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CIBANEWS

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ICAR- CENTRAL INSTITUTE OF BRACKISHWATER AQUACULTURE
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CIBANEWS

Published by
Dr. K.P. Jithendran
Director,
ICAR-CIBA, Chennai.

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Design
Dr. J. Raymond Jani Angel
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Aparna Graphic Arts, Chennai

Photography
Mr. Sai Madhusudhanan

Print
Aparna Graphic Arts, Chennai

Cover page
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Lutjanus argentimaculatus

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Lutjanus argentimaculatus

From the DIRECTOR'S DESK | Dr. K.P. Jithendran

I am wishing you a happy new year! May the year 2022 bring you happiness, peace, and prosperity.

While we hope for relief from COVID-19, I like to emphasize that we could accomplish greater progress in 2021 despite the limitations. Though the ongoing pandemic has been highly stressful for the majority, it did not affect much aquaculture production, except a worse hit in the 2020 beginning. Here, we thank the policymakers for exempting all the activities related to fisheries and aquaculture from nationwide lockdown by considering this as essential for the Nation. This decision helped revive the production and allowed us to execute our research activities, and farming demonstrations, wherein the farm activities and logistics of feed and seed were not affected.

In June 2021, while taking over the charge as the Director of this prestigious institute, we tried to draw strength and inspiration from our very supportive and committed staff. As I reflect on this year past, I see that the world over, institutions explored new working conditions and many people adopted completely different ways of living. We embraced the hybrid working environment to ensure the safety of our families, co-workers, and clients. In a way forward, we were able to disseminate our activities in a better way by organizing webinars and training programs online, but these are not without their limitations. As part of the *Azadi ka Amrut Mahotsav* celebrations to commemorate 75 years of our independence, we revived our engagements by organizing webinars, training programs, exhibitions, and farmers' meetings. With the new situation, adopting the ICT technologies, we virtually reached many of our stakeholders and handheld them on technical inputs.

The entire CIBA family is very excited about the honour of Dr. S. Ayyappan, Former Secretary (DARE) & DG (ICAR), with the prestigious Padma Shri award 2022 for his excellence in aquaculture science. I share my happiness in congratulating him for this distinction.

A client (M/s. Dr Attar Aqua Feeds, Haryana) of CIBA who adopted our feed technology was awarded the best entrepreneur of the year 2021 by Fisheries Department, Govt. of Haryana for producing cost-effective, quality shrimp feed in the state. In a major research program, CIBA has sequenced and independently assembled the whole genome of Indian white shrimp, *Penaeus indicus*, being first of its kind in the world. This breakthrough is expected to contribute immensely to future genetic improvement and health management programs. Our scientific team brought out more than 50 peer-reviewed research articles in various international journals in 2021. We are highly motivated by the two recent honors we got; 1. ICAR Best Annual Report Award 2020 under large institute category; 2. Second prize in the Swachhta Pakhwada award 2021 from ICAR.

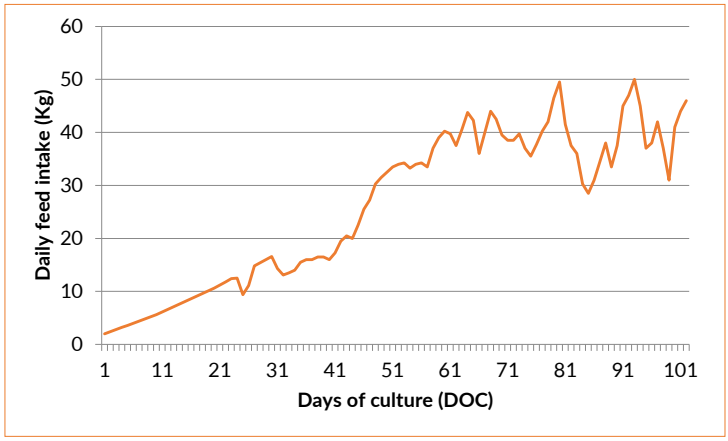
ICAR-CIBA officially attained the 10 ha farmland for research and demonstration of brackishwater aquaculture from the Department of Fisheries, Govt of Gujarat through an MoU signed in the Pre-Vibrant Gujarat Summit in December 2021. Several distinguished officials like Dr J.K. Jena, DDG (Fy), ICAR, Dr J. Balaji, IAS, Joint Secretary, Department of Fisheries, Govt. of India, Dr B.M.K. Reddy, Chairman, Andhra Pradesh State Biodiversity Board, Dr Pravin Puthra, ADG (Marine fisheries), visited CIBA in the recent past and appreciated our research activities and development at the institute.

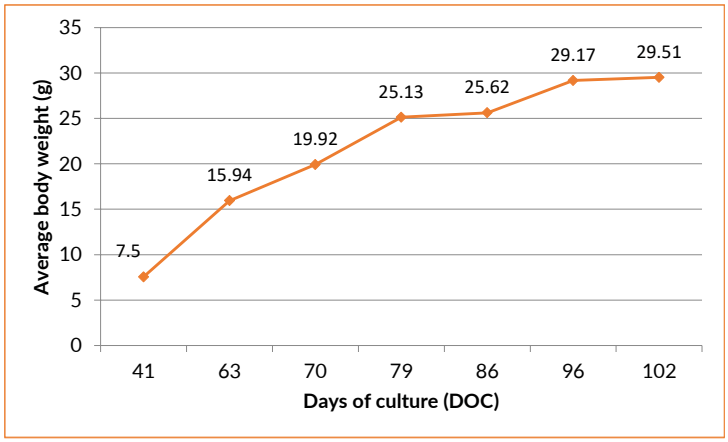
We were honored by the visit of Shri. Bankim Chandra Hazra, Minister of Sundarban Affairs, Govt. West Bengal, who inaugurated the shrimp harvest mela and farmers interaction-meet at Kakdwip Research Center of CIBA. All these achievements were made possible only with the proactive support of my team members.

I thank every member of the CIBA family for their greater contributions. I hope the present edition of the CIBANEWS brings more exciting information to refresh you all about the activities and achievements of ICAR-CIBA in the recent past.

NGRC-CIBA successfully completed a commercial farming demonstration of SPF tiger shrimp *Penaeus monodon* at Navsari, Gujarat

Genetically improved and specific pathogen-free (SPF) stocks of black tiger shrimp, *Penaeus monodon*, were introduced in India during late 2020 by CAA due to growing demand from the farming community for an alternative to the exotic whiteleg shrimp. A commercial farming trial for the newly introduced SPF tiger shrimp was carried out at the experimental station of NGRC-CIBA at Navsari, Gujarat, to evaluate the production parameters and feasibility. A 0.6 ha (6,000 m^2) earthen pond at the experimental station of NGRC was stocked with 90,000 SPF *P. monodon* postlarvae (PL) during August @ 15 nos./m^2. Shrimps were fed using a commercial tiger shrimp diet. The growth rate of the animals was slow until 30 DOC, following which the growth improved. Salinity in the pond was gradually reduced to 11 ppt by 60 DOC due to monsoon and progressively increased to 17 ppt by 95 DOC before harvest. Shrimps attained an average body weight of 7.55 g, 15.94 g and 25.62 g by 41, 63 and 86 DOC, respectively. The culture was harvested by 105 DOC when the ABW reached 29.5 g. At the end of 105 DOC, 1,901 kg of shrimp was harvested with a survival rate of 71.6% and FCR of 1.40. The trial resulted in total production of 3.168 tonnes/ha with a cost of approximately ₹375/kg and net revenue of ₹4.89 lakhs/ha. Overall, the trial generated total revenue of ₹8.96 lakhs. The production characteristics during the trial indicated that SPF tiger shrimp has a high growth rate and adequate survival rate for economically viable farming. However, prospective farmers targeting larger-sized shrimp should ensure sufficient material for sale to export units as the local demand and pricing for tiger shrimp is poor.



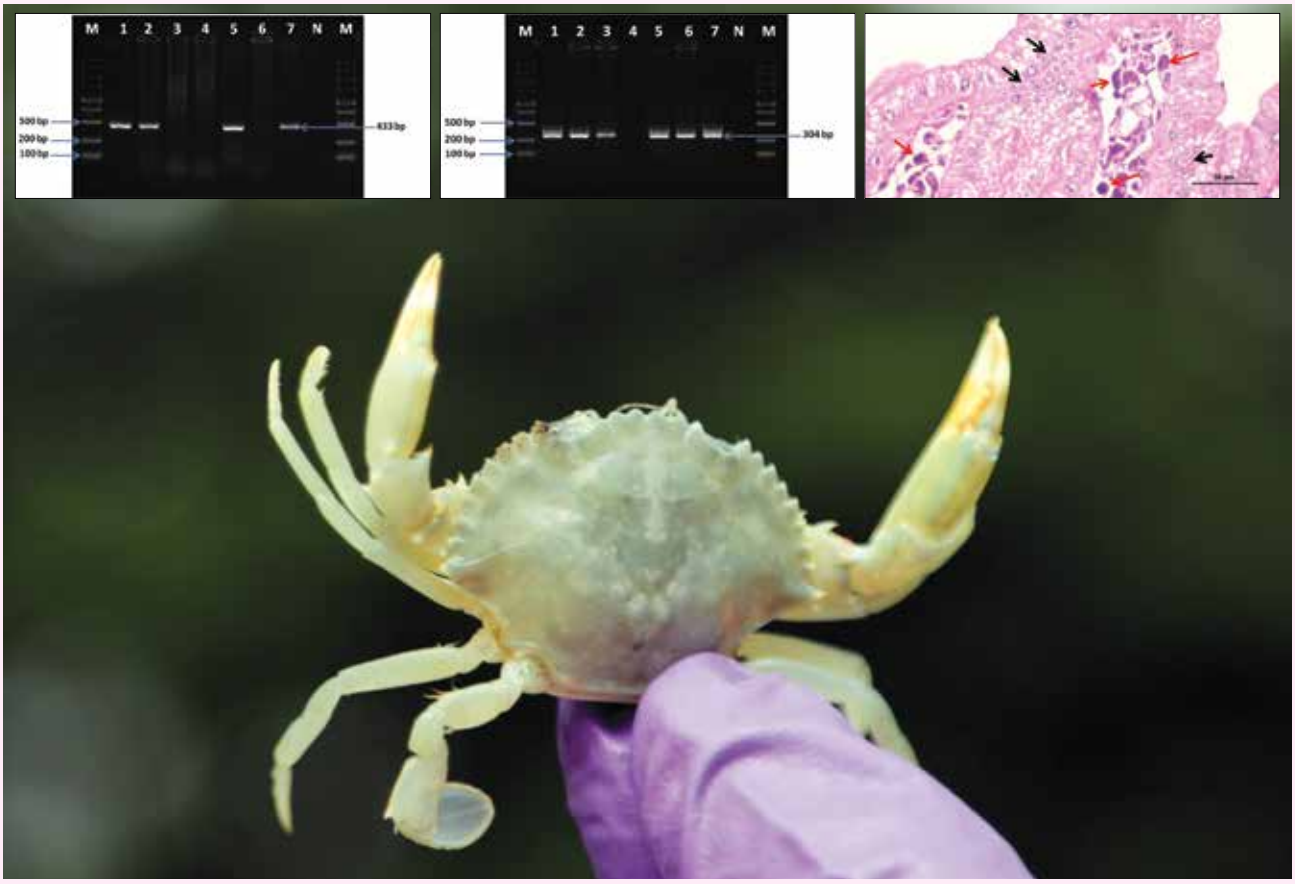


Detection of Mud Crab Reovirus (MCRV) in cage cultured *Scylla serrata* by customized Real Time-PCR

Mud crabs are generally considered hardy animals. Recently, mortalities due to Mud Crab Reovirus (MCRV) in wild and farmed *Scylla* species have been reported from India. A disease condition termed "Sleeping disease (SD)" during 2004 in China caused about 70% mortality in cultured mud crab (*Scylla serrata*) with substantial economic loss. MCRV was isolated first in 2007 and reported as the causative agent of sleeping disease. The clinical signs of MCRV affected mud crabs include weakness, lack of appetite, a grey colouration and no response to external stimuli. Internally diseased crabs display an atrophied hepatopancreas, empty intestines and loose gills.

