Diagnostics in Aquaculture’	ICAR-CIFE, Mumbai	13 September 2023
Dr. Manjusha L Dr. Deepitha R.P Dr. B.B.Nayak Dr. Sanat Kumar	Workshop on “Blended Learning Platform”	ICAR-IASRI, New Delhi at ICAR-CIFE, Mumbai	5Th October 2023
Dr. B B Nayak Dr. Layana P	2nd Technical advisory committee meeting on ICAR Network programme on Precision Agriculture	ICAR-CIFE, Mumbai	16-17 November 2023

Dr. B B Nayak Dr. Sanath Kumar Dr. Layana P Mr. Avinash Sable	Farmer's meet	ICAR-CIFE, Rohtak Centre, Haryana	15th December 2023
Dr. Asha T. Landge	CIFE Technology Awareness Program for the Fish Farmers	Office of Assistant Commissioner of Fisheries (State fisheries Department), Thane, Palghar Maharashtra	19.10.2023
Dr. Asha T. Landge	As an Advisor(Fisheries) to Maharashtara Public Service Commission to conduct interviews	Maharashtra Public Service Commission, Belapur	29th to 31st August, 2023
Dr. Asha T. Landge & Dr Shashi bhushan	26 th Session of the IOTC Scientific Committee (Indian Ocean Tuna Commission-Scientific Committee-26 Meeting)	IOTC (Indian Ocean Tuna Commission)	4th to 8th December 2023
Dr. Shashi Bhusan	Online Workshop on: Pannel Discussion on Tuna Fisheries in BOBP Region: Emerging challenges under changing climate and BBNJ regime	Bay of Bengal Programme, Chennai	02nd May 2023
Dr. Shashi Bhusan	National Conference on: Transforming Rural Poverty to Prosperity through Sustainable Fisheries (TRPSE-2023)	College of Fishery, Kishanganj Alumni Association and College of Fishery, Kishanganj	19-21 July, 2023
Dr. Shashi Bhusan	26th Session of Scientific committee meeting on Indian Ocean Tuna commission	FAO Rome and Indian Ocean Tuna Commission (IOTC)	4-8th December 2023

5.6. Meetings Attended by Director and Joint Director

Dr. C. N. Ravishankar, Director & Vice Chancellor

Name of Meeting	Organized by	Date
Delivered a talk in 29th Indian Convention ICFoST	AFST(I), Trivandrum	06.01.2023
Preparatory meeting regarding the Agri-innovate Industry Interface Meeting (Online)	ICAR, New Delhi	09.01.2023
PMMSY-State Level Approval and Monitoring Committee (SLAMC) Meeting under the Chairmanship of the Principal Secretary Fisheries, Govt. of Maharashtra (Online)	Department of Fisheries	12.01.2023
○ ○	ICAR-CIFE	17.01.2023
Meeting to discuss admission related issues with Directors of Deemed Universities (IARI, NDRI, IVRI, CIFE) under the Chairmanship of the DDG (Edn.), ICAR (Online)	ICAR, New Delhi	23.01.2023
The first meeting of the Mega University Committee under the chairmanship of Dr. R.C. Agrawal, DDG (Agril. Education), ICAR (Online)	ICAR, New Delhi	23.01.2023
FOCARS Review Meeting organized by ICAR-NAARM, Hyderabad	ICAR-NAARM, Hydrabad	23-24.01.2023
National Consultative Meet on "Roadmap for Dissemination of Genetically Improved Varieties of Fish and Shellfish"	ICAR-CIFA, Bhubaneswar	27.01.2023
ICES-FAO International Symposium on Innovations in Fishing Technologies for a Sustainable and Resilient Fisheries organised by BOBP-IGO, Chennai at Cochin.	BOBP-IGO, Chennai	14.02.2023
Inaugural Function of the Conference on "Fisheries and Aquaculture - An ecological perspective" organized at GADVASU, Ludhiana	GADVASU, Ludhiana	22.02.2023
Launch Workshop of the National Surveillance Programme for Aquatic Animal Diseases, Phase-II organized by ICAR-NBFGR, Lucknow at Chennai	NBFGR, Lucknow	27.02.2023
Participation as Chief Guest in the National Science Day Programme of CWRDM, Kozhikode (Online)	CWRDM, Kozhikode	28.02.2023
Review Meeting to assess the progress of implementation of Electronic Human Resource Management System (eHRMS) software under the Chairmanship of Addl. Secretary, DARE and Secretary, ICAR (Online)	ICAR, New Delhi	28.02.2023
27th Meeting of Food and Agriculture Division Council (FADC) organized by Food & Agriculture Department, BIS, New Delhi (Online)	ICAR, New Delhi	01.03.2023
Third preparatory meeting for ICAR-Industry Stakeholders Consultation Meet under the Chairmanship of Secretary (DARE), Director General (ICAR) organized by Agrinnovate India Ltd., New Delhi (Online)	ICAR, New Delhi	02.03.2023

Signing of MoU between ICAR-CIFE, Mumbai and CSIR-IITR, Lucknow to develop the partnership and to further interests in toxicological research in fisheries including aquatic environment	CSIR-IITR, Lucknow	02.03.2023
Annual Conference of Vice Chancellor's and Directors of ICAR Institutes	ICAR, New Delhi	04-05.03.2023
ICAR-Industry Stakeholder Consultation Meet	Agrinnovate India Ltd. ICAR, New Delhi	06.03.2023
94th Annual General Meeting of the ICAR Society at New Delhi.	ICAR, New Delhi	10.03.2023
[illegible]	ICAR-CIFE, Mumbai	19.04.2023
Meeting to discuss Aquaculture in Farm Pond with Secretary (Agriculture), Govt. of Maharashtra	Govt of Maharashtra	01.05.2023
45th meeting of the Scientific Committee of FSSAI at New Delhi.	FSSAI, New Delhi	02.05.2023
BIS Meeting	BIS, New Delhi	16.05.2023
Selection Board meeting	ASRB, New Delhi	23.05.2023
Thirtieth General Body Meeting and Foundation Day Programme of NAAS at New Delhi	NAAS, New Delhi	05.06.2023
Inaugurated Agricultural Program Advisory Committee Workshop in collaboration with Doordarshan, Mumbai	ICAR-CIFE, Mumbai	09.06.2023
Workshop on “Regreen-Climate Change Adaptation and Mitigation in Agriculture”	ICAR, New Delhi	14.06.2023
Study Visit of the Parliamentary Standing Committee on Agriculture, Animal Husbandry and Food Processing	ICAR-CIFE, Mumbai	26.06.2023
Launching of the 'Report Fish Disease' App organized Department of Fisheries, Govt. of India	ICAR, New Delhi	28.06.2023
Meeting to discuss “Preparation of Fisheries Management Plans - Way Forward” convened under the Chairmanship of the Secretary (Fisheries)	Dept. of Fisheries, Govt of India	14.07.2023
95th Foundation Day and Technology Day Celebration	ICAR, New Delhi	16.07.2023
Attend an Institute-Industry Interface Meeting	ICAR, New Delhi	17.07.2023
Chair the Technical Session-V “Fisheries Value Addition & Supply Chain for Sustainable Consumption” on 20th July 2023 in the National Conference on “Transforming Rural Poverty to Prosperity through Sustainable Fisheries (TRPSF2023)” & Fish Fair	College of Fisheries, Kishanganj, Bihar	20.07.2023
Inaugural Programme of National Seminar on Millets and Interaction Meeting with the Secretary, DARE & DG, ICAR	ICAR-NIASM, Baramati	22.08.2023
Participate in G-20 Technical Workshop on the theme "One Health: Opportunities & Challenges"	Bengaluru	29.08.2023
To chair the Nineteenth Meeting of Food Hygiene, Safety Management and Other Systems Sectional Committee, FAD	BIS, New Delhi	12.09.2023

Delivered a talk in Livestock, Dairy and Fisheries Exposition organised by HITEX & Aquafarming Technologies & Solutions	Hydrabad	22.09.2023
XVI Agricultural Science Congress, Kochi, Kerala	CMFRI, Kochi	10-13.10.2023
FAO Workshop on "Mainstreaming Climate Change into International Fisheries Governance and Strengthening of Fisheries Management in the Indo-Pacific Region" co-organized by BOBP-IGO & NFDB at Mahabalipuram, Tamil Nadu and to deliver Lead Talk on 'Priority areas of research and development for climate resilient fisheries in the BOB region'.	Mahabalipuram	17.10.2023
"Brainstorming Session on Strengthening National Agricultural Education System"	TAAS, New Delhi	30.10.2023
Host the third Steering Committee Meeting and the second Technical Advisory Committee Meeting of the ICAR-NePPA	ICAR-CIFE, Mumbai	16-18.11.2023
International Fisheries Symposium (IFS 2023) as a Keynote Speaker.	Asian Institute of Technology (AIT), Thailand	22-24.11.2023
Keynote Address in the 9th International Food Convention (IFCoN) organised by AFST(I) at Mysore	AFST(I), Mysore	08.12.2023
NAHEP Concluding Programme	ICAR-CIFE Regional Centre, Rohtak	14.12.2023

