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ICAR-CENTRAL INSTITUTE OF BRACKISHWATER AQUACULTURE
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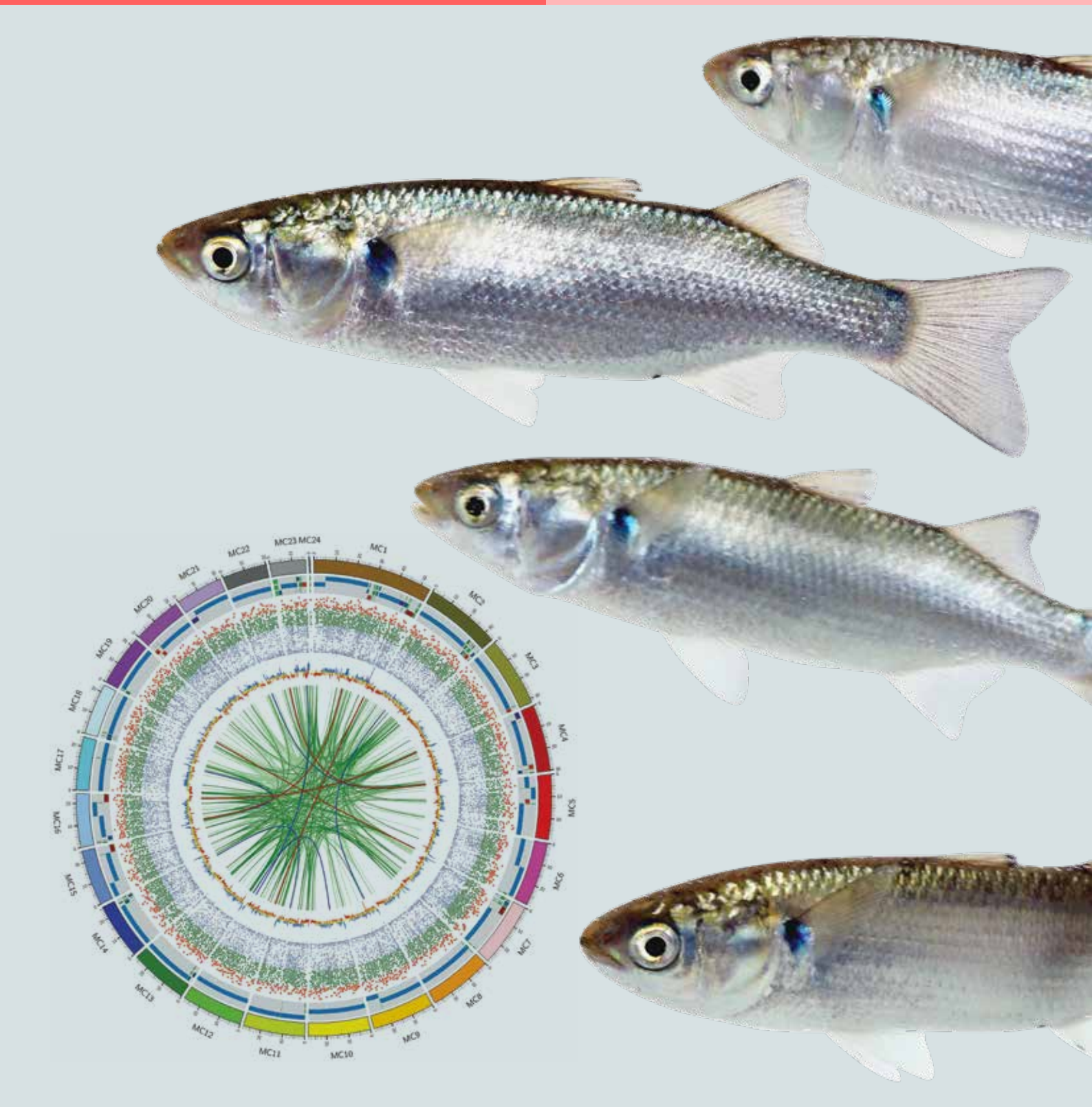

CIBANEWS

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Cover page
Genome of Grey mullet
Mugil cephalus unravelled by the
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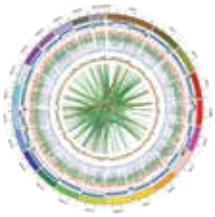
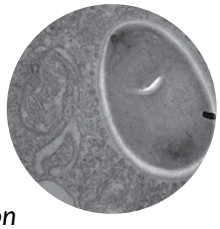




From the DIRECTOR'S DESK

Dr. K.P. Jithendran

The year 2022 can be considered a resurgent year post-COVID-19 pandemic, with life returning on track and activities are back to the pre-pandemic level. Working on holistic development of brackishwater aquaculture, CIBA has been focusing on diversifying species and farming systems for sustainable farming expansion and doubling the farmer's income. Success with the spawning of Bengal yellowfin seabream, *Acanthopagrus datnia* in captivity at our Kakdwip Research Centre has given hope for another finfish species in the farming basket. The whole genome sequence of the grey mullet *Mugil cephalus* was unrevealed successfully. This genome-level information is expected to support better understanding of the species for further technology development for farming this fish on a mass scale. Grey mullet is one of the most sought-after fish in the international and domestic markets. The fish has found local delicacy and is priced at ₹ 250-400 per kg.

Diversification of the farming system provides multiple options for the farming communities to ensure sustainability. Copefloc, a farming technology in the line of biofloc can be such an intervention to explore natural food for farming, where copepods are enriched by providing nutrient inputs. Mud crab larval rearing has been one of the bottlenecks in the development of seed production of crab for aquaculture. Rearing mud crab megalopa larvae with biofloc supplementation found to improve the crab instar quality, better survival and growth. Farming of milkfish together with *Penaeus vannamei* has been encouraged since milkfish improves the pond bottom and water quality.

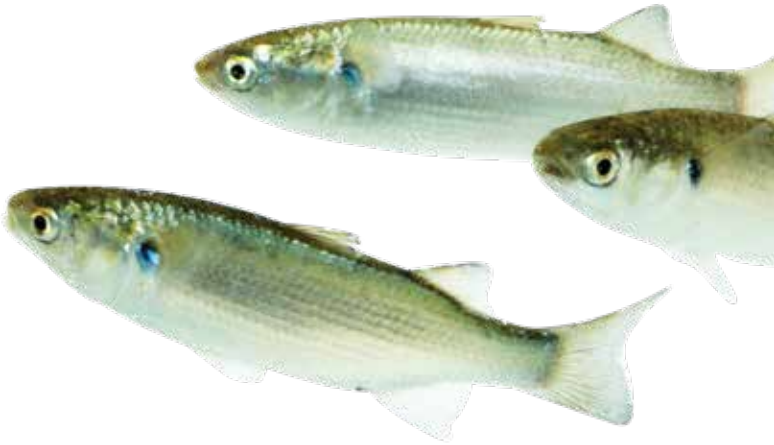
In the first half of this year, the institute was visted by several dignitaries including, Dr. Joy Krushna Jena, DDG (Fisheries), ICAR, Shri. Jatindra Nath Swain, IAS, Secretary, Department of Fisheries, Govt. of India, Shri. Nitin Sangwan, IAS, Director of Fisheries, Govt of Gujarat, and Shri. S. Annadurai, CLS, Director, State Tribal Welfare Department, Government of Tamil Nadu and appreciated our activities and the progress we are making in a diverse range of technologies. Continuous efforts of the institute has been recognised at various stages, like awarding the second best in cleanliness and hygiene work in Swachhta Pakhwada, the best scientist award and presentation awards in conferences such as 12th Indian Fisheries and Aquaculture Forum (IFAF), Indian Fisheries Outlook 2022. ICAR-CIBA also bagged the best display stall award in exhibition of the 12th IFAF, Chennai.

It is also noteworthy to record that CIBA signed agreement for collaborative research with several industrial partners such as AA Biotech, Hindustan University of Technology and Science, M/s Naturalle Herbal Remedies Pvt. Ltd., M/s Coastal Corporation Ltd. etc. Further, several technologies were transferred for mass production/development and distribution and signed transfer of technology with M/s Helini Biomolecules, and Fish Workers Welfare Federation of India (FISHFED). In addition, the institute supports start-ups for development and validations of technologies with M/s Aqgromalin Farmtech Service Pvt. Ltd., Chennai for a start-up programme on mud crab seed production.

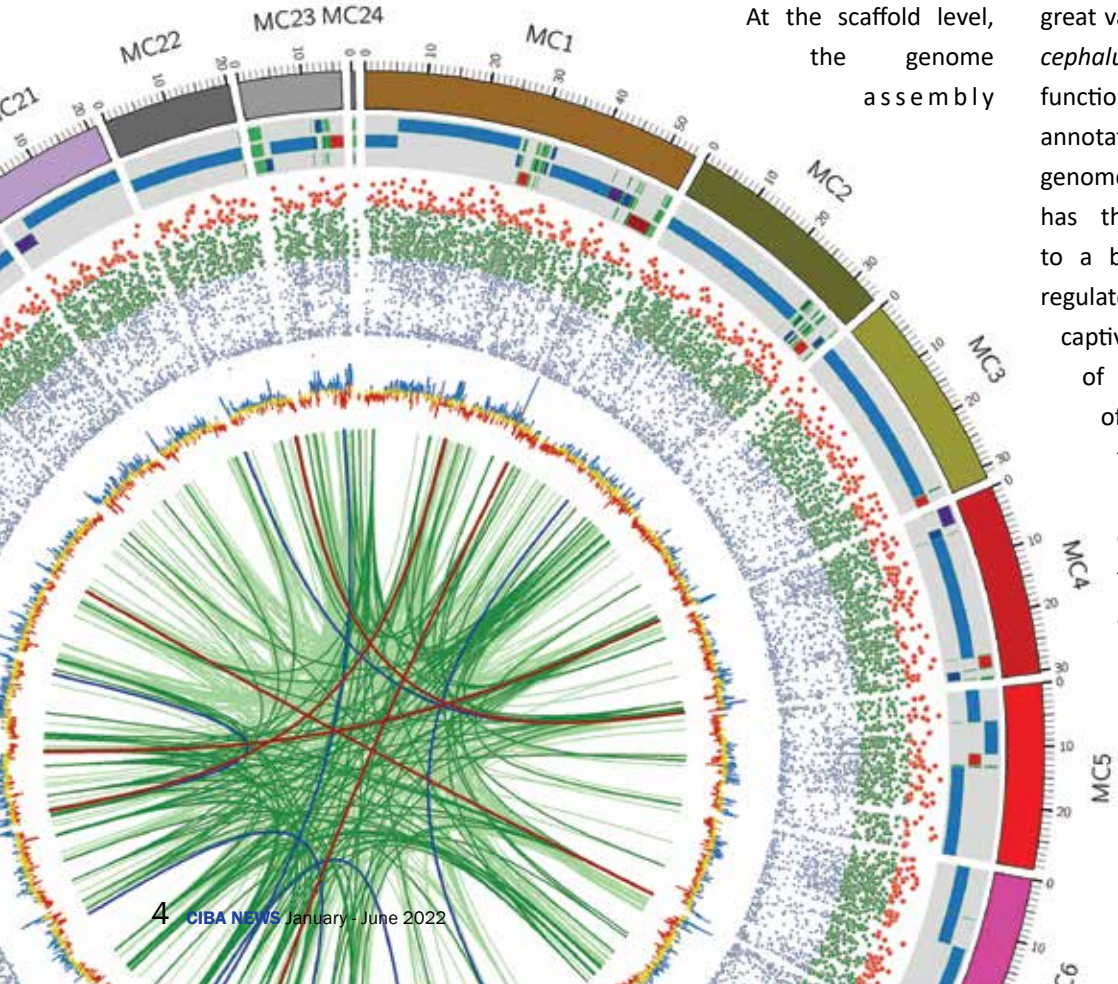
The institute has been actively involved in dissemination of technological development, welfare activities through various platforms. CIBA hosted Prime Minister's Garib Kalyan Sammelan event on 31st May 2022 as a reach out for the beneficiaries, and the event was presided by Dr. L. Murugan, Hon'ble Union Minister of State for Fisheries, Animal Husbandry and Dairying and Information and Broadcasting, Government of India. Nine training programmes were conducted as a part of human resource development in aquaculture for various stakeholders in the sector. CIBA organised a focus group discussion on 23rd March 2022 with insurance sector on re-introduction of shrimp crop insurance in India.