MCRV was reported in mud crab cultured in Tamil Nadu. The mud crabs weighing about 3-5 g at 30-40 days of culture period experienced 70% mass mortalities within a fortnight. The affected crabs were found sluggish and stopped feeding. MCRV was detected in gills and hepatopancreatic tissues on RT-PCR screening. Further, a nested RT-PCR protocol with custom-designed primers detected MCRV in gills and hepatopancreatic tissues.

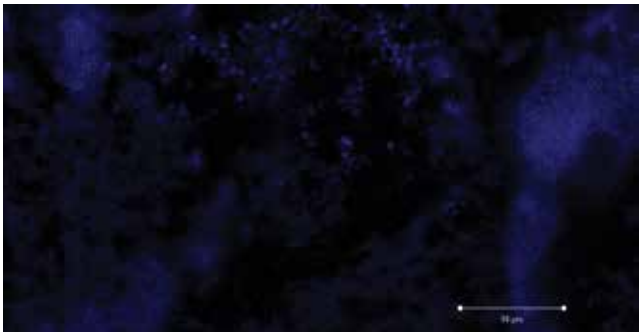
The histopathology showed extensive multi-nucleated giant cell formation in intertubular space and intra-cytoplasmic inclusion bodies in haemal sinus spaces of hepatopancreas. Due to the lack of commercial mud crab hatchery in India, mud crab fattening and farming activities depend mainly on wild seed or water crabs. Therefore it is essential to regularly screen the samples for emerging pathogens such as MCRV. In this scenario, the validation and evaluation of this technique can be evolved as a tool for regular screening of MCRV.



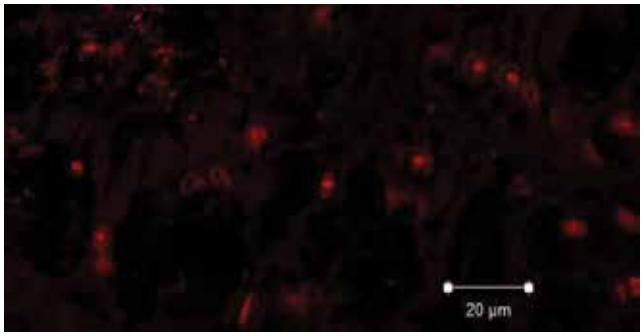
Grey colour disclouration of body infected with MCRV

Confocal microscopy based diagnosis of hepatic microsporidiasis in *Penaeus vannamei*

Hepatopancreas of the *Enterocytozoon hepatopenaei* (EHP) positive shrimp tissues were subjected to confocal microscopic examination on the 5th, 14th and 21st days of infection. The hepatopancreatic tissue was processed for confocal microscopy following standard protocols and stained using Propidium iodide (PI) and 4', 6-diamidino-2-phenylindole (DAPI). The stained sections were examined under confocal microscope (Carl Zeiss- LSM 700). In both stains, the spores were seen inside the hepatic tubular epithelial cells during early stage of infection whereas in 14th and 21st DPI, the spores seen scattered inside the lumen of the hepatopancreatic tubules indicating the multiplication and dispersal of the spores. In the control animal hepatopancreatic tissue did not emit any fluorescence indicating the absence of spores.



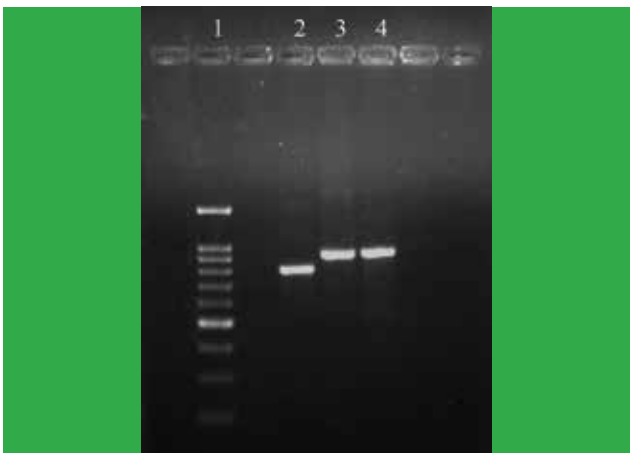
Spores seen in the tubular epithelial cells indicating early stage of infection – DAPI staining.



Spores seen in the hepatopancreatic tubule – PI staining

Isolation of osmoregulatory genes from Indian white shrimp, *Penaeus indicus*

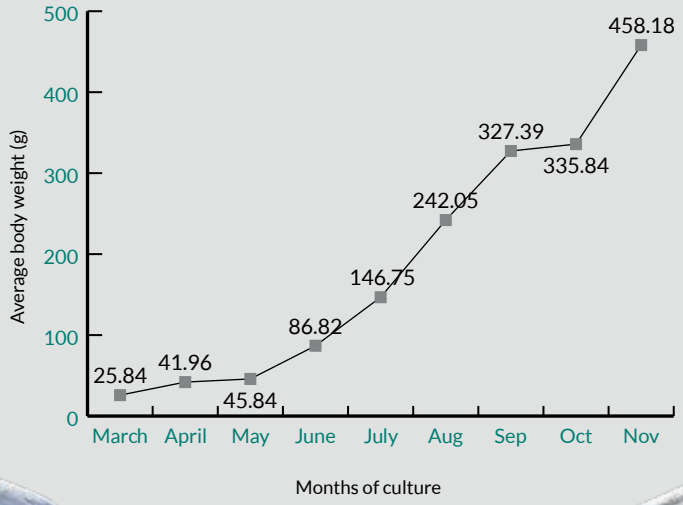
Penaeid shrimps generally can survive a wide range of salinities and are cultured in many tropical and subtropical areas of the world. Changes in abiotic and biotic factors may stress the shrimps during the culture. Studies with juvenile Indian white shrimp, *Penaeus indicus* revealed that this species could osmoregulate between 3 and 40 ppt salinities. Osmoregulation is an important mechanism by which euryhaline crustaceans regulate osmotic and ionic concentrations. Salinity is one of the most important abiotic factors affecting the growth and survival of penaeids, particularly in brackishwater areas where the animals may be exposed to rapid salinity fluctuations and extreme environmental conditions. The ion uptake in crustaceans is mostly attributed to the carbonic anhydrase and Na^+/K^+-ATPase osmoregulatory enzymes. The current study successfully isolated carbonic anhydrase 1, carbonic anhydrase 2 (isoforms of carbonic anhydrase gene) and Na^+/K^+- ATPase (βisoform) genes from *P. indicus*. Further research involving functional characterization of these salinity stress-regulated genes would reveal the molecular-level precise gene pathways and regulatory mechanism of osmotic stress.

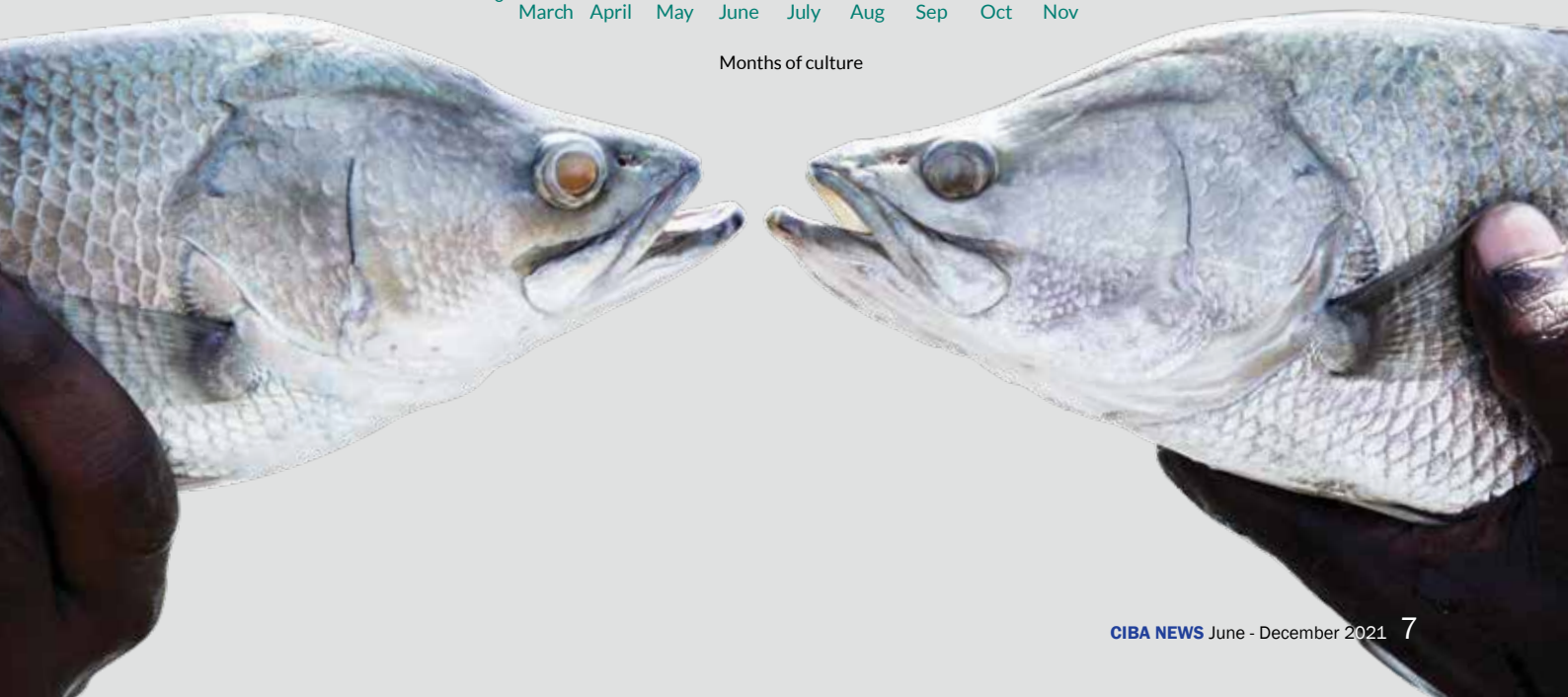


Lane (1): 100 bp ladder, Lane (2) Carbonic anhydrase (CA1) (810 bp), Lane (3) Carbonic anhydrase (CA2) (927 bp), Lane (4) Na^+/K^+ -ATPase β (942 bp)

Farming of Asian seabass in recirculatory aquaculture system (RAS)

This is the first experimental attempt to farm the Asian seabass, *Lates calcarifer* in recirculatory aquaculture system (RAS) at Kakdwip Research Centre of ICAR-CIBA. CIBA hatchery-produced seabass fry (0.21 g, 18 mm) were nursery reared for 120 days in brackishwater pond (100 m^2). Nursery reared fingerlings (25.84 g, 122.7 mm) were stocked in RAS system @ 5nos/m^2. RAS tank (10,000 L capacity, water holding 8000 L) was fitted with, 1 HP electric water pump, pressure sand filter (10,000L/h) and a biological filter. The electric pump was operated for 10-15 h daily. Fishes were fed once daily with low cost fish to the satiation. After nine months of rearing, fishes attained a size of around 500 g (Mean weight: 458.18 ±12.5 g) with 100% survival. Zero water exchange was followed during the culture period. Water was added monthly to compensate for the evaporation loss. The range of water quality parameters such as temperature, pH, salinity, dissolved oxygen, total hardness and ammonia-N were 22-28.5 ˚C, 7.5-8.31, 3-12 ppt, 5.5-6.8 ppm, 800-1200 ppm, 0.01-0.04 ppm, respectively. Total operational cost (fish seed, electricity, feed etc.) for nine months of culture was around ₹8,000 only. Gross return from the sale of harvested seabass was ₹54,000 (@ ₹500/kg). An operating ratio or benefit-cost ratio of 1.12 is estimated for this farming operation.





Performance of milkfish fingerlings in different nursery rearing systems

An experiment was designed to assess the suitable stocking density on growth and survival of milkfish juveniles reared in four different nursery systems, i.e., earthen ponds (T1), lined ponds (T2), periphyton-based FRP tanks (T3) and FRP tanks (T4) for two months. A square-shaped shed-net structure having eight surfaces (1ft x1ft x1ft) framed in PVC were placed at the center of FRP tanks for periphyton formation. Milkfish fry (0.4g avg. body weight; 3.0 cm average TL) were stocked @ 8 nos/m^2 and 200 nos/m^3 in ponds (both lined and earthen) and FRP tanks, respectively. Fishes were fed with 500–1000 micron CIBA milkfish nursery^{Plus} feed (Crude Protein 35-40%, Fat 8%) @ 8-10 % body weight. After 60 days of rearing, maximum growth (17.13 g ABW and 13.3 cm average TL.) was obtained from earthen ponds compared to lined ponds (14.24 g ABW & 12.5 cm avg. TL). At the end of experiments, lined ponds and earthen ponds recorded survival ($p > 0.05$) of 92% and 89.34%, respectively, with no significant difference. In the tank experiment, periphyton-based FRP tanks showed higher growth (10.5 g ABW, 8.7 cm avg. TL) and survival (75%) compared to without periphyton FRP tanks (8.26 g ABW, 6.7 cm avg. TL). Lesser growth and survival in tank-based systems may be due to reduced space triggering stunted fingerling production. Milkfish fingerling production may be advisable in a pond-based system with artificial feed for higher growth and survival in a short duration.

Nursery rearing of milkfish in periphyton system

Periphyton-based farming is widely used in the nursery rearing of fishes. Similar to biofloc, periphyton is also a heterogenous mixture of biota including bacteria, fungi, phytoplankton, zooplankton, benthic organisms, detritus, etc. But unlike the biofloc-based system, here the mixture of biota is generally attached to any submerged substrate surface. In the present experiment, milkfish nursery is attempted in net cage hapa (2x1x1m) with and without periphyton. Hatchery-produced seed (Avg. wt. 0.08 g; Average total length: 12 mm) were distributed in three experimental groups viz. T1 (4 m^2 periphyton), T2 (2 m^2 periphyton) and T3 (without periphyton) at the stocking density of 250 nos/m^2. All the animals were fed with formulated feed (size: 500 µ, protein: 42%). After the 90 days of nursery, 90, 70 and 50 percentage survival was observed in T1, T2 and T3 groups, respectively. Similarly,

final weight was highest in T1 group (3.86 g) followed by T2 (2.87 g) and T3 (2.28 g). Hence, periphyton based nursery rearing of milk fish gave good growth and survival.

Experimental monoculture of milkfish, *Chanos chanos* fed with formulated floating pellet feed

A monoculture trial of milkfish *Chanos chanos* was initiated at KES-CIBA in a pond of 1,156 m^2. Milkfish fingerlings of 20 g avg. body weight, 11.6 cm TL were stocked @ 2 nos/m^2. The salinity ranged from 3 ppt (Nov-Dec) to 32 ppt (July-August). Fishes were fed with CIBA's Milkfish Grow-Out^{Plus} feed (Protein 30-35%, Fat 6%) @ 3-5% of body weight. After 160 DOC, fishes gained an average weight of 222 g and 31.62 cm TL.

CIBA Shrimp Krishi App for real time farm management decisions

ICAR-CIBA has developed an android based mobile application, "Shrimp Krishi" in English, Hindi, Tamil and Telugu languages, for handholding shrimp farmers to make real-time farm managerial decisions. This app also alerts the farmers with technical advisories whenever any deviations are noted in operational parameters such as water quality, feeding and shrimp health.

Participatory demonstration of cage culture of wild mangrove red snapper in Maharashtra

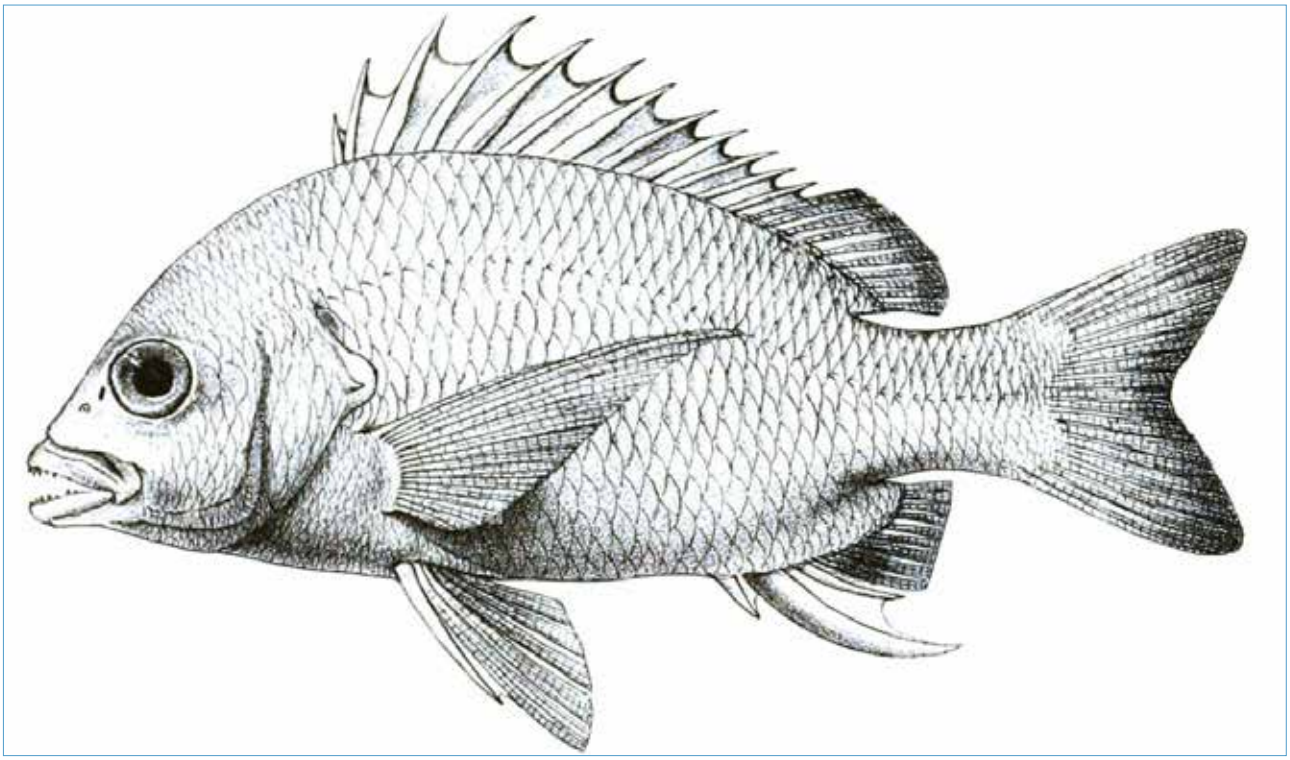
A participatory demonstration of cage culture of wild-collected mangrove red snapper was carried out in the creek at Mirya village of Ratnagiri, Maharashtra. Around 500 nos (3-6 inch & 20-40 g) of fishes were collected from fishers through dragnet operation in creeks of Ratnagiri and stocked in GI pipe cage 4 x 4 x 2 m fitted with 18 mm & 30 mm HDPE knotless nets. Fishes were fed with the CIBA formulated feed (45% crude protein) twice a day @ 3-8% body wt. during the culture. The stocked fishes (500 nos.) attained 300-800g within six months, with 80% survival. The culture generated an income of ₹55,000 and the demonstration positively impacted the cage culture in creeks to create an alternative livelihood for fisherfolks.

Bengal yellowfin seabream (*Acanthopagrus datnia*)

Taxonomic position

Kingdom	:	Animalia
Phylum	:	Chordata
Subphylum	:	Vertebrata
Class	:	Actinopteri
Order	:	Perciformes
Family	:	Sparidae
Genus	:	*Acanthopagrus*
Species	:	*Acanthopagrus datnia*

Acanthopagrus datnia (Hamilton, 1822) commonly known as Datin Mas, is widely distributed in lower Ganges estuarine areas, across Bangladesh and West Bengal coast of India. This fish has high market value and consumer demand due to its taste and appearance. This species is a senior synonym of *Acanthopagrus longispinnis* (Valenciennes, 1830).



Taxonomic character:

Acanthopagrus datnia is slender-shaped, silvery grey fish with 12 dorsal-fin spines and 10 dorsal soft rays, 3½ scale rows between the fifth dorsal-fin spine base and lateral line. It has a larger second anal-fin spine and yellowish pelvic and anal fins.

Biology:

- In general, is a carnivorous fish, mainly feeds on small fishes, crustaceans and molluscs.
- It is observed that *A. datnia* is a protandrous hermaphrodite fish.
- In captivity, males attained the maturity at the size of 80-100 g (around 10-12 months) and female at the size of 300-450 g (one and half years).
- It spawns once during the winter months (December- January). Oozing male and female with mature oocyte (450 µm) were found during December to February.
- Total fecundity ranges from 1.0-2.5 Lakhs
- The availability of wild seed observed from January to April.

Present status:

Kakdwip Research Centre of ICAR-CIBA has studied reproductive biology and developed the captive broodstock of this species.

ADG (Marine Fisheries) visited NGRC-CIBA farm facilities and interacted with SHGS, farmers and fisher youth on 29th August 2021

Dr. Pravin Puthra, ADG (Marine Fisheries), ICAR, visited NGRC-CIBA on 29th August 2021, and appreciated the scientific team at NGRC for their efforts in the livelihood upliftment of tribals. He interacted with women SHGs at Matwad Village, Navsari, Gujarat, who were involved in nursery rearing of milkfish and pearlspot at the farm and handed over the revenue (₹82,900) earned by them. He also presented a cheque worth ₹2,16,448 to the SC youth self-help group against the sale of shrimp from the winter farming demonstration undertaken by the NGRC for SC youth. Later he visited Singod, the tribal village, to monitor the Integrated Fish Farming System (IFFS) implemented by NGRC-CIBA with cage culture of fishes in the village pond, horticulture, poultry farming and goat rearing on the periphery of the pond. ADG handed over a cheque worth ₹58,690 to beneficiaries against the sale of fish and poultry and distributed inputs like life jackets, lifebuoys, tree saplings, *etc.*

Dr. L. Murugan, Hon'ble Union Minister of State for Fisheries, Govt. of India, attends Mud Crab Harvest Mela

Hon'ble Union Minister of State for Fisheries, Animal Husbandry and Dairying and Information and Broadcasting, Dr. L. Murugan, visited the Mud crab harvest Mela held at ICAR-CIBA demonstration site, Pulicat Lake in Tiruvallur district, Tamil Nadu on 18th September 2021. ICAR-CIBA under the SCSP scheme demonstrated mud crab fattening as an economically viable livelihood activity for the coastal SC families who have access to water crabs from the fish landing centres. Fattening is a short duration activity of 30-40 days and the farmers could continue the activity as per the availability of water crabs for income generation. The minister interacted with the beneficiary families about the livelihood activities taken up by CIBA and appreciated the work done by CIBA scientists to enhance the social status of coastal rural low-income families.

Dr. B. M. K. Reddy, Chairman Andhra Pradesh State Biodiversity Board visited ICAR-CIBA

Dr. B. M. K. Reddy, Chairman Andhra Pradesh State Biodiversity Board, visited ICAR-CIBA from 20-21st September 2021. Dr. K.P. Jithendran, Director, CIBA, broadly narrated the mandate and activities of CIBA. The Chairman explained the activities of state biodiversity boards and interacted with HoD/Scientist In-Charges of different Divisions/Sections of CIBA on biodiversity issues in fisheries and aquaculture during the brief interaction meeting. Chairman interacted with the scientists during his visit to the laboratory facilities at headquarters and shrimp, crab and finfish hatcheries and feed mill at MES, CIBA and experimental pond facilities at Kovalam Experimental Station (KES) of CIBA.

Dr. J. Balaji, IAS, Joint Secretary, Department of Fisheries, Govt. of India, visited ICAR-CIBA

Dr. J. Balaji, IAS, Joint Secretary (Marine Fisheries), Department of Fisheries, Govt. of India, visited ICAR- CIBA, Chennai, on 8th October 2021 and interacted with the scientists on national priorities in the brackishwater farming sector. Dr. V. Kripa, Member Secretary and senior officials from Coastal Aquaculture Authority (CAA), Govt. of India, also attended. Dr. K.P. Jithendran, Director, CIBA appraised CIBA's research achievements and significant contributions to the sector. Dr. Balaji explained the ongoing nationwide discussions on the constraints in exotic *P. vannamei* farming and issues in recent proposals to import SPF tiger shrimp (*Penaeus monodon*). Department of Fisheries is looking at the possibilities of making native Indian white shrimp, *P. indicus*, as a choice and permanent solution in the longer run. He expressed his interest in understanding CIBA's experiences, technologies and capacities concerning the development of SPF Indian white shrimp and got convinced that India can pioneer on selectively bred SPF *P. indicus*.

Shri. Bankim Chandra Hazra, Hon'ble Minister of Sundarban Affairs, Govt. of West Bengal Inaugurated the Shrimp Harvest Mela and Farmers Interaction Meet at Kakdwip Research Centre of ICAR-CIBA

KRC of ICAR-CIBA demonstrated the scientific farming of *P. vannamei* in its farm at Kakdwip, South 24 Parganas district of West Bengal on 10th November 2021. Shri. Bankim Chandra Hazra, Hon'ble Minister of Sundarban Affairs, Govt. of West Bengal, witnessed the harvest and inaugurated the farmer's interaction meet as a part of the celebration of Azadi Ka Amrut Mahotsav. The harvest of vannamei shrimp generated revenue of ₹17 lakhs.

About 250 participants comprising of aqua farmers, young entrepreneurs, women SHG's and state government officials witnessed the harvest and attended the interaction meet. The minister appreciated the activities of KRC-CIBA in the state and asked farmers to follow scientific culture technology developed by ICAR-CIBA for vannamei shrimp farming. He distributed the fish seeds (orange chromide, milkfish and pearlspot), Poly^{Plus} feed and CIBA-developed products (Plankton^{Plus} and Horti^{Plus}) to the farmers and entrepreneurs.

Dr. Joy Krushna Jena, DDG (Fisheries) visited ICAR-CIBA, Chennai

Dr. Joy Krushna Jena, Deputy Director General (Fisheries), ICAR, visited ICAR - CIBA, Chennai on 17th December 2021 and reviewed the research activities and administrative matters of the institute through discussions with all the staff and students. Dr. K.P. Jithendran, Director, CIBA briefed the research achievements in the recent past, especially during the COVID lockdown. Dr. J.K. Jena, in his opening remarks, appreciated the research activities of CIBA and advised that appropriate strategies need to be adopted for scaling up the brackishwater finfish culture. He also visited newly emerging Kovalam experimental station and stressed that the newly acquired 64.55 acres of land need to be effectively utilized on a mission mode approach for developing KES into CIBA's visionary farming centre. He distributed the seeds of Asian seabass, mud crab and Indian white shrimp to the identified beneficiaries under SCSP and also inaugurated the sale of brackishwater ornamental fishes produced by women farmers to the aquarium entrepreneurs. This field visit cum seed distribution event, DDG Fisheries, was accompanied by Dr. A. Gopalakrishnan, Director, CMFRI and the Director, CIBA and other senior officials of the institute.

ICAR-CIBA bagged the ICAR's Best Annual Report Award 2020

ICAR-CIBA, Chennai bagged the 'Best Annual Report Award 2020 under large institute category of all the ICAR Institutes in the country. The institute received the award from Shri Narendra Singh Tomar, Honourable Union Minister of Agriculture and Farmers Welfare, in the presence of Shri. Parshottam Rupala, Union Minister of Fisheries, Animal Husbandry & Dairying & Vice-President, ICAR, Dr. Trilochan Mohapatra, Secretary (DARE) & Director General (ICAR) and other dignitaries, on virtual mode during the 93rd ICAR Annual Foundation Day & Award Ceremony held on 16th July, 2021.

A private feed mill established at Haryana with ICAR-CIBA technology received excellent performance appreciation from Government of Haryana

A start-up company owned by Shri. Anil, Dhoki village, Charkhi Dadri District, Haryana, adopted the technology of CIBA in formulating *desi* shrimp feeds and won the accolades as the best entrepreneur for excellent performance.

Shri. J.P. Dalal, Hon'ble Senior Cabinet Minister, presented the award to Mr. Anil Kumar, Managing Director, M/s Dr. Attar Aqua Feeds for the best entrepreneur under the large feed mill category. Commercial production of this formulated feed reduces the production cost in shrimp aquaculture in North India, particularly inland states like Haryana, Punjab and Rajasthan, effectively contributing to the doubling of farmers' income. The company started operation in 2018 and currently has an installed production capacity of 20 tonnes per day. It is estimated that the production cost could be reduced by 20 percent with the commercialization of ICAR-CIBA's desi feed technology.

ICAR-CIBA partners with M/s W S Telematics Pvt. Ltd., New Delhi, for commercialization of multi-parameter water quality analysis kit

ICAR-CIBA signed an MoU with M/s. W S Telematics Pvt. Ltd., Delhi, on 23rd July 2021 for the production and marketing of the CIBA-Multi-parameter water quality kit. The kit was developed to determine water quality parameters such as pH, dissolved oxygen, carbonate, bicarbonate, total alkalinity, calcium, magnesium, total hardness, total ammonia-N and nitrite-N at field level. Dr. K.P. Jithendran, Director, CIBA, highlighted the importance of the water quality kit for the rapid measurement of parameters at the farm level. He complimented the Directors of M/s W.S. Telematics Pvt Ltd, Mr. Wazir Singh Dahiya and Mr. Harsha Dahiya for recognizing the potential of CIBA in R&D backstopping in brackishwater aquaculture. Dr. M. Muralidhar, Principal Scientist and team leader of this technology, explained its importance to reducing abiotic stress and improving animal growth.

M/s. Betterwell Pvt. Ltd. signed MoU with ICAR-CIBA for acquiring technological support in fish feed processing

M/s. Betterwell Pvt. Ltd., Kochi, Kerala, inked MoU with ICAR-CIBA on 3rd August 2021 for technical support on fish feed processing on a non-exclusive basis. The MoU was to customize fish feed formulation and feed processing technology for poor and marginal farmers of Kerala. Dr. K.P. Jithendran, Director, CIBA, highlighted the strength of CIBA in developing and commercializing feed technologies to the sector from Northern Punjab to Southern Tamil Nadu. Dr. K. Ambasankar, Principal Scientist & SIC (Nutrition Group), outlined the genesis of this initiative. The MoU covers the exchange of information on customized machinery, feed formulations, macro and micro-nutritional parameters, feed processing and testing identified ingredients and finished feeds. Mr. Johns James, Director, Betterwell Pvt. Ltd., said the formulated feeds would have more business opportunities in Kerala. The partners are a group of farmers from Kerala who are directly associated with the State Fish Farmers Association. The significant aspect of this venture is aimed to provide cost-effective feed to farmers and avoid intermediary exploitation.

ICAR-CIBA transfers breeding and seed production technology of *Mystus gulio* to Department of Fisheries, Government of Andhra Pradesh

Nona tengra, *Mystus gulio* is a commercially important brackishwater catfish for aquaculture. They are very hardy with excellent nutritional value and high market demand. To reduce the seed exploitation from the wild and to meet high seed demand, the KRC-CIBA has standardized seed production and farming of Nona tengra. An MoU was signed between ICAR-CIBA and Department of Fisheries, Krishna District, Government of Andhra Pradesh for technology transfer on consultancy mode for hatchery design, construction, breeding and seed production of Nona tengra. The first batch of hatchery-produced seeds of Nona tengra was distributed to the farmers by Hon'ble Sri. Simhadri Ramesh Babu, MLA, Avanigadda, Krishna District on 25th August 2021.

ICAR-CIBA partners with M/s. Coastal Corporation Ltd. and M/s. Naturalle Herbal Remedies Pvt. Ltd. for production of safe and healthy polychaete worms as maturation diet for shrimp brooders

Polychaete worms are an indispensable maturation diet for broodstock shrimps to accelerate maturity and enhance fecundity. Wild collected polychaetes are potential carriers of pathogens to shrimp brooders. Therefore, the scientific production of SPF polychaete worms is the key to pathogen-free shrimp seed production. In this context, ICAR-CIBA signed a MoU with Coastal Corporation Ltd. (CCL), Vishakhapatnam Andhra Pradesh, on 2nd November 2021 to extend consultancy services for breeding and production of SPF polychaete worms (*Perinereis* spp). Through this collaboration, the Coastal Corporation Ltd. will invest in infrastructure for domestication and mass-scale production of the polychaetes, while the ICAR-CIBA will facilitate research and development for quality production. Dr. K.P. Jithendran, Director, ICAR-CIBA, highlighted the importance of SPF polychaete worms to the Indian shrimp industry and the potential of such technologies in ensuring disease-free shrimp seed production. Mr. V.R. Sharma, Vice President, Coastal Corporation Ltd, explained the demand for SPF polychaete worms to the Indian shrimp industry. Likewise, another MoU was signed with the M/s. Naturalle Herbal Remedies Pvt. Ltd., Nellore, Andhra Pradesh on 17th November 2021 to develop grow-out culture technology for polychaete worms such as sand (*Perinereis* spp.) and mud worms (*Marphysa* spp.). Mr. N. Dolendra Prasad, Managing Director, M/s. Naturalle Herbal Remedies Pvt. Ltd. emphasized their commitment to this program and the importance of polychaete worms in the Indian shrimp industry.