Dr. N. P. Sahu, Joint Director

NAHEP CAAST Meeting	ICAR-CIFE, Mumbai	11.01.2023
Meeting conduct by Secretary, DSIR and DG, CSIR	ICAR, New Delhi	12.01.2023
○	ICAR-CIFE, Mumbai	17.01.2023
Annual Conference of Vice Chancellor's and Directors of ICAR Institutes at New Delhi	ICAR, New Delhi	04-05.03.2023
ICAR-Industry Stakeholder Consultation Meet	Agrinnovate India Ltd. ICAR, New Delhi	06.03.2023
9th Meeting of Project Monitoring Committee of NAHEP	ICAR, New Delhi	16.03.2023
Fourth Students' Convention at ICAR-CIFE, Mumbai: Next Generation Teaching Under NAHEP	ICAR-CIFE, Mumbai	21.03.2023
"Deans Meet" a Symposium	ICAR-CIFE, Mumbai	22.03.2023
FISHSWAD Festival Under NAHEP	ICAR-CIFE, Mumbai	23.03.2023
ICAR-CIFE 28th Extension Council Meeting	ICAR-CIFE	27.03.2023
Academic Council Meeting (17th) of Bihar Animal Science University, Patna	Patna	14.03.2023
○	ICAR-CIFE, Mumbai	19.04.2023
Meeting to discuss Aquaculture in Farm Pond with Secretary (Agriculture), Govt. of Maharashtra (Online)	Govt of Maharashtra	01.05.2023

Meeting with Secretary, DoF, Assam and Sr. Officer	ICAR-CIFE, Mumbai	16.05.2023
Annual Technical Review Meeting of NAHEP	Kerala Agriculture University	18-20.05.2023
Interaction Meeting of Vice Chancellor BSKKV, Dapoli, Maharashtra.	ICAR-CIFE, Mumbai	28.05.2023
Thirtieth General Body Meeting and Foundation Day Programme	NAAS, New Delhi	05.06.2023
Fish Farmer Day Celebration at ICAR, CIFE Motipur center	Motipur	10-11-06.2023
95th Foundation Day and Technology Day Celebration	ICAR, New Delhi	16.07.2023
Key Note Address on “Changing Aquaculture and Aquafeed Scenario: Looking Beyond 2030” in a technical session National Conference on “Transforming Rural Poverty to Prosperity through Sustainable Fisheries of (TRPSF-2023)” and Fish Fair at College of Fisheries, Kishanganj Bihar	College of Fisheries, Kishanganj Bihar	19-21.07.2023
A Ī 104 ħ	ICAR-CIFE, Mumbai	27.07.2023
10th RAC Meeting at ICAR-CIARI, at ICAR-Central Island Agricultural Research Institute Port Blair	Portblair	22-23.07.2023
Delivered a lecture series on “Aquaculture for Feeding the World: Untapped Opportunities for Climate Resilient Food System” as Chief Guset of honour and speaker of the programme and attend the 43rd foundation day of College of Fisheries Ratnagiri	College of Fisheries Ratnagiri	04.08.2023
Workshop on “Techniques in Health Management” under the aegis of National Agricultural Higher Education Project (NAHEP).	ICAR-CIFE, Mumbai	07.09.2023
One Day Interactive Workshop Under Environmental Sustainability Plane (ESP) and Equity Action Plane (EAP) of NAHEP on “Climate change and its impact on reproductive and mental health of women”	ICAR-CIFE, Mumbai	06.09.2023
International workshop on “Diagnostics for Future: Precision Diagnostics in Aquaculture”	ICAR-CIFE, Mumbai	13.09.2023
18th Academic Council Meeting of Bihar Animal Science University, Patna	Patna	07.10.2023
Lecture on “Feed and Feeding Management for Next generation aquaculture in College of Fisheries, Kawardha, Chhattisgarh the workshop conducted by NAHEP, College of Fisheries, Kawardha, Chhattisgarh	Kawardha, Chhattisgarh	11-13.10.2023
A Ī 105 ħ	ICAR-CIFE, Mumbai	26.10.2023
Global Fisheries Conference 2023 (GFC - 2023) and chaired the Fish Nutrition Session at Gujarat Science City, Ahmedabad, Gujarat organized by Dept of Fisheries, GoI, New Delhi.	Ahmedabad, Gujarat	21-22.11.2023
NAHEP Concluding Programme	ICAR-CIFE Regional Centre, Rohtak	14.12.2023

5.7 Meeting Attended by Scientists/Faculty

Name of the faculty	Meeting Attended	Organized by	Date
Shivaji Argade	Good Aquaculture Practices (GAqPs) Workshop	JIFSAN, USFDA & CAA, Chennai	09-13.01.2023
Jeena K.	One Health Aquaculture Workshop on 'Innovative Technologies in Support of a Safe and Sustainable Aquatic Food Supply'	CEFAS, UK and ICAR-CMFRI, Kochi	20-22.02.2023
Karankumar Ramteke	Technical committee to study measure required for conservation of Silver pomfret	Commissioner of Fisheries, Maharashtra	23.02.2023
Vinod Kumar Yadav	Biodiversity, Climate Change and Sustainable Agriculture towards Food Security	Annamalai University, Annamalai Nagar, Tamil Nadu	09-10.03.2023
Sreedharan K	Meeting of Task force for the preparation of Kisan Kalyan Niti constituted	Haryana Government, Haryana	03.04.2023
Karankumar Ramteke	Fishery Improvement Project for Trawl bycatches (Multi species FIP) along the coast of Maharashtra & Goa	The Bombay Presidency Radio Club, Mumbai	06.04.2023
Jeena K.	Inception Meeting of FAO–Government of India Project Under Global Health Security Programme (GHSP) in India	FAO & USAID , Inspire Hall, Hotel Le Meridian, New Delhi	11.04.2023
Gayatri Tripathi	5th Online International Conference on Aquaculture and Fisheries" and presented paper on "Therapeutic potentials of fish gut microbiota in management of bacterial diseases".	Coalesce Research Group, National Institute of Oceanography and Fisheries, Egypt	17-18.04.2023
Jeena K	Consultation workshop for MAHASAPCAR (Maharashtra State Action Plan for Containment of Antimicrobial Resistance	Intercontinental Hotel, Marine Drive Mumbai, Government of Maharshtra	8-9.06. 2023
Gayatri Tripathi	4th Edition of World Congress on Infectious Diseases	Magnus Group, USA, Rome Italy, Hybrid mode	21-22.06.2023

Shashi Bhusan	National Conference on: Transforming Rural Poverty to Prosperity through Sustainable Fisheries (TRPSE-2023)	College of Fishery, Kishanganj Alumni Association and College of Fishery, Kishanganj	19-21.07. 2023
Muralidhar P. Ande	One day National conference on “Green initiatives for sustainable aquaculture	P.R. Govt. College, Kakinada	4.08.2023
Kapil Sukhdhane Karan Ramteke	Mega Awareness Campaign on Ocean Information and Advisory Services	JioTalks Auditorium, Navi Mumbai, INCOIS Hyderabad	03.08.2023
S. Munilkumar	Meeting of the Sub Committee on Species Diversification & New Technology Adoption for Marine Products Export Promotion	MPEDA, Kochi	03.08.2023
Kapil Sukhdhane	High level Committee on Setting up Agenda on Fisheries Development of Maharashtra	Commissionaire of Fisheries, Maharashtra	23.08.2023
Megha Kadam Bedekar	Recent Biotechnological Advances in Health, and Management of Livestock Poultry and Companion Animals	Society for Veterinary Science & Biotechnology Mhow	5- 7.10.2023
Kapil Sukhdhane	Participated as expert member for fish stock assessment of Tilapia and other fish species in Barvi Dam, of Thane-Palghar	Department of Fisheries, Thane-Palghar, Maharashtra	09.10.2023
Annam Pavan Kumar	Genetic Improvement of Performance Traits: A Genome-wide Selection Perspective	CIFA, Bhubhaneshwar, Odisha	28.10.2023
Kapil Sukhdhane	High level meeting organized by Commissioner of Fisheries, Maharashtra on Tilapia permission to PMSSY beneficiaries.	Commissionaire of Fisheries, Maharashtra	30.10.2023
Muralidhar P. Ande	Fishers meet on World Fisheries Day	Aditya degree College	21.11.2023
S. Munilkumar	Regional Committee Meeting Zone III	ICAR, Shillong/Online	01.12.2023

