

# CIFRI NEWS

(July - December 2021)



Vol.26, No.1

ISSN : 0972-0774



ICAR-CIFRI got Best ICAR Institute Award

The Institute was conferred with Sardar Patel Outstanding ICAR Institution Award 2020 under Large Institute Category on the occasion of 93<sup>rd</sup> ICAR Foundation Day and Award Ceremony on 16<sup>th</sup> July 2021



Dr. B. K. Das, Director, received the ICAR Rafi Ahmed Kidwai Award for Outstanding Research in Agricultural Sciences under Animal & Fisheries Sciences Category

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## Director's Column



I am happy to share the news of receiving the 'Best ICAR Institute Award 2020' by our institute. This is for the first time the Institute got the coveted award. We also received the Agri-Food Award of Excellence 2021 award and Ganesh Shankar Vidyarthi Protsahan Purashkar (for magazine Nilanjali). These are the acknowledgement of the hard work of the institute particularly during the COVID 19 pandemic. I take this opportunity to congratulate all the staff and seniors at the council. This has increased our

responsibility and gives us challenges to work more efficiently and result oriented for the society.

After the ravages of second wave caused by Delta variant of COVID 19 during the summer, the country was hit by another new variant 'Omicron' which brought the third wave. Thanks to less virulence, the third wave caused less mortality and less disruption to the life and livelihood. Even in this difficult time our research and development works did not stop. We have successfully organized webinar on 'Impact of COVID-19 on ecology and fisheries of river Ganga', workshop on catch estimation methods, regional workshop on 'Open water fisheries enhancement of Northeast Region of India'. The institute could conduct couple of demonstration programmes in different corners of the country and ranching programmes at 12 different places in Ganga River. We have also organized 20 training programmes for the fishers/fish farmers, students. Besides, 17 mass awareness camps were conducted.

We are thankful to Dr. T. Mohapatra, DG (ICAR) and Dr. J. K. Jena (DDG, Fisheries Sc.) for visiting the institute and inaugurating the multi facility training complex, ICPMS facility, and laid the foundation stone for the 2<sup>nd</sup> floor of the main building of the institute.

I welcome Shri Subhankar Dey and Shri Rajdip Dutta who joined the institute as FAO and Assistant, respectively. I also welcome Dr. Sonalika Sahoo, scientist who joined our institute on transfer. I owe to all the staff for getting the Rafi Ahmed Kidwai Award for Outstanding Research in Agricultural Sciences under Animal & Fisheries Sciences Category. During the period, nine of our staff got promoted. Many staff got awards/recognitions and brought laurels to the institute. I congratulate all of them. Six of our staff got superannuated. I acknowledge their contributions in growth of the institute and wish them very healthy and happy retired life.

February, 2022

**Dr. B. K. Das**  
Director

## About ICAR-CIFRI

Started as Central Inland Fisheries Research Station in March, 1947 at Barrackpore, West Bengal, ICAR-CIFRI has carved a niche in inland fisheries research. Induced fish breeding, composite fish culture and other scientific fish production practices developed during the sixties by the Institute helped in bringing

the blue revolution in the country. Reservoirs and wetland fisheries management technologies developed and disseminated by the institute resulted in enhanced fish production from these resources. By the turn of the year 2000, the research and development agenda of the Institute concerning inland open waters shifted from fish as the only benefit to ecosystem health and ecological benefits

with emphasis on sustainability, livelihood and nutritional security. In addition to the Headquarters at Barrackpore and two Research Stations at Kolkata and Kochi, CIFRI has four Regional Research Centres at Allahabad, Guwahati, Bengaluru and Vadodara, through which the issues of inland open water fisheries are being addressed.

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Printed at  
**Royal Offset Printers**  
New Delhi



Vol.26, No.1  
ISSN : 0972-0774

# सिफरी समाचार CIFRINEWS

(July - December 2021)

## Dr. Trilochan Mohapatra, Secretary, DARE and DG, ICAR visited the institute headquarters and inaugurated several facilities

**Dr. Trilochan Mohapatra**, Secretary, DARE and DG, ICAR visited ICAR-CIFRI, Barrackpore on 6 October 2021. **Dr. J. K. Jena**, DDG (Fy. Sc.) also accompanied him.