NGRC-CIBA demonstrated an "Integrated Aqua-Agri-Poultry-Goat Farming System" for the livelihood and nutritional security of tribal communities in Gujarat

A model farm run by a 40-member tribal self-help group called Singod Halpati Samaj Yuva Matsya Udhyog Juth was mobilized by the scientific team of NGRC-CIBA. The farm consisted of 25 low volume cages (4 x 4 x 2 m) for the culture of fishes like *pangasius*, tilapia, pearlspot and rohu. The dykes of the pond were utilized for growing seasonal vegetables such as brinjal, chilly, cauliflower, tomatoes and fenugreek and fruit-bearing trees like mango, coconut and dragon fruit. A poultry unit (2000 birds) and a goat rearing (12 goats) shed were also erected on the other side dykes of the pond to create additional income for the members.

Cage-based fish farming was planned as a multiple stocking and multiple harvesting mode. CIBA provided livelihood development support through the scheduled tribe component (STC) plan by supplying cage nets, frames, brackishwater and freshwater finfish seed and feed, poultry chicks (meat variety), goats, etc. and the beneficiaries were trained on management of cage nets, feeding, handling of fishes and aquatic animal health management. During the harvest mela held on 24th October 2021, about 800 kg of live *Pangasius* fish (size 1-1.5 kg) were partially harvested and sold to a local fish dealer. During the program a sum of ₹1.85 lakh was

distributed to the group from the sale of fish, poultry birds and vegetables. It is estimated that the farming system may generate a total income of ₹14-15 lakhs for tribal communities of Singod, Navsari, Gujarat.

ICAR-CIBA signed MoU's in Pre-Vibrant Gujarat Summit 2021

Navsari Gujarat Research Centre of CIBA (NGRC) signed two MoU's during the Pre-Vibrant Gujarat Summit 2021 held at Anand Agricultural University for two imperative goals. The three-day national summit was organized by the Department of Agriculture, Farmers Welfare and Co-operation, Govt. of Gujarat during 14th-16th December 2021.

The first MoU signed with the Department of Fisheries, Govt. of Gujarat, to obtain the 10 ha fish farmland at Matwad village, Navsari, for brackishwater aquaculture research and demonstration. Mr. Satish Patel, IAS, Commissioner of Fisheries, Department of Fisheries, Govt. of Gujarat and Dr. K.P. Jithendran, Director, ICAR-CIBA, signed the agreement.

The other MoU was signed between M/s. Gujarat Fish Farmers Producers Co-op. Society, Ltd. and NGRC-CIBA for providing technical support and critical inputs in brackishwater farming demonstrations in Gujarat to boost fish production and livelihood. Gujarat Fish Farmers Producers Co-op. Society Ltd. is the first FFPO in the cooperative sector of the country, working on skill development, self-reliance and employment generation for fish farmers and tribal communities. Witnessing the successful demonstration of improved brackishwater farming technologies by NGRC-CIBA at tribal villages of Matwad, Eru and Singod, the Society decided to join hands with CIBA to replicate similar projects in other regions of the state. Dr. K.P. Jithendran, Director, ICAR-CIBA and Shri. Jayantilal P. Kewat, President, Gujarat Fish Farmers Producer Co-op. Society Ltd. signed the documents.

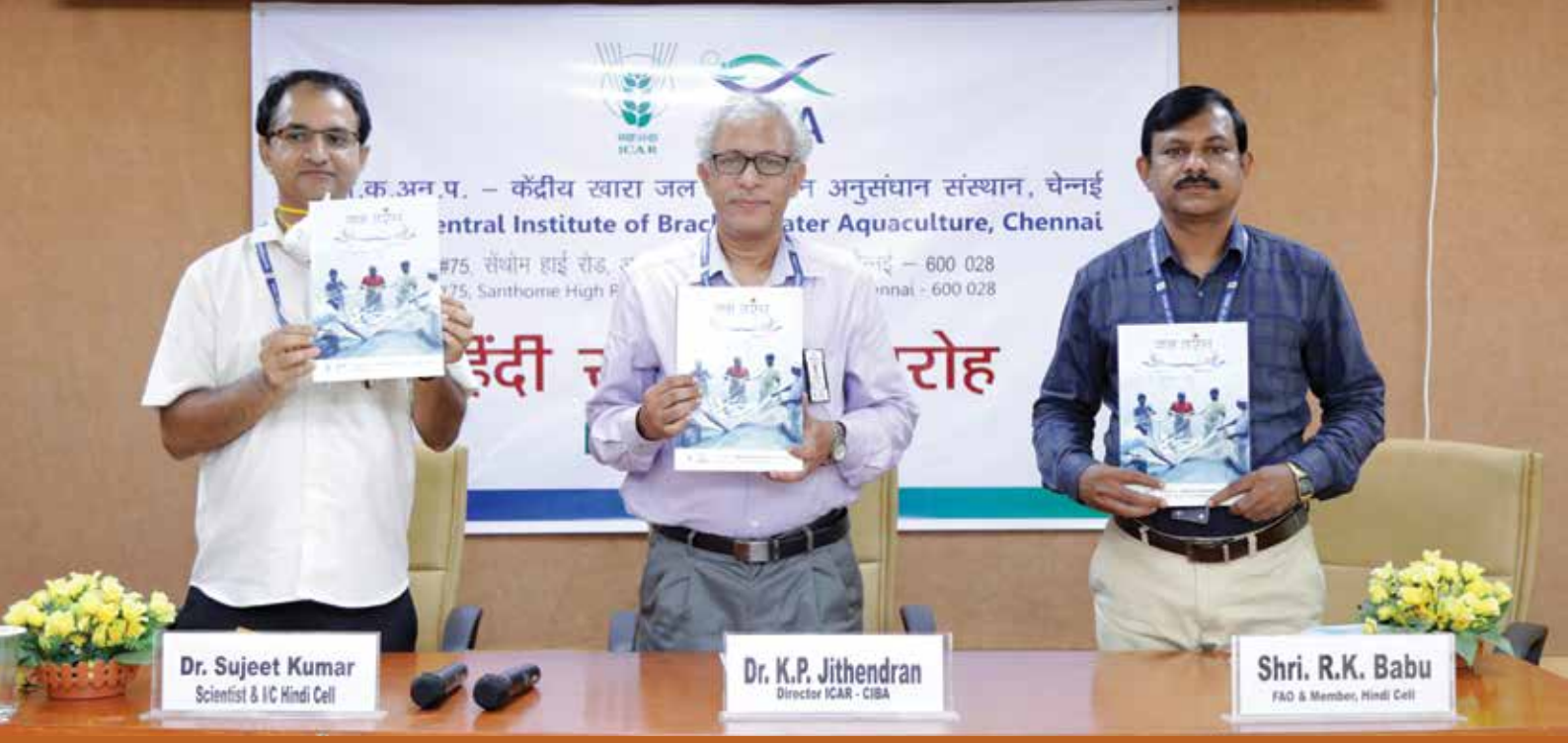
ICAR-CIBA celebrated World Environment Day 2021

ICAR-CIBA celebrated World Environment Day on 5th June 2021 through a digital platform with an invited talk by Chief guest Dr. Himanshu Pathak, Director, ICAR-National Institute of Abiotic Stress Management, Baramati, India, on the topic 'Economy or Environment? Solving the Eternal conflict'. This year's Environment Day theme was 'Reimagine – Recreate – Restore'. Dr. K.P. Jithendran, Director, ICAR-CIBA, opined on the necessity of environmental balancing between food production and sustainable use of natural resources.

Dr. Pathak emphasized the implementation of scientific farming and bringing a new concept of green income and the environmental cost to assess the impact of agriculture on the environment. He concluded his talk with comments that though the conflict between economy and environment will continue, our responsibility is to restore the ecosystem with an alternative plan: 'Reimagine, recreate and restore'.

75th Independence Day celebrations

ICAR-CIBA and its research centres celebrated the 75th year of Independence Day on 15th August 2021 with pride and honour. Dr. K.P. Jithendran, Director, ICAR-CIBA, hoisted the national flag at the headquarters and greeted the scientists and staff of CIBA. He informed that the country is celebrating 'Azadi ka Amrut Mahotsav', marking the 75th year of independence and the ICAR-institutes are organizing a series of events to commemorate the occasion. He advised the scientists and staff to follow the COVID–19 guidelines of the Govt. of India and contribute their best research efforts towards the sustainable brackishwater aquaculture sector in the country. Independence Day was celebrated in the Navsari and Kakdwip Research centres and Muttukadu Experimental Station, Chennai.



Hindi week celebration

ICAR-CIBA, Chennai celebrated Hindi Week from 14th-20th September 2021 to promote the use of Hindi as official language and conducted Hindi noting, drafting, translation, singing and quiz competitions. During the valedictory function held on 20th September 2021, Dr. K.P. Jithendran, Director, ICAR-CIBA, released the 7th issue of Annual Hindi magazine "Jal Tarang" and inaugurated 'Saransh' digital notice board with dedicated television for display of Hindi words and distributed the prizes to the winners under Hindi incentive schemes. The Director highlighted the linguistic diversity of India and the importance of Hindi in communicating across the nation. Similarly, Hindi Pakhwada was celebrated at KRC of CIBA, Kakdwip, during 8th-22nd September 2021.

Vigilance Awareness Week

ICAR-CIBA conducted the Vigilance Awareness Week during 26th October to 1st November 2021 with the theme of the year '*Independent India @ 75, self-reliance with integrity*'. A week-long programme on Vigilance awareness included: pledge on the first day followed by competitions on essay writing, elocution, quiz and drawing competition among the staff and students. On the first day, Director In-charge, CIBA pronounced the pledge to all the institute staff. A drive was undertaken to spread awareness regarding the provisions under the PIDPI (Public Interest Disclosure and Protection of Informers) resolution and all related information. Research scholars of CIBA actively participated in the drive held in the public area.

ICAR-CIBA conducted farmer's meet at coastal Karnataka and distributed soil and water health cards

ICAR-CIBA held a farmer's meet and celebrated World Soil Day in consort with aqua farmers on 4th December 2021 at Kundapura, Udupi district, Karnataka, under the guidance of Dr. K.P. Jithendran, Director, ICAR-CIBA. Mr. K. Ganesh, Joint Director of Fisheries, Udupi District, inaugurated the farmer's meet outlined the scope for future collaborations of the Fisheries Department with ICAR-CIBA in utilizing the resources of Karnataka state for sustainable brackishwater aquaculture development. Dr. M. Muralidhar, Principal Scientist, Scientist-in-Charge, Environment Group & Principal Investigator, NICRA project, narrated the need to conserve soil health and sensitized farmers on soil and water quality issues in brackishwater farms in coastal Karnataka. Dr. M. Ganapathi Naik, Professor and Head, Dept. of Aquaculture, College of Fisheries, Mangalore, Dr. P.P. Suresh Babu, Senior Scientist & SIC, ICAR-CMFRI, Karwar, Dr. Vishnudas Gunaga, Assistant Director, MPEDA Sub Regional Division, Mangalore and Mr. Shrinivas H. Hulkoti, Scientist, KVK Brahmavara briefed the farmers about the roles played by their agencies in aquaculture development in Karnataka. During the meeting, Soil and water health cards (SWHC) were issued to 148 farmers by the dignitaries. Mr. Biju I.F. and Mr. Tanveer Hussain, Scientists from CIBA, highlighted the aquaculture technologies and Dr. Satheesha Avunje, Scientist, CIBA, explained the current scenario of diseases in *Penaeus vannamei* farming. During the interaction, brackishwater farmers actively participated in the discussions, flagged their queries and sought answers on different aspects of aquaculture such as species diversification, changing climatic scenarios, finfish and shellfish farming systems, biofloc technology, water and soil quality management in brackishwater aquaculture.

‘Azadi ka amrut mahotsav’

Awareness campaign on ‘balanced use of minerals/ fertilizers in shrimp aquaculture’

ICAR-CIBA organized the Farmers’ Awareness Campaign on ‘Balanced Use of Minerals/Fertilizers in Shrimp Aquaculture” in Tamil language on 18th June 2021 in a virtual platform on the occasion of celebrating 75 years of Indian Independence. About 310 members, including shrimp & fish farmers, aqua consultants, scientists and research scholars have participated in the campaign.

Dr. K.P. Jithendran, Director, ICAR-CIBA, stressed the importance of balanced application of minerals in different source waters of varying salinity. The Chief Guest, Dr. D. Manikandavelu, Professor and Head, Department of Aquatic Environment Management, TNJFU, emphasized the importance of water quality management in aquaculture with special reference to fertilizer, nutrients and minerals. He imparted the knowledge on the role of soil and water testing in identifying minerals deficiency, judicial use of minerals and fertilizers in different saline aquaculture systems, alternative use of shrimp pond discharge water and pond soil for agricultural use as waste management strategies and ongoing Soil and Water Health Card Scheme.

National campaign on ecosystem management for sustainable fisheries

ICAR-CIBA and its Research Centres organized the National Campaign on ‘Ecosystem Management for Sustainable Fisheries’ on 10th July 2021, commemorating the 75th Anniversary of India’s Independence (Azadi Ka Amrut Mahotsav), adhering to the COVID-19 guidelines from the Government of India. About 100 aquafarmers, fishers and SHG women participated in the programmme. Dr. K.P. Jithendran, Director, ICAR-CIBA, emphasized the necessity to adopt sustainable aquaculture practices in balance with the carrying capacity of the coastal ecosystems. At Kakdwip Research Centre, the farmers were sensitized to adopt system-specific aquaculture models to enhance the productivity of unutilized brackishwater resources. At NGRC, Navsari, About 70 aquafarmers, fishers and SHG women participated in the program. The participants were motivated on nursery rearing, farming of candidate brackishwater finfish species and the experiences of fish farming methods adopted on the west coast. Milkfish, pearl spot and orange chromide fingerlings produced at the NGRC research farm were distributed to the farmers and SHGs.

'One Student-One Tree' initiative on ICAR Foundation Day

ICAR-CIBA, Chennai launched a novel initiative on 'Student custodian' for the trees planted in the office campus during the nationwide campaign on plantation and awareness on the eve of ICAR's Foundation Day (16th July 2021). Dr. K.P. Jithendran, Director, ICAR-CIBA urged the staff and scholars on 'Green Campus,' conservation of natural resources and ecosystem. The programme was organized with the theme, "Har Med Par Ped," as part of the "Azadi Ka Amrut Mahotsav" to commemorate 75 Years of India's Independence. Tree saplings of Coconut (*Cocos nucifera*), Jackfruit (*Artocarpus heterophyllus*), Aththi (*Ficus racemose.* L), Naval (*Syzygium cumini*), Nelli (*Phyllanthus emblica*) and Sapota (*Manilkara zapota*) were planted at the institutional premises adhering COVID-19 guidelines. Similarly, Kakdwip Research Centre of ICAR-CIBA organized a sapling distribution programme.

Virtual Farmers-Scientists-Industry Interaction Meet on Brackishwater Aquaculture Species and Systems Diversification

ICAR-CIBA organized a Farmers-Scientists-Industry interaction meet on "Brackishwater aquaculture species and system diversification" in virtual mode on 1st September 2021 to commemorate the 75th Anniversary of India's Independence (Bharat Ki Azadi Ka Amrut Mahotsav 2021-22). The event had about 124 participants, including aqua farmers, technicians, entrepreneurs, researchers and students. In his inaugural speech, Dr. K.P. Jithendran, Director, ICAR-CIBA, emphasized the importance of species and system diversification in brackishwater aquaculture as a strategy for sustainable production and to mitigate farming risks. The interaction meet had three technical sessions' *viz.*, species diversification in crustacean aquaculture, species diversification in finfish aquaculture and system diversification in brackishwater aquaculture. The subject matter scientists highlighted the potential species for diversification and technology available for the same. In each session, the experts answered the queries raised by the aqua farmers and other stakeholders. Dr. T. Ravisankar, Dr. K.P. Kumaraguru Vasagam and Dr. P.K. Patil, Principal Scientists moderated the deliberations. In his concluding remarks, the Director highlighted that CIBA is on the right track with the visible efforts and outputs in species and system diversification in brackishwater aquaculture through focused research and extension efforts. The event was coordinated by ITMU Unit of ICAR-CIBA.

Campaign on International Year of Millets 2023 on Nutri-Garden and Tree Plantation

ICAR-CIBA launched a novel initiative of 'Student and Farmer Custodian' for the trees planted in the office campus in connection with the Nationwide campaign on *Poshan Vatika* and tree plantation to celebrate India sponsored UN declaration of International Year of Millets 2023 on Nutri-garden and tree plantation on 17th September 2021. All the scientists, staff and farmer-beneficiaries, including women, attended the virtual inauguration program by Shri. Narendra Singh Tomar, Hon'ble Union Minister of Agriculture and Farmers' Welfare, Government of India. ICAR-IIMR events on "Nutri-cereals Multi-stakeholders Mega convention, Poshan Vatika and Tree plantation Campaign for International Year of Millets 2023". Dr. K.P. Jithendran, Director, ICAR-CIBA, emphasized 'importance of millets,' green campus, conservation of natural resources and ecosystem. A total of 191 tree saplings such as coconut, tamarind, jamun, cherry, almond, sweet lime, pomelo, pomegranate, amla, mango, athi, guava, jack fruit, wax apple and *sapota* were planted with the active participation from 171 farmers, including 71 women from tribal self-help groups (SHGs), 40 students, scientists and staff. Similar kinds of programs were organized in KRC, MES and NGRC.

ICAR-CIBA observes World Antimicrobial Awareness Week

ICAR-CIBA observed World antibiotic Awareness Week aims to increase global awareness of antibiotic resistance and to encourage best practices among the general public, health workers, prescribers and policymakers to avoid the further emergence and spread of antibiotic resistance. The theme of this year was 'Spread awareness and stop Resistance.' ICAR-CIBA organized two online webinars during the week. The first webinar was held on 9th November 2021 on the topic "Antimicrobial Resistance in Aquaculture – Who is responsible?" by Internationally renowned scientist Prof. (Dr.) Iddya Karunasagar, the Expert Member, World Health Organization (WHO) advisory group on critically important antimicrobials for human use, was the chief guest of the webinar. About 106 participants including scientists, aqua-professionals, stakeholders, academicians and students both from India and abroad participated in the webinar. In his talk, Prof. Karunasagar covered basic aspects of antibiotics, the mechanism of AMR & its spread and the specific issues pertaining to AMR vis-a-vis aquaculture industry. Dr. K.P. Jithendran, Director, ICAR-CIBA, in his introductory remark outlined the importance of AMR and averred that this programme will benefit a large number of participants who can gain knowledge from the vast experience of a speaker like Dr. I. Karunasagar. The second webinar was conducted on 22nd November 2021 wherein, Dr. G. Ganga, Associate Professor, Sree Ayyappa College, University of Kerala, was the chief guest and delivered a talk on 'Antimicrobial resistance a global threat' and covered broad aspects on antimicrobials, their discovery, timeline of the development of resistance, mechanism of resistance and ways to manage the spread of AMR in all the sectors such as human, livestock and fisheries. During the webinar, Dr. K.P. Jithendran, Director, ICAR-CIBA, mentioned the importance of the awareness creation on AMR towards sustainable fisheries and provided a brief background regarding the situation of AMR in aquaculture practices.

Societal development and outreach activities

Launching of income generation activities for tribal families in brackishwater aquaculture systems

ICAR-CIBA initiated two interventions "Diversification of livelihoods among coastal Scheduled Tribal families and Scheduled Caste Families through brackishwater aquaculture technologies integrated with agro-based technologies and societal developments" at Lakshimipuram tribal Nagar, Kattur village and Thonirevu village, Kottaikuppam Panchayat, Pulicat, Tiruvallur district of Tamil Nadu under the STC/TSP and SCSP schemes. Under these two schemes, CIBA adopted six coastal Irular tribal families and 18 coastal Scheduled Caste families as traditional fishers, crab, shrimp and clam collectors. ICAR-CIBA has launched various interventions in Kattur and Thoniveru villages on 1st November 2021 for the coastal SC and ST families. About 110 participants, including aqua farmers, fishers, tribal, panchayat, village leaders and officials from CIBA, have participated in the program. Dr. K.P. Jithendran, Director, ICAR-CIBA, highlighted the purpose of implementing Scheduled Caste Special Programmes (SC-SP) and STC/TSP. He stated that under these projects, brackishwater aquaculture technologies viz; Two-tier milkfish farming in pond and pens; seabass nursery rearing in hapas, pen and low volume floating cages; crab farming in pen and boxes; fish food sales unit could be integrated with agro-based technologies like poultry farming, vegetable gardening. Societal developments like youth and children's study centres are being implemented and requested to utilize these opportunities to improve their knowledge and empowerment.

Exposure visit of SC/ST beneficiaries to ICAR-CIBA

ICAR-CIBA is undertaking fisheries-based livelihood development interventions for SC-ST fishermen families in Ponneri taluk of the Tiruvallur district. A batch of 35 beneficiaries visited the Muttukadu and Kovalam experimental stations of CIBA on 25th September 2021. They visited fish and shrimp hatcheries and could familiarize themselves with ongoing brackishwater aquaculture activities at MES and KES. Farm inputs like fishnets and ₹50,000 the income generated by the beneficiaries through crab harvest and training certificates were distributed to beneficiaries during the interactive session at headquarters. Dr. K.P. Jithendran, Director, CIBA, interacted with the SC & ST beneficiaries and appreciated their sincere efforts towards adopting fish and crab farming interventions. The program was conducted under SCSP/TSP scheme.

Similarly, an awareness programme on nursery rearing of seabass was organized at Muttukadu Experimental Station for 36 SCSP beneficiaries of Kottaikadu Village, Chengalpattu District, Tamil Nadu on 28th December 2021.