Debajit Sarma Kedar Nath Mohanta B.B. Nayak S. Jahageerdar Parimal Sardar Rupam Sharma Gayatri Tripathi Ananthan P.S. Sanath Kumar Paramita Banarjee Sawant Vidya Shree Bharti Babitha Rani Tincy Varghese Shashi Bhushan Saurav Kumar MujahidKhan Pathan Shamna N Sreedharan K. Pankaj Kumar Abuthagir Iburahim Dasari Bhoomaiah Poonam Behl	Concluding workshop of NAHEP	CIFE, Rohtak Centre	14-15.12.2023
S. Munilkumar	Meeting of the steering committee on Export of Marine Products	MPEDA, Kochi	29.12.2023
Dr. Arun Sharma	3 Days International Conference "On Impact of Climate Changes on Global Food, Livestock, Livelihood and Environmental Security: Advanced Approaches and Mitigation Strategies" ICCGFLLES-2023"	Navsari Agricultural University (NAU) Navsari, Gujarat	28-30th Dec 2023

5.8. List of faculties travelled abroad for training

Sl.No	Name of faculty	Designation	Host Institute	Period
1	Dr. Martin Xavier	Senior Scientist	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
2	Dr. Shashi Bhusan	Scientist	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
3	Dr. Tincy Varghese	Scientist	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
4	Dr. Sreedharan	Scientist	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
5	Dr. Pankaj Kumar	Scientist	Asian Institute of Technology (AIT), Bangkok, Thailand	06 Jan - 08 Feb 2023
6	Dr. Ananthan	Principal Scientist	University of Tasmania, Hobart, Australia	16 Jan- 16 Feb 2023
7	Dr. Neha Qureshi	Scientist	University of Monash, Clayton, Victoria, Australia	16 Jan- 16 Feb 2023
8	Dr. Saurav Kumar	Scientist	University of South Bohemia in České, Budějovice, Vodnany	01 Feb- 02 Mar 2023
9	Dr. G H Pailan	Principal Scientist	School of Molecular and Life Science, Curtin University, Perth, Australia	15 Sep – 29 Sep 2023
10	Dr. Arpita Sharma	Principal Scientist and Head	Michigan State University, USA	16 Sep - 08 Oct 2023
11	Dr. Aparna Chaudhari	Principal Scientist & Co PI	University of Malaya, Kuala Lumpur, Malaysia	17 Sep – 2 Oct 2023
12	Dr. Manish Jayant	Scientist	Asian institute of Technology, Thailand	18 Sep – 17 Oct 2023
13	Dr. Sikendra Kumar	Scientist	Asian institute of Technology, Thailand	18 Sep – 17 Oct 2023
14	Dr. Prem Kumar	Senior Scientist	Asian institute of Technology, Thailand	18 Sep – 17 Oct 2023
15	Dr. Arvind A Sonwane	Senior Scientist	National University Corporation Kyushu University, Animal and Marine Bio resource Sciences, Motooka Nishi-ku .Fukuoka, Japan	20 Sep – 19 Oct 2023
16	Dr. Layana P	Scientist	Prince of SongklaUniversity, Hat Yai, Thailand	25 Sep – 24 Oct 2023
17	Dr Jeena K.	Scientist	Centre of Excellence for Shrimp Molecular Biology and Biotechnology, Mahidol university, Bangkok, Thailand	25 Sep – 25 Oct 2023
18	Dr. Annam Pavan Kumar	Senior Scientist	School of Natural Sciences, Bangor University, Bangor, Wales, UK	01 Oct - 30 Oct 2023
19	Dr. Subodh Gupta	Principal Scientist	Fisheries and Aquaculture Centre, IMAS, University of Tasmania, Hobart, Australia	16 Oct -30 Oct 2023

20	Mr. Abuthagir Iburahim. S	Scientist & Co PI	University of Tasmania, Hobart, Australia	16 Oct - 31 Oct 2023
21	Mr. Angom Lenin Singh	Scientist	University of Tasmania, Hobart, Australia	16 Oct - 31 Oct 2023
22	Ms. Vidhya V	Scientist	Fisheries Resource Management Lab, Northern Territory, Government of Australia	27 Oct – 11 Nov 2023
23	Dr. Kiran D. Rasal	Scientist	University of Aberdeen, Scotland	28 Oct – 27 Nov 2023
24	Dr. Karthireddy Syamala	Scientist	Asian Institute of Technology, Thailand	25 Nov – 9 Dec 2023
25	Dr. Muralidhar P. Ande	Senior Scientist	Asian Institute of Technology, Thailand	25 Nov- 24 Dec 2023
26	Dr. Ajit Kumar Verma	Senior Scientist	Aquaculture Research Group (GIA), University of Las Palmas de Gran Canaria Telde, Canary Island, Spain	27 Nov – 26 Dec 2023
27	Dr. Vinod K. Yadav	Senior Scientist	University of Tokyo, Japan	27 Nov- 26 Dec 2023
28	Dr. Sujata Sahoo	Senior Scientist	Torre de la Sal Aquaculture Institute, Superior Council of Scientific Investigations (CSIC), Ribera de Cabanes s/n 12595 Spain	29 Nov- 28 Dec 2023
29	Dr. Sukhdhane Kapil Sukhdeo	Scientist	Curtin University, Western Australia	2 Dec – 29 Dec 2023
30	Dr. Karankumar K. Ramteke	Scientist	University of Tasmania, Australia	2 Dec – 30 Dec 2023
31	Dr. Sukham Munil Kumar	Principal	Aquaculture Research Group (GIA), University of Las Palmas de Gran Canaria, Telde, Canary Island, Spain	12 Dec- 26 Dec 2023
32	Ms. Shobha Rawat	Scientist	Asian institute of Technology, Thailand	12 Dec – 26 Dec 2023
33	Mr. Dayal Devadas	Scientist	Asian institute of Technology, Thailand	12 Dec – 26 Dec 2023
34	Dr. Deepitha R. P	Scientist	Prince of SongklaUniversity, Hat Yai, Thailand	12 Dec- 27 Dec 2023

6 Publications

143
Total Publications

99
International

44
National

34
NAAS >10

65
NAAS 6.0-10.0

44
NAAS<6.0

36
Popular Articles

13
Books

38
Chapters in Book

25
Technical Bulletins/Brochures/
Extension Booklets

02
Reports

16
Training Manuals

02
Patents

02
Copyrights

6.1. Peer reviewed publications with NAAS;Impact Factor

NAAS rating > 10.0 (NAAS: IF)

Ahmed M, Phukan B, Talukdar A, Ahmed I, Sarma J, Ali A, Gogoi R, Borah K, Xavier M (2023). Assessment of microplastic contamination in the gastrointestinal tracts of indigenous fishes from north eastern hill regions of Bhogdoi, a tributary of River Brahmaputra, India. *Environmental Science and Pollution Research*. 30(57):121124-37. https://doi.org/10.1007/s11356-023-30821-0. (5.80, 11.80)

Amal CT, Bharti VS, Choudhary M, Kara T, Kumar S, Rao AA (2023). Biochar for improving growth performance of shrimp and environmental quality in an inland saline culture system. *ACS Omega*. 8(41):37991-8004. https://doi.org/10.1021/acsomega.3c03484. (4.1, 10.10)

Chakraborty P, Krishnani KK, Mulchandani A, Sarkar DJ, Das BK, Paniprasad K, Sawant PB, Kumar N, Sarkar B, Poojary N, Mallik A (2023). Toxicity assessment of poultry-waste biosynthesized nanosilver in *Anabas testudineus* (Bloch, 1792) for responsible and sustainable aquaculture development-A multi-biomarker approach. *Environmental Research*. 235:116648. https://doi.org/10.1016/j.envres.2023.116648. (8.30, 14.30)

Chattopadhyay K, Xavier KM, Ngasotter S, Karmakar S, Balange A, Nayak BB (2023). Chitosan gel prepared with citric acid as the food acidulant: effect of the chitosan concentration and gel pH on physicochemical and functional properties of fish protein emulsion sausages. *ACS Omega*. 8(8):7829-37. https://doi.org/10.1021/acsomega.2c07538. (4.1, 10.10)

Das R, Mehta NK, Ngasotter S, Balange AK, Nayak BB, Murthy LN, Xavier KM (2023). Process optimization and evaluation of the effects of different time-temperature sous vide cooking on physicochemical, textural, and sensory characteristics of whiteleg shrimp (*Litopenaeus vannamei*). *Heliyon*. 9(6). https://doi.org/10.1016/j.heliyon.2023.e16438. (4, 10)

Dayakar B, Xavier M, Ngasotter S, Dhanabalan V, Porayil L, Balange AK, Nayak BB (2023). Extraction, optimization, and functional quality evaluation of carotenoproteins from shrimp processing side streams through enzymatic process. *Environmental Science and Pollution Research*. https://doi.org/10.1007/s11356-023-30232-1. 13:1-4. (5.80, 11.80)

Farooq A, Verma AK, Hittinahalli CM, Harika N, Pai M (2023). Iron supplementation in aquaculture wastewater and its effect on the growth of spinach and pangasius in nutrient film technique based aquaponics. *Agricultural Water Management*. 277:108126. https://doi.org/10.1016/j.agwat.2022.108126. (6.70, 12.70)

Farooq A, Verma AK, Hittinahalli CM, Varghese T, Pathak MS (2023). Iron supplementation in aquaculture wastewater and its impact on osmoregulatory, haematological, blood biochemical, and stress responses of pangasius with spinach in nutrient film technique based aquaponics. *Aquaculture*. 567:739250. https://doi.org/10.1016/j.aquaculture.2023.739250. (4.5, 10.50)

Ghosh SK, Lekshmi M, Reddy R, Balange AK, Xavier M, Nayak BB (2023). Comparative efficiency of native and non-native starter culture in the production of bio-silage using composite waste from fish and vegetables. *Environmental Science and Pollution Research*. 17:1-5. https://doi.org/10.1007/s11356-023-27266-w. (5.80, 11.80)

Gurjar UR, Xavier KM, Shukla SP, Takar S, Jaiswar AK, Deshmukhe G, Nayak BB (2023). Seasonal distribution and abundance of microplastics in the coastal sediments of north eastern Arabian Sea. *Marine Pollution Bulletin*. 187:114545. https://doi.org/ 10.1016/j.marpolbul.2022.114545. (5.80, 11.80)

Haque R, Sawant PB, Sardar P, Varghese T, Xavier KM, Chadha NK, Sundaray JK, Haldar C, Jana P, Pattanaik SS (2023). Shrimp shell waste-derived astaxanthin in synergistic combination with its commercial variant augments gonadal maturation and upregulates vitellogenin gene expression of discus (*Symphysodon aequifasciatus*). *Aquaculture*. 562:738828. https://doi.org/10.1016/j.aquaculture.2022.738828. (4.5, 10.50)

Kantharajan G, Govindakrishnan PM, Chandran R, Singh RK, Kumar K, Anand A, Krishnan P, Mohindra V, Shukla SP, Lal KK (2023). Anthropogenic risk assessment of riverine

habitat using geospatial modelling tools for conservation and restoration planning: a case study from a tropical river Pranhita, India. *Environmental Science and Pollution Research*. 30(13):37579-97. https://doi.org/10.1007/s11356-022-24825-5. (5.80, 11.80)

Kara T, Bharti VS, Amal CT, Shukla SP, Manupati AA, Sahu NP (2023). Sugarcane bagasse biochar enhances the growth parameters, haematological parameters, and enzyme activities of genetically improved farmed tilapia (GIFT) reared in inland saline water. *Environmental Science and Pollution Research*. 16:1-2. https://doi.org/10.1007/s11356-023-30797-x. (5.80, 11.80)

Kate GU, Krishnani KK, Kumar N, Sukhdhane K, Verma AK, Brahmane MP, Chadha NK, Kumar J (2023). Abiotic and biotic stress alleviating effects of the medicinal and aromatic plant-derived product on striped catfish *Pangasianodon hypophthalmus*. *Fish & Shellfish Immunology*. 135:108625. https://doi.org/10.1016/j.fsi.2023.108625. (4.70, 10.70)

Krishnani KK, Boddu VM, Singh RD, Chakraborty P, Verma AK, Brooks L, Pathak H (2023). Plants, animals, and fisheries waste-mediated bioremediation of contaminants of environmental and emerging concern (CEECs)—a circular bioresource utilization approach. *Environmental Science and Pollution Research*. 30(36):84999-5045. https://doi.org/10.1007/s11356-023-28261-x. (5.80, 11.80)

Kumar P, Chandan NK, Biswas G, Mandal B, Hussain T, Kailasam M, Jithendran KP (2023). Fatty acid mobilization and histological changes at different maturation stages of female hilsa, *Tenualosa ilisha*. *Aquaculture*. 576:739887. https://doi.org/10.1016/j.aquaculture.2023.739887. (4.5, 10.50)

Mallik A, Bhushan S, Chakraborty P, Ramteke KK, Pal P, Jaiswar AK, Sreekanth GB, Nayak BB (2023). Study of feeding biology and diet-associated microplastic contamination in selected creek fishes of northeastern Arabian Sea: A multi-species approach. *Marine Pollution Bulletin*.190:114875. https://doi.org/10.1016/j.marpolbul.2023.114875. (5.8, 11.8)

Mallik SK, Pathak R, Shahi N, Kala K, Chandra S, Das P, Singh B, Singh M, Giri AK, Tandel RS, Sarma D (2023). Pathological analysis and antimicrobial susceptibility of *Chryseobacterium balustinum* RTFCP 298 isolated from diseased rainbow trout, *Oncorhynchus mykiss*. *Scientific Reports*. 13(1):13268. https://doi.org/10.1038/s41598-023-40028-5. (4.60, 10.6)

Meena LL, Verma AK, Krishnani KK, Hittinahalli CM, Haridas H, John VC (2023). Combined foliar application effect of iron and potassium on growth of okra and striped catfish using media bed based aquaponics. *Aquaculture*. 569:739398. https://doi.org/10.1016/j.aquaculture.2023.739398. (4.5, 10.50)

Naskar S, Biswas G, Kumar P, De D, Das S, Sawant PB, Chadha NK, Behera P (2023). The green seaweed, *Enteromorpha intestinalis*: An efficient inorganic extractive species for environmental remediation and improved performances of fed species in brackishwater integrated multi-trophic aquaculture (BIMTA) system. *Aquaculture*. 569:739359. https://doi.org/10.1016/j.aquaculture.2023.739359. (4.5, 10.50)

Nathaniel TP, Varghese T, Sahu NP, Panmei H, Krishna G, Dasgupta S (2023). The effects of non-lethal heat-shock-induced cross-protection on survival and growth of Pacific whiteleg shrimp, *Litopenaeus vannamei* in response to ionic stress in inland saline waters. *Aquaculture*. 568:739287. https://doi.org/10.1016/j.aquaculture.2023.739287. (4.5, 10.50)

Ngasotter S, Xavier KM, Porayil L, Balange A, Nayak BB, Eapen S, Adarsh KJ, Sreekala MS, Sharma R, Ninan G (2023). Optimized high-yield synthesis of chitin nanocrystals from shrimp shell chitin by steam explosion. *Carbohydrate Polymers*. 316:121040. https://doi.org/10.1016/j.carbpol.2023.121040. (11.2, 17.2)

Nuzaiba PM, Gupta S, Gupta S, Jadhao SB (2023). Synthesis of L-methionine-loaded chitosan nanoparticles for controlled release and their in vitro and in vivo evaluation. *Scientific Reports*. 13(1):7606. https://doi.org/10.1038/s41598-023-34448. (4.60, 10.6)

Nuzaiba PM, Nirmal T, Arya P, Varghese T, Gupta S, Sahu NP, Srivastava PP (2023). Impact of dietary soybean inclusion on the endocrine disruptive effect in female brood stock of *Cyprinus carpio*. *Aquaculture*. 577:739894. https://doi.org/10.1016/j.aquaculture.2023.739894. (4.5, 10.50)

Olude OO, Sahu NP, Sardar P, Nuzaiba PM (2023). Utilization of valorized cassava leaf meal as an alternative feedstuff to defatted soybean meal in feed for rohu, *Labeo rohita* fingerlings. *Bioresource Technology Reports*. 22:101400. https://doi.org/10.1016/j.biteb.2023.101400. (5.06, 11.06)