### Ranching at Ganga River

The DG, ICAR started his visit with ranching of 75,000 fingerlings of Indian Major Carps in Ganga River at Gandhi ghat Barrackpore. Simultaneously 50 catla (*Labeo catla*) fishes were tagged and released to study the migration and route to the systems as a part of conservation measures to take conservation measures.

Dr. B. K. Mahapatra, Vice-Chancellor, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Dr. Anil Rai, ADG (ICT), Directors of ICAR-NINFET, Kolkata, ICAR-CRIJAF, Barrackpore, Director, ICAR-ATARI, Kolkata, officers and staff members of ICAR institutes were also present on this occasion.

### First time drone-based sampling in inland open waters

The DG, ICAR inaugurated and launched drone facility for sampling in inland open water bodies as a part of the initiatives of IoT-in-fisheries. For the first time, drone-based samplings were done on the river Ganga.



## Inauguration of the multi-facility training complex and addressing the staff

The multi-facility training complex, of the institute, has also been inaugurated by the DG, ICAR. The training complex has sitting capacity of 250+ and will be used to conduct training for the fish farmers, fishers, and other Institute activities. More than 100 farmers and farm women attended the programme.



◀ Inside view of new auditorium (Inset)





## Inauguration of ICAR-CIFRI facilities by the DDG (Fisheries Science)

Dr. J. K. Jena, DDG (Fy. Sc.), ICAR, inaugurated the newly created cell culture laboratory, bio flock units and Ganga fish conservation unit on 05 October 2021. To accommodate the increased facilities and manpower of the Institutes the DG, ICAR also laid the foundation stone for the 2<sup>nd</sup> floor of the main building of the institute.



◀ Inauguration of cell culture Lab



Inauguration of  
▶ Ganga fish conservation unit



## Research Highlights

### Electrofishing in the River Torsa, around Jaldapara National Park complex

Electric fishing is a means of illegal fishing practice. Despite a ban on such fishing methods due to its destructive nature, electrofishing is being practiced by the local fishers Kodalbasti fishing areas in river Torsa, around the Jaldapara National Park complex (November 2021). The local fishers (tribes) usually use a battery of a motor car, or bike to power the electro-fishing. Two men usually operate such fishing methods, one to stun the fishes by providing electric shock, and other to collect the stunned fishes flowing with water by putting a triangular scoop net downstream. It was observed that, during an hour of electro-fishing operations, around 750 g of small indigenous fishes were caught which were in alive conditions for a certain time. The composition of fish species was observed in such fishing methods were, *Ompok pabda*, *Channa stewartii*, *Crossocheilus latius*, *Garra lamta*, *Systomus sarana*, *Tor putitora*, *Opsarius bendelisis*, *Neolissocheilus hexagonolepis*, *Macragnathus pancalus*, etc. *Putitora mabseer*, *Tor putitora* (Hamilton, 1822), an Endangered (EN) species were also there in the catch. Though the method is cost effective but highly destructive, and harmful to the sustainable fisheries, as they do not take any precautions for saving the larvae and small juveniles.



*Ompok pabda* and *Opsarius barna* being caught by electro-fishing method



Electrofishing in river Torsa at Kodalbasti

**Dibakar Bhakta, R. K. Manna, Sangeetha M. Nair, R. C. Mandi and B. K. Das**

### Pre-impoundment assessment of fish and fisheries in the Banda stretch of the River Ken



Survey in the river Ken in the Banda stretch of Uttar Pradesh

National Water Development Agency (NWDA) has proposed two new barrages in the river Ken in the Banda stretch of Uttar Pradesh at Marauli (25° 28'36" N & 80°16'30" E) and Pailani (25° 46'00" N & 80°25'11" E), downstream of the Bariyarpur check dam at Panna, Madhya Pradesh. ICAR-CIFRI along with the NWDA team visited Pailani (dam site), Pathari (upstream stream of Pailani), Nari (downstream of Pailani), Marauli (dam site), and Bhuragadh (upstream of Marauli). Ichthyofaunal survey on the River Ken along its various stretches, namely Bhuragarh and Nari, a stretch of 63 km recorded a total of 55 species belonging to 43 genera, 19 families, and nine orders. Of these, Cypriniformes were the most dominant order with 20 species followed by Siluriformes (17 species). The catch composition of the fishes in the River Ken between Bhuragadh and Nari is almost similar. Exotics fish species formed an essential fishery in the surveyed stretch among them *Cyprinus carpio* dominated the fishery (30%) and it along with tilapia contributed around 35%. This was followed by IMC which contributed to around 30% of the catch. The catfishes almost contributed around 20% of the catch.