It is highly satisfactory and privilege to lead a national institute mandated for sustainable development in farming sector which is expected to offer livelihood, food security and prosperity to the farmers. In this regard, I acknowledge the support from each and every member involved inside and outside CIBA, and thank all members for bringing this edition of CIBANEWS. I hope the contents of this issue will be refreshing for the readers with newer informations on the brackishwater aquaculture and activities of CIBA.

Grey mullet, *Mugil cephalus* genome unveiled



Mugil cephalus, flathead grey mullet, is globally distributed and inhabits inshore seas, estuaries, and brackish water areas. It is of important commercial value to global fisheries and aquaculture with high demand for mullet roe. This species belongs to the family Mugilidae which comprises 26 genera and 80 valid species. The adaptability of *M. cephalus* to varied aquatic environments at different life stages and tolerance to a wide range of salinities and temperatures occurring in tropical, subtropical, and temperate coastal waters make it an important cultivatable fish species across the world. The whole-genome sequence information for an aquaculture species has potential applications in genomic selection and selective breeding for sustainable production and improvement of desirable traits, such as disease resistance and growth. A combination of PacBio, Illumina, and Arima Hi-C technologies were applied to construct the genome assembly of *M. cephalus*, an economically important brackish water aquaculture species. At the scaffold level, the genome assembly obtained for *M. cephalus* was 644Mb in length in 583 scaffolds with an N50 of 28.32 Mb and 27,269 of protein coding genes. The longest 24 scaffolds represented 98.56% (634 Mb) of the scaffold-level assembly length. The mitochondrial genome of *M. cephalus* was obtained as a single scaffold of 16,738 bp in the assembly. An isoform-level, full-length transcriptome resource was generated for grey mullet, using nine different adult tissues and five different developmental stages. The full-length transcripts are of great value for annotation of the *M. cephalus* genome, the conduct of functional studies, and to support annotations of other mullet fish genomes. The transcript assembly has the potential to contribute to a better understanding of the regulatory pathways involved in the captive maturation and breeding of grey mullet. The integration of genome information into fisheries and aquaculture management is important to ensure long-term sustainable fishery harvest and aquaculture production.

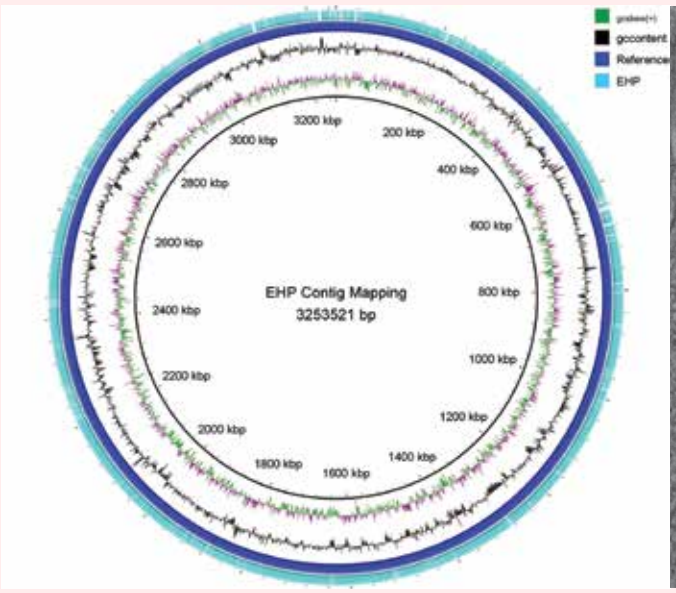


First report on whole genome of *Enterocytozoon hepatopenaei* (EHP) from India

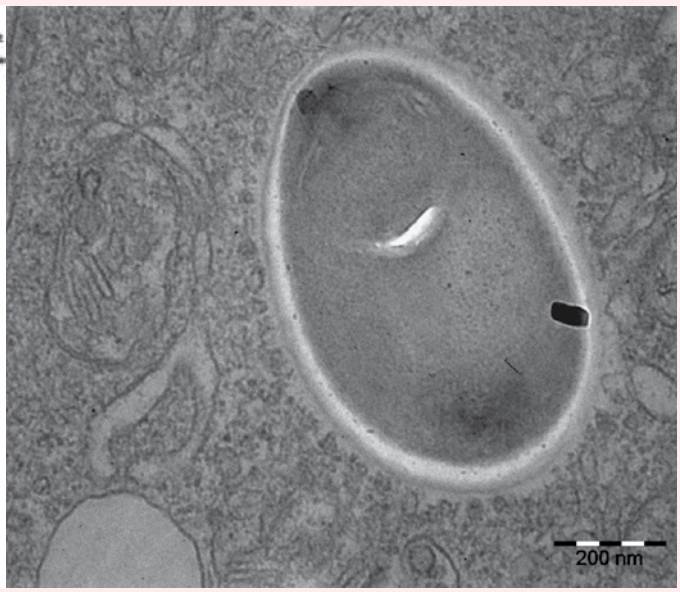
Enterocytozoon hepatopenaei (EHP), the emerging microsporidian, is the causative agent of the disease Hepatopancreatic Microsporidiasis (HPM) reported to cause severe economic losses in shrimp aquaculture. EHP known to affect both farmed *P.monodon* and *P. vannamei*. The disease was first reported in Thailand in 2009 and thereafter recorded in many shrimp farming nations including Vietnam, Malaysia, Bruanei, Indonesia, China, Venezuela, Korea, Australia and India.

The pathogen did not cause mass mortality but reported to cause size variation/growth retardation and associated with white faeces syndrome (WFS). The target organ for this microsporidian is hepatopancreas (HP) and infection cause severe necrosis and sloughing and desquamation of HP epithelial tubules. Hence the disease affects shrimp secretion, digestion, absorption, physiology, metabolism and growth. The pathogen is named as *Enterocytozoon hepatopenaei* (EHP) based on its distinctive ultra-structural characters and placed under the family *Enterocytozoonidae*. Considering the spore size, marine habitat and 16% difference in the 18 SSU (small subunit) rRNA gene sequence, a new name *E. hepatopenaei* within the family *Enterocytozoonidae* is accepted for shrimp microsporidian. However, the whole genome studies on EHP are very limited. So far the whole genome of EHP has been reported from China, Thailand and Indonesia. ICAR-CIBA had decoded the whole genome of EHP for the first time from India.

The whole genome sequencing of EHP was completed with illumina platform. The whole genome of EHP is around 3.25 Mbp including 2,500 genes. Our EHP genome revealed a genome similarity of 99.8% with earlier reported scaffold level assembly of EHP whole genome available in public data base domain. This whole genome sequence will help in understanding the metabolism and biology of pathogen and also useful in studying the genome composition and genome variability among other geographical isolates of EHP.



Draft whole genome of *Enterocytozoon hepatopenaei* (EHP)

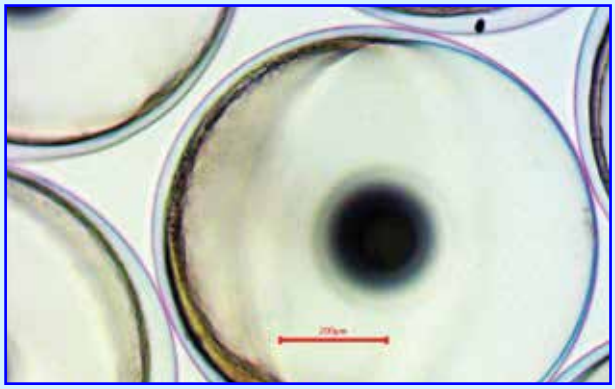


Transmission electron microscopy of EHP

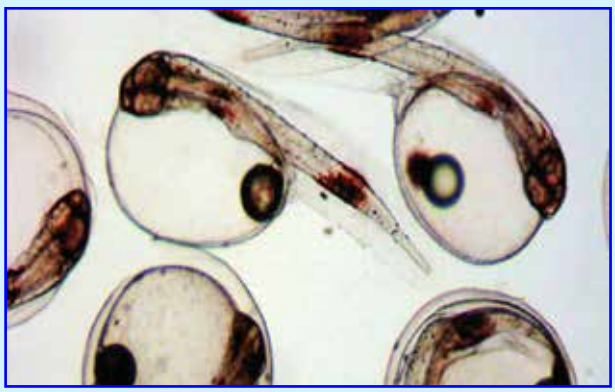
Breakthrough in captive breeding of Bengal yellowfin seabream, *Acanthopagrus datnia*

Bengal yellowfin seabream, *Acanthopagrus datnia* (Hamilton, 1822) is an important commercial food of India due to high market value and consumer preference with domestic market price ranging between ₹ 250 to 400/kg. Traditional farming of this fish is being carried out in Bheries of West Bengal, depends on seeds collected from wild. Kakdwip Research Centre (KRC) of CIBA has made breakthrough in captive breeding of *A. datnia*. Captive broodstock (male: female- 2:1) was developed in brackishwater (salinity: 5-7 ppt) in a Recirculatory Aquaculture System (RAS). Both male and female broodstock were administered with hormone implant (LHRHa 25 µg/kg body weight) thrice in monthly intervals since gonadal development was noticed. Fish was fed twice daily with pellet feed (38% protein, @ 2% of biomass) and low cost fish (Tilapia, and Bombay duck, @ 5% of biomass). Salinity was gradually increased to 30 ppt during breeding season (Nov - Dec). Mature female having oocyte size in range of 400-450 µm and mature male with free flowing milt were administered with LHRHa @ 30 µg/kg body weight to female and half the dose to male. Spawning occurred after a latency period of 55 hr, fertilized eggs were transparent, floating and 750-830 µm in diameter. Average estimated functional fecundity was around 2.0 lakhs eggs/ female (480 g body weight). Fertilized eggs hatched at 26-28 hr of post spawning at 16°C. Average total length of newly hatched larvae was 1.75 mm. In conclusion, Bengal yellowfin seabream broodstock can be developed in the brackishwater and induced to spawn with LHRHa at water salinity of 30 ppt.

Hormonal Induction



Early gastrula stage



Hatching

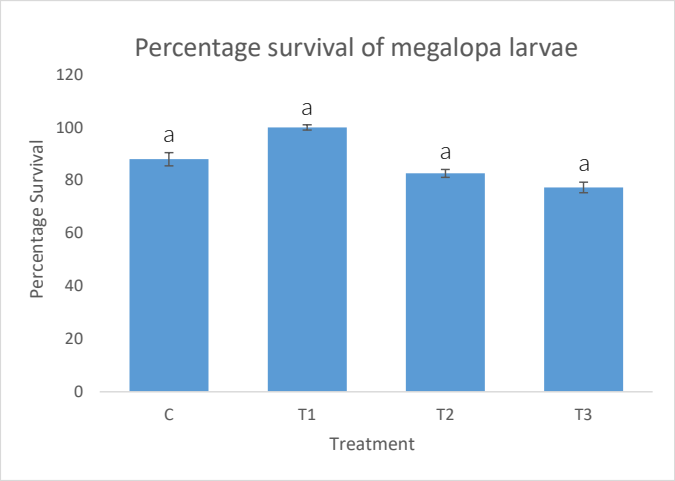
Copefloc based shrimp farming: an innovative aqua-mimicry based concept

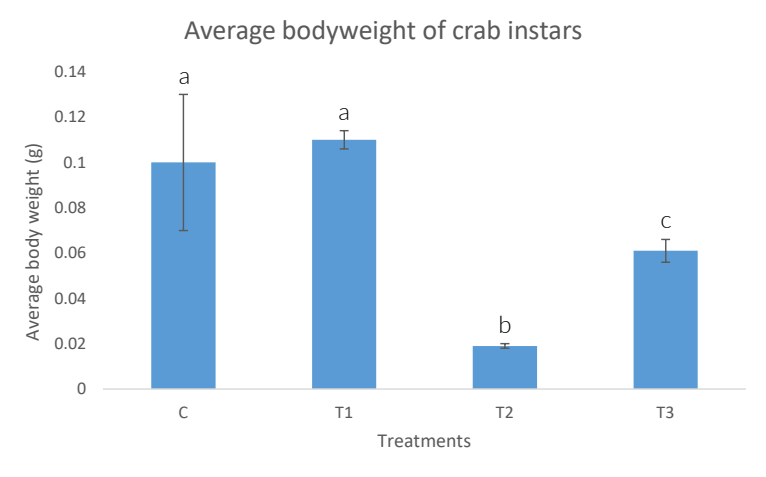
Aquamimicry in brackishwater aquaculture is an innovative technology that stimulates estuarine environment conditions in ponds by developing live feed blooms, mainly copepods, for the rearing of shrimps. Specific Pathogen Free of *P. vannamei* - PL 10 was reared in a copefloc based FRP circular tank (10 tonnes) at a stocking density of 2,500 nos/tonne with 32 ppt salinity. Nursery reared shrimp survival and growth of 97±1.1% and 0.902 g were observed within a month. Copefloc-based nursery reduced 20% of supplementary feed during the nursery phase. These juvenile *P. vannamei* were stocked in the lined pond of 1,000 m^2 area with a stocking density of 40 nos/m^3 reared for 40 days. Copefloc was developed with three species of copepods using filtered fermented juice of rice bran powder, molasses, and yeast as a nutrient source. Water quality parameters were monitored regularly, and organic waste was removed every 15 days using the central drainage facility. Total biomass of 440 kg was harvested with 91.5% survival with a productivity of 4.4 tonnes/ha. The average size of the harvested shrimp was 15.2 g with a FCR of 1.07. Total revenue of ₹ 1.10 lakh was generated by selling the shrimp at a rate of ₹ 250/kg. Hence, copefloc reared nursery shows compensatory growth performance and significant survival with lower FCR during grow-out culture, directing the potential of copefloc technology for future shrimp farming practices. This work was carried out under the SCSP programme.

Rearing of mud crab's megalopa larvae in biofloc enriched systems

Mud crab larval survival and mass seed production are significant bottlenecks in the development of mud crab aquaculture. Cannibalism causes lower survival rates in the later stages of larvae, which is a major concern in hatcheries. Mud crab larvae in advanced stages require larger prey for feeding and development. Several studies have found that introducing live feeds and a new diet can improve survival. However, it can degrade water quality and cause problems with high-density larvae rearing. The biofloc systems are not ideal for smaller stages of mud crab larvae, but they are suitable for advanced stages.

The current study investigated the use of biofloc systems for rearing megalopa larvae. Two-day-old megalopa larvae (n=25) were stocked in triplicate in 100 L FRP tanks. The treatment tanks were grouped based on the biofloc application. In the T1 group, the larvae were fed biofloc meal plus clam meat. In treatment T2, the larvae were fed only biofloc meal, whereas, in treatment T3, the larvae were reared under *in situ* biofloc systems with supplementary clam feeding. The biofloc meal was made separately from biofloc culture tanks. The flocs for the *in situ* biofloc systems were generated in the larval rearing tank using rice flour and the CIBAFLOC consortium. The control for the experiment was larvae reared in a clear water system fed with clam meat. The experiment ended when the megalopa larvae metamorphosed into instar (10 days). Carapace width, body weight and survival were recorded at the end of the experiment.





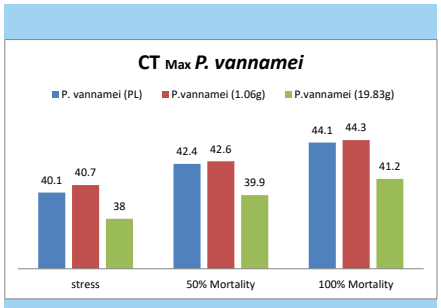
At the end of the experiment, the average body weight of the instars differed significantly between treatments. The T1 instars fed biofloc meal, and clam meat had significantly ($P<0.05$) higher body weight than the other biofloc systems. However, no statistically significant difference was found compared to the control group. Lower body weight in larvae fed only biofloc (T2) indicates that biofloc cannot replace the normal feed materials of crab instar as growth may be affected. Lower growth rates observed *in situ* biofloc systems warrant further investigation. The survival of the larvae in the various treatment groups was not significantly different ($P>0.05$), indicating that the biofloc systems can be successfully implemented for the mud crab megalopa rearing for higher instar production.

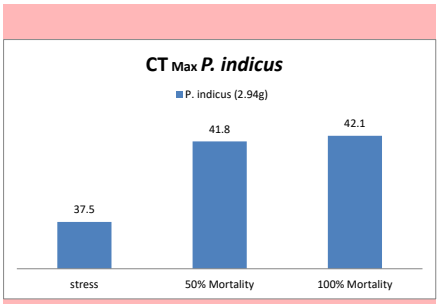
Thermal tolerance ability of the different shrimp species

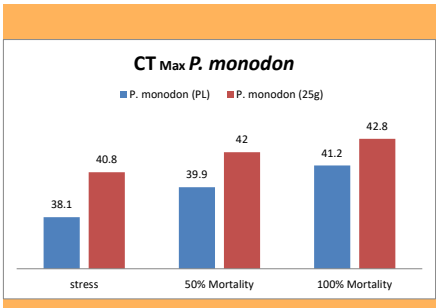
The ability of the various shrimp species for its tolerance to temperature was studied under the experimental conditions. In this experiment, the critical thermal maxima and critical thermal minima of the commonly cultured shrimp species has been ascertained and the results are given below.

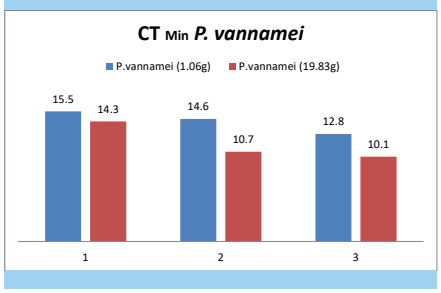
The results of the critical thermal maxima experiments revealed that highest value of CTMax was observed for *P. vannamei* (44.3°C) followed by *P. monodon* (42.8°C), *M. monoceros* (42.4°C), *P. indicus* (42.1°C), *M. dobsoni* (42°C).

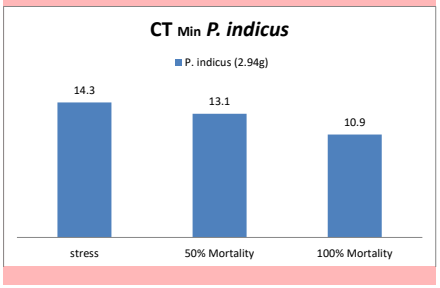
The species which can tolerate lowest critical temperature value were observed as *M. monoceros* (10.8°C) followed by *P. indicus* (10.9°C) , *M. dobsoni* (12.7°C), *P. vannamei* (12.8°C), *P. monodon* (14.2°C).

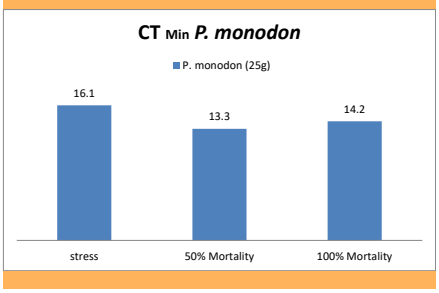


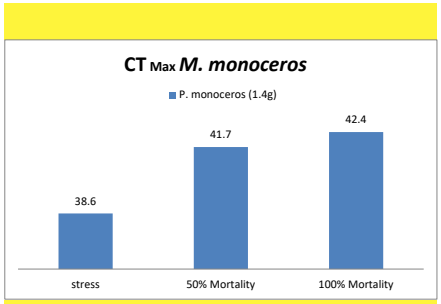


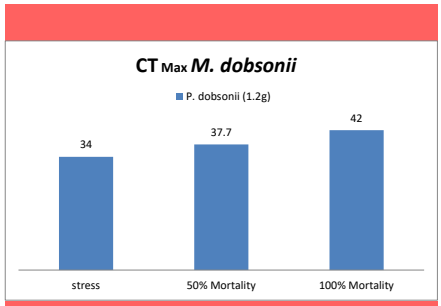


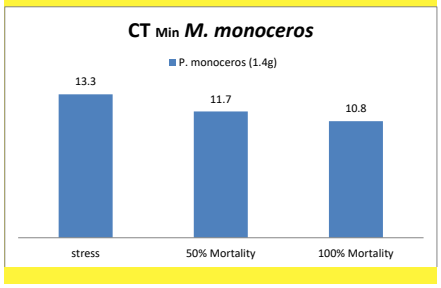


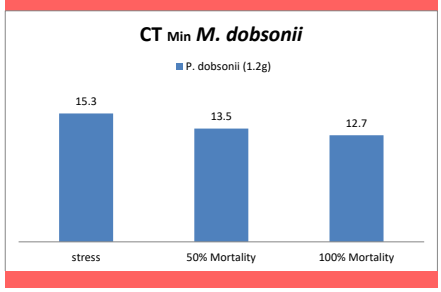












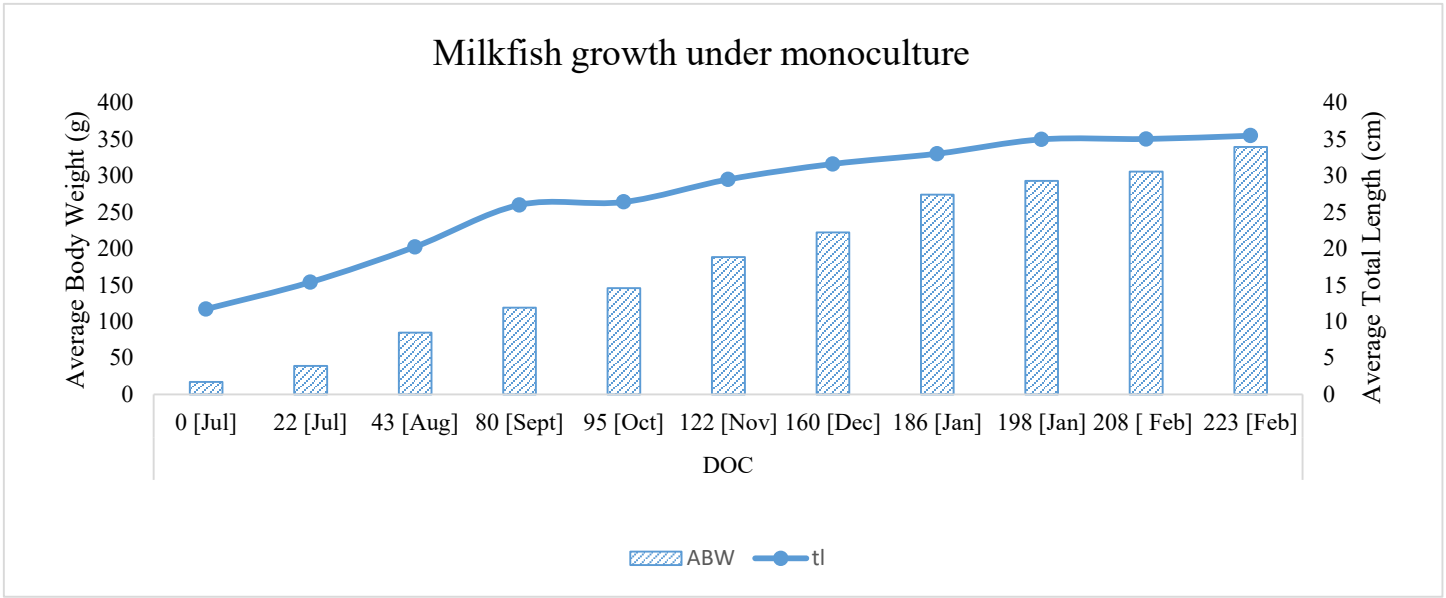
Graphical representations of CTmax and CTmin for different species

Milkfish, a promising climate-resilient species for brackishwater aquaculture

DDG (Fy) witnessing the sampling of milkfish

Harvested milkfish from KES-CIBA pond and display of frozen de-boned product

Milkfish is a candidate species for diversification of brackishwater aquaculture, and availability of hatchery seed has fuelled scientific farming in various parts of India since 2015. However, real-time production data for various farming models from the farmer's pond is scarce. KES-CIBA farm conducted a milkfish monoculture trial to develop a cost-effective farming protocol that is adaptable in different seasons. This farming trial was carried out during the pre-monsoon, monsoon, and post-monsoon seasons. A 1,156 squre meter pond was renovated and prepared using organic manures. Milkfish fingerlings (20 g average body weight) were stocked at 1.5 nos/m^2 in water salinity ranging from 0 to 32 ppt and depth ranging from 60 to 90 cm. Fish were fed with CIBA Milkfish Grow-Out ^{Plus} (Protein 30-35%, Fat 6%) at 5-3% of their body weight. Pond plankton diversity and water quality varied significantly across months. Milkfish was cultured for 230 DOC to harvest biomass of 4.78 tonnes/ha productivity with a specific growth rate of 1.34, FCR of 1:1.38, and survival rate of 93.7%, generating total revenue of 65,450. Dr. J.K. Jena, DDG (Fy.) ICAR visited the KES-CIBA and witnessed the farming trial. Buyers were demonstrated with a deboning method for milk fish to increase the farm gate price. Overall, milkfish monoculture was promising and appropriate for climate-resilient aquaculture in different weather conditions.



Length & weight of milkfish in 223 DOC monoculture trial

Polyculture of SPF tiger shrimp and milkfish in brackishwater

Field trial was carried out to evaluate the polyculture of milkfish and SPF tiger shrimp in an earthen pond (1,000 m^2) with SPF tiger shrimp PL (5 nos/m^2) and milkfish (0.5 no/m^2) at NGRC, Gujarat. The culture was practised for 100 days to produce 110 kg of tiger shrimp (26.60±0.69 g) and 103 kg milkfish (237±30.4 g), with attaining productivity of 2.1 tonne/ha. Sale of farm produced milkfish and tiger shrimp, generated ₹ 54,200 as revenue.

Harvested milkfish and SPF tiger shrimp from polyculture pond

Long Whiskers Catfish, ***Mystus gulio***

Taxonomic position

Kingdom	:	Animalia
Phylum	:	Chordata
Subphylum	:	Vertebrata
Class	:	Actinopterygii
Order	:	Siluriformes
Family	:	Bagridae
Genus	:	*Mystus*
Species	:	*Mystus gulio*

Mystus gulio (Hamilton) is a native catfish of family Bagridae distributed around India to Malay Archipelago, especially in estuarine and tidal waters. *M. gulio*, the long whiskers catfish is a commercially important brackishwater catfish locally known as “Nona tengra”. This hardy fish with delicious taste, excellent nutritional value and high market demand is an important candidate species for aquaculture diversification. In general, in six months of culture period, it attains 60-100 g which has high market value; however growth depends on type of feed used, stocking density and physico-chemical parameters of water. This fish species is traditionally farmed in rice fields and bheries of Eastern India and Bangladesh.

Vernacular name of *M. gulio* is "Nona tengra" in Bengali, whereas "Kala-tenguah" in other parts of India.

Taxonomic character:

Body is elongated and compressed with a rough and granulated upper surface has four pairs of barbels and maxillary one extends to the end of pelvic fin. Adipose fin is small and caudal fin is forked. Fin formula is D.1/7; P1. 1/8-9; P2. 6; A.12-15.

Biology:

M. gulio is carnivorous species; though omnivorous feeding is also reported. Sexual dimorphism is distinct, in male a muscular papilla with dark red tip is prominent which is absent in female. It is a single spawner fish, spawning is correlated with North - East and South - West monsoon season. Due to euryhaline nature, this fish can be cultured in both brackishwater and freshwater environments.

Present status:

To meet up high seed demand and also to reduce dependency from wild seed collection, KRC, ICAR-CIBA has developed complete package of practices comprising seed production, nursery rearing and grow-out farming of *M. gulio*.

Dr. Joy Krushna Jena, DDG (Fisheries) inaugurated modular biofloc unit at KES of ICAR-CIBA, Kovalam

Dr. Joy Krushna Jena, Deputy Director General (Fisheries), ICAR inaugurated a newly constructed modular biofloc nursery rearing unit for shrimp/fish at Kovalam Experimental Station (KES) of ICAR-CIBA on 7th May 2022. Biofloc unit consist of six culture tanks of 20 tonnes capacity each and two reservoir tanks of 60 tonnes capacity. In presence of Dr. J.K. Jena, these systems were stocked with SPF *P. vannamei* (2,500 nos/m^3) in monoculture mode and fish fingerlings of mullet, milkfish and pearl spot in polyculture mode. In the inaugural speech Dr. J.K. Jena briefed the importance of sustainable and climate resilient modular culture methods for future aquaculture development. Dr. K.P. Jithendran, mentioned the importance of these systems for bio secure culture of aquatic organisms. Dr. Akshaya Panigrahi, PI of the program briefly explained the advantages of biofloc unit to facilitate nursery and grow-out rearing and to disseminate the technology.

Shri. Jatindra Nath Swain, IAS, Secretary, Department of Fisheries, Govt. of India visited ICAR-CIBA, Chennai

Shri. Jatindra Nath Swain, IAS, Secretary, Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying made two visits to ICAR-CIBA on 10th January and 18th June, 2022. The Secretary visited state-of-the-art shrimp and finfish hatcheries and the pilot-scale feed mill at Muttukadu Experimental Station of ICAR-CIBA. During the interaction meeting with scientists, he stressed on developing innovative and efficient technology options for the farming community. He also urged the researchers to focus on the reduction of the farm input cost, creation of new market for diversified fish and fishery products and development of responsive extension systems to disseminate the technologies to end-users. Further, the Secretary appreciated the progress in eco-based farming such as biofloc farming technology for shrimp nursery and grow-out technology. He had also interacted with engineers associated with the institute through start-up program regarding aerator efficiency and automation in biofloc and intensive farming systems. He underlined plan of Government of India scheme for establishment of finfish hatcheries and cage aquaculture units through public-private partnership (PPP) mode. Dr. K.P. Jithendran apprised about strength of the brackishwater aquaculture sector and the accomplishments made by the institute in diversification of species/ culture system and technological innovations in feed, disease diagnostics, prophylactics etc. He also thanked the Secretary for his confidence on CIBA's scientific team and sanctioning project on Indian white shrimp (*Penaeus indicus*) selective breeding with a budget outlay of ₹ 25.44 crores. Dr. V. Kripa, Member Secretary, CAA requested assistance from CIBA scientists for amending/refining the guidelines for coastal aquaculture.

Shri. Nitin Sangwan, IAS, Director of Fisheries, Gujarat visited NGRC of ICAR-CIBA

Shri. Nitin Sangwan, IAS, Director of Fisheries, Gujarat visited NGRC-CIBA farm at Matwad, Navsari, Gujarat on 30th May 2022. Shri. Sangwan was appraised upon farm and hatchery facilities of NGRC-CIBA, and the accomplishment of CIBA in the development of brackishwater aquaculture for improvement in livelihood to coastal communities of Gujarat. Shri. Nitin Sangwan acknowledged research and development activities of ICAR-CIBA like winter farming of shrimp, cost effective portable pearl spot hatchery and brackishwater integrated fish farming. He also noticed demonstration activities for the upliftment of coastal communities of Gujarat. He emphasized the need for technology standardisation on intensive farming models such as biofloc and recirculatory aquaculture.

Director, State Tribal Welfare Department, Government of Tamil Nadu visited project sites under STC and SCSP schemes

ICAR-CIBA, Chennai is implementing livelihood development interventions for the tribal groups and scheduled caste families at Kattur and Thonirevu Villages in Thiruvallur district, Tamil Nadu under the STC and SCSP schemes. CIBA has demonstrated brackishwater aquaculture technologies viz., milkfish farming in pond and pens, seabass nursery rearing in hapas, pen and low volume floating cages, crab fattening in pen and boxes for their diversified livelihood development. An interaction meet was organised on 16th June 2022 with the ST and SC beneficiaries to get their feedback on the livelihood support activities being undertaken by CIBA. Shri. S. Annadurai, CLS, Director, State Tribal Welfare Department, Government of Tamil Nadu visited the project sites and appreciated the efforts and expressed his willingness for collaboration with CIBA programmes for the upliftment of tribal families. About 75 beneficiaries, elected representatives, state department officials and public attended the meeting. Dr. B. Shanthi, Principal Investigator and Dr. T. Senthil Murugan, Co-Principal Investigator of the project convened this programme.

ICAR-CIBA bags Swachhta Pakhwada Award-2021

ICAR-CIBA was awarded Swachhta Pakhwada Award-2021 (Second Prize) for the work done on cleanliness and hygiene during the Annual Conference of Vice-Chancellors of Agricultural Universities and Directors of ICAR institutes on 13th April 2022. The Hon'ble Union Minister of Fisheries, Animal Husbandry and Dairying, Govt. of India Shri. Parshottam Rupala presented the award to Dr. K.P. Jithendran, Director, ICAR-CIBA, in the presence of Shri. Narendra Singh Tomar, Hon'ble Minister of Agriculture & Farmers Welfare, Govt. of India, Sushri Shobha Karandlaje, Hon'ble Minister of State for Agriculture & Farmers Welfare, Government of India, Dr. Trilochan Mohapatra, Secretary, DARE & DG, ICAR and other dignitaries. The Swachhta Pakhwada was celebrated by all the 102 Institutes of ICAR institutes/establishments across the country. The award was based on the range and scale of organizing the innovative events of cleanliness and hygiene besides documentation and dissemination of the same during the Swachhta Pakhwada fortnight observed from 16th to 31st December 2021.

ICAR-CIBA won multiple awards in 12th Indian Fisheries and Aquaculture Forum

12th Indian Fisheries and Aquaculture Forum (IFAF) was organized by Tamil Nadu Dr. J. Jayalalithaa Fisheries University (TNJFU) at Chennai from 5th to 7th May 2022, where more than 850 participants including scientists, technical officers, research scholars and students of ICAR-CIBA attended the event. Dr. Joy Krushna Jena, Deputy Director General (Fisheries), ICAR, New Delhi inaugurated the event on 5th May 2022 along with Dr. G. Sugumar, Vice Chancellor of TNJFU, Nagappatinam. The ICAR-CIBA bagged awards for research excellence, best oral and poster presentations.

Dr. P.S. Shyne Anand, Senior Scientist received Professor T.J. Pandian and A.J. Matty Award, 2022 from Asian Fisheries Society for Excellence in Aquaculture Development (Research). Dr. B. Shanthi, Principal Scientist received TNJFU Excellence Award 2022 (Fisheries Extension). Dr. M.S. Shekhar, Principal Scientist was awarded the best oral presentation, "Unravelling of the complex genome of Indian white shrimp *Penaeus indicus,*" in Aquaculture Genetics, Breeding and Biotechnology Session. Mr. Vishwajeet Potadar, Research Scholar (NICRA), was awarded the best oral presentation on "Contribution of shrimp aquaculture to global warming potential: life cycle assessment approach" in the Aquatic Environment and Management Session. Ms. Sravanthi Oduru, Research Scholar (NICRA Project), was awarded for the best poster presentation on 'Effect of dietary lipid level on growth performance in tiger shrimp, *Penaeus monodon* reared at three different water salinities', in the session on Fish Nutrition and Feeding.

ICAR-CIBA stall won 'Best Exhibitor-Winner' award in the 12th Indian Fisheries Aquaculture Forum

ICAR-Central Institute of Brackishwater Aquaculture participated in the exhibition event of 12th Indian Fisheries Aquaculture Forum organized by the Tamil Nadu Dr. J. Jayalalithaa Fisheries University (TNJFU) at Chennai during 5-7th May 2022. The stall was set up with aquaria displaying the aesthetic beauty of brackishwater environment with major varieties of fish and crustacean fauna. In addition, exhibit displayed the major technological achievements, feed samples, disease diagnostic kits, extension publications and reports from ICAR-CIBA. The display attracted 850 delegates including scientists, teaching faculty, farmers, students and research scholars. The stall won the "Best Exhibitor – Winner" award and the certificate was presented by Dr. Joy Krushna Jena, DDG (Fisheries), ICAR to Dr. K.P. Jithendran, Director, ICAR-CIBA.

Best oral presentation award

Dr. Prem Kumar, Senior Scientist, KRC of ICAR – CIBA received the best oral presentation award under the theme Aquaculture in the 1st Indian Fisheries Outlook 2022 held during 22-24th March, 2022 at ICAR Central Inland Fisheries Research Institute (CIFRI), Barrackpore, West Bengal.

Dr. Akshaya Panigrahi, Principal Scientist, Crustacean Culture Division, ICAR-CIBA has received "K. Chidambaram Memorial Annual Award" from the Fisheries Technocrats Forum (FTF), Chennai, Tamil Nadu. The Aqua International magazine has organized the India International Aqua Expo 2022 during 23rd-25th June 2022. In this expo Dr. A. Panigrahi, received "Best Aquaculture Scientist award". He also received "Dr. Hiralal Choudhury Gold Medal" during 1st Indian Fisheries Outlook 2022, organized by ICAR-CIFRI, Barrackpore on 22nd-24th March 2022. Further he was awarded with "Outstanding Aquaculture Scientist Award" by Dr. B. Vasantharaj David Foundation, Chennai, Tamil Nadu.

M/s Naturalle Herbal Remedies Pvt. Ltd., signed MoU with ICAR-CIBA to evaluate therapeutic efficacy of herbal products against pathogens

ICAR-CIBA signed a MoU with M/s Naturalle Herbal Remedies Pvt. Ltd., on 23rd May, 2022 for contract research for evaluation of therapeutic efficacy of RESURGE (herbal product) for *Enterocytozoon hepatopenaei* in shrimp and for evaluation of bactericidal efficacy of WIPE & LEAP (two herbal formulation products) against *Vibrio* species and *Pseudomonas aeruginosa.* Dr. K.P. Jithendran, Director, ICAR-CIBA briefed that shrimp disease management is more complex than disease prevention and use of herbs act as anti-pathogenic, antibiotic which strengthens the immune system of aquatic organisms. Dr. M. Poornima, Principal scientist and Team Leader of this program wished that if these herbal formulations are effective as remedy for diseases like *Hepatic microsporidiosis* and bacterial diseases, then this strategy may pave way as alternative to usage of antibiotics / chemicals inputs in aquaculture. Mr. Dolendra Prasad, Managing Director, M/s Naturalle Herbal Remedies Pvt. Ltd., highlighted that CIBA is a technology transfer pool to turn research into products and also stressed that these products can be used by farmers/entrepreneurs/researchers and leaves scope to extend further for formulations based on research needs as new projects.

M/s Helini Biomolecules, Chennai signed MoU with ICAR-CIBA for technology transfer of indigenous shrimp feed production

M/s Helini Biomolecules, Chennai, Tamil Nadu signed a MoU with ICAR-CIBA on 23rd May 2022, for technology transfer of 'Vanami ^{Plus}' feed technology. The company envisaged to produce shrimp feed with the CIBA's technical guidance to meet the demands of aquaculture farmers in Tamil Nadu. Dr. K.P. Jithendran, Director, ICAR-CIBA highlighted the relative advantages and cost effectiveness of 'Vanami ^{Plus}'. Dr. K. Ambasankar, Principal Scientist and team leader for the technology emphasized that the farmers would get an opportunity to source the feed directly from the feed mill avoiding the marketing costs which would increase their profitability through this model.

Fish workers welfare federation of India (FISHFED) signed up with ICAR-CIBA to promote brackishwater aquaculture technologies

Fish workers welfare Federation of India (FISHFED) signed MoU with ICAR-CIBA on 7th May, 2022 for the transfer and demonstration of brackishwater aquaculture technologies for the livelihood and upliftment of fish workers. These technologies include fish waste to wealth, brackishwater finfish cage culture, integrated fish farming, finfish and shrimp nursery, grow-out farming, crab farming, feed formulation and processing, etc. Dr. K.P. Jithendran, Director of ICAR-CIBA, highlighted the role of technologies in helping coastal fish farmers improve their standard of living, and Mr. Jai Patil, President of FISHFED, provided an overview of the organization's activities, including skill development, employment creation, and securing livelihoods for fish workers through a number of public and private institutions. He also commended CIBA for taking the effort to expand its engagement with federations and expressed his confidence in the success of this alliance, which would considerably assist fish workers.

ICAR-CIBA and M/s Coastal Corporation Ltd., Visakhapatnam allied together for India's first feed for shrimp larvae

ICAR-CIBA formed a strategic alliance with M/s Coastal Corporation Ltd., Visakhapatnam, Andhra Pradesh, for production of indigenous shrimp larval feed. Quality larval feeds are the central element for successful hatchery operation. The larval feeds used in India are wholly imported and expensive. In this context, a cost-effective indigenous larval feed for shrimp is the need of the hour for sustainable aquaculture. Focused research efforts at CIBA over the last five years resulted in the development of CIBA Shrimp Larvi*Plus*. This feed has been tested and demonstrated for its effectiveness in various shrimp hatcheries in Tamil Nadu and Andhra Pradesh. To promote the shrimp larval feed production in line with the make in India program of Govt. of India, ICAR-CIBA has signed a MoU for the manufacture of indigenous shrimp larval feed on 6th May, 2022, in the presence of Dr. J.K. Jena, Deputy Director General (Fisheries), ICAR, New Delhi.

M/s A.A. Biotech Pvt. Ltd., Chennai joins with ICAR-CIBA for collaborative research on calibration and validation of water testing protocol in aquaculture

M/s A.A. Biotech Pvt. Ltd., Chennai signed a MoU with ICAR-CIBA on 27th April 2022 for collaborative research on "calibration and validation of water testing protocol for use in Aquaculture". Dr. K.P. Jithendran, Director, CIBA, highlighted the importance of monitoring environmental parameters and instant decision making at the farm level for the successful crop. Dr. M. Muralidhar, Principal Scientist & SIC, Environment Section described the innovation in the water quality testing protocol, its rapidity, accuracy and reliability at the farm level. Mr. Udaya Ram Jothy, CEO of M/s A.A. Biotech informed that the water testing protocol would address farm level issues like human error in testing water quality parameters and will support in rapid detection, instant decision making, geo-location and option for rectifying errors in tests. He also stressed that the test cost will be economical and benefits the farmers.

Hindustan University of Technology and Science, Chennai ties up with ICAR-CIBA for research programmes in aquaculture

Hindustan University of Technology and Science, Chennai signed MoU with ICAR-CIBA on 27th April 2022 to facilitate academic and research cooperation in the diverse fields of engineering, technology, applied, allied and life sciences applications in aquaculture. Dr. K.P. Jithendran, Director, CIBA emphasized the significance of this collaborative research programme between a research and development institution and academic university in knowledge sharing, technology transfer and popularization of broad spectrum of techniques available in the Institute. Dr. K. Nandakumar, Director of Research, Hindustan University, stated that this MoU to evaluate nano-sensors for sustainable intensification of different aquaculture systems like RAS and Biofloc based systems and synthesis of nanoparticles for targeted therapy and protein or peptide characterization. Dr. Puspamitra Panigrahi, Professor, Centre for Clean Energy and Nano Convergence (CENCON), Hindustan University explained about the potential areas of research under the collaboration. Dr. A. Panigrahi, Principal Scientist, CCD and team leader described that the presence of synthesis of nanoparticles for targeted therapy and characterization of proteins and various functionalized nanostructures for antimicrobial activities, development of nano-sensors for monitoring metabolites in different aquaculture systems like RAS and biofloc based systems.

A start-up programme on mud crab seed production with M/s Aqgromalin Farmtech Service Pvt. Ltd., Chennai

M/s Aqgromalin Farmtech Service Pvt. Ltd., a farm diversification corporate business enterprise based in Chennai signed a MoU with ICAR-CIBA on 7th February, 2022 for a start-up program in mud crab seed production and scaling up of mud crab farming with a supply chain. Mr. Prasanna Manoharan, CEO and Mr. Bharani, COO from Aqgromalin Farmtech Service highlighted the brief history and significance of the company that serve as farm diversification platform and their plans of operation of the start-up program. Dr. K.P. Jithendran, Director, ICAR-CIBA elaborated economic viability and potential of mud crab farming, critical gaps in crab seed production and dissemination of production technologies to farmers. Dr. C.P. Balasubramanian, Principal Scientist and team leader in sighted about the practical issues in popularizing mud crab aquaculture and the production of stockable 'seed crab'.

Prime Minister's Garib Kalyan Sammelan event was organized at ICAR-CIBA

Prime Minister's Garib Kalyan Sammelan event was organized at ICAR- CIBA, Chennai on 31st May 2022, with about 1,500 aqua farmers, fishers, women from coastal community, beneficiaries of Prime Minister's Ujjwala LPG Scheme have participated. The Programme was inaugurated by Dr. L. Murugan, Hon'ble Union Minister of State for Fisheries, Animal Husbandry and Dairying and Information and Broadcasting, Government of India. Shri. Arvind Kumar, Managing Director, CPCL, Chennai and Shri. V.C. Asokan, Executive Director, IOCL also graced the occasion. Dr. K.P. Jithendran, Director, ICAR-CIBA welcomed the dignitaries, invitees and the participants and also highlighted activities implemented by ICAR-CIBA through Government of India's schemes such as Tribal Sub Plan, Scheduled Caste Sub Plan Programme etc.

Shri. Dr. L. Murugan delivered a scintillating address on various Government of India schemes for societal development focusing on poor and the down trodden, women and fishers community. He also stated that the more people need to be a part of schemes and get benefitted for their social and economic empowerment. The live programme of Prime Minister Shri Narendra Modi Ji's Garib Kalyan Kisan Sammelan, his discussion with various sections of beneficiaries, farmers and farm women and his address to the nation from Shimla was telecasted to all the participants and the gist of the same was translated and conveyed to the participants in Tamil. Later, the Union Minister distributed the benefits to the coastal fisherwomen, which they earned through adopting CIBA technologies. The Programme was organized in convergence with Chennai Petroleum Corporation Chennai, Indian Oil Corporation and Bharat Petroleum Corporation Chennai. Dr. M. Kumaran, Principal Scientist, Social Sciences Division, ICAR-CIBA coordinated the programme.

भा कृ अनु प- केन्द्रीय खारा जलजीव पालन अनुसंधान संस्थान, चेन्नई में संसदीय राजभाषा समिति का निरीक्षण दिनांक 18.05.2022

आज दिनांक 18.05.2022 चेन्नई में संसदीय राजभाषा समिति ने भा कृ अनु प– केन्द्रीय खारा जलजीव पालन अनुसंधान संस्थान के साथ निरीक्षण बैठक की | इस दौरान समिति ने परिषद और संस्थान के वरिष्ठ अधिकारियों की उपस्थिति में हो रहे राजभाषा हिंदी के कार्यों का अवलोकन किया | दूसरी उपसमिति के बैठक में माननीय संयोजक प्रो. रीता बहुगुणा जोशी, माननीय सांसद रंजन बेन भट्ट एवम् समिति के पदाधिकारी उपस्थित थे | संस्थान के राजभाषा सम्बंधी क्रियाकलाप पर समिति ने संतोष जताया तथा आगामी समय में अधिकाधिक सरकारी काम राजभाषा में करने हेतु निर्देश दिये | नियमित कार्यशाला के आयोजन पर माननीय सदस्य ने कहा कि संस्थान के सभी अधिकारी एवम कर्मचारी को कार्यशाला में नियमित रूप से उपस्थिति सुनिश्चित करे ताकि राजभाषा का प्रयोग अच्छे तरीके से हो सके | निरीक्षण के दौरान संस्थान के निदेशक (कार्यकारी) डा. के. पी. जितेंद्रन, डा. प्रवीण पुत्र (सहायक महानिदेशक, समुद्र मात्स्यिकी), श्रीमती सीमा चोपड़ा, निदेशक (राजभाषा) एवम संस्थान के वरिष्ठ अधिकारियों भी उपस्थिति थे |

27th Research Advisory Committee (RAC) meeting of ICAR-CIBA

The 27th Research Advisory Committee (RAC) meeting of ICAR-CIBA was conducted during 29-30th March 2022 at the headquarters in Chennai. The Chairman of the RAC committee, Prof. Madhusoodana Kurup, Former Vice Chancellor of Kerala University of Fisheries and Ocean Studies (KUFOS) and members Dr. M. Vijayakumaran, Retired Principal Scientist of ICAR-CMFRI, Dr. Lalit C. Garg, Retired Scientist of National Institute of Immunology (NII), Shri. S. Santhana Krishnan, CEO, Maritech Pvt. Ltd., Chennai and Dr. Pravin Puthra, Assistant Director General (Marine Fisheries), ICAR participated in the two days deliberations. Dr. K.P. Jithendran, Director, ICAR-CIBA welcomed the delegates and briefly presented research programmes being carried out at the institute along with major achievements during 2021-22. Subsequently, all the division and section heads of the institute presented in detail the research achievements for the past one year and the same were discussed in length by the committee and valuable suggestions were offered for improvement. Earlier, the Chairman, RAC also visited the infrastructure facilities at Muttukadu Experimental Station and the upcoming Kovalam Experimental Station of ICAR-CIBA and interacted with the scientists. The Chairman and the members highly appreciated the significant research contribution of CIBA scientists and wished the same tempo to be maintained for the sustainable development of brackishwater aquaculture sector and also suggested to include a road map for future research with an emphasis on domestication of potential shrimp and finfish species, genomic studies on other important finfish species, preventive mechanisms for major diseases, studies on nutri-genomics, revisiting brackishwater aquaculture ecosystem vis-à-vis fish growth and feeding habits, expansion of research findings through Public-Private Partnership mode and providing need based skill development programmes etc.

Focus group discussion with insurance sector on re-introduction of shrimp crop insurance in India

ICAR-CIBA has been working with National Fisheries Development Board, national and international insurance broking companies and public and private insurance companies for the past decade for reintroduction of crop insurance for shrimp aquaculture. On 23rd March 2022, a focus group discussion was arranged by ICAR-CIBA with selected senior officials from Oriental Insurance and Alliance Insurance brokers for an intense focus group discussion for facilitating re-introduction of shrimp crop insurance in India. Dr. K.P. Jithendran, Director ICAR-CIBA inaugurated the programme and stressed upon the importance and need to have shrimp crop insurance. Disease risks can wipe out the working capital of small farmers in one crop loss of five successive good crops. Hence the insurance companies' role is very important to ensure economic sustainability. Dr. T. Ravisankar, Principal Scientist, SSD presented landscape of risks of shrimp aquaculture and suggested crop insurance policy could be restricted to 60 days and natural calamity cover for full crop of four months to make the product to be workable proposition for insurance companies as well as for the farmers. Dr. M. Muralidhar, Principal & SIC, Environmental group, gave a presentation of last 20 years of climate risks faced by the farmers and Dr. M. Kumaran demonstrated 'CIBA Vanami app' and 'Shrimp krishi app' and stated possible use of these apps for use by insurance companies to monitor the progress of farming under proper scientific management in the client farms. Later Ms. Shelly Dheer, Deputy General Manager and Mr. Safia Patel, Chief Regional Manager from Oriental Insurance and Mr. A. Srinivasan, Vice President, Mr. K.V. Pathasarathy, Chief Manager and Mr. Kuldeep Bhadekar, Asst. Vice President (Agricultural Insurance) discussed in detail with CIBA Scientists on various technical and insurance aspects in shrimp farming.

Interaction meeting with tribal farmers of Singod-Halpati Samaj Matsya Udhyog Juth

NGRC of ICAR-CIBA conducted an interaction meeting with tribal families on "Aquaculture and allied activities for livelihood development of tribal communities" at Singod village in Navsari, Gujarat, on 19th April 2022. The tribal village has been adopted by NGRC of CIBA for demonstration of pond-based cage culture and allied activities under the scheduled tribe component. Dr. K.P. Jithendran, Director, ICAR-CIBA inaugurated the meeting and interacted with the members of the Singod-Halpati Samaj Matsya Udhyog Juth (Tribal SHG). He explained the benefits of integrated fish cum crop farming models that yield continuous revenue and livelihood to the farmers and congratulated the members of the SHG for their earnest efforts in reaping the benefits of aquaculture. He handed over a cheque for ₹ 7.83 lakhs, the revenue generated by the SHG through sale of fish and other farm produce. CIBA technology booklets in Gujarati and English languages on region specific brackishwater farming and livelihood technologies were also released during the occasion.

Training programme on “Shrimp pond water and soil analytical techniques and interpretation of results”

ICAR-CIBA organized a customised three-day training programme on "Pond water and soil analytical techniques and result interpretation" during 15th -17th June 2022 at the ICAR-CIBA, Chennai. The training was attended by about 21 farmers, students, researchers, industry personnel and field technicians. Participants gained hands-on experience in analysing physicochemical and microbial parameters in water and soil and learned how to interpret analysis results in terms of soil and water quality requirements, management, and microbial amendments for a healthier environment and animals.

Training-cum-workshop on biofloc based high density nursery and grow-out farming of shrimp/fish for eco based aquaculture

ICAR-CIBA conducted a customised training-cum-workshop on “Biofloc based high density nursery and grow-out farming of shrimp/fish for eco based aquaculture” for the SC/ST farmer groups from Kovalam, Kottaikadu, Koovathur, Thiruvidanthai villages in Chengalpattu and Villupuram districts of Tamil Nadu at Kovalam Experimental Station (KES), ICAR-CIBA on 14th June 2022. About 70 beneficiaries were trained under the schedule caste sub plan (SCSP) scheme to develop the skills on shrimp nursery/grow-out rearing technology developed by ICAR-CIBA. The trainees were given hands-on training in preparation and maintenance of biofloc, water quality analysis, seed stocking and sampling. Trainees were exposed with use of check tray, acclimatization and stocking of seeds, feeding and measurement of biofloc with the help of Imhoff cone, biofloc based microbial consortium, “CIBAFLOC” developed by CIBA for floc generation and water quality management in the biofloc shrimp/fish multi-phased nursery cum grow-out systems. The practical classes were co-ordinated by Dr. A. Panigrahi at the newly inaugurated biofloc facility of ICAR-CIBA at KES.

Training programme on RNAseq data analysis

ICAR-CIBA organized a 'Hands-on training programme on RNAseq data analyses' during 8th -10th June 2022. The training programme was attended by 25 participants (including research scholars, scientists, and assistant professors) from various institutes/universities. The trainees were given access to a Linux server, where they learned by doing each analysis on their own. The topics were covered during the training includes introduction to the Linux environment and R-stats, downloading RNA-seq datasets from GenBank and performing quality trimming, generation of denovo transcriptome assembly and discovery of unigenes, genome-guided analyses with RNAseq data to establish differentially expressed transcripts and gene annotation.

Skill-cum-entrepreneurship development training on "Aqua feed preparation techniques and quality control"

ICAR-CIBA, Chennai, hosted a hands-on skill development training on 'Aqua feed preparation techniques and quality control' during 25th - 27th May 2022. The purpose of this training was to provide skill development in indigenous aqua feed formulation, feed processing with an extruder and pelletizer, and feed management for sustainable brackishwater aquaculture. Twenty-six participants from nine Indian states with diverse professional backgrounds, including farm managers, potential entrepreneurs, farm owners, feed mill technicians, academicians and aqua input suppliers attended the programme. Participants received hands-on training in feed formulation and manufacturing using a cutting-edge feed mill and analytical facilities. Trainees learned the fundamentals of aqua nutrition, feed formulations and feed management in shrimps, crabs and fishes.

Internship training to the students of College of Fisheries Science, Birsa Agriculture University (BAU), Gumla, Jharkhand

Twenty five B.F.Sc., students from College of Fisheries Science, Birsa Agriculture University (BAU), Gumla, Jharkhand attended the exposure cum training programme on brackishwater aquaculture at Kakdwip Research Centre of ICAR CIBA from 16th - 25th May 2022. Students were exposed to the entire brackishwater farm and hatchery facilities at the campus. The students underwent practical cum theory sessions on principles of aquaculture, reproductive endocrinology, seed production, larval rearing and farming, live feed collection, enumeration, water quality parameters estimation and fish anatomy. Student trainees were also exposed to different laboratory techniques.

Hands on training on "Shrimp and mud crab aquaculture: A practical exposure"

ICAR-CIBA, Chennai held a five-day hands-on training on "Shrimp and mud crab aquaculture: A practical exposure" from 21st to 25th of May 2022, to educate farmers and new entrant farmers on current developments in shrimp and crab aquaculture that may enhance their skill-sets to adopt sustainable methods and to achieve higher productivity. The training programme was attended by 19 trainees from different states. Dr. K. P Jithendran, Director, ICAR-CIBA, inaugurated the training programme. The sessions on shrimp farming covered in detail the pre and post-stocking management, feeding, water quality control, and other fundamentals of shrimp aquaculture. The basic concepts of crab farming, including moulting, crab fattening, crab farming, box and vertical crab farming systems, crab grading, etc., were also covered. Dr. V. Kripa, Member Secretary, CAA, Chennai, gave a special talk on the CAA regulations in the shrimp farming industry. The training session also included field visit to the shrimp farming and crab box-farming sites at Paiyanur and Kalpakkam and a crab export facility and vertical crab farming site of AQAI CRABS, Sadras, Kalpakkam, Tamil Nadu.

Hands on training on 'Biofloc production technology for aquaculture'

Shrimp farming and shrimp nurseries based on biofloc technology are growing in popularity among farmers since it is regarded as a sustainable intensification of the shrimp farming model that incorporates biosecurity controls. A five-day hands-on training on "Biofloc production technology for aquaculture" was held by the ICAR-CIBA, Chennai, from 17th to 21st May 2022. The current training programme was designed to address the problems raised by farmers who have implemented biofloc technology and to give participants an understanding of the fundamentals of biofloc farming. The workshop was attended by thirteen trainees, including progressive farmers and aspiring aquapreneurs. Dr. K.P. Jithendran, Director, ICAR-CIBA, inaugurated the training programme and Dr. Pravin Putra, Assistant Director General (Marine Fisheries), ICAR graced the occasion. The practical classes were organized at the newly inaugurated biofloc facility of ICAR-CIBA at Kovalam Experimental Station (KES) of the institute.

Training programme on brackishwater cage farming

Navsari-Gujarat Research Centre (NGRC) of ICRA-CIBA conducted a training programme on brackishwater cage culture at Navsari, Gujarat in collaboration with the Department of Fisheries, Govt. of Gujarat from 22nd - 24th March 2022. The National Fisheries Development Board (NFDB) sponsored training programme was aimed to impart technical know-how on brackishwater low-volume cage culture to farmers and entrepreneurs of Navsari, Surat, and Valsad districts of Gujarat. About 50 participants were trained in species and site selection, seed quality assessment, construction of cages, feeding, grow-out and health management.

Training Programme on "Disease management of brackishwater aquaculture"

A hands-on training programme on "Disease management of brackishwater aquaculture" was conducted by Kakdwip Research Centre of ICAR-CIBA, Kakdwip, West Bengal, during 21st -26th March 2022. The training programme was specially planned to increase awareness among local brackishwater farmers on diseases of brackishwater aquaculture systems and their proper management. The training programme was attended by 26 trainees, which included brackishwater farmers and students.

Training programme on "Recent advances in hatchery seed production and farming of milkfish and grey mullet"

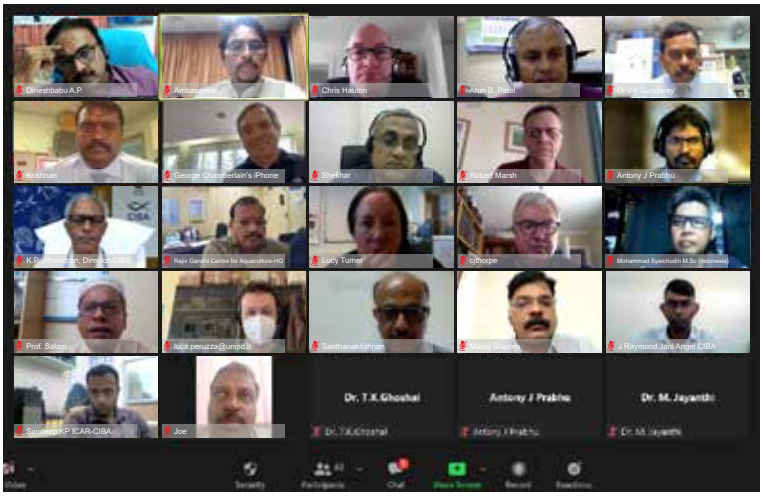
The five-day training programme on 'Recent advances in hatchery seed production and farming of milkfish and grey mullet' was organised by the ICAR-CIBA, Chennai, during 3rd -7th January 2022. The programme was organised as hands-on training for the eight officials from six districts of the Department of Fisheries, Govt. of Kerala. Artificial propagation for seed production of milkfish and grey mullet, including broodstock development, assessment of the maturity, hormone pellet preparation, implantation, spawning, fish tagging, larval rearing, live feed culture, nursery rearing, grow-out culture, development of formulated feed, health management and water quality management were covered. The training programme would help to establish a multispecies hatchery in Kerala for year-round brackishwater fish seed production.

Webinars

An online lecture series on 'Aquaculture without borders'-A joint initiative of ICAR-CIBA and SCAFi

ICAR-CIBA through its professional societal forum the Society of Coastal Aquaculture and Fisheries (SCAFi) Chennai initiated an 'Online lecture series' under the banner: "Aquaculture without borders" to be presented by the global fisheries/aquaculture experts. Dr. K.P. Jithendran, Director, ICAR-CIBA and President SCAFi formally inaugurated the dialogue series, highlighting the usefulness of this initiative to young scientists and research scholars. On 22nd June 2022, Dr. Edgar C. Amar, Head, Training and Information Division of South East Asian Fisheries Development Center-Aquaculture Department (SEAFDEC-AQD), Iloilo, Philippines presented the first lecture in the series on "Aquaculture in Philippines". About 100 participants inclusive of scientists and research scholars participated in the programme in the CIBA Auditorium.

Virtual workshop on 'Diversifying crustacean culture – developing future climate resilience'



A two-day virtual workshop was conducted by ICAR-CIBA on 'Diversifying crustacean culture: developing future climate resilience' in collaboration with the University of Southampton, UK, and The Pirbright Institute, UK, on 22nd & 23rd March 2022 as part of the international collaborative project, 'Diversification of potential crop species in brackishwater aquaculture, adaptation for climate resilience' funded by Natural Environment Research Council, UK. The two days scientific deliberations consisted of presentations and panel discussions from international and national stakeholders, including Global Seafood Alliance, USA; University of Southampton, UK; Bay of Bengal Programme Inter-Governmental Organisation, India; Institute of Marine Research, Bergen, Norway; fisheries research institutes under ICAR; Bangladesh Agricultural University; Gujarat Aqua Feed Dealers Association; representatives from Saudi Arabia and Indonesia. The panel discussion included The impact of climate change and its current relevance to crustacean farming in India and wider Asia; Indian climate variability, extremes and trends over 1950-2050 in a high-fidelity climate model; Simulation models to analyze and predict the extreme climatic events in India; Species envelopes: temperature and salinity tolerance windows of aquaculture relevant crustaceans; Salinity and temperature tolerance of Penaeid shrimps; Preliminary findings based on the lab and field data; and Application of genomics in climate resilience with special reference to *P. indicus* genome. The workshop was concluded with recommendations of the urgent necessity to diversify the shrimp species and emphasized that the climate-resilient shrimp farming should be adapted based on the holistic study of various factors like salinity, temperature, carrying capacity, quality of feed, age at maturity, marketability of species etc.

Awareness programme on "Efficient and balanced use of fertilisers"

The ICAR-CIBA, in association with Krishi Vigyan Kendra (KVK), Kattupakkam, Kancheepuram District, Tamil Nadu, organised an awareness programme on the "Efficient and balanced use of fertilisers (including Nano-Fertilizers)" on 21st June 2022 at the KVK campus. About 203 participants, mostly farmers from Kancheepuram District, Subject Matter Specialists (SMS) of different disciplines and other staff of KVK attended the programme. In his introductory speech, Dr. M. Siddharth, Professor & Programme Coordinator, KVK, highlighted the judicious use of fertilisers in crops. Dr. R. Saraswathy, Principal Scientist, Environment Section, ICAR-CIBA, emphasised that improper use of fertilisers can be expensive and also harm the environment. Therefore, the application of fertilisers should be based on a-prior soil testing and the correct dose at the right time to avoid adverse environmental effects. Dr. S. Gangadharan, SMS, KVK, highlighted the importance of nano-fertilisers in improved nutrient availability and plant uptake. In the interaction session, the farmers shared their views and doubts, which the professionals from KVK and ICAR-CIBA clarified. Dr. P.K. Patil, Principal Scientist, Aquatic Animal Health Division, coordinated the programme.

Awareness programme on protection of plant varieties / fish species at Krishi Vigyan Kendra, Kancheepuram, Tamil Nadu

ICAR-Central Institute of Brackishwater Aquaculture in association with Krishi Vigyan Kendra (KVK), Kancheepuram, Tamil Nadu organized an awareness programme on Protection of Plant Varieties/Fish species and Farmer's Rights on 21st June 2022 at the KVK campus. About 203 participants, mostly farmers from Kancheepuram district, Subject Matter Specialist (SMS) of different disciplines and other staff of KVK attended the programme. Dr. M. Siddharth, Professor and Head, KVK in his introductory speech emphasized that protection of plant varieties/fish species and Farmer's Rights Act enabled an effective system for protection of plant varieties, the rights of farmers and plant breeders. Dr. C.V. Sairam, Principal Scientist & SIC, Social Science Division CIBA, presided over the meeting and highlighted the rights of farmers arising from their contribution in conserving, improving and making available the plant genetic resources to develop new varieties.

Dr. S. Kannappan, Principal Scientist, Crustacean Culture Division and Dr. R. Jayakumar, Principal Scientist, Fish Culture Division highlighted the opportunities exist in sustainable aquaculture practices and diversification in brackishwater aquaculture respectively. An interaction session was conducted wherein the farmers shared their views and clarifications were given to their queries by the technical experts of KVK and ICAR-CIBA. The event was organized by the Institute Technology Management Unit (ITMU) of ICAR-CIBA. Dr. P.K. Patil, Principal Scientist & Officer in-Charge, ITMU proposed vote of thanks.

Celebration of World Environment Day under the theme '*Only One Earth*'.

On 4th June 2022, the ICAR-Central Institute of Brackishwater Aquaculture in Chennai observed World Environment Day under the theme "Only One Earth." The Chief Guest, Dr. P. Krishnan, Director, Bay of Bengal Programme - Inter Governmental Organization (BOBP-IGO), delivered a speech on 'Marking environment day: few thoughts for collective but differential action,' highlighting that India is on track to become the world's second largest economy by 2050 and emphasising the importance of scientific support to keep the environment safe. ICAR-CIBA also held quiz and extempore competitions on 1st June 2022, to raise awareness about environmental protection and conservation. The programme drew a large number of students from the city's various colleges and research institutes.

International Women's Day

International Women's Day (IWD) is celebrated every year on 8th March globally to commemorate the achievements of women. The 2022 UN theme for International Women's day is "Gender equality today for a sustainable tomorrow," which acknowledges women's contribution in various aspects of life raises awareness against bias and encourages others to advocate for gender equality. To mark the occasion, ICAR-CIBA organized varied programmes like a free medical camp, donations for cancer patients through Cancer Institute (WIA), Chennai, a special invited talk by medical professionals, and many competitive events for institute staff. On 5th March 2022 a free dental treatment camp was organized at Government Scheduled Caste Welfare Primary School, Kottaikadu, for the benefit of the villagers at Kottaikadu, Chengalpattu district of Tamil Nadu. A medical team from Ragas Dental College and Hospital, Chennai, examined about 68 patients including fisherwomen, men, and primary school children and provided them with dental check-ups and treatment.

National Science Day

ICAR-Central Institute of Brackishwater Aquaculture, Chennai, organised a special lecture on water quality in aquaculture as part of the National Science Day celebrations on 28th February 2022. A batch of forty-five post-graduate students and staff from Women Christian College, Chennai, enthusiastically participated in the programme. To inculcate the concept of a green environment and healthier ecosystem among the students, the visitors were asked to plant trees in the Muttukadu Experimental Station campus of CIBA.

73rd Republic Day celebrations

ICAR-Central Institute of Brackishwater Aquaculture, Chennai celebrated the 73rd Republic Day on 26th January 2022. At CIBA headquarters, Dr. K.P. Jithendran, Director, unfurled the national flag and addressed the staff on the importance of freedom and responsibilities. During the event, he specially mentioned and congratulated Dr. S. Ayyappan, former Secretary, DARE & Director General, ICAR, and Dr. M.L. Madan, former Deputy Director General (Animal Sciences), ICAR, for being conferred upon the prestigious Civilian Awards, Padma Shri by Govt. of India and emphasized that the present time is challenging for the research sector due to the COVID-19 pandemic and all have to work hard to keep up the momentum of CIBA's success in the brackishwater aquaculture sector in the days to come. The republic day was also celebrated at the regional centres, Kakdwip Research Centre, Kakdwip (West Bengal),

Navsari-Gujarat Research Centre (NGRC), Navsari (Gujarat), and Muttukadu Experimental Station, Muttukadu (Tamil Nadu). KRC unit of CIBA recreation club organized its 2nd Annual sports meet involving all the staff and their family members on this occasion.

The National Girl Child Day

National Girl Child Day (Rashtriya Balika Diwas) is observed on 24th January every year to create awareness about the rights of the girl child and the importance of female education, health, and nutrition. The Day is celebrated with appropriate themes aimed at empowering the girl child in diverse walks of life every year. ICAR-Central Institute of Brackishwater Aquaculture, Chennai, has celebrated National Girl Child Day 2022, as a part of Azadi Ka Amrut Mahotsav 2021-22, by organizing a *"Selfie with Daughter"* competition in virtual/online mode among the staff and students as per the guidelines issued by the Ministry of Women and Child Development, Govt. of India. The certificates and prizes were distributed to the winners and participants during the Republic day celebrations of ICAR-CIBA.

Participation in Exhibitions

TechBharat-2022 Exhbition at CFTRI Mysuru, Karnataka

ICAR- CIBA participated in the exhibition event of the third edition of "TechBharat-2022" held at CSIR-Central Food Technology Research Institute, Mysore, from 19th - 21st May 2022. Shri. Kailash Choudhary, Hon'ble Union Minister for Agriculture and Farmers' Welfare, inaugurated the event in the presence of Dr. Sridevi Annapurna Singh, Director of CSIR-CFTRI, Dr. Madhaiyaan Angamuthu, Chairman of Agricultural and Processed Food Products Export Development Authority (APEDA), Shri B.C. Patil, Hon'ble Agriculture Minister, Government of Karnataka, Shri. Kris Gopalakrishnan, Former CEO of Infosys and current chairman of Axilor Ventures and Shri. Sachin B. Sabnis, Chairman of Lagu Udyog Bharati, Karnataka. Hon'ble Union Minister of State for Agriculture and Farmers' Welfare stressed the need for innovations and technologies in the agriculture and food sector to enhance the farmer's income. Smt. Shobha Karandlaje, Hon'ble Union Minister of State for Agriculture and Farmers' Welfare, visited the ICAR-CIBA stall during the visit to Agritech and Foodtech expo. The successful technologies of shellfish and finfishes were exhibited and displayed in CIBA's stall. More than 6,000 participants visited the exhibition, and interested persons were provided with literature on successful technologies in brackishwater aquaculture farming.

Exposure Visits

Students from various collages and universities visited ICAR-CIBA and its research units as a part of their exposure cum awareness field visits. The scientists and technical staff explained the research and development activities undertaken by the ICAR-CIBA for the development of brackishwater aquaculture sector.

College	Number of students	Date of visit
Dr. MGR Fisheries College and Research Institute, Thalainayeru	31	1st March 2022
Government Science College, Fort-Sonagadh, Tapi district, Gujarat	35	8th March 2022
SRM Arts and Science College, Kattankulathur	50	21st March 2022
Prathyusha Engineering College, Thiruvallur	26	29th March 2022
Loyola College, Chennai	17	29th March 2022
Microbiology Department, Shri Sankara Arts and Science College, Kanchipuram	72	12th April 2022
College of Horticulture, Bidar, Karnataka	65	20th April 2022
Department of Zoology, Bharathiyar University, Coimbatore,	15	28th April 2022
Vel Tech High Tech Dr. Rangarajan Dr. Sakunthala Engineering College	40	13th May 2022
College of Fisheries, Guru Angad Dev Veterinary and Animal Sciences University, Punjab	19	17th May 2022
Department of Biotechnology, Jeppiaar Engineering College, Chennai	35	25th May 2022
College of Horticulture, Munirabad, University of Horticultural Sciences, Karnataka	65	27th May 2022
Mazharululoom College, Ambur, Thirupattur district, Tamil Nadu	50	27th May 2022

Outreach activities

Two-tier aquaculture system- A livelihood improvement venture

ICAR-CIBA Kakdwip Research Centre (KRC) started a brackishwater aquaculture programme as part of the SCSP to improve beneficiaries' alternate means of subsistence. The farm inputs such as seed, feed and a net cage were supplied to selected groups in the village of Buddhapur (South 24 Parganas district, West Bengal). They were trained for seed production, brackishwater fish farming and cage construction. They were taught pond preparation, seed acclimation, fish sampling and other skills through capacity-building programmes. Two-tier fish farming of brackishwater fish (Tilapia and Nona Tengra, *Mystus gulio*) in selected household backyard ponds was demonstrated as a viable livelihood option. Tilapia was stocked in the backyard pond and *M. gulio* was farmed in cages (3 x 2 x 1 meter) of ten household ponds in this innovative fish farming model (area: 250 m^2). At the end of six months, each family had harvested 30 kg of tilapia and 4 kg of *M. gulio*, resulting in revenue of ₹ 6,100. Aside from the two-tier farming demonstration, the group was also exposed to brackishwater ornamental fish breeding and seed production (Orange chromide and Pearl spot and *M. gulio*). The KRC of CIBA hosted a harvest mela on 3rd June 2022 to commemorate the successful completion of farming.

Harvest from three-in-one system of fish polyculture for doubling tribal farmers' income and livelihood security

The ICAR-CIBA demonstrated a three-in-one polyculture of fishes using different installations in the same farm environment. For this, ornamental fishes in happas, mud crab in submerged boxes, and Asian seabass were reared on the farm for 100 – 120 days. The initiative's objective was to double the income of tribal families under the Scheduled Tribe Component (STC) implemented in November 2021 at CIBA's Kovalam Experimental Station (KES), Kelambakkam. Four tribal families in the Kanchipuram district of Tamil Nadu were identified and trained on the system mentioned above and aquaculture practices. CIBA has established marketing relationships with ornamental vendors and live fish wholesalers to market the produce. The tribal families generated an income of ₹ 77,775 in 120 days using this model. A field-level interaction with tribal families was conducted as part of the final harvest on 3rd June 2022 at KES of CIBA. The revenues from this polyculture model were distributed to tribal beneficiaries.

Nursery rearing of Asian seabass fingerlings by Fisherwomen SHGs-A success Story

Asian seabass (*Lates calcarifer)* is an economically important food fish in India reared in brackishwater ponds and cages. Generally, the farmers prefer to stock the fingerlings of seabass above 10 cm in size to minimize cannibalism and better survival. However, the availability of these stockable fingerlings is a constraint for expanding its farming. Many nursery rearing operators rear seabass fingerlings in the conventional earthen ponds by feeding with low-value fishes and shrimps, which is an unsustainable activity and having the risk of carrying infectious pathogens. Hence, the Fish Culture Division (FCD), ICAR-CIBA developed an improved scientific rearing method for seabass fingerlings in a backwater-based nursery rearing with formulated feed. This method has been promoted under the Scheduled Caste Sub Plan (SCSP) scheme of ICAR-CIBA to create additional livelihood revenues for the rural coastal fisherwomen. Three fisherwomen groups, each consisting of 12 members from Kottaikadu village, Cheyyur Taluk, Chengalpattu District, Tamil Nadu, were trained at FCD hatchery, Mutukkadu Experimental Station, ICAR-CIBA. In the backwaters of Kottaikadu village, a crab fencing of 30 meter width and 60 meter length (mesh size 25 mm) was installed by involving fisherwomen Self Help Groups (SHGs). Happas of 2 meter x 1.5 meter x 1 meter (l x h x w) were installed inside the crab fencing, and 12,000 nos of seabass fingerlings of 3.0 – 4.0 cm length and 1.20 – 1.50 g weight were stocked @ 300 nos/happa. The fishes were fed *ad libitum* twice/thrice a day with formulated nursery rearing feeds containing crude protein 45% and crude fat 10%. Grading was carried out weekly, and after 48 days of rearing, the fishes attained a marketable size of 10.52 cm in length and 13.50 g in weight. FCD of ICAR – CIBA extended technical support for site selection, installation of crab fencing and happas; transportation, acclimatization, and stocking of fish fingerlings; onsite training on grading and feeding; health management and marketing. The survival rate of fish fingerlings was 93.30%, and part of these grown seabass fingerlings was used for cage farming by the same SHGs. The remaining 10,500 numbers of seabass fingerlings were sold to farmers and other SHGs, and revenue of ₹ 4,20,000 was generated. Dr. L. Murugan, Hon'ble Union Minister of State for Fisheries, Animal Husbandry and Dairying and Information and Broadcasting, Government of India, distributed the revenue generated by the SHGs during the Garib Kalyan Sammelan held at ICAR- CIBA, Chennai, on 31st May 2022. Fisherwomen SHGs thanked ICAR-CIBA for showing them new and additional livelihood activities.

Personnel

Promotions

Dr. Vinaya Kumar Katneni
Senior Scientist
Animal Genetics & Breeding
Effective date of Promotion :
12.06.2019

Dr. R. Ananda Raja
Senior Scientist
(Veterinary Pathology)
Effective date of Promotion :
08.01.2020

Dr. (Mrs.) Krishna Sukumaran
Senior Scientist
(Aquaculture)
Effective date of Promotion :
07.01.2020

Dr. (Mrs.) Ezhil Praveena
Senior Scientist
(Veterinary Pathology)
Effective date of Promotion :
07.01.2020

Dr. B. Sivamani
Senior Scientist
Animal Genetics & Breeding
Effective date of Promotion :
07.01.2020

Dr. Sujeet Kumar
Senior Scientist
(Veterinary Microbiology)
Effective date of Promotion :
07.01.2021

Dr. (Mrs.) Shyne Anand
Senior Scientist
(Aquaculture)
Effective date of Promotion :
07.01.2021

Dr. Prem Kumar
Senior Scientist
(Aquaculture)
Effective date of Promotion :
10.02.2021

Mrs. N. Lalitha
Scientist
(Veterinary Microbiology)
Effective date of Promotion :
07.01.2021

Dr. (Mrs.) T. Bhuvaneswari
Senior Scientist
(Veterinary Microbiology)
Effective date of Promotion :
10.02.2020

Dr. N.S. Sudheer
Scientist
(Fish Health)
Effective date of Promotion :
01.01.2021

Shri. Jose Antony
Scientist
(Aquaculture)
Effective date of Promotion :
01.01.2021

Shri. Tanveer Hussain
Scientist
(Aquaculture)
Effective date of Promotion :
01.01.2021

Shri. Pankaj Amrut Patil
Scientist
(Aquaculture)
Effective date of Promotion :
01.01.2021

Shri. Dani Thomas
Scientist
(Aquaculture)
Effective date of Promotion :
01.01.2021

Shri. R. Aravind
Scientist
(Fisheries Resource Management)
Effective date of Promotion :
01.01.2021

Shri. I. F. Biju
Scientist
(Aquaculture)
Effective date of Promotion :
01.01.2021

Mrs. Misha Soman
Scientist
(Aquaculture)
Effective date of Promotion :
01.01.2021

Mrs. Leesa Priyadarshini
Scientist
(Fish Health)
Effective date of Promotion :
01.01.2021

Superannuation

Shri. V.M. Dhanapal
Skilled Support Staff
Nutrition Genetics and Biotechnology Division
Date of retirement: 31.03.2022

New Appointments

Shri. Navin Kumar Jha
Chief Administrative Officer
Date of joining : 28.03.2022

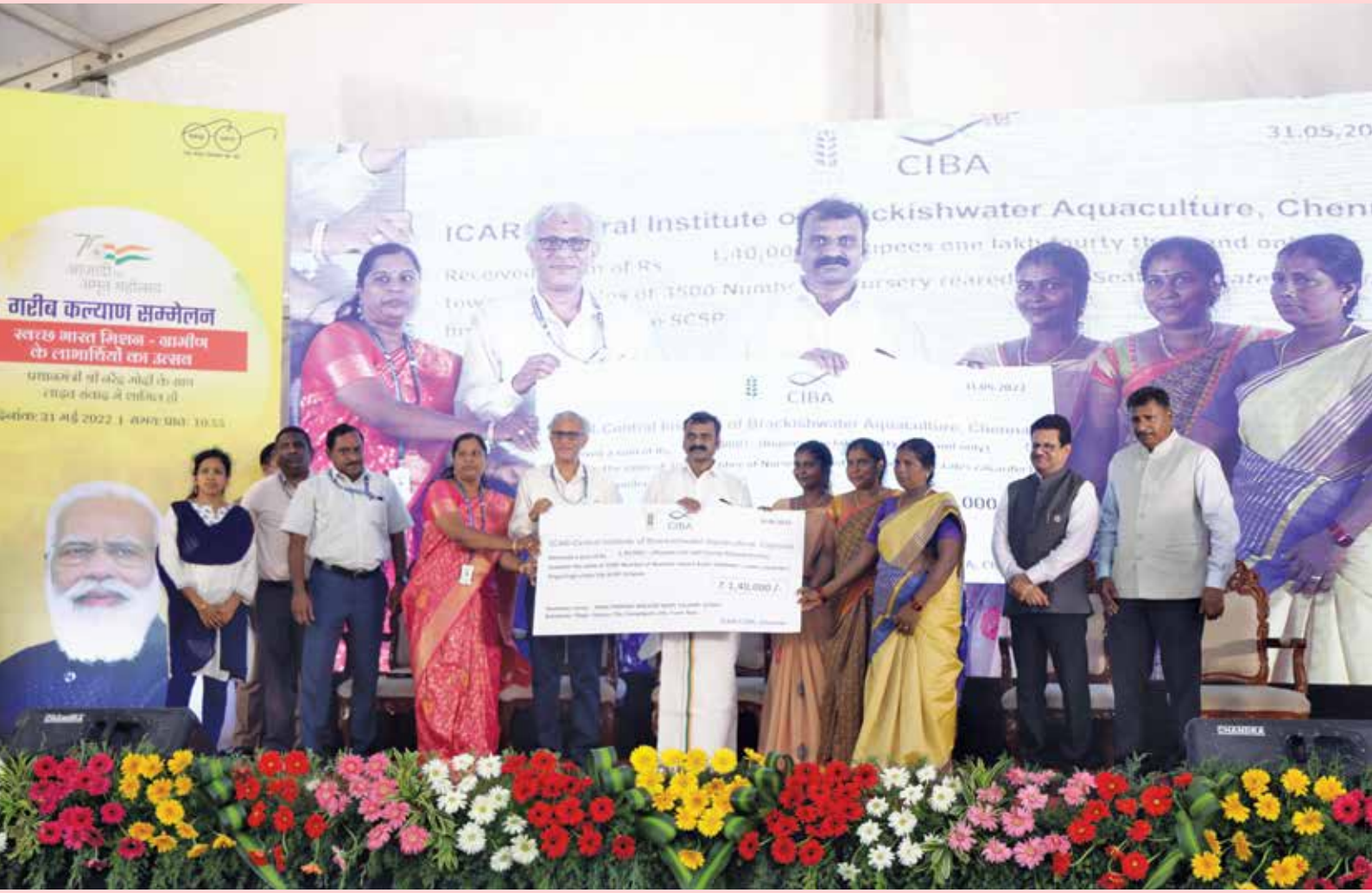
Ph.D. awarded

Dr. P. Saravanan
Thesis Title: Sparing effect of defense genes in *Penaeus monodon* with respect to White Spot Virus (WSSV) infection.
Supervisor and Guide: Dr. Subhendu Kumar Otta
Date of Award: 10.05.2022

Dr. Arvind Kumar Ray
Thesis Title: Microencapsulation of Vibrio bacterial cell based immunostimulant for improved delivery and enhance efficacy in penaeid shrimp
Supervisor and Guide: Dr. C. Gopal
Date of Award: 08.06.2022

Dr. S. Thirumurthy
Thesis Title: Geospatial multi-criteria analysis for assessing coastal resources vulnerability in northern districts of Tamil Nadu, India
Supervisor and Guide: Dr. M. Jayanthi
Date of Award: 08.06.2022

"Brackishwater aquaculture for food, employment and prosperity"



In the Garib Kalyan Sammelan held at ICAR- CIBA, Chennai, Dr. L. Murugan, Hon'ble Union Minister of State for Fisheries, Animal Husbandry and Dairying and Information and Broadcasting, Government of India, distributed the revenue generated by the Fisherwomen SHGs through the nursery rearing of seabass fingerlings at Kottaikadu village, Chengalpattu district, Tamil Nadu.

ICAR-Central Institute of Brackishwater Aquaculture

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