Parvathy AJ, Das BC, Jifiriya MJ, Varghese T, Pillai D, Rejish Kumar VJ (2023). Ammonia induced toxico-physiological responses in fish and management interventions. *Reviews in Aquaculture*.15(2):452-79. https://doi.org/10.1111/raq.12730. (10.40, 16.40)

Patel RK, Verma AK, Krishnani KK, Krishnan S, Hittinahalli CM, Singh AL, Haque R (2023). Effect of temporal increment in salinity of inland saline groundwater on growth performance, survival, metabolic and osmoregulatory responses of juveniles of *Labeo rohita* (Hamilton, 1822). *Aquaculture*. 571:739473. https://doi.org/10.1016/j.aquaculture.2023.739473. (4.5, 10.50)

Pawar NA, Prakash C, Kohli MP, Jamwal A, Dalvi RS, Devi BN, Singh SK, Gupta S, Lende SR, Sontakke SD, Gupta S (2023). Fructooligosaccharide and *Bacillus subtilis* synbiotic combination promoted disease resistance, but not growth performance, is additive in fish. *Scientific Reports*. 13(1):11345. https://doi.org/10.1038/s41598-023-38267-7. (4.60, 10.60)

Pinto N, Nissa MU, Pathan MA, Yashwanth BS, Pratapa MG, Srivastava S, Goswami M (2023). High throughput proteomic analysis of *Labeo rohita* liver infected with *Edwardsiella tarda*. *Aquaculture*. 569:739338. https://doi.org/10.1016/j.aquaculture.2023.739338. (4.5, 10.50)

Pratapa MG, Kumar S, Bedekar MK, Kumar HS, Rajendran KV (2023). Experimental infection reveals mud crab, Scylla serrata is less susceptible than *Scylla olivacea* and shrimp, *Penaeus vannamei* to white spot syndrome virus (WSSV). *Aquaculture*. 577:739877. https://doi.org/10.1016/j.aquaculture.2023.739877. (4.5, 10.50)

Rukmangada R, Naidu BC, Nayak BB, Balange A, Chouksey MK, Xavier KM (2023). Microplastic contamination in salted and sun dried fish and implications for food security–A study on the effect of location, style and constituents of dried fish on microplastics load. *Marine Pollution Bulletin*. 191:114909. https://doi.org/10.1016/j.marpolbul.2023.114909. (5.80, 11.80)

Singh PK, Munilkumar S, Sundaray JK, Santhanam P, Sharma A, Haque R, Satheesh M (2023). Effect of selenium, vitamin C and highly unsaturated fatty acids-enriched *Brachionus calyciflorus* on growth, survival, physio-metabolic and anti-oxidative responses in *Anabas testudineus* (Bloch, 1792) larvae. *Aquaculture*. 568:739293. https://doi.org/10.1016/j.aquaculture.2023.739293. (4.5, 10.50)

Varela MF, Stephen J, Bharti D, Lekshmi M, Kumar S (2023). Inhibition of multidrug efflux pumps belonging to the major facilitator superfamily in bacterial pathogens. *Biomedicines*. 11(5):1448. https://doi.org/10.3390/biomedicines11051448. (4.7, 10.70)

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NAAS rating (10.00 < 6.00)

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6.3. Patents and Copyrights

Patent awarded

1. Catfish hatchery and rearing of seed under Three Tier System IN418598
2. A design has been granted as design no. 382778-001 entitled WORM REARING UNIT in the name of ICAR-Central Institute of Fisheries Education.

Copyrights granted

m-Jhinga Mobile app developed under NAHEP (Diary No. 466/2023-CO/SW)

m-Jhinga" developed exclusively for shrimp farmers of Inland Saline areas under NAHEP has nine self-explanatory modules and it provides detailed advisory to farmers on setting up new shrimp farms, growing healthy shrimp crop and current market price trends. The app also helps farmers to self-identify problems and ask the experts when they are not sure and provides a platform to check actual and forecasted weather info. It also acts as a digital repository for the farmers to record and track their inputs, harvests and expenses. This app has the potential to help create an enabling environment for the shrimp farmers in inland saline areas to follow "Better Management Practices" and enhance the shrimp production sustainably.

Methodological framework developed Human Capital Valuation Framework for Academia (HCVaF) (Diary no.: 2239/2023-CO/L)

HCVaF: Human Capital Valuation Framework for Academia" developed exclusively for accounting and valuation of human capital produced by Universities in terms of students. It also envisages valuing the worth of students produced and quantifying their contribution towards the National Income (GVA) of the Country. This not only justifies the budgetary allocation to various Public funded Universities but also necessitates the impact evaluation of fisheries professionals in a quantitative manner. This framework/methodology has the potential to be replicated and revalidated for valuing human capital in any University.

7 Honours & Awards

ICAR-CIFE

Ranked 7th by NIRF, in Agriculture and Allied Sector

Annual Institutional Awards (Year 2022-23)

In order to recognize the significant contributions by the faculty, staff members and students of the institute to reward talent and promote team spirit, provide encouragement and inspiration for improved performances, ICAR-CIFE released annual institutional awards on 16th June 2023 and list of awardees are as following in various categories.

S.No	Awards	Awardee Names
1.	Best Scientist Award	Dr. Babitha Rani A. M
2.	Best Young Scientist	Dr. Thongam Ibemcha Chanu
3.	Best Division Award	Aquaculture Division
4.	Best Supporting Staff	Ankush Joyashi
5.	Best Student of the Year (Ph.D.)	Mr. Chanikya Naidu B.
6.	Best Student of the Year (M.F.Sc.)	Mr. Ganesh Kumar T.
7.	Best Publication of the Year Award	C. Lloyd Chrispin, Ananthan PS, Ramasubramanian V, Sugunan VV, Preetha Panikkar, Asha Landge
8.	Award for Technology Generation	Dr. Megha Bedekar
9.	Best Scientist of Regional Centre ICAR-CIFE	Dr. Sreedharan K
10.	Best Centre of ICAR-CIFE	CIFE-Rohtak Centre, Haryana
11.	Special Recognition from the Director	Dr. Md. Aklakur Dr. Dasari Bhoomaiah Mrs Poonam Behl Shri Shailesh V. Kasabe Shri Ninan V. Kandalgaonkar

Distinguished Scientist Award

Dr Arun Sharma was awarded the Distinguished Scientist Award for Contribution in the field of Fish Health during ICCGFLLES-2023 held at Navsari Agricultural University, Gujarat, from 28th to 30th December 2023.

Dr P.V. Dehadharai Gold Medal

Dr Saurav Kumar was awarded the Dr P.V. Dehadharai Gold Medal during the Young Scientist Conclave of the National Conference on Transforming Rural Poverty to Prosperity held at the College of Fisheries, Bihar Animal Sciences University, Kishanganj, Bihar, India, on 21 July 2023

Excellence in Research Award

Dr Vidya Shree Bharti was awarded the Excellence in Research Award for outstanding contribution to soil Science RVS Krishi Viswavidyalaya, Gwalior, M.P 26-28 March 2023 in 8th International Conference on Recent Advances in Agriculture, Animal Husbandry, Science & Technology for Sustainable Entrepreneurship.

Women Achievers Award

Dr Upasana Sahoo was awarded the Women Achievers Award for her scientific contribution towards the Tee Foundation on the occasion of the International Women's Day celebration at Andheri Sports Club on 8 March, 2023

Young Scientist Award

Dr Tincy Varghese was awarded the Young Scientist Award by the Society of Fisheries and Life Sciences, Mangalore, on the occasion of World Fisheries Day for research contributions made in the field of Fisheries and Life Sciences on 21st November 2023

Academic Excellence award

Dr Vinod Kumar Yadav was awarded the Academic Excellence award at the 4th World Environment Summit 2023.

Best Paper/Oral Presentation Award

Dr Arun Sharma was awarded the Best Paper Award for oral presentation for the paper entitled 'Assessing the efficacy of farm-made prebiotic and rock salt against *Aeromonas caviae* infection in magur (*Clarias magur*)' during ICCGFLLES-2023 held at Navsari Agricultural University, Gujarat from 28th to 30th December 2023.

Dr Vidya Shree Bharti was presented with the Best Paper Award at the International Conference on Recent Trends & Innovation in Science, Engineering, and Social Sciences held at National College, Tiruchirapalli, on 10.2.2023.

Dr Vidya Shree Bharti was awarded the Best Paper Award at 8th International Conference on Recent Advances in Agriculture, Animal Husbandry, Science & Technology for Sustainable Entrepreneurship RVS Krishi Viswavidyalaya, Gwalior, M.P on 26-28th March 2023.

Dr Ankush L. Kamble was awarded the Best Paper Presentation Award on the second day of the International Conference on Current Advances in Agriculture, Animal Husbandry and Allied Sciences during CAAAAS-2023 held at Shri Mata Vaishno Devi University, Katra (India) on July 10-11, 2023.

Dr Vinod Kumar Yadav received Best Oral Presentation for the paper entitled Ecosystem Valuation and Trophic Structure Dynamics for Sustainable Fisheries Management in Dimbhe Reservoir, Maharashtra 4th World Environment Summit, 2023, held at Galgotias University, Noida, UP, during 4-6 Nov, 2023.

Letter of Appreciation

Dr Babitha Rani A. M, OIC, Rohtak Centre, received the certificate of appreciation from the Department of Fisheries, Govt. of Haryana on the occasion of World Fisheries Day celebration on 21st November 2023

8 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

- 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

- 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

- 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

Universities

- Cochin University of Science and Technology, Kochi
- Annamalai University, Chidambaram
- Acharya N. G. Ranga University, Guntur
- B. S. Konkan Krishi Vidyapeeth, Dapoli
- Maharana Pratap University of Agriculture and Technology, Udaipur
- Jawaharlal Nehru University, New Delhi
- Mangalore University, Mangalore
- Bhartiyar University, Coimbatore
- West Bengal University of Animal & Fishery Sciences, Kolkata
- Mumbai University, Mumbai
- Bidhan Chardra Krishi Viswa Vidyalaya, Nadia, West Bengal
- Kalyani University, Kalyani, West Bengal
- Barkatullah University, Bhopal
- Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur
- Chhattisgarh Kamdhenu Vishwavidyalya, Chhattishgarh
- Babasaheb Bhimrao Ambedkar University, Lucknow
- Centre of Agriculture University, Imphal

State Governments

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

NGOs:

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

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

8.2. MoUs

1.3.2023

HiMedia Laboratories Pvt. Ltd.,
Thane (West), Maharashtra

- To upscaling and development of cultivated meat-relevant fish-derived cell lines and culture media

17.1.2023

Vrutti NGO
Ashwathnagar, Bangalore

- Training of value-added fish products

6.3.2023

Fisheries Department, Govt.of Maharashtra
Palghar Tal. & Dist. Palghar

- Training of value-added fish products

3.4.2023

Green Protein Foundation
Mumbai

- To accelerate research and development, incubation, and promotion within the smart protein sector through the SPIH-CS at CIFE

4.5.2023

Myoworks Private Limited
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- CIFE will sell the primary fish muscle cells for cultivated seafood production as per the sale agreement.

9 Events and Meetings

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Celebration of 9th International Day of Yoga-2023

ICAR-CIFE Headquarters

ICAR-Central Institute of Fisheries Education, Mumbai celebrated the 9th International Day of Yoga-2023 (IDY-2023) on 21st June 2023. A total of 103 participants including Head of Departments, Scientists, Technical officers, Administrative Staff and Students of ICARCIFE participated in the Celebrations of 9th IDY-2023 on the theme of 'Yoga for Vasudhaiva Kutumbakam'. Dr. Ravishankar C.N., Director and Vice Chancellor, ICAR-CIFE and Dr. N.P. Sahu, Joint Director, ICAR-CIFE participated in the program. The Scientists and Staff from ICAR-CMFRI Regional Centre, Mumbai also joined the Celebrations. At the outset, Dr. Ravishankar C.N., welcomed the team of nine experts of Sahaj Yoga, from 'The Eternal Life Trust', Andheri (E), Mumbai with floral bouquets. Dr. N. S. Nagpure, Nodal Officer, IDY2023, welcomed the dignitaries, guests and the participants and explained the importance of regular yoga practice for mental and physical wellbeing. This was followed by a Sahaj Yoga session by Adv. Suman Kotian, in which she explained about the practice and importance of Sahaj Yoga Meditation for leading stress free life, and for gaining happiness and selfrealization. A short meditation session was then conducted by combining music for stress relief and for experiencing a blissful state of thought and awareness. Mr. Ramesh Wanage, a Sahaj Yoga expert took a session on balancing/awakening of the seven chakras/plexus in our body to prevent the psycho-somatic diseases and for gaining inner beauty, power and strength. During the sessions, the instructors personally guided the participants regarding the correct techniques of Sahaj Yoga Meditation. The Sahaj Yoga Meditation was emphatically practiced and performed by all the scientists, staff members, and students under guidance of the instructors. On the occasion of the IDY-2023, an Essay Competition was also organized for Staff and Students and the theme was 'Yoga and its Importance for Human Life'. Similarly, a Quiz Competition was conducted by Mr. A. Lenin Singh and Dr. Nalini Poojary and the name of the winners were declared during the program. The program concluded with formal vote of thanks by Dr. A. Pavan Kumar. The program was coordinated by Dr. N.S. Nagpure, Dr. Megha K. Bedekar, Dr. A. Pavan Kumar and Dr. Chandrakant M.H.

ICAR-CIFE, Kolkata Centre

The 9th International Yoga Day was observed with great enthusiasm on 21st June, 2023 at ICAR-CIFE, Kolkata Centre. All the officials, staff members and students participated in the programme. The inauguration session of the programme started at 09.15 am at Committee Room of the Centre. Dr. G. H. Pailan, Principal Scientist & OIC welcomed all the participants and informed about the importance of the day. After the inauguration session all participants practice different Asanas at ground of the campus.

ICAR-CIFE, Rohtak Centre

The 9th International Yoga Day, 2023 was observed on 21st June, 2023 at ICAR-CIFE, Rohtak Centre. All the officials, staff members and students participated in the programme. Dr. Pankaj Kumar, Scientist (SS) & Acting OIC welcomed all the participants of the program. The theme of the program for this year is "Yoga

for Vasudhaiva Kutumbakam". He also emphasized the positive effects of yoga on physical, mental and spiritual health. The program ended with a formal vote of thanks.

ICAR-CIFE, Powarkheda Centre

The 9th International Day of Yoga (IDY 2023) was celebrated with enthusiasm at ICAR-CIFE Powarkheda Center. A total of 25 participants were present during the Yoga session including staff, students and farmers. A brief talk on importance of Yoga in the development of mental and physical health was given by various staff of the center. Yoga session was conducted and different Asanas were practiced. The IDY-2023 celebration was a resounding success fulfilling the objective of wellness and Yoga awareness.

ICAR-CIFE, Mumbai and Doordarshan Kendra, Mumbai organized Agriculture and Fisheries Doordarshan Programme Advisory Workshop Venue: ICAR-CIFE, Mumbai 9.6.23

The objective of this workshop was to identify and prioritise the agricultural and fisheries programmes which can be broadcasted through Krishidarshan and Amchi Mati Amchi Manase programmes of Doordarshan for the benefit of farmers, fishermen, fisherwomen, farm women, youth and entrepreneurs during July-September, 2023. The workshop was attended by 45 participants (Male - 38 and Female - 7) who were the representatives from ICAR Institutes, Doordarshan, State Agriculture Universities, like Maharashtra Animal & Fishery Sciences University, Nagpur, College of Fisheries, BSKKV, Ratnagiri, Krishi Vigyan Kendra, India Meteorological Department, Fishery Survey of India, Agricultural and Processed Food Products Export Development Authority, Department of Fisheries, Department of Agriculture, Progressive Farmers, etc. from state of Maharashtra. The workshop started with the address by Dr. Ravishankar C. N., Director ICARCIFE who highlighted the importance fisheries sector in the country and the role of ICARCIFE. He stressed that CIFE can provide fisheries related information with the help of Doordarshan at a wider level. Appreciating the role played by Doordarshan in reaching the unreached, he mentioned about the marathi programmes delivered by CIFE scientists and coordinated by Dr. Shivaji from FEES Division He also suggested that CIFE has experts who can deliver programmes in Hindi as well as other languages. Shri. Sandeep Sood, Programme Head, Doordarshan addressed the participants and highlighted the role of Doordarshan. This was followed by the technical session in which all participants presented their views and suggestions on various topics which can be included for broadcasting during July-September, 2023 quarter. The same were discussed and reviewed by all. New areas like Drone technology in agriculture and fisheries, Agri Business Incubation Centres, Fish Farmer Producing Companies etc. were suggested to be included. The workshop ended with vote of thanks by Dr. Arpita Sharma, Head (A), FEES Division, ICAR-CIFE. The Agriculture and Fisheries Doordarshan Programme Advisory Workshop coordinated by Dr. Shivaji Argade, Dr. Ankush Kamble and Dr. Arpita Sharma from FEES Division was successful in strengthening ICAR-CIFE and Doordarshan.

Celebration of "World Intellectual Property Day"

The "World Intellectual Property Day" was celebrated at ICAR – CIFE, Mumbai with the theme of Women and IP : Accelerating Innovation and Creativity on 26th April, 2023. This event was celebrated through Agri Business Incubation Center (ABIC) and Institute Management Unit (ITMU) by conducting awareness program on IP rights and women's entrepreneurship development. Dr. A. K. Balange, Principal Scientist, Fisheries Resources Harvest and Post-Harvest Management Division & Project In-charge – ITMU & ABI welcome all the participants and read message received from Dr. Himanshu Pathak, Secretory (DARE) & Director General (ICAR) for World Intellectual Property Day celebration. The program was celebrated with priority to women for sharing their knowledge and experience as per the theme of World IP Day-2023. Dr. Arpita Sharma, Principal Scientist & Head, Fisheries Economics Extension & Statistics Division presented scenario of patents with reference to fisheries and aquaculture. Dr. Gauri Harkulkar, RA, ITMU & Mrs. Snehal Parab, SRF, ABI presented on 'Women's and IP necessity' and ITMU & ABI activities to create awareness about necessity of Intellectual Property Rights. Besides this Dr. Arpita Sharma delivered virtual lectures for ICARCentral Institute for women in Agriculture (ICAR-CIWA) and ICAR-Central Institute of Freshwater Aquaculture (ICAR-CIFA) on the 'Gender and IP'. On this day, FEES Division ICAR CIFE organized Awareness program on "Intellectual Property Rights". Students from FEES division of ICAR-CIFE, Mumbai actively participated in this programme to celebrate the achievements and contributions of IP rights holders, including artists, inventors, entrepreneurs, and other creators on occasion of World IP day. Program began with welcome note by Ph.D. Scholar Ms. Samatha Beemalla. Thereafter, presentations were done on the topic 'Types of IPR' and 'Patent in Fisheries' by Ph.D scholars Shri. Sourabh Debnath and Shri. Bhalchandra V. Naik. This was followed by doubt clarification and discussion on frequently asked questions on patent. At last appreciation given to all the women scientist and technologist working in Institute for their role in the research field by Dr. Ravishankar C. N., Director & Vice Chancellor and Dr N. P. Sahu, Joint Director, ICAR-CIFE, Mumbai.

Swachhta Programme undertaken by ICAR-CIFE, Mumbai at Bazar Galli, Versova Landing Centre Fish Market on 29/03/2023

Under the research project 'Swachhta Action Plan - Commercial Utilization of Fish Waste in Urban Fish Markets', ICAR-CIFE, Mumbai conducted Swachhtha programme/Cleaning Programme at Bazar Galli, Versova Landing Centre Fish Market on 29/03/2023 under the guidance of Dr. Ravishankar C.N., Director ICAR-CIFE, Mumbai. Deep cleaning of the Versova landing centre fish market was done by the cleaning marshalls thoroughly with the involvement of Koli fishing community, CIFE staff and FEES Division students. Dr. Swadesh Prakash, Principal Scientist FEES Division, Shri. Narendra Aglave and Shri. Pranay Biswal participated in this Swachhtha programme. FEES division student team comprised of Ms. Nidhi Katre, Shri. Shyam Waghmare, Shri. Shubham Soni, Shri. Anurag Singh and Shri. Mehul Patel. Fisherwomen and fishermen of Bajar Galli Koli Community, Versova Landing Centre Fish Market, Versova fisheries cooperative society members expressed their heartfelt thanks to Dr. Ravishankar C.N., Director ICAR-CIFE, Dr. Arpita Sharma, PI / Nodal officer of the research project and entire project team.

ICAR-CIFE Organized Swachhata Shram Daan at Harbadevi Community Pond, Madh village, Malad West

ICAR-CIFE and Harbadevi Mandir Trust jointly organized a Swachhata Shram Daan (cleanliness campaign) at Harbadevi community pond in Madh on October 29, 2023, under the programme for cleanliness Campaign-3.0. ICAR-CIFE staff, students and citizens of local community residing nearby Harbadevi pond actively participated in the cleanliness campaign. The community people were sensitized about the importance of cleanliness in community pond by the staff of ICAR-CIFE for raising awareness among the community members about the importance of cleanliness in the community pond. They were also educated about refraining from washing clothes and utensils in the pond water, which is a common practice negatively impacting the water quality. Dr. S. P. Shukla, Principal Scientist, shared valuable insights with the community regarding the ways to improve the health of the community pond. This included restriction on plastic use in the premises of the community pond and the potential for starting aqua-tourism activities in Harbadevi community pond. Such initiatives can contribute to the betterment of the local ecosystem and provide economic opportunities. Mr. Sitaram Koli, Vice-President of Harbadevi Mandir Trust, made a significant contribution in providing the necessary support to removal plastic and floating debris from the pond water. His commitment for maintaining the pond hygiene is praiseworthy. Mr. Koli expressed his appreciation for the efforts of ICAR-CIFE. Shri. J.M. Koli (Retd. Technical Officer, ICARCIFE) actively contributed during the entire program. The event was coordinated by Dr. Shivaji Argade and Dr.S.P.Shukla with an active involvement of CIFE staff, Students and Harbadevi Mandir Trust representatives. This initiative demonstrated the importance of community engagement and collaborative efforts of CIFE with local communities for preserving and enhancing the ecological status of local resources. The program stimulated the interest of local communities in the principles of cleanliness, environmental awareness, and sustainable utilization of the Harbadevi community pond.

Climate Change and its impact on reproductive and mental health of women" on 6 th September, 2023

ICAR-Central Institute of Fisheries Education, Mumbai conducted a one-day interactive Workshop on "Climate Change and its impact on reproductive and mental health of women" under the aegis of Environmental Sustainability Plan (ESP) and Equity Action Plan (EAP) of National Agricultural Higher Education Project (NAHEP) on 6th September, 2023. This workshop was targeted towards an all-woman audience and envisaged sensitization of young female students in particular and women in general towards better reproductive and mental health awareness in times of climate change. During the inaugural session, Dr. Vidya Shree Bharti, Nodal Officer, EAP, NAHEP welcomed the participants and encouraged them to have an openminded discussion to identify challenges faced by women for possible interventions and

solutions. Dr. Ravishankar C.N., Hon'ble Director and Vice Chancellor, welcomed and felicitated the external expert and also harped upon the importance of this subject in today's changing environmental and social set ups. Dr. N.P. Sahu, Principal Investigator, NAHEP & Joint Director, ICAR-CIFE, Mumbai, also put forward his valuable remarks about this workshop under the context of the ESP and EAP of NAHEP. The Workshop session was thoughtfully designed with an informative presentation from the external expert, Dr. Suruchi Desai, (MBBS, D.N.B. D.G.O, D.F.P, F.C.P.S), Senior Consultant, Gynaecology & Obstetrics, Centre for Robotic Surgery, Nanavati Max Super Speciality Hospital, Mumbai followed by freewheeling discussion and close interaction with participants. The detailed presentation by Dr. Desai reviewed the link between contributors to climate change and social & environmental determinants of health. She stressed upon reproductive and mental health consequences of women due to a changing climate and suggested possible ways to minimise risks and increase resilience. The workshop saw the participation of 70 registered female MFSc and PhD scholars, scientists, technical, administrative, supporting staff and members of the Ladies Club/ wives of scientists from the campus. Dr. Tincy Verghese, Scientist and member, EAP, NAHEP, delivered the vote of thanks. The Workshop was conceptualized and organized by Dr. Paramita Banerjee Sawant, Principal Scientist and Nodal Officer, ESP, NAHEP and Dr. Vidya Shree Bharti, Senior Scientist and Nodal Officer, EAP, NAHEP.

'Third Anniversary of PMMSY and launching of Matsya Sampada Jagrukta Abhiyan' Brilliant Convention Centre, Indore, Madhya Pradesh 15-09-2023

ICAR-CIFE Mumbai participated in The Department of Fisheries, Govt. of India, organised the 'Third Anniversary of PMMSY and launching of Matsya Sampada Jagrukta Abhiyan' at Brilliant Convention Centre, Indore, Madhya Pradesh on 15th September 2023. ICAR fisheries Institutes, including CIFE, fisheries startups, fisheries colleges, Fish FPOs and fish cooperatives, participated in the program. Shri Parshottam Rupalaji Hon'ble Union Minister of Fisheries, Animal Husbandry and Dairying, Government of India, inaugurated the program. Other dignitaries present were Minister of State for Animal Husbandry, Dairying and Fisheries Shri Sanjeev Balyan, Dr. L. Murugan, Hon'ble Minister of State of Fisheries, Animal Husbandry and Dairying and Information and Broadcasting, Shri Tulsi Ram Silawat, Minister of Fishermen Welfare and Fisheries Development Department, Govt. of Madhya Pradesh, Dr. Abhilaksh Likhi, Secretary DoF, Dr. J.K Jena, DDG (Fisheries), ICAR and Sagar Mishra, Joint Secretary, DoF. On this occasion, an exhibition displaying various programs under PMMSY by various agencies was also organised. ICAR-CIFE Mumbai also put up an exhibition displaying the various activities undertaken by the Institute under PMMSY program at HQ and its regional Centres. Posters showing objectives and the achievements under different projects funded by PMMSY/NFDB were put up in the Exhibition. Pamphlets showing these achievements were distributed to the visitors. Shri Parshottam Rupalaji and other dignitaries visited our stall and appreciated the Institute's activities. Farmers and entrepreneurs from various parts of the country visited our stall, evinced keen interest in our programs. The CIFE's Exhibition activities were carried out under the guidance of Dr. Ravishankar C.N., Director, CIFE. Dr. Shriniva Jahageerdar, Nodal Officer of all Regional Centers, coordinated it. The program was attended by Scientists Dr. S.K Nayak and Dhalongsaih Reang ICAR-CIFE Powarkheda Center, Madhya Pradesh.

A REPORT ON AGRICULTURE EDUCATION FAIR CONDUCTED UNDER NAHEP

ICAR-CIFE organised 'Agriculture Education Fair' on 9th September 2023 at Powarkheda centre situated in Narmadapuram district of Madhya Pradesh under the aegis of National Agricultural Higher Education Project (NAHEP). Around 350 higher secondary students from science stream of schools from the adjoining areas on Narmadapuram district attended the program. The aim of the Agri-Education Fair was to create awareness on AgriEducation and to mainstream agriculture and allied subjects at HSC and SSC levels as per National Education Policy (NEP)-2020. In this fair student were informed about the career opportunities in Agriculture and allied sector by educational consultants, researchers and academicians. Successful entrepreneurs were also invited to interact with the students and to encourage students for entrepreneurship development. The Director of the department of Fisheries, Government of Madhya Pradesh, Mr. Bharat Singh inaugurated the program. Mrs. Sasikala, Deputy Director of Department of Fisheries, Government of Madhya Pradesh also graced the inaugural program. Dr. Srinivas Jahageerdar, Principal Scientist and Nodal Officer of all the centres of ICAR – CIFE, Mumbai welcomed all. Dr. Rupam Sharma, Principal Scientist and Nodal Officer of NAHEP briefed about the program and the technical program. Speaking in the occasion, Mr. Bharat Singh explained about the fisheries resources of Madhya Pradesh and highlighted the opportunities in the field of Agriculture and allied sector particularly in fisheries. With the brief ice-breaking session by Dr Rupam Sharma and Dr. Shamna N., student audience were asked about their career options, to which entrepreneurship was opted by most of the students.

Report on Vigilance Awareness Campaign 2023 (16th August 2023 to 15 th November, 2023)

Vigilance Awareness Campaign was observed at ICAR-Central Institute of Fisheries Education from 16th August 2023 to 15 th November, 2023 on „PIDPI Resolution" & Capacity Building Program. Vigilance Awareness Week- 2023 was observed on the theme “Say No To Corruption: Commit To The Nation” from 30th October to 5th November, 2023. Display of Banners Banners on „Public Interest Disclosure & Protection of Informer Resolution, 2004" (PIDPI) were displayed in different languages such as Hindi, Marathi and English, in front of Main Gate and at the Office Building in the campuses at Yari Road and Seven Bungalows. PIDPI Banners were also displayed at the Office Main Gate of Brackishwater Fish Farm, Kakinada, Freshwater Fish Farm, Balabhadrapuram of ICAR-CIFE, Kakinada Centre and ICAR-CIFE Kolkata Centre. PIDPI posters were also displayed at Powarkheda, Rohtak, and Motipur Centres of CIFE.

Integrity pledge

ICAR-CIFE, Mumbai The Vigilance Awareness week commenced with administration of the integrity pledge to the staff, officials and scientists by Dr. N. P. Sahu, Joint Director of ICAR-CIFE, Mumbai, on 30th October 2023, followed by his enlightening address on the importance of integrity in the workplace.

Har Ghar Dhyan-Campaign Yoga & Meditation Session by 'Art of Living Foundation of Sri Sri Ravi Shankarji'

ICAR-CIFE organized a Yoga and Meditation session of the 'Har Ghar Dhyan' Campaign launched under the aegis of Azadi ka Amrit Mahotsav, from Ministry of Culture, Government of India, in association with 'Art of Living Foundation' of Sri Sri Ravi Shankarji on Friday, 04 August, 2023, in the Auditorium of the New Campus of ICAR-CIFE, Mumbai, from 9.30 -11 a.m. Dr. N. S. Nagpure, Principal Scientist, introduced Mr. Adwait Mane, Faculty from Art of Living Foundation and briefed the gathering about the Har Ghar Dhyan compaign and its relevance in the context of yoga practice and meditation for the new generation. Dr. Ravishankar C.N., Director and Vice Chancellor, ICAR-CIFE, Mumbai, welcomed Mr. Adwait Mane and thanked him for the initiative taken by 'Art of Living' Foundation to spread the awareness of yoga and positive meditation for everyday wellbeing. He also encouraged the gathering to learn from this campaign and embrace yoga as a part of their day to day life. A total of 125 participants including Heads of Divisions, Scientists, Technical officers, Administrative Staff and students of ICAR-CIFE participated in the yoga and meditation session. The session lasted for one and a half hour, wherein, Mr. Adwait catapulted the audience to a meditative trance through a variety of yogic postures and simple breathing techniques. The session was very lively and interactive as he emphasized how physical and mental wellbeing are connected and both go hand in hand towards blessing us with a holistic, long and healthy life. The program concluded with formal vote of thanks by Dr. Paramita Banerjee Sawant, Principal Scientist. The organizing committee comprising of Dr. N.S. Nagpure, Dr. Rupam Sharma, Dr. Paramita Banerjee Sawant, Dr. Nalini Poojary and Dr. Chandrakant M.H. pledged to continue this campaign in future for the benefit of all.

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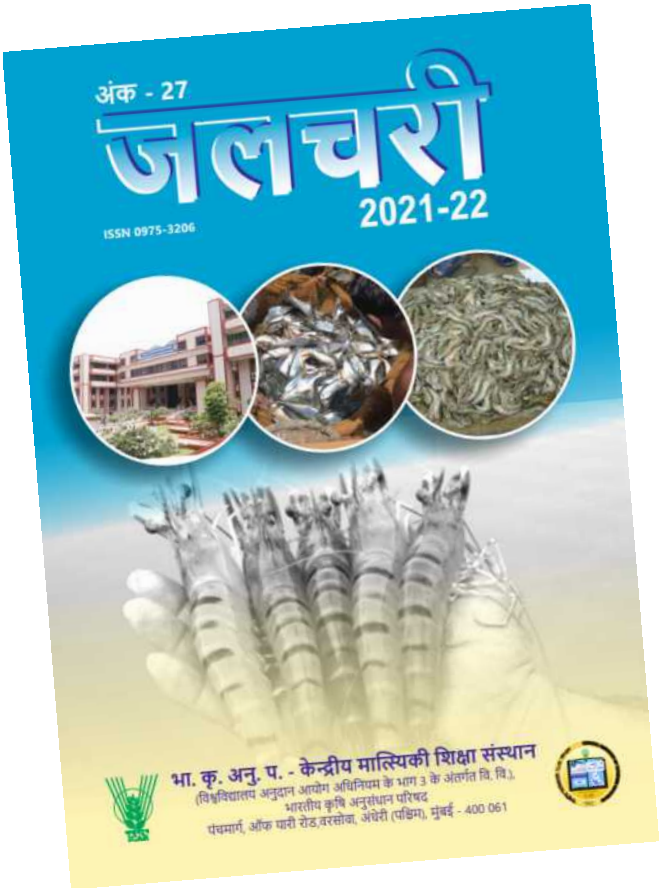

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