**Absar Alam, A. K. Sahoo and B. K. Das**

### Morphometric and meristic characteristics of indigenous *Badis blosyrus* Kullander & Britz, 2002 of river Brahmaputra

Dwarf Chameleon fish, *Badis blosyrus* Kullander & Britz, 2002 is a freshwater fish belonging to the family Badidae and is locally known as Dum bhecheli. It is distributed in Brahmaputra River drainage, Assam, India. The fish exhibits a prominent dark blotch poster dorsally on opercle and two rows of irregular blackish blotches alongside. The fish is orange reddish with irregular scattered bluish-blackish blotches on the lateral side. The fins are hyaline with the dorsal, anal and caudal fin origins having the orange reddish. The dorsal fin has a large black blotch located at the first few rays, and another large black blotch is present at the centre of the caudal peduncle. Due to its attractive and colourful pattern, it is used as an ornamental fish species and exploited in the aquarium trade. A total of 30 *B. blosyrus* was collected from river Brahmaputra and studied for its morphometric and meristic characteristics. The total length and total weight of the fish ranged from 3.6-5.1 cm and 0.54-1.27 gm, respectively. The meristic counts showed 16-17 dorsal fin spine, 8-11 dorsal fin soft rays, 6-7 pectoral fin rays, 8-10 total anal fin rays, and 12-14 caudal fin rays. The fish are sexually differentiated by the female being smaller in size than males, having duller patterns, and the body profile of females being shorter and rounder than males.



*Badis blosyrus*

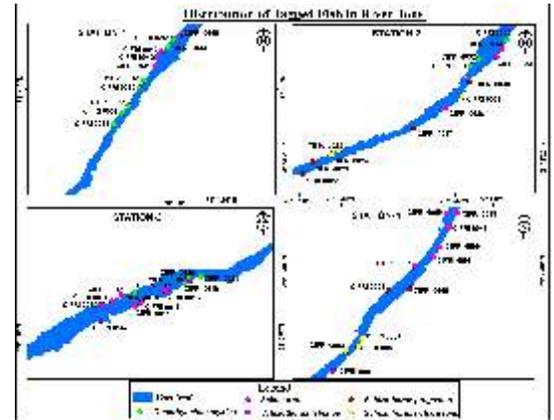


*Badis blosyrus* male (top) and female (bottom)

**Niti Sharma, S. Yengkokpam, D. Bordoloi, U. K. Sarkar and B. K. Das**

## Conservational measures of five hill stream fish species in river Tons

An investigation was carried out in the river Tons to assess the fish diversity as well as their conservational status. A total of 10 species of fishes belonging to 4 families were recorded. Trouts were dominating in the selected stretches. *Oncorhynchus mykiss* (Rainbow trout), *Salmo trutta* (Brown trout), *Schizothorax richardsonii* (Common snow trout), *Schizothorax progastus* (Dinnawh Snow trout), *Schizothorax labiatus* (Kunnar Snow trout), *Schizothorax plagiotomas* (Hill trout) were the major trouts recorded in the study stretch. Brown trouts were predominant at the project sites and shows upstream migration to breed during monsoon season i.e., from July-August. While snow trouts, predominant at the downstream of the project site, shows migration across the project site to breed during early winter or post monsoon i.e., from November to January. Migration study through tagging was carried out to map their migration path and protect through adequate water release. A total of 49 fish species were tagged and released in throughout the up and down stream of selected stretches. A total of 10% of the released fish was recovered by the local fishermen and the migratory rout was assessed. Based on the reproductive seasons and migratory rout, fish passes were designed and the gate opening of the fish pass needs to be adjusted in line with the fluctuating reservoir level. Flows @1.5-1.7 m/s need to be maintained in the fish pass.



Map showing site-wise release point of tagged fishes

**B. K. Das, A. K. Sahoo, D. K. Meena and K. Mondal**

## Migration study revealed firsthand information towards hilsa bioenergetics and conservational sites in river Ganga

Tagging is the most suitable methodology to trace the migration. Live hilsa was tagged to understand the migratory path and the behaviour both upstream and downstream of the Farakka barrage in the river Ganga. A fish of average length 28.5cm and weight 209g bearing tag no. 1516 was ranched in the upstream of Farakka barrage area (24° 49' 0.8358" N, 87° 54' 57.8802" E) and the same tag number was captured from Nimai Tirtha Ghat, Chapdani, Baidyabati (22° 47' 29.5" N, 88° 20' 18.8" E) after 5 days. During this period the fish has migrated 225 km downstream of Farakka barrage in Ganga indicating the migration rate at 1.9 km/hr. Of these, 225 km, approximately 70 km is tidal freshwater stretch. This showed that the hilsa fish not only migrated unidirectional water flows but also counteracted up/down tidal flows. During this process of migration, interestingly it has been observed that a loss of 34 g weight. This record of weight loss is of its first kind and firsthand information on hilsa migration bio-energetics.



Hilsa tagged and released into Ganga at Farakka re-captured hilsa from Baidyabati

However, further research is required in this connection.

**A. K. Sahoo, D. K. Meena, Mitesh Ramteke, Santana K. V., Sunita Prasad and B. K. Das**

## Macroplastic: a menace to the estuarine set bag net fishery in Hooghly-Matlah estuarine systems

Estuarine set bag net (ESBN), or bag net is one of the main fishing gears in the Hooghly-Matlah estuarine systems and contributes about 70% of the total estuarine fish catch. This is a non-selective conical shape fishing gear, generally 25-27 m in length, and 6-7 m wide mouth (2-10 mm cod-end mesh size). However, the size and cod-end mesh varied from place to place and targeted species. The ESBN is a highly destructive fishing method, as it mainly harvests small-sized fishes including juveniles. A recent survey at Hooghly-Matlah estuarine systems observed that, macroplastic acts as a menace to the ESBN fishery, especially at upper and middle stretches of the estuary. Recent winter sampling revealed that volume-wise macroplastic constituted  $\geq 65\%$  and  $\geq 90\%$  catch composition from the ESBN at Birlapur (Hooghly estuary), and Sandeshkhali (Matlah estuary), respectively. The number of macro-plastics was found more in the middle stretch of the estuary compared to the lower, which might be due to the adjacent city waste discharge. Composition of dominant litter

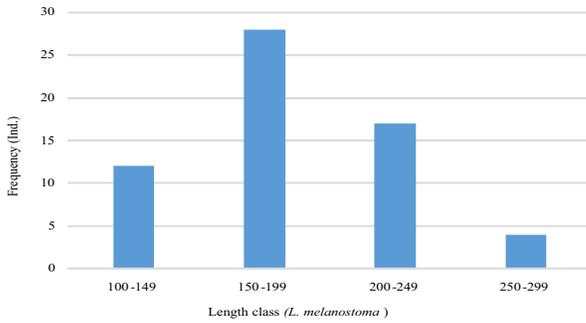


Dominance of macroplastics in ESBN catch composition

categories were food wrappers, bottles and lids, bags, sanitary items, fishing nets, etc. Such plastic garbage not only lessens the fishing efficiency of EBSN fishery but also reduces the life span of operational nets including a drastic reduction of CPUE and increases demand for human resources for sorting of fishes.

**Dibakar Bhakta, R. K. Manna, Sangeetha M. Nair, Chayna Jana, S. Mandal, S. Samanta and B. K. Das**

## The interactions of gastropods and the mangrove in the Indian Sundarbans



Distribution of *L. melanostoma*

(frequency) was for the length group 150-159 mm followed by 200-249 mm, while *N. articulata* for the length group 249-300 mm. The species-specific interactions of *L. melanostoma* to the mangrove species *A. marina*/*A. alba* can be correlated to living on a dry substrate surface (climbing on the leaf, tree trunk) above the high tide line. Overall, the mangrove-associated macrobenthic abundance ranged between 26-68 ind./m<sup>2</sup> and dominated by *Cerithidea cingulata*.

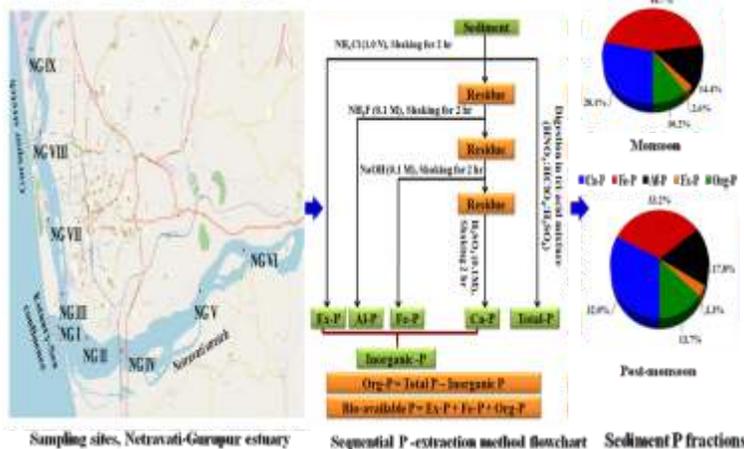
The relationship between the gastropods (*Littoraria melanostoma*, *L. scabra*, *Nerita articulata*) and the mangrove species (*Avicennia marina*, *A. alba*, *Ceriops tagal* and *Aegiceras corniculatum*) were investigated at Pathar Pratima and Frajerganj, Indian Sundarbans. The attachment/association of the species *L. melanostoma* and mangrove species *Avicennia marina* was found to be maximum as compared to the other mangrove species at both sites. The abundance of *L. melanostoma* ranged between 9- 65 nos./ *A. marina* tree, and their attachment was recorded at a maximum climbing height of 1.67 m. However, *Nerita articulata* was found to have lower abundance (2-8 nos./ tree), irrespective of specific association of mangrove species at a height of <1.0 m. The density and average diameter at breast height (DBH) of *A. alba*/*A. marina* was high at Pathar Pratima may be due to less human interference at the sites. However, *N. articulata* was mostly attached in the roots with the favourable submerged clayey substrate as compared to the dry substrates. The highest *L. melanostoma* distribution



Gastropods attached in leaves and trunk

**Pranab Gogoi, S. Dam Roy, T. N. Chanu, A. Mitra and B. K. Das**

## Seasonal variations, potential bio-availability, and ecological risk of phosphorus species in the sediments of the Netravati-Gurupur estuary



Phosphorus (P) is an important driving factor in the estuarine ecosystem as Netravati-Gurupur estuary passes through urbanized coastal city Mangalore. Therefore, to determine the phosphorus forms and their bioavailability in the surface sediments of the Netravati-Gurupur estuary system, sequential extraction procedure was used to evaluate the abundance of five phosphorus chemical species including calcium bound (Ca-P), iron-bound (Fe-P), aluminium bound (Al-P), exchangeable (Ex-P) and organic-P (Org-P). Total phosphorus (TP) content varied from 435-810 mg/kg and 257.9-699.1 mg/kg in post-monsoon and monsoon season, respectively. Iron bound phosphorous (Fe-P) was dominating in both seasons. More than half of sedimentary inorganic phosphorus was bio-available and can be conditionally released into water column. However, average phosphorus pollution index except few cases was lower than one show lower eutrophication risk regarding sedimentary TP load.

**Ajoy Saha, M. Feroz Khan, M. E. Vijay Kumar, S. Samanta and B. K. Das**

Variation in P fraction contribution to total P in Netravati-Gurupur estuary

## Plankton dynamics in three protected national parks (Bhitarkanika, Jaldapara and Jharkhand waterfalls) of India

Exploratory survey in Bhitarkanika NP (Baradia, Chardiya, Dangmal, and Jaynagar), Jaldapara NP (Holong River, Chirakhana, Torsa River and Kodalbasti) and Jharkhand waterfalls (Hundru, Dassam, Jonha, and Panchghagh) revealed the diverse plankton population. During the study in Bhitarkanika NP (Odisha), 19 species of phytoplankton with the dominance of Bacillariophyceae (86.17%) followed by Chlorophyceae (7.57%) and

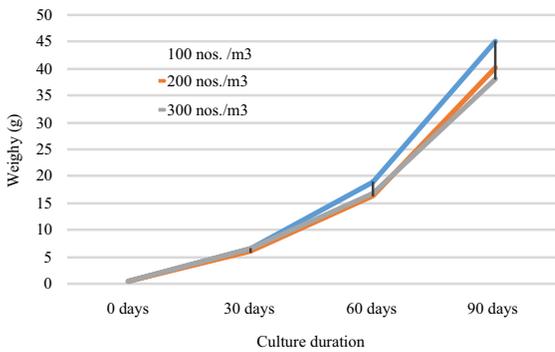




displayed the worst FCR of  $1.67 \pm 0.02$ . A significantly higher protein efficiency ratio ( $2.192 \pm 0.04$ ) and feed conversion ratio ( $0.66 \pm 0.01$ ) were obtained in fish cultured with bamboo substrate (T1). The above study indicates the efficiency of bamboo substrate for periphyton production and along with culture of *S. sarana* when compared to other natural (sugarcane bagasse) and artificial (mosquito net) substrates, in tropical inland open-water cages.

**B. K. Das, A. Upadhyay, H. S. Swain, M. H. Ramteke, V. Kumar, Y. Ali, A. Sengupta and B. K. Naskar**

## Evaluation of growth performance and survival of amur carp *Cyprinus carpio haematopterus* (Martens, 1876) in inland nursery cages



Growth performance of Amur carp in nursery cages.

by fishes during 90 days of culture was  $45.07 \pm 4.55$  g,  $40.09 \pm 2.49$  g and  $38.05 \pm 2.00$  g at the stocking densities of 100, 200 and 300 nos. /m<sup>3</sup>, respectively. The survival percentage was ranged from 52.67 to 61.33. No significant difference ( $p > 0.05$ ) has been observed in water and sediment quality at the cage site compared to reference sites.

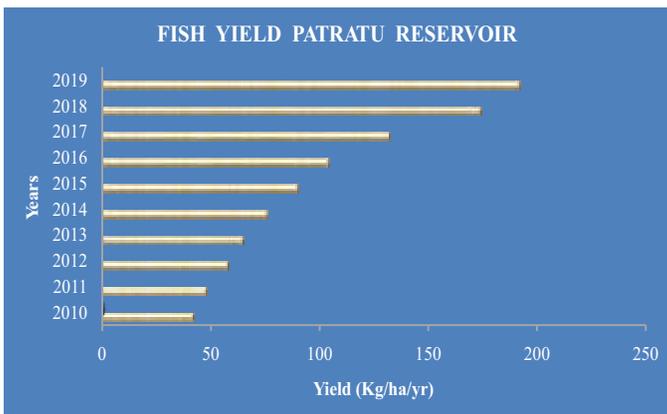
Amur carp is the genetically improved breed of common carp and are useful in low-input aquaculture systems. Therefore, it is considered as potential candidate for species diversification in inland cage culture. The present study was conducted (April to July 2021) to evaluate the growth performance of Amur carp in nursery cages in Maithon reservoir, Jharkhand India. The spawn of Amur carp ( $3.10 \pm 0.10$  cm,  $0.47 \pm 0.05$  g) was stocked in CIFRI GI model cages ( $5\text{m} \times 5\text{m} \times 2.5$  m) in triplicate at three different stocking densities viz. 100, 200 and 300 nos./m<sup>3</sup> designated as low, medium and high stocking density. The fishes were fed with CIFRI CAGEGROW feed at the rate of 3-6% of body weight twice a day. The average size attained



Amur carp reared in cages at Maithon reservoir, Jharkhand

**Mitesh H. Ramteke, H. S. Swain, A. Upadhyay, Vikas Kumar, S. Kumari, R. Pal and B. K. Das**

## Spatio-temporal dynamics of phytoplankton communities and environmental characterization in Patratu Reservoir, Jharkhand



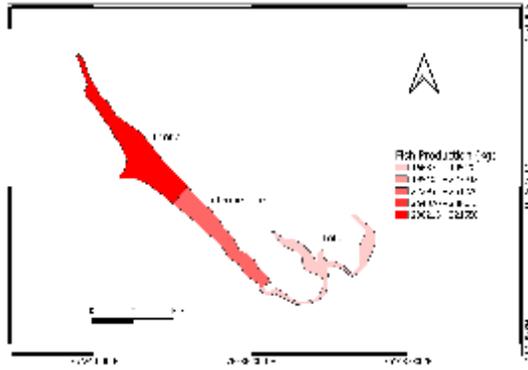
Fish yield (kg/ha/yr) of Patratu reservoir through stock enhancement

The study revealed a total of 46 taxa of phytoplankton viz., