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## News Highlights



Most of the global finfish mariculture production comes from net cages. However, coastal net cage farming has many disadvantages. Firstly, more than 70 % of the nitrogen given as feed in cages is lost to the open water polluting the environment and large-scale adoption of coastal cage culture will inevitably lead to massive self-pollution, besides economic losses due to parasitic and viral diseases emerging from the polluted ecosystem. In addition, the cages are vulnerable to natural calamities such as high waves, wind and floods leading to huge crop losses. Hence, globally land-based RAS is gaining popularity, especially for the production of high-value finfishes as it offers many advantages such as total control over most of the critical water quality parameters, and limited use of land and water while maximising production. This production mode which is sustainable, eco-friendly and

bio-secure offers flexibility in the site and species selection as well as easy and total harvesting and planned production cycles, irrespective of the seasons. High capital cost which is one of the major bottlenecks in the land-based RAS can only be offset by adopting an intensive farming mode.

To develop land-based super-intensive farming technology Vizhinjam Regional Centre of ICAR-CMFRI set up a system comprised of a 30-ton dual-drain tank, balancing tank, drum filter, foam fractionator, biological filter, degassing unit, cartridge filter, UV filter, oxygen concentrator and Speece cones (down-flow bubble contactor). The dual drain system helps to remove the concentrated waste through the central drain and the side drain helps to remove the surface film and part of the circulating water. The balancing tank regulates the amount of water going out through these drains. The drum filter

helps to remove particles larger than 60 microns from the circulating water whereas the foam fractionator removes dissolved and colloidal organic matter and particles less than 60 microns. The biological filter removes ammonia by nitrification whereas degassing unit strips CO<sub>2</sub> and other harmful gases. The cartridge filter removes any particulate matter left in the water before it enters the UV filter which eliminates parasites, bacteria and viruses. The oxygen concentrator-Speece cone assembly helps to maximise the dissolution of pure oxygen into the system water to sustain the high stocking density. The system will be used to develop and fine-tune a super-intensive mode of production. Preliminary results of studies done in the Fingerling Production Units (PFU) have given excellent growth.

Reported by: M. K Anil, Raju B, Jose Kingsly and Anand V ♦



Sustainable fishing, balancing the economic and livelihood needs as well as environmental concerns are key to a healthy marine ecosystem. Over the past few decades, climate change and related marine heat-waves have become disruptive, with significant socio-economic ramifications. Hence it requires effective responses from all stakeholders, including researchers. Seaweeds are good for carbon sequestration as well as yield highly valued products and hence focussed under the fisheries development programmes of the Government of India. ICAR-CMFRI has a geo-referenced database of 342 suitable seaweed farming sites across the country and also actively researching on its micropropagation techniques. Efforts to build a land based super-intensive fish farming technology using RAS has also demonstrated encouraging results and needs to be taken forward.

With best wishes

**A. Gopalakrishnan**

Director, ICAR-CMFRI



# Successful Grow-out in marine cages for *Lutjanus johnii*



Seed of John's snapper (*Lutjanus johnii*) produced at Visakhapatnam Regional Centre of ICAR-CMFRI were stocked in marine cages at Ramakrishna Beach, Visakhapatnam as a research activity to understand growth and adoptability in confined marine cages. The fishes of  $8.0 \pm 2.5.0g$  were stocked on 20<sup>th</sup> April, 2021 at stocking density of 25 numbers/m<sup>3</sup> in single cage with inner net of 10.0 mm mesh size. The stocked advance fish fingerlings were fed with high nutritional diet (45% protein and 10% fat), supplemented with minced meat. Upon reaching 150 g in size after five months, the fishes were transferred in to cage with inner net of 25 mm mesh size. Thereafter, the fishes were fed with feed containing 40% protein and 10% fat along with small cut piece of low valued fishes such as

sardine and scads, twice a day. In grow-out culture system, the culture fishes were showed better preference for low valued fish than, pelleted feed. However, mixed feeding with artificial pelleted feed and trash fishes showed better growth. After 12 months of grow-out culture in April, 2022, the stocked fish had reached an average size of  $1125.0 \pm 50.0 g$ . The initial grow-out culture trail showed that fish is having moderate growth rate with better adoptability to the marine cages. However, further studies are being carried out for better understanding the growth patten, optimum feed requirements in commercial grow-out culture systems.

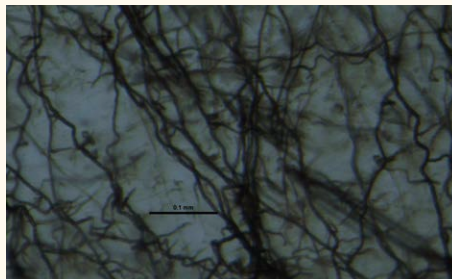
Reported by Sekar Megarajan, Ritesh Ranjan, Biji Xavier, Shubhadeep Ghosh, Jayasree Loka, B. Chinni Babu, and R. D. Suresh, Visakhapatnam Regional Centre ♦



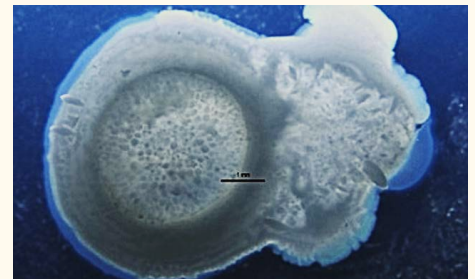
# Regeneration of plantlet in seaweeds through micropropagation

Remarkable achievements were made by ICAR-CMFRI in the micropropagation of marine algae in controlled environmental condition with manipulation of plant growth hormone, light intensity, photoperiod and dark incubation. Initially there was success in formation of profuse branching of explants in *Kappaphycus alvarezii*, *Gracilaria foliifera*, *G. crassa* and *G. edulis* followed by callus growth in most of the algae belonging to Chlorophyceae (*Ulva lactuca*, *Halimeda gracilis*, *Codium tomentosum*), Phaeophyceae (*Turbinaria ornata*, *T. conoides*, *Sargassum wightii*, *Dictyota dichotoma*) and from Rhodophyceae (*Gracilaria edulis*, *G. crassa*, *G. foliifera*, *G. dura*, *Acanthophora spicifera*, *Gelidiella acerosa* and *Kappaphycus alvarezii*). Also there was unique observations on the microscopic gametophytic like stages in most of the red algae (*Gracilaria corticata*, *G. dura*, *Acanthophora spicifera* and *Kappaphycus alvarezii*), plantlet formation in green algae from zoospore, spore development from the explants of tetrasporophytic plants of *Gelidiella acerosa*, calcium crystal formation in the micro propagated alga of *Halimeda gracilis* and finally the plantlet with profuse robust branching in *Kappaphycus alvarezii*. Micropropagation is the method of large production of plants in less time. In this method, a small piece of plant tissue (explant) is cultured in a sterile medium which later develops into new plantlets. Micropropagation facilitates the growth, storage, and maintenance of a large number of plants in small spaces which makes it a cost-effective process. The success in the plantlet formation in the laboratory condition will definitely pave the way for seed production of *Kappaphycus* in large quantity through micropropagation and also transporting the explants to distance places without any problem.

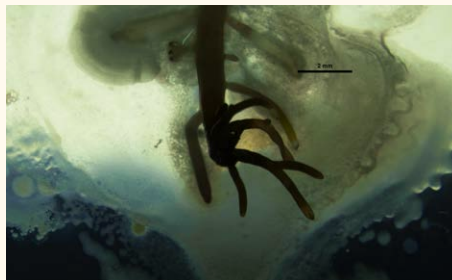
Reported by Reeta Jayasankar & Reena Joseph ◆



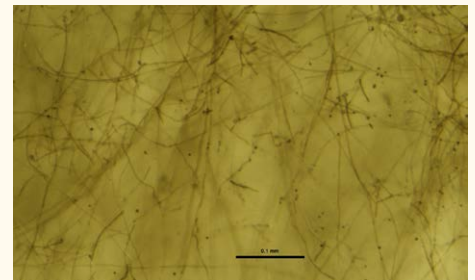
Branching of *Kappaphycus*



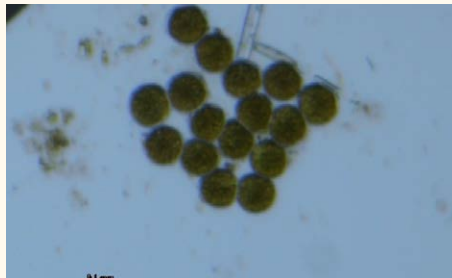
Callus of *Kappaphycus*



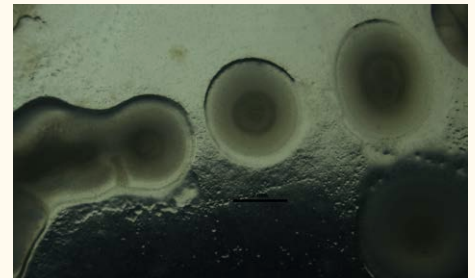
Callus of *Gelidiella*



Gametophytic like structure in *G. dura*



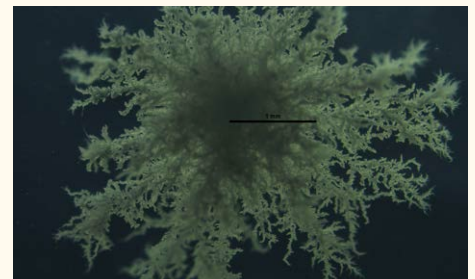
Tetraspores of *Gelidiella*



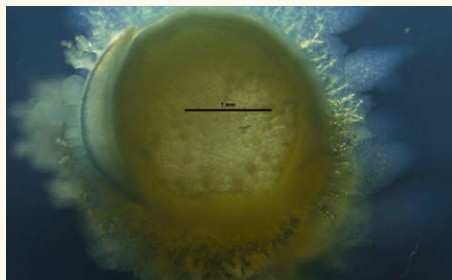
Spores of *Gracilaria edulis*



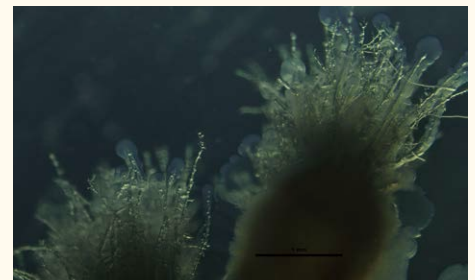
Calcium crystals of *Halimeda gracilis*



Plantlet of *Acanthophora*



Plantlet of *Kappaphycus*

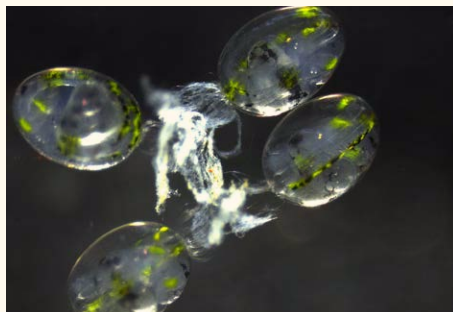


Plantlet of *Kappaphycus*

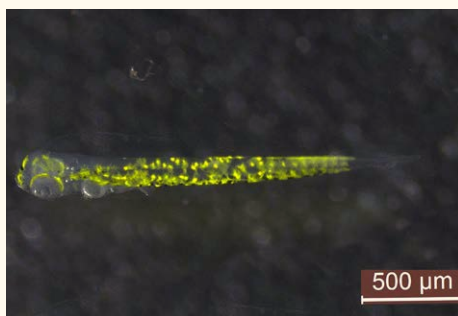
# Marine ornamental Black-bar chromis successfully bred in hatchery



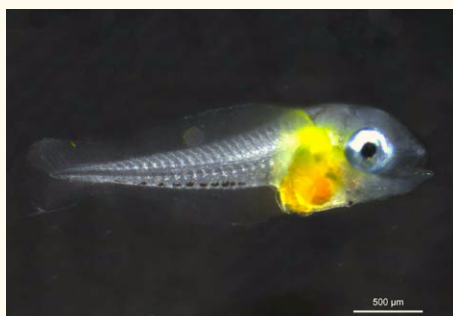
Broodstock of black-bar chromis



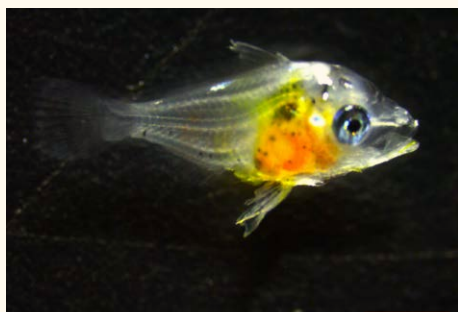
Eggs



Newly hatched larvae



Preflexion larvae



Flexion larvae



Post flexion larvae

Broodstock development, breeding, and larval rearing of Black-bar chromis, *Pycnochromis retrofasciatus* (Weber, 1913) was successful in the Vizhinjam Regional Centre of ICAR-CMFRI. Ten sub-adults of black-bar chromis measuring around 3 cm were reared in circular HDPE tanks of 500 L capacity having a simple biofilter setup. Fishes were fed with commercial pellet feeds (0.5-0.8 mm) and fresh feed and after 4 months started spawning. Spawning occurred in the early mornings and the eggs were attached to the PVC pipes provided as substratum. Eggs per spawning ranged from 50-200, were ellipsoid in shape and hatched within 36-38 hours. The newly hatched larvae had very little yolk and started feeding from 2 dph onwards. Selected copepods were given as live feed till the completion of the flexion stage and they completed the metamorphosis by the 45<sup>th</sup> dph. Black-bar chromis a popular and important marine ornamental fish recommended for community aquariums is categorized as one of the most difficult fish to breed.

Reported by: Ambarish P. Gop, B. Santhosh, M. K. Anil, Muhammed Anzeer, K. S. Aneesh, A. R. Akhil, Vizhinjam Regional Centre ♦

## Recognition for research on fish genetics

The VASVIK (Vividhlaxi Audyogik Samshodhan Vikas Kendra) Industrial Research Award for the year 2020 in the category of Agricultural Sciences and Technology was awarded to Dr. A. Gopalakrishnan, Director ICAR-CMFRI. The award includes a cash prize of ₹1.51 lakh and citation, which is in recognition of his significant research contribution on fish genetics. The award committee observed that genetic studies conducted and the technologies developed have served to produce molecular markers for many endangered fishes which is crucial for biodiversity conservation.







## Invasive mussel species, *Mytella strigata* recorded in Mumbai

The mussel, *Mytella strigata* (Hanley, 1843) native to Central and South America, was observed in the middle stretches of the Thane creek. It was found attached to the concrete structures, fishing nets, fishing boat hull of the Cuffe Parade fishing landing centre, Mumbai. This species is known to live in a wide range of salinity and is found to compete with locally available bivalves beds. The species size range observed was 3-38.1 mm. The salinity range observed in Thane Creek was 9.5–31.88 ppt. Occurrence of this invasive species has earlier been recorded from Kerala and Karnataka also and its life history studied by researchers in ICAR-CMFRI.

Reported by S. Ramkumar, N. B. Santosh, D. M. Vaibhav, A. K. Punam, H. R. Umesh, T. Vaibhav, C. Ashish and P. Laxmilatha ♦

## First demonstration farming of Indian Pompano in Karnataka

In the first demonstration farming of Indian pompano *Trachinotus mookalee* in Karnataka harvest after 7 months of culture period was done in June 2022, from marine cage farm operated by Karwar Regional Station of ICAR-CMFRI. Fish seed was procured from Vizhinjam Regional Centre and were fed with pellet feeds (Nutrila,

Growel, 40% CP). At the time of harvest, the fishes reached an average weight of  $360.6 \pm 64.4$  g from  $38.8 \pm 8.4$  g with a survival of 70%. The fishes were sold at a farm gate price of ₹400 per Kg.

Reported by A. Anuraj, P. P. Suresh Babu, Raghu Ramudu, N. G. Vaidya, Praveen Dube, Mahendra Pal and Harish Rathod, Karwar Regional Station ♦

## Marine microalgae mass production starts for aquafeed development

Microalgae are recognized as an alternative source of protein and fatty acids for use in fish feeds. ICAR-CMFRI has developed and standardized the pure and mass culture of marine microalgae using 'Green water techniques' for the seed production of high-value marine food fishes and ornamental fishes in India. The commercial production of marine microalgae is operating with Jemmax Nutraceuticals Pvt. Ltd, Tirunelveli in a consultancy mode under ICAR-CMFRI, Tuticorin Regional Station, Thoothukudi. The design consists of six twin-cement, open pond recirculation units (OPRe) (30×5×0.33 m) coated with food grade liners (non-foam PVC) of 150

tonnes of culture capacity each, having 300 m<sup>2</sup> area. The selected marine microalgae are *Nannochloropsis gaditana*, *Isochrysis galbana* and *Dunaliella salina*, maintained in the mother ponds as monoculture. The monoculture method is practiced for producing marine microalgae paste, powder, and algal meal, based on the requirement for the marine fish and shrimp hatcheries. The open pond was inoculated and held for 15 days with adequate nutrients under optimal water quality. The OPRe is fitted with paddle wheels of 2.5m length for uniform flow of culture at the rate of 16 rpm with a 2 hp motor. Carbon dioxide is typically bubbled for two hours a day at the bottom of the

raceways with diffuser systems at the rate of 2.5 kg/h. Each twin-pond yielded 5 kg of wet algal biomass from a single harvest on an alternate day basis using a high-speed tubular bowl centrifuge (16000 rpm) with a capacity of 5000l/h. The filtered culture water is re-circulated back to the OPRe for continuous microalgae production for 120 days. The production capacity of the one OPRe is 10 kg of wet biomass and dry algae powder production of 2.86 kg per day. The harvested algal paste was squished and placed under the solar drier, attached to a dehumidifier for 24 to 36 hours. The dried microalgae powder is utilized as protein supplement ingredient in aqua feed production.

Reported by C. Kalidas, D. Linga Prabu, L. Ranjith, M. Kavitha and P. S. Asha | Tuticorin Regional Station ICAR-CMFRI ♦



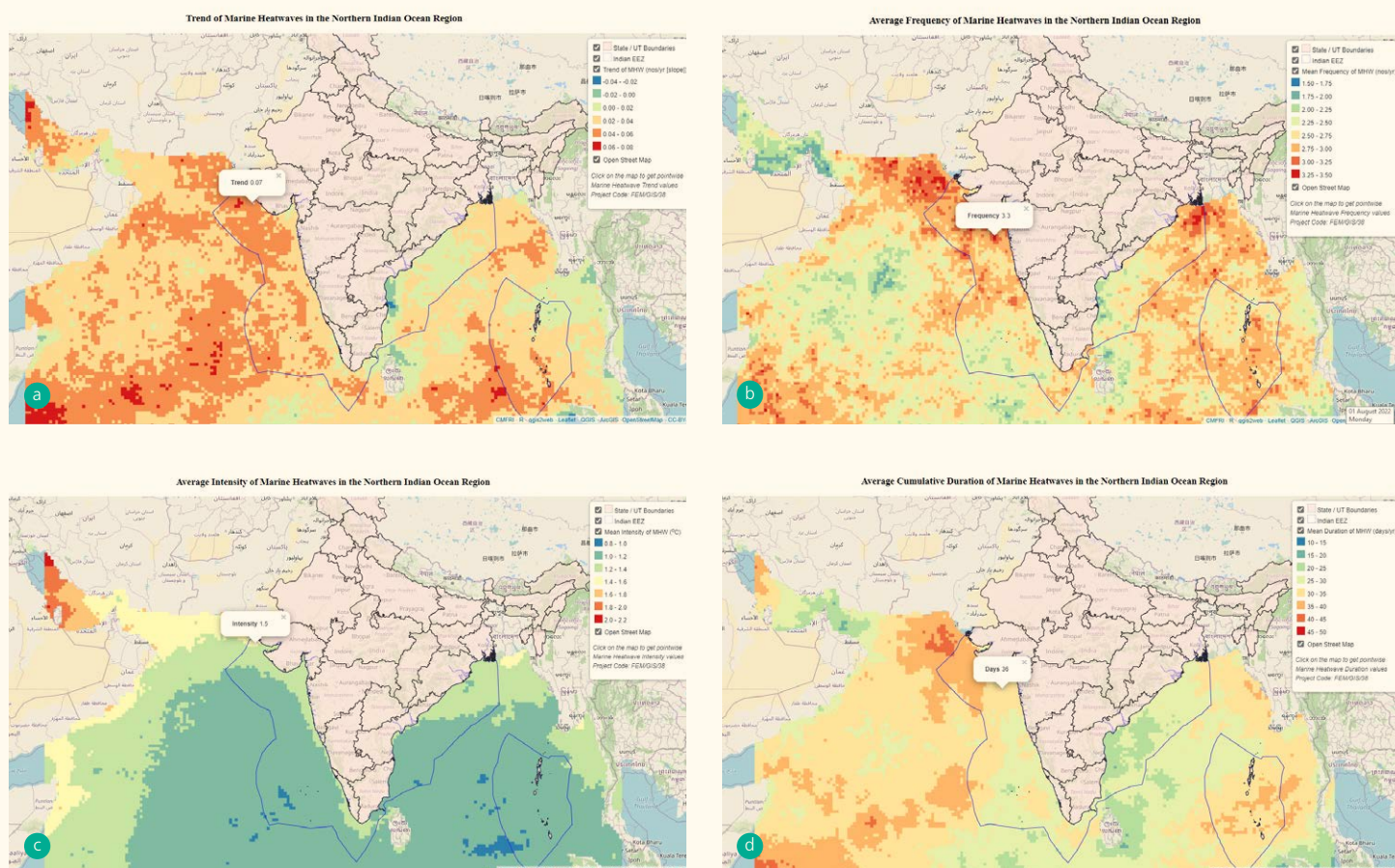
# Interactive map of marine heatwave characteristics of Northern Indian Ocean released

Following the global trends, the northern Indian Ocean (NIO) region is also witnessing increased occurrences of extreme weather events. Marine heatwaves are one of the most common extreme weather event that happens in the region, which interact with the marine ecosystems in multiple ways and its ramifications can be felt in the marine fish resources and the avian fauna. Understanding the characteristics of the marine heatwaves is very important and an interactive map projecting frequency, intensity, cumulative duration and trend of marine heatwaves in the NIO was developed. These interactive maps are available in the ICAR-CMFRI website for easy accessibility to the interested stakeholders with pop-up windows that can be clicked open for relevant information.

The pace of global warming is not equal throughout, likewise the trends in sea surface temperature (SST) are different for the Bay of Bengal and the Arabian Sea. The occurrence of marine heatwaves in the NIO region also shows a similar trend where the Arabian Sea exhibits an upward trend and the Bay of Bengal reveals a downward trend (Fig. 1). The coastal areas of Tamil Nadu and Andhra Pradesh are very clearly showing negative trends while the coastal areas of Gujarat and Maharashtra are showing positive trends. The mean frequency (number per year) of the marine heatwave occurrence ranges from 1.5 to 3.5 in the NIO region and the northeast Arabian Sea and the northwest Bay of Bengal recorded the highest values (Fig. 2). But the mean intensity of the

heatwaves in the NIO region indicates that the coastal areas experience more intense marine heatwaves ( $1.2 - 1.4^{\circ}\text{C}$ ) while the open ocean experience less intense ones ( $0.8 - 1.2^{\circ}\text{C}$ ) and the Persian Gulf experience the most intense ( $2.0 - 2.2^{\circ}\text{C}$ ) marine heatwaves (Fig. 3). The mean number of days in a year affected by the marine heatwaves is more in the southwest Arabian Sea (45-50 days) followed by the northeast Arabian Sea (40-45 days) (Fig. 4). On an average, the east coast of India experiences marine heat waves for 20-30 days, while the west coast experiences 25-35 days of marine heatwaves in a year.

Reported by Shelton Padua, D. Prema, R. Ratheesh Kumar, Reshma Gills, P. S. Asha, Bindu Sulochanan, Reeta Jayasankar, K. S. Sobhana, L. Loveson Edward, D. Ajay Nakhawa and P. Abdul Azeez ♦



Interactive map of marine heatwave characteristics – (a) trend, (b) frequency, (c) intensity and (d) duration



## Bhumija tribes of Odisha benefited from integrated farming practice

Under the TSP programme of Puri Field Centre of ICAR-CMFRI, the Bhumija tribal families of Jugadiha village (Balasore, Odisha) under the Nilamadhab SHG have been assisted with the necessary technology and farm inputs for the polyculture of grey mullets with black tiger shrimp in high saline coastal ponds, which was later integrated with a poultry farming system of the "Kuroiler" variety to reduce fertilization costs for the pond and generate additional income. The

culture practice was continued for 7 months and the produce was harvested by organizing a farmers fair cum harvest mela on 24.05.2022 to sensitise the fishermen about the benefits of the integrated farming practice. A total of 1271 kg of grey mullets, 156 kg of black tiger shrimps and 780 kg of chickens were harvested from the integrated culture system in a phased manner according to the local market demand and also to continuously fulfill the protein requirements of the tribal

families during the fishing ban period. The total revenues of ₹3,49,674 generated from the sale of fishes & shrimps and ₹1,17,000 from the sale of poultry were distributed to the beneficiaries in the SHG. The successful adoption of this integrated farming practice has strengthened the socio-economic status of the Bhumija tribes of Nilamadhab SHG in Odisha.

Reported by: Rajesh Kumar Pradhan, Gyanaranjan Dash, Swatipriyanka Sen Dash, Biswajit Dash and Madhumita Das ♦



## IMTA cages yield bountiful harvest

Inaugural of the Harvest Mela from Integrated Multitrophic Aquaculture (IMTA) demonstration cages under All India Network Project on Mariculture, at Harwada, Uttara Kannada was done on 13-5-2022 by Dr. A. Gopalakrishnan, Director, ICAR-Central Marine Fisheries Research. Under the technical guidance of Karwar Regional Station of ICAR-CMFRI, a fishermen self-help group, Shri Vigneswara Prasanna, carried out the IMTA in two 6m diameter galvanised iron (GI) marine cages at Harwada, Uttara Kannada. The cages were stocked with seabass (*Lates calcarifer*) and silver pompano (*Trachinotus blochii*) while seeded ropes of green mussel, *Perna viridis* were tied on the outer frame

of the marine cages. A total of 300 kg of seabass, 100 kg of pompano and 150 kg of green mussels were harvested after 135 days of culture.

The IMTA demonstration cage at Koderi, Udipi comprising 398 kg of seabass and

60 kg of green mussels was also harvested on 26-5-2022 by fishermen self-help group, Karavali friends.

Reported by A. Anuraj, P. P. Suresh Babu, Mr. Raghu Ramudu, Mr. N. G. Vaidya, Praveen Dube, Mahendra Pal, Harish Rathod and P. Anjulekshmi ♦





# Sea ranching of the green tiger shrimp *Penaeus semisulcatus*

Under the Central Sector Scheme component of 'Pradhan Mantri Matsya Sampada Yojana' (PMMSY) 8.31 million green tiger shrimp *Penaeus semisulcatus* seeds of PL 25- 40 were sea ranched at Palk Bay during April to June, 2022. With

the funding support of Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Govt. of India, release of 200 million Green tiger shrimp post larvae in a period of four years (2022-2026) in Palk Bay and Gulf of Mannar

region of Tamil Nadu with a total budget of ₹168.948 lakhs is envisaged. The Mandapam Regional Centre of ICAR-CMFRI is implementing the programme and fishermen have enthusiastically supported it as it will be helpful in replenishing the green tiger shrimp stock.

Reported by G. Tamilmani, B. Johnson, M. Sakthivel, P. Rameshkumar, K. K. Anikuttan, R. Vinothkumar and R. Bavithra, Mandapam Regional Centre ◆



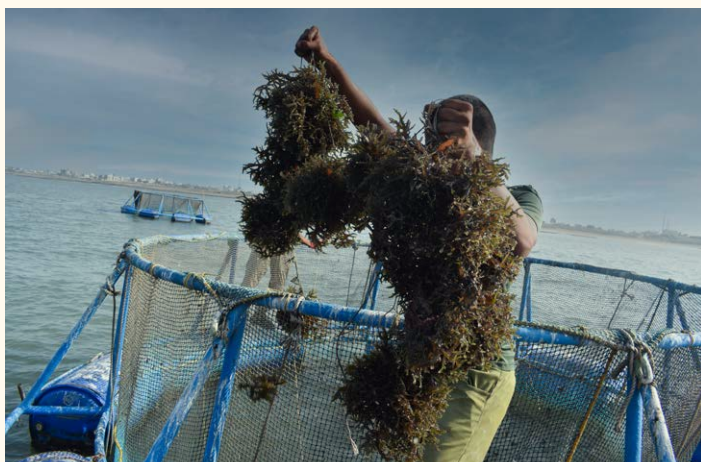
## Open sea cage farming enthuses Sidi tribes

In continuation to the 10<sup>th</sup> consequent successful grow-out of Lobster (*Panulirus polyphagus*) sea cage farms off Prabhas Patan, Veraval by the local Sidi tribal community under Tribal Sub-Plan (TSP) of ICAR-CMFRI, sea cage farm harvest mela was organized on 21.04.2022. The on-board harvest mela was intended to enhance entrepreneurship capabilities and

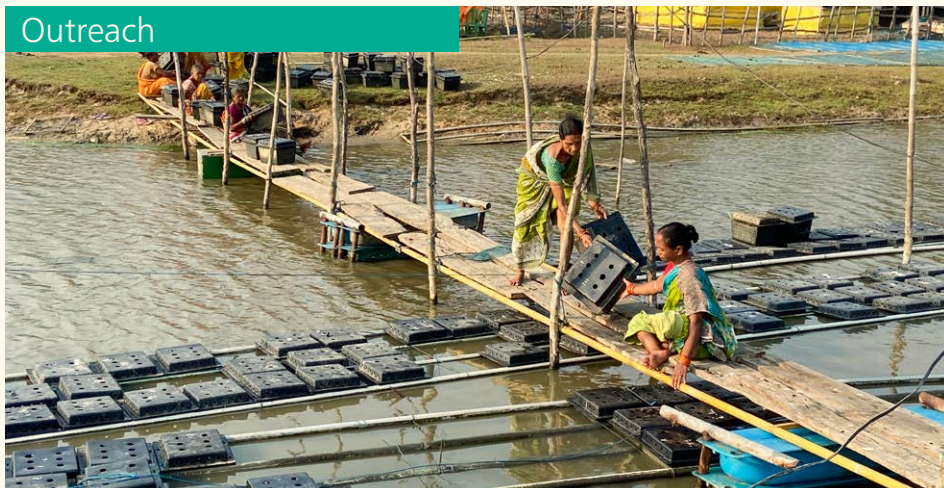
empower “Sidi” adivasi tribal communities and also spread awareness of open sea cage farming among various other stakeholders of Gujarat state. Integration of seaweed by involving the women enabled a sustainable livelihood model through IMTA in the same ecosystem. Capture-based mariculture of lobsters in cages and the harvest of seaweed is finding widespread acceptance

along Gujarat coast. Stakeholders from various groups, officials from the Indian Coast Guard Station, Veraval, NETFISH (MPEDA), and ICAR-CIFT witnessed the on-board harvest mela.

Reported by: D. Divu., Vinaykumar Vase, Suresh K. Mojjada, Rajankumar, R. Shikha, Abdul Azeez ♦







## Improved HDPE box culture for mud crab successful

A maiden attempt to support the scheduled caste fisher women adjacent to Chilika lagoon by the demonstration of mud crab rearing technique using floating HDPE boxes in coastal saline waters has been carried out by the Puri Field Centre of ICAR-CMFRI, Odisha under the SCSP programme. Twenty families of Chaubar Mahila Samiti SHG were trained and provided with all the necessary inputs for the rearing of mud crabs in HDPE boxes. Six

hundred boxes were stocked with the wild-caught juvenile mud crab, *Scylla serrata* (average body weight of 50g) from Chilika take and fed with fresh trash fish once daily. The water was exchanged fortnightly and the boxes were cleaned every month to prevent fouling of crabs as well as HDPE boxes. The crabs were grown for a period of 6 months, after which they were harvested by organizing a farmers fair cum harvest mela on 22.04.2022 to sensitise



the fishermen about the benefits of this improvised crab culture technique. As the crabs fetch more price than the watery crab in their post-moulting period, the harvest was done in a phased manner. A total of 132 kg of mud crab was harvested, which was sold at ₹820 per kg for crab weighing more than 500g and ₹630 per kg of crab weighing between 350-500g. A total revenue of ₹1,03,000.00 was earned and distributed among the beneficiaries of the SHG. The successful demonstration of this crab culture technique has helped the marginalized women fishers to strengthen their socio-economic status by ensuring additional income from this culture technique.

Reported by: Gyanaranjan Dash, Swatipriyanka Sen Dash, Rajesh Kumar Pradhan, Biswajit Dash and Madhumita Das ♦



Hatchery produced Indian was stocked in 6 meter diameter HDPE cage with 4 meter net depth. A total of two different cages were stocked during September 2021 with advanced fingerlings of  $25.0 \pm 5.0$  in size at stocking density of 25 no/m<sup>3</sup>. The fish fingerlings were fed with pellet feed containing 40% protein and 10% fat twice a day. The grow out cultured

fishes were harvested at an average size of  $710.0 \pm 50.0$ g on 22<sup>nd</sup> April, 2022 after approximately eight months of culture. A total of 2.9 tonnes of Indian pompano were harvested with an average production of 1.45 tonnes/cage/eighth months. The fish harvested were sold to different traders in Visakhapatnam and Chennai @ ₹310/kg. The cages were

managed by Traditionally Mutually Aided Fisherman Cooperative Society, Pedda Jalaripettai, Visakhapatnam with technical support from Visakhapatnam Regional Centre of ICAR-CMFRI.

Reported by Sekar Megarajan, Ritesh Ranjan, Biji Xavier, Shubhadeep Ghosh, Jeyasree Loka and R. D. Suresh, Visakhapatnam Regional Centre ♦





## Polyculture in high saline ponds successfully demonstrated in Odisha

The demonstration of polyculture of mullets with black tiger shrimp in the high saline coastal pond has been carried out in Odisha. Wild caught seeds of flathead grey mullet (*Mugil cephalus*), tade grey mullet (*Planiliza planiceps*), and post-larvae of black tiger shrimp (*Penaeus monodon*) along with the necessary farm and technology inputs were provided to the Kaibarta scheduled caste beneficiaries under the Maa Banasital

SHG of Jugadiha (Balasore) through the SCSP programme of ICAR-CMFRI. The cultured species were given commercial feed pellets and grown for a period of 7 months, after which they were harvested. The fishermen were sensitised about the benefits of the polyculture farming practice by organizing a farmers fair cum harvest mela on 25.05.2022. A total produce of about 557 kg of mullet with 82 kg of black tiger prawn was harvested from the

polyculture ponds in a phased manner to earn better returns from the local market. Total revenue of ₹1,43,375 obtained from the sale of fish and shrimp was distributed to the beneficiaries in the SHG. Apart from this, the nutritional security of the families was also ensured by the availability of farmed fishes and prawns during the fishing ban period. The successful adoption of this polyculture practice has strengthened the socio-economic status of the Kaibarta beneficiaries of Maa Banasital SHG in Odisha.

Reported by: Swatipriyanka Sen Dash, Rajesh Kumar Pradhan, Gyanaranjan Dash, Biswajit Dash and Madhumita Das ♦

## Asian Seabass farming successfully completed under Scheduled Caste Sub Plan



The Karwar Regional Station of ICAR-CMFRI extended support to a scheduled caste group "Adimaya" to carry out cage farming of Asian seabass in two 6 m x 3 m x 3 m cages in Panchagangavalli River at Tallur, Udupi district, Karnataka under the SCSP programme operated in the institute. The group reaped a harvest of 1054 kg of fishes after 135 days of culture with an average survival of 93.5%. The group earned a revenue of ₹3,30,000 through the sale of fishes.

Reported by A. Anuraj, P. P. Suresh Babu, Raghu Ramudu, N. G. Vaidya, Praveen Dube and Harish Rathod ♦





## Harvest of farmed Indian pompano in GI cages



Hatchery reared Indian pompano were stocked in two numbers of coastal estuarine cages in Kothanavarasapuram Village, Narasapuram Mandal, West Godavari District, Andhra Pradesh under Tribal Sub Plan (TSP) Component. Two Galvanised Iron cages of 5.0 x 5.0 m size with 3.0 m net depth were stocked on 2<sup>nd</sup> February 2022 with nursery reared Indian pompano of  $14.0 \pm 2.0$  g in weight @ 20 numbers/m<sup>3</sup>. Stocked fishes were fed with high nutrition diet of 40% crude protein and 10% crude fat. Fishes were fed five times in a day at 8.0 to 3.0% of body weight according to size. The fishes were reared to an average size of  $490.0 \pm 50.0$  g for five months and harvested on 30<sup>th</sup> June 2022. The harvest programme was given wide publicity and fishes sold at farm gate price of ₹300 per kg to buyers from Karnataka. The profit was shared beneficiaries of Yenadi community who managed the cages under the TSP component.

Reported by Sekar Megarajan, Ritesh Ranjan, Shubhadeep Ghosh, Biji Xavier, Jeyasree Loka and Nagaraju Panchakarla ♦

## Farming by Yenathi tribe under TSP

Wild Asian seabass was stocked in 2 estuarine cages at Etipagaru Pallipalem Village, Kruthivennu Mandal, Krishna District, Andhra Pradesh under Tribal Sub plan (TSP) component with beneficiaries belonging to Yenathi community. The cages were made using Galvanised Iron (GI) pipes of 5.0 x 5.0 m size with 2.5 m net depth. The GI cages were stocked during July, 2021 with nursery reared Asian Seabass of  $90.0 \pm 5.0$  g in weight @ 15 numbers/m<sup>3</sup>. Stocked fishes were fed with chopped Tilapia, twice a day at 5.0 to 3.0% of body weight depending on the fish growth during different periods. The fish in grow-out cages were reared for 11 months and harvested on 6<sup>th</sup> June, 2022. During the culture, fish had attained an average size of 1.24 kg ranging from 0.8 to 1.84 kg. A total of 1350 kg of fishes were harvested from the two cages in the harvest programme attended by aqua farmers, beneficiaries and members of ICAR- CMFRI. Harvested fish was sold at the rate of ₹420/kg and the income was shared by the beneficiaries.

Reported by Sekar Megarajan, Ritesh Ranjan, Shubhadeep Ghosh, Biji Xavier, Jeyasree Loka and Nagaraju Panchakarla; Visakhapatnam Regional Centre ♦







## Harvest of cage farmed Cobia by SCSP beneficiaries at Mandapam

Sea cage farming activity under the Scheduled Caste Sub-Plan (SCSP) was implemented at Mandapam in Ramanathapuram district of Tamil Nadu during 2021-2022. As this village is located near the sea shore cage farming activity can be easily adopted by the beneficiaries and they had shown keen interest to take up

cage farming as an additional livelihood activity. A total of 10 fishermen in 2 groups, were selected for undertaking sea cage farming. Two numbers of 6m diameter HDPE cages were fabricated and each cage was stocked with 450 numbers of Cobia seeds of an average weight of 50grams during the month of November, 2021. All the

inputs were given to the beneficiaries by the Mandapam regional Centre of ICAR-CMFRI. Fishes were fed with low value fishes at the rate of 8-10% initially and it was reduced to 5% after 3 months. Net exchange was done by the beneficiaries once in 2 months. Scientists and technical staff of the Centre regularly monitored the cage farming activity and extended technology support to the beneficiaries on cage installation, seed stocking, net exchange, feeding and health management till the harvest.

Due to the prevailing rough weather conditions during trawl fishing ban period and resulting non-availability of trash fish for feeding, premature harvest of cobia was done on 19<sup>th</sup> May and 21<sup>st</sup> May, 2022. The culture period was about 6 months with a final survival of 68% and an average size of 1.2 kg. The farm gate price of harvested fishes was ₹390 per Kg. A total revenue of ₹2,86,416/- was obtained by the beneficiaries by selling 734.4 kg of farmed cobia. Appropriate COVID-19 precautions were adopted by the beneficiaries during the entire culture period and harvest.

Reported by G. Tamilmani, M. Sakthivel, K. K. Anikuttan, P. Rameshkumar and B. Johnson ♦

## Harvest Mela of Oyster and Mussel held in Kodungallur



Under ICAR-CMFRI's project for popularising the less expensive farming methods among the Scheduled Caste members across the coastal states under the Scheduled Caste Sub Plan (SCSP) Project of the Indian Council of Agricultural Research (ICAR), Govt. of India, the institute had installed 10 oyster farms and 3 mussel

farms. Scientific, technical and financial support in oyster and mussel farming was extended to 40 and 10 Scheduled Caste families respectively in Kodungallur Municipality, Thrissur. The Harvest Mela arranged at Chalakkulam, Kodungallur on 13<sup>th</sup> June, 2022, was inaugurated by Smt. M. U. Shinija, the Chairperson of Kodungallur

Municipality. Dr. P. Laxmilatha, Shellfish Fisheries Division, Dr. K. Madhu, SCSP Chairman, Dr. Rema Madhu, and Dr. Vidya R from ICAR-CMFRI were also present at the function.

Reported by R. Vidya, P. Laxmilatha, P. S. Alloyious, B. Jenni, K. K. Sajikumar and K. M. Jestin Joy ♦



## Green Mussel Harvest under All India Network Project of Mariculture

Demonstration farming of green mussel, *Perna viridis* was carried out at Gangavali, Ankola, Uttara Kannada under All India Network Project of Mariculture (AINP-M). In a period of 4 months, seeded mussel ropes reached an average weight of 7.5 kg from an initial average weight of 1.8 kg.

Reported by P. P. Suresh Babu, A. Anuraj, Raghu Ramudu, N. G. Vaidya, Praveen Dube, Mahendra Pal and P. Anjulekshmi ♦



## Successful harvest of farmed oyster at moothakunnam

Women farmers in Moothakunnam and Chettuva have had a bumper harvest of green mussels under the guidance of ICAR-Central Marine Fisheries Research Institute. Kudumbashree units harvested a yield of 1.5 tonnes of mussels from Moothakunnam and 350 kg from Chettuva on June 13. They started farming in December last

year in mussel farms (racks) made of bamboo poles. Depurated mussel meat from the farms was sold through the Agriculture Technology Information Centre (ATIC) of ICAR-CMFRI to the public at ₹200/250-g.



## Efforts to rejuvenate Black clam beds in Vembanad Lake yield results

Aimed at enhancing production and sustaining the black clam, *Villorita cyprinoides* fishery of Vembanad Lake which provides livelihood to over 5000 clam fishers, baby clams were re-laid in suitable areas on the northern side of the Thanneermukkom barrage of Vembanad Lake. This effort has yielded results with fishermen starting to

harvest good catch from the region and the relaying programme is expected to bring out a 10 fold, increase in the clam production. Approximately 140 tonnes and 60 tonnes of baby black clams were relayed in Keecheri and Chakkathukadu areas of the Vembanad Lake respectively under the technical guidance of ICAR-

CMFRI. Now, fishermen under the Keecheri Ulnadan Matsya Thozhilali Sahakarana Sangham collect the clams using canoes from different locations and they sell clam meat for ₹150 per kg in the nearest market. Each canoe collects around 450 kg of clams per day. The success story of clam relaying programme in Vembanad Lake was telecast in the Malayalam DD News Channel.

Reported by: R. Vidya, P. Laxmilatha, V. Venkatesan, P. S. Alloyious, B. Jenni, K. K. Sajikumar and K. M. Jestin Joy ♦



## Training Programme on Natural farming of Seaweeds



A Training Programme on 'Natural farming of Seaweeds' was organized in connection with the Campaign on "Annadata Devo Bhava" under Azadi Ka Amrit Mahotsav by the Mandapam Regional Centre of ICAR-Central Marine Fisheries Research Institute on 23<sup>rd</sup> April, 2022. A total of 135 staff & fishers participated in the programme. Dr. G. Tamilmani, Senior

Scientist & Head-in-Charge presided over the programme and delivered a talk on importance of natural farming of seaweeds. Later, Dr. Johnson, B., Senior Scientist, provided the knowledge on seaweed farming techniques & integrated multi-trophic aquaculture through presentation. Awareness on government schemes related to seaweed farming under PMMSY was

also given. A video on seaweed farming techniques & IMTA prepared by Mandapam Regional Centre was also screened to provide first-hand field knowledge about the technology. The hands-on training on seaweed farming techniques was also given at seaweed farm, Munaikadu. Dr. Johnson, B., Senior Scientist, was the convener for the programme.

Reported by B. Johnson, and G. Tamilmani, Mandapam Regional Centre ♦

## Mariculture training programme organised

Under All India Network Project on Mariculture, training programme on "Mariculture Technologies" was conducted from 28<sup>th</sup> to 31<sup>st</sup> May 2022 at the Karwar Regional Station, ICAR-CMFRI and 38 participants attended.

## Training on open sea cage culture of Indian Pompano in Odisha

A 10-day hands-on training programme on the demonstration of open sea cage culture of Indian pompano (*Trachinotus mookalee*) has been organized from 22.03.2022 to 31.03.2022 to impart applied knowledge on the technicality of marine cage farming practices and sensitize the diverse groups of

stakeholders (students, academicians, fisheries department officials, fishermen, interested people from adjacent villages) of Odisha about the benefits of open sea cage culture. A total of 300 trainees were trained on the best management practices in open sea cage culture such as cage fabrication, mooring system deployment,

cage installation, net mounting and exchange, seed transportation and stocking, feed and health management of farmed fishes by the scientists and technical officers of Puri Field Centre of ICAR-CMFRI.

Reported by Puri Field Centre of ICAR-CMFRI ♦





# Successful demonstration of open sea cage culture of Indian Pompano at Bahabalpur, Odisha

Harvesting of the marine cage-grown Indian Pompano, *Trachinotus mookalee* cum Farmers fair (Harvest mela) has been organized during 19<sup>th</sup> April to 1<sup>st</sup> May 2022 at Bahabalpur jetty in Balasore, Odisha. Sri K Sudarshan Chakravarthy, IAS, Collector and District Magistrate, Balasore, graced the occasion. Under the demonstration programme, a total of 30 HDPE circular cages of 6 m diameter and 4 m depth (Area: 28 m<sup>2</sup>, Volume: 113 m<sup>3</sup>) were deployed in the sea off Bahabalpur (Odisha) using an innovative anchor mooring system (2.1 tonnes per cage) to withstand the frequent and harsh cyclonic weather of the state. Each cage was stocked with about 2500 seeds of *T. mookalee*, mass-produced at the marine finfish hatchery of Visakhapatnam Regional Centre using the seed production technique developed and standardized by ICAR-CMFRI. This was a first of its kind marine cage farming demonstration programme conducted by the ICAR-Central Marine Fisheries Research Institute (CMFRI) with funding from the National Fisheries Development Board



(NFDB) on such a massive scale in Odisha to increase awareness about the livelihood opportunities in mariculture among the fishermen community of the state. The fishes were grown from December to April (about 5 months) as the period is relatively undisturbed from cyclonic incidences, during which they grew from an average size of 10 g to around 400 g, registering a phenomenal increase in weight just within 150 days. A total biomass of 20,050 kg was produced, which was transported to the prospective marketing outlets across the country, where it commanded a good market price of 300 per kg. Considering

the input cost (₹210/kg) involved in the culture operation, a minimum profit of about ₹90 per kg of fish was realized from the farming of Indian Pompano. This successful execution of the demonstration programme will instill confidence among the fishermen community that they can improve their socio-economic status by adapting the innovative open sea mariculture techniques developed and standardized by ICAR-CMFRI.

Reported by: Gyanaranjan Dash, Biswajit Dash, Shubhadeep Ghosh, Rajesh Kumar Pradhan, Pralaya Ranjan Behera, Swatipriyanka Sen Dash and Madhumita Das ♦

## Personnel

### Promotion of Scientist to Senior Scientist

| Name & Designation        | w.e.f      |
|---------------------------|------------|
| Dr. Gyanaranjan Dash      | 15.12.2019 |
| Dr. Anulekshmi Chellappan | 15.12.2019 |
| Dr. Loveson Edward        | 15.12.2019 |
| Dr. M. Muktha             | 15.12.2020 |
| Dr. K. R. Sreenath        | 15.12.2019 |
| Dr. R. Saravanan          | 15.12.2019 |
| Dr. Shelton Padua         | 15.09.2020 |
| Dr. Eldho Varghese        | 04.05.2019 |
| Dr. P. Ramesh Kumar       | 26.02.2018 |
| Dr. Biji Xavier           | 11.02.2018 |
| Dr. C. Kalidas            | 23.09.2019 |
| Dr. D. Divu               | 04.11.2018 |
| Shri Mohammed Koya        | 15.12.2019 |

### Grade pay promotion of scientists

| Name (From ₹6000 to 7000)       | w.e.f      |
|---------------------------------|------------|
| Dr. Sanal Ebenezar              | 01.01.2020 |
| Dr. Reshma Gills                | 01.07.2019 |
| Dr. T. G. Sumithra              | 01.07.2019 |
| Dr. V. Mahesh                   | 01.01.2020 |
| Dr. Livi Wilson                 | 01.01.2020 |
| Smt. Ramya Abhijith             | 01.01.2020 |
| Smt. P. Gomathi                 | 01.07.2020 |
| Shri P. Abdul Azeez             | 01.01.2021 |
| Shri Ambarish P. Gop            | 01.01.2021 |
| Shri Nakhawa Ajay Dayaram       | 01.01.2020 |
| Smt. Shikha Rahangdale          | 01.01.2021 |
| Dr. Rajesh Kumar Pradhan        | 01.01.2020 |
| Shri Bhendekar Santhosh Nagnath | 01.01.2021 |
| Shri Rajan Kumar                | 01.01.2021 |
| Dr. Remya L.                    | 01.01.2020 |
| Shri Raj Kumar. M               | 01.01.2020 |
| Shri S. Thirumalaiselvan        | 01.01.2020 |

|                         |            |
|-------------------------|------------|
| Shri R. Vinothkumar     | 01.01.2021 |
| Shri Tarachand Kumawat  | 01.01.2021 |
| Shri Kurva Raghu Ramudu | 01.01.2021 |
| Shri M. Sankar          | 01.07.2020 |
| Shri N. Rajesh          | 10.02.2019 |
| Dr. K. K. Anikuttan     | 01.01.2018 |
| Smt. M. T. Shilta       | 01.01.2019 |
| Smt. M. Kavitha         | 01.01.2019 |
| Dr. A. Anuraj           | 21.05.2018 |

| Name (From ₹8000 to 9000) | w.e.f      |
|---------------------------|------------|
| Dr. P. Shinoj             | 12.06.2019 |
| Dr. M. Sakthivel          | 08.01.2020 |
| Dr. Ritesh Ranjan         | 09.03.2020 |
| Dr. P. P. Suresh Babu     | 07.01.2020 |
| Dr. G. Tamilmani          | 07.01.2020 |





**Shri R. Sundar**  
Sr. Technician  
30.04.2022



**Shri K. G. Baby**  
Technical Officer  
30.04.2022



**Shri R. Ponniah**  
Senior Technical Assistant (Electrician)  
30.04.2022



**Dr. T. V. Sathianandan**  
Principal Scientist  
31.05.2022



**Dr. Molly Varghese**  
Principal Scientist  
31.05.2022



**Shri K. Ramadasan**  
Assistant Administrative Officer  
31.05.2022



**Shri M. P. Jadhav**  
Sr. Technician  
31.05.2022



**Smt. S. Subbulakshmi**  
Skilled Support Staff  
31.05.2022



**Dr. Reeta Jayasankar**  
Principal Scientist  
30.06.2022



**Shri C. G. Ulvekar**  
Technical Officer  
30.06.2022

## Promotion of non-scientific staffs

| Name & Designation                       | Promoted as | w.e.f      |
|--|-------------|------------|
| <b>Shri P. P. Anilkumar</b> , FAO        | SFAO        | 04.04.2022 |
| <b>Smt. C. A. Leela</b> , Assistant      | AAO         | 18.05.2022 |
| <b>Shri Chandra Mauli Sharma</b> , AAO   | AO          | 26.05.2022 |
| <b>Smt. Ponnamma Radhakrishnan</b> , AAO | AO          | 26.05.2022 |
| <b>Smt. K. Latha</b> , Assistant         | AAO         | 31.05.2022 |
| <b>Smt. Molly Lazar</b> , Assistant      | AAO         | 01.06.2022 |
| <b>Shri Ashish Chobey</b> , AAO          | AO          | 06.06.2022 |
| <b>Smt. Jesli Disilva</b> , SSS          | Technician  | 20.06.2022 |
| <b>Shri Ullas Shankar</b> , SSS          | Technician  | 20.06.2022 |
| <b>Shri T. R. Kaushik</b> , SSS          | Technician  | 20.06.2022 |

## Voluntary Retirement

| Name                     | Designation         | w.e.f          |
|--------------------------|---------------------|----------------|
| <b>Dr. K. N. Saleela</b> | Principal Scientist | 01.04.2022(FN) |

## Transfers

| Name & Designation                                 | From                                      | To  | w.e.f.           |
|--|---|---|------------------|
| <b>Smt. E. M. Chhandaprajnadarsini</b> , Scientist | Madras Regional Station, ICAR-CMFRI       | ICAR-CIFA, Bhubaneswar                    | 02.04.2022 (A N) |
| <b>Shri Sunil Kumar S. Ail</b> , Scientist         | ICAR-CIFA, Bhubaneswar                    | Madras Regional Station, ICAR-CMFRI       | 18.04.2022 (F N) |
| <b>Smt. N. G. Supriya</b> , Assistant              | ICAR-CMFRI, Kochi.                        | Calicut Regional Station, ICAR-CMFRI      | 30.04.2022       |
| <b>Shri D. Augustus Julin Raj</b> , AAO            | Visakhapatnam Regional Centre, ICAR-CMFRI | Mandapam Regional Centre, ICAR-CMFRI      | 30.04.2022       |
| <b>Shri Santosh Kumar</b> , AAO                    | Calicut Regional Station, ICAR-CMFRI      | Visakhapatnam Regional Centre, ICAR-CMFRI | 30.04.2022       |
| <b>Shri A. T. Sunil</b> , AAO                      | Vizhinjam Regional Centre, ICAR-CMFRI     | ICAR-CMFRI, Kochi.                        | 31.05.2022       |

## Inter-Institutional Transfer (Deputation)

| Name & Designation                                 | From                                  | To  | w.e.f.     |
|--|---------------------------------------|---|------------|
| <b>Shri Fofandi Mahendrakumar Dhirajlal</b> , ACTO | Veraval Regional Station, ICAR-CMFRI. | Deputy Commissioner (Fisheries), New Delhi. | 17.05.2022 |



## ICAR-CMFRI

The Central Marine Fisheries Research Institute is a premier research institute under the Indian Council of Agricultural Research and focusses on research and training in marine fisheries and mariculture.

Cadalmin is the quarterly newsletter of ICAR-CMFRI. This publication gives an insight into the major events of the institute, besides highlighting the salient research findings for the benefit of various stakeholders in the marine fisheries sector.

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