Swachhta campaign

ICAR-CIBA organized special Swachhta campaigns in Tamil Nadu and West Bengal

As part of the observance of the Swachhta campaign and special Swachhta Pakhwada from 16th to 31st December 2021, ICAR-CIBA has organized many events involving all stakeholders, students and officials associated with the aquaculture sector. Swachhta Pledge was taken by the Scientists, Officers, Staff and Students at CIBA Headquarters, Experimental Station at Muttukadu and Kovalam and its Research Centres at Kakdwip West Bengal and Navsari, Gujarat, on 16th December 2021. Around 137 participants attended the Swachhata Pledge. Followed by an awareness drive on campus and workplace cleanliness, the importance of weeding out of files, ensuring COVID-19 protocols were emphasized to the participants.

In Koovathur fishing village, Chengalpattu District, Tamil Nadu, a stakeholder's awareness programme was conducted on 26th October 2021. About 112 participants, including aqua farmers, fishers, school children and villagers, participated in the programme. Dr. K.P. Jithendran, Director, ICAR-CIBA, emphasized the importance of cleanliness in various spheres of life for healthy living and distributed Asian seabass seeds for farming; materials and accessories for implementing cleaning activities by the villagers. The school children from the village gave speeches on the importance and methods of maintaining their cleanliness and the environment. Likewise, KRC of CIBA organized the Swacchta campaign on 29th October 2021 in Mundapara tribal village in West Bengal. About 100 women, aqua farmers and children participated in the Swacchta campaign. Dr. Debasis De, OIC, KRC, addressed the villagers and sensitized them about the mission and importance of the Swacchta campaign in India. On this occasion, masks, sanitizers and KRC feed mill produced fish feed were distributed to the villagers and farmers adopted under the tribal sub-plan of KRC, followed by a cleaning drive. A scientist-farmer interaction meet was also held to resolve the problems of the aqua farmers in the village.

A Swachhta campaign at Kovalam Experimental Station was attended by Irular tribal aqua farmers, farm women, fishers and CIBA scientists and staff. Dr. C.V. Sairam, SIC, SSD, emphasized the importance of the Swachhta campaign and cleanliness. During the occasion, seeds of Asian seabass, mono angel, mud crab, shrimp viz., Indian white shrimp, Black tiger shrimp, Kuruma shrimp and Speckled shrimp were stocked in the ponds. These demonstrations could create technical know-how for the tribal community. Accessories for cleaning were also distributed to the Irular community farmers to adopt the cleaning drive in their village.

ICAR-CIBA inaugurated the production unit for recycling of fish waste to value added products- CIBA-Plankton^{Plus} and CIBA-Horti^{Plus} at Kasimedu

Nambikkai Fish Farmers Group, Mrs.K.Velankanni, started a micro-level enterprise as M/s. V.S. Fish Waste Hydrolysate at Kasimedu Fishing Harbour, Chennai, for manufacturing of CIBA-Plankton^{Plus} and CIBA-Horti^{Plus}. Dr. K.P. Jithendran, Director, ICAR-CIBA inaugurated 'M/s. VS Fish Waste Hydrolysate Unit' owned by Mrs. Velankanni, on the occasion of the Special National Swachhta Campaign at Kasimedu Fishing Harbour, Chennai on 12th October 2021. The technology was widely recognized and popularized/published in more than 30 leading newspapers including different regional languages.

ICAR-CIBA has conducted a demonstration on the "Waste to Wealth" programme by recycling of fish waste to value added products under Swachhta Pakhwada on 20th December 2021 at ICAR-CIBA, Chennai. A Self Help Group members trained earlier by the institute demonstrated the protocol for recycling fish waste to value added products. CIBA Scientists involved in this activity highlighted the importance of cleanliness in the villages and recycling of fish waste to avoid infections and diseases. Recycling will not only help in cleaning and hygienic disposal of fish market waste which is abundantly available in the village cluster but will also help to produce wealth from waste. Around 20 participants including fishermen, women and officials from ICAR-CIBA, Chennai, were actively participated in the programme.

Special Kisan Diwas program

ICAR-CIBA celebrated the National Farmers Day with the fishers, tribal farmers and fisheries students at Muttukadu Experimental Station, Muttukadu, Tamil Nadu. The National Farmers Day (Rastriya Kisan Diwas) is celebrated on 23rd December every year in honour of Chaudhary Charan Singh, a popular Kisan leader and former Prime Minister of India. About 120 farmers, students, scientists and staff of CIBA participated in the program. Dr. K.P. Jithendran, Director, CIBA, sensitized the participants about the employment opportunities in fisheries and aquaculture, especially for utilizing efficient brackishwater aquaculture technologies using the vast stretches of brackishwater resources. He also highlighted the importance of cleanliness, sanitation and hygiene among students and farmers. Nodal Officer of Swachh Bharat Mission ICAR-CIBA highlighted the importance of National Farmers Day. She briefed the Swachh Bharat Mission and highlighted the importance of recycling fish and domestic waste to avoid infections and diseases. She also narrated the demonstration and extension activities conducted in various coastal states by ICAR-CIBA for tribal and coastal communities towards enhancing their livelihood and socio-economic status. Shri. T. Kennit Raj, fish entrepreneur and proprietor of M/s. V.S. Fish Waste Hydrolysate, Kasimedu and Nammbikkai Fishers Group, Pattinapakkam, Chennai Tamil Nadu, shared his experience about the establishment of a fish waste processing unit under the technical guidance of CIBA for the production of CIBA Plankton^{Plus} and CIBA Horti^{Plus}, value-added products by recycling of fish waste. He also cherished CIBA's efforts in promoting waste to wealth

as an alternative livelihood activity for the fishers in their village. He expressed that their group received the "Best Fisheries Self Help Group-2020" award from the National Fisheries Development Board (NFDB), Ministry of Fisheries, Animal Husbandry and Dairying, Government of India because of CIBA-Plankton^{Plus} and CIBA Horti^{Plus} technologies. At the end of the meeting, CIBA staff distributed the swachhta materials to tribal families for cleaning their premises.

Awareness-cum-tree plantation programmes

ICAR-CIBA has organized an awareness program on 'shun single-use plastics' and importance of cleanliness, sanitation and hygiene practices among farmers, students and scientist and staff of CIBA at Muttukadu, Tamil Nadu on 24th and 28th December 2021. Subsequently, tree planation programme and an awareness rally were conducted. Around 100 participants were attended in both the programmes. CIBA scientists narrated various means to avoid plastic waste and a pledge in this regard was taken by the participants. The participants understood the importance on the call on Shun Single-Use Plastics and affirmed solemnly on avoidance of Single-Use Plastics to make our country greener and plastic free.

Swachhta awareness-cum-rally

ICAR-CIBA has organized two awareness-cum-rallies under the Swachhta campaign. Around 100 participants, including scientists and staff of ICAR-CIBA, farmers and students from Tamil Nadu Dr. J. Jayalalithaa Fisheries University, participated in a rally on the Highway followed by an awareness program at Muttukadu, Tamil Nadu on 22nd and 27th December 2021. The Director, CIBA, highlighted the importance of cleanliness, sanitation and hygiene among students. Nodal Officer of CIBA-Swachh Bharat Mission narrated the Swachhata Pakhwada and explained various means to avoid plastic waste and the participants pledged in this regard.

Farm Harvests

Shrimp production trials at Kakdwip Research Centre of CIBA

An experimental shrimp farming trial was carried out in Kakdwip Research Centre of CIBA to evaluate the compensatory growth and production characteristics of *Penaeus vannamei* after three weeks of high density nursery culture at stocking density of 5,000 PL/ton. Shrimps were reared at two rearing densities (15 nos/m^2 and 19 nos/m^2), and after 68 days of culture, excluding nursery culture period, 835 kg/ha and 1,563 kg/ha were harvested at lower and higher stocking densities, respectively.

Culture practice of Mud Crab (*Scylla serrata*) in saltern grow-out pond at Kovalam Experimental Station of CIBA

250 individuals of 56 g size of wild juvenile mud crabs (*Scylla serrata*) were stocked in a 500 m^2 square earthen pond. The mud crabs were fed with fish meat (Tilapia fish) at 10 % of the body weight. The salinity in the culture pond varied between 32 ppt and 41 ppt during the culture period. At the end of 77 days of culture, 29.0 Kg of crab biomass was harvested. The crabs attained a weight gain of 15 kg in 77 days with a survival of 42.8%. The harvested size of crabs varied from 410-547 g, 305- 390 g, 218- 296 g and 112–195 g. The male crab grew faster than the female crabs with the size variation of 59 g in 77 days as compared to female crabs. Growing the crabs in crab boxes would give better yield than growing in growout ponds.

Maiden harvest of Asian seabass from newly established Kovalam Experimental Station (KES) of ICAR-CIBA

Kovalam Experimental Station (KES) of ICAR-CIBA, which spreads on 64 acres of land in the Muttukadu backwaters, harvested 121 kg seabass after 115 days of culture. About 300 advanced seabass fingerlings (60-90 g) were stocked in a 1000 m^2 size pond and reared using the Seebass^{Plus} (a cost-effective indigenous feed developed by the CIBA). After 115 days, 121 kg of uniform size fishes (550 to 650 g each) were harvested with survival and FCR 57.6% and 1.2, respectively. The fishes were marketed locally for a price of ₹400/ kg.

Webinars/ Meetings/ Training programmes organized

International webinar on the scope of reintroduction of shrimp crop insurance

An international webinar on the reintroduction of shrimp crop insurance was held on 10th August 2021 at ICAR-CIBA, Chennai, in association with a leading world re-insurance company the Willis Towers Watson. Dr. K.P. Jithendran, Director, ICAR-CIBA, gave an overview of Indian shrimp aquaculture and the potential for aquaculture insurance in India.

Dr. T. Ravisankar, Principal Scientist, CIBA, presented a landscape analysis of market potential and insurance opportunities on Indian shrimp aquaculture. Industry presentations were made by Willis Tower Watson and Aquaconnect group. Later, a panel discussion on "Indian aquaculture insurance from a re-insurance perspective" was also conducted. M/s. Swiss Re, Hannover Ruck SE – India Branch, AXA Climate, Qatar Reinsurance Company Limited and Liberty Mutual also participated in the webinar.

Farmers-Scientists Interface Meeting on Climate Resilient Varieties, Technologies and Practices

ICAR-CIBA organized a Farmers-Scientists interface on climate resilient varieties, technologies and practices on 28th September 2021 as a part of 75th Anniversary of India's Independence at HQ and Muttukadu Experimental Station. About 115 participants including farmers, scientists, aqua entrepreneurs and students participated in the programme. Dr. K.P. Jithendran, Director, ICAR-CIBA highlighted the importance of climate-resilient varieties in agriculture in general and aquaculture. He also stated that CIBA is undertaking smart aquaculture based on Artificial Intelligence techniques for achieving to resolve the emerging challenges. Dr. R. Saraswathy, Principal Scientist, Environment Section, presented in detail on various aspects of climate-resilient agriculture including aquaculture. This was followed by an interface of CIBA Scientists with farmers, students from the University of Madras and other stakeholders. Dr. M. Kailasam, SIC, FCD and his team distributed seeds of ornamental fish (silver moony, *Monodactylus argenteus*) to each farmer.

Workshop cum training on 'Biofloc based green technology for nursery and grow out aquaculture'

ICAR-CIBA, Chennai conducted an offline workshop cum training on "Biofloc Technology (BFT) for Nursery and Grow-out Aquaculture" from 9th to 12th November 2021 for aqua- farmers and potential entrepreneurs venturing into Biofloc based shrimp farming. BFT is becoming India's sought-after technology for farming fish and shrimps as a sustainable alternative for intensive aquaculture. Many participants of our previous workshops are most successful entrepreneurs now and become trainers taking forward this innovative and diversified farming approach. Dr. K. P. Jithendran, Director, ICAR-CIBA, briefed the importance of biofloc farming and its role in achieving the sustainable development goal by 2030 and stressed the importance of hands-on training than the knowledge acquired through social media. Thirteen trainees from various states participated in the four days training program despite the inclement cyclonic weather in Chennai. The training program covered the generation of biofloc, pre-stocking, post-stocking, feeding management and economics of the biofloc farming activities.

Skill Development Training on 'Feed Formulation and Feed Management in Brackishwater Aquaculture'

KRC-CIBA conducted skill development training on 'Feed formulation and management in brackishwater aquaculture of shellfishes and finfishes' during 15th-20th November 2021. Twenty participants, comprised of farmers and entrepreneurs from different parts of West Bengal, attended the training. Skills on assessing the nutrient requirement of different brackishwater species at different stages; feed formulation and processing technology, including low-cost farm-made feed, sinking pellet, extruded feed preparation and feed management in culture pond were imparted to the trainees. The trainees were exposed to the farming practices of hilsa and different brackishwater fish species and live feed culture at the KRC farm facility. They were taken to crab farms of progressive farmers in Namkhana and composite aquaculture farms in Henry Island, operated by West Bengal State Fisheries Development Corporation. The participants also benefitted from the guest lecture on nutrition and feed management in freshwater aquaculture delivered by Dr. G.H. Pailan, Officer-in-Charge, Kolkata Centre of CIFE, Kolkata. The certificates were issued on successful completion of the training programme.

Hands on 'Training on Diagnostics and Management of *Enterocytozoon hepatopenaei* in Shrimp'

ICAR-CIBA conducted a six-day "Hands-on training on diagnostics and management of *Enterocytozoon hepatopenaei* (EHP) in shrimp" from 25th to 30th October 2021 to the shrimp farmers, consultants and stakeholders. Dr. K.P. Jithendran, Director, ICAR-CIBA, inaugurated the training program and briefed the importance of the training, as the *Hepatopancreatic microsporidiosis* (HPM) caused by EHP is the major disease-causing economic losses in shrimp farming in the country. Seven trainees from Andhra Pradesh, Kerala and Rajasthan participated in the program. There were 24 sessions (13 theory and 11 practical classes) with elaborate discussions on the overview of the disease, clinical signs, transmission, pathogenesis, diagnostics, economic loss, management and control of the disease. The trainees were given hands-on training on disease diagnosis, starting from microscopy to advanced molecular diagnostic methods. The valedictory session was held on 30th October 2021 with Dr. Bhaskaran Ravi Latha, Professor & Head, Department of Veterinary Parasitology, Madras Veterinary College, TANUVAS as the chief guest. She delivered a special lecture on parasites sustenance in other hosts and the importance of developing farm-level diagnostics. The chief guest distributed the certificates to the trainees.

Hands on 'Training on Shrimp and Mud Crab Aquaculture: A Practical Exposure'

ICAR-CIBA, Chennai conducted a six-day hands-on "Training on Shrimp and Mud Crab Aquaculture: A practical exposure" from 20th to 25th September 2021 for beginners in brackishwater crustacean farming. Dr. K.P. Jithendran, Director, ICAR-CIBA, inaugurated the training program ensured a hands-on experience through the training program. Dr. C.P. Balasubramanian, SIC, CCD, explained the genesis of the training program. Eight trainees from the states of Andhra Pradesh, Tamil Nadu, Kerala, Maharashtra and Assam participated in the program. The training covered pre-stocking, post stocking, feeding, health management in shrimp and mud crab farming and economics.

A special lecture was delivered by Shri John, Matha Shrimp hatchery, Patipulam, Chengalpattu district on the selection of quality shrimp seed. The practical classes for counting, age determination and quality assessment of post-larvae was arranged in Hisun shrimp hatchery, Patipulam. The chief guest Dr. V. Kripa, Member secretary, Coastal Aquaculture Authority (CAA), Chennai, also delivered a special invited lecture on the regulatory aspects and licensing of the coastal aqua farms.

Skill Development Programme on 'Farming and Seed Production Technologies of Brackishwater Fishes'

A six-day training programme on "Farming and seed production technology of brackishwater fishes" was conducted from 18th to 23rd December 2021 at KRC-CIBA. A total of 27 participants consisted of farmers, entrepreneurs, aquaculture consultants and students from West Bengal and Odisha. The training program covered fish breeding, nursery rearing, grow-out culture, live feed culture, feed formulation, soil-water quality management and fish diseases. The trainees learned about brackishwater farming models *viz.*, periphyton, polyculture, recirculatory aquaculture system and integrated multi-trophic aquaculture (IMTA). They were also taken for an exposure visit to the multi-species fish-breeding hatchery at Mohanpur.

Seed production and distribution

Asian seabass

A total of 10,20,250 nos of seabass seeds produced from the fish hatchery, MES, ICAR-CIBA from June to December 2021 were distributed to 42 farmers and the revenue of ₹22,59,740 was generated through the sales. In addition to that, 17.2 lakhs of seabass fertilized eggs were supplied for ₹4.23 lakhs during the period of July to December 2021 to M/s. CANARES Aqua LLP, Kumta, Karnataka for larval rearing.

Milkfish

Sixty-nine thousand four hundred twenty milkfish seeds were produced at the finfish hatchery, MES, and sold to the fourteen farmers from Kerala, Gujarat, Tamil Nadu, Odisha, West Bengal, Andhra Pradesh, and Uttar Pradesh and given to in-house different SCSP/ TSP programs. Total revenue of ₹2.41 lakhs was generated from the milkfish seed sale from June to December 2021.

Participation in Exhibitions

KRC of ICAR-CIBA participated in the 24th National Agriculture Exhibition at Science City, Kolkata

An exhibition was organized by the Central Calcutta Science & Culture Organization for Youth from 28th-31st October 2021. About 28 organizations of Central and State Governments participated in the event. Hon'ble Member of Parliament (Lok Sabha) Prof. Saugata Roy and other dignitaries visited the CIBA Exhibition stall and appreciated CIBA's effort in popularizing brackishwater fish and shrimp farming in our country. The farming practices of major candidate species of shrimp viz., *Penaeus vannamei*, *Penaeus indicus*, *Penaeus monodon*, mud crab (*Scylla serrata*), finfishes such as hilsa (*Tenualosa ilisha*), Asian seabass (*Lates calcarifer*), milkfish (*Chanos chanos*), pearlspot (*Etroplus* spp.), modular breeding techniques, major diseases and their

management in shrimp and finfishes were exhibited. Plankton^{Plus}, Horti^{Plus}, feeds developed for shrimp, crab and finfishes were also displayed. About 2,000 students, entrepreneurs and farmers visited the CIBA stall during the exhibition. Booklet of CIBA technologies in the Bengali language was distributed to the visitors.

NGRC-CIBA, Navsari organized CIBA exhibition stall in the "Pre-Vibrant Gujarat Summit – 2021", Anand agricultural university, Anand, Gujarat

ICAR-CIBA, Chennai participated and organized an exhibition stall in the "Pre-Vibrant Gujarat Summit – 2021" organized by the Department of Agriculture, Farmers Welfare and Co-operation, Government of Gujarat at the Anand Agricultural University, Anand, Gujarat, from 14th to 16th December 2021. Shri. Acharya Devvrat, Hon'ble Governor of Gujarat and Shri. Parshottam Rupala, Hon'ble Union Minister of Fisheries, Animal Husbandry and Dairying - Government of India inaugurated the summit and exhibition on 14th December 2021.

The summit's central theme was "From Aatmanirbhar Gujarat to Aatmanirbhar Bharat,' and the exhibition was organized mainly to showcase agriculture and fisheries new innovative farming technologies for the employment of youths, farmers and entrepreneurs.

The ICAR-CIBA stall in the national summit showcased the scientific accomplishments, technical know-how developed and transferred by CIBA to develop brackishwater aquaculture in the country. The major exhibits displayed include farming practices of the candidate brackishwater aquaculture species, modular breeding techniques, major diseases and their management in shrimp and finfishes, Plankton^{Plus}, Horti^{Plus} and feeds. About 2000 students, entrepreneurs, farmers and officials of different government organizations visited the CIBA stall during the three-day exhibition. The visitors were given publications on CIBA technologies in English and Gujarati language.

CIBA in

News & Media

Transfers/Promotions/Superannuation

Inter-Institutional Transfers

From ICAR- CMFRI, Mandapam Regional Centre to ICAR - CIBA, Chennai

Dr. Rengarajan Jayakumar
Principal Scientist
20.10.2021

From ICAR- CMFRI, Chennai to ICAR- CIBA, Chennai on Deputation basis

Shri. R. Raja Sekar
Lower Division Clerk
(Deputation Basis)
01.11.2021

From ICAR-CIBA Headquarters, Chennai to ICAR- CRIDA, Hyderabad

Dr. Suvana Sukumaran
Scientist
12.11.2021

Promotions

Shri. P. Srikanth
Assistant Finance
& Accounts Officer
26.06.2021

Shri. K.G. Gopala Krishna Murthy
Private Secretary
26.06.2021

Smt. K. Hemalatha
Personal Assistant
26.06.2021

Shri. R. Kumaresan
Upper Division Clerk
26.06.2021

Shri. A. Paul Peter
Upper Division Clerk
26.06.2021

Superannuations

Shri. Elankovan
Chief Technical Officer
01.06.2021

Shri. K. Nithyanandam
Skilled Support Staff
31.07.2021

Resignation

Ms. Christina Lalramchhani
Scientist
28.07.2021

Ph.D.'s Awarded

Mr. C.P. Binesh

Thesis Title :
Betanodaviruses in fishes: Molecular surveillance, phylogenetic and development of a diagnostic assay

Supervisor & Guide :
Dr. K.P. Jithendran

Date of Award :
30.09.2021

Ms. P. Saikrithi

Thesis Title :
Molecular mechanism of neurotransmitters mediated regulation of ovarian maturation in *Penaeus indicus.*

Supervisor & Guide :
Dr. Sherly Tomy

Date of Award :
1.12.2021

Mr. C. Bala Amarnath

Thesis Title :
Possibility of combined silencing of host and viral genes, as a strategy for better survivability of *Penaeus vannamei* against WSSV infection

Supervisor & Guide :
Dr. Subhendu Kumar Otta

Date of Award :
23.12.2021

"Brackishwater aquaculture for food, employment and prosperity"

Pre-Vibrant Gujarat Summit 2021

Agro & Food Processing: Entering a new era of Co-operation

14th to 16th December, 2021

Anand Agricultural University, Anand, Gujarat

Agricultural, Farmers Welfare and Co-operation Department, Government of Gujarat

Exchange of MoU between ICAR-CIBA and Dept. of Fisheries, Govt. of Gujarat for transfer of farmland to promote brackishwater aquaculture at Gujarat region

ICAR-Central Institute of Brackishwater Aquaculture

ISO 9001:2015 Certified

75, Santhome High Road, M.R.C. Nagar, Chennai - 600 028

Phone: 044-24610565, 24618817, 24616948, Telefax: 044-24613818, 24610311

Email: director.ciba@icar.gov.in, Website: www.ciba.res.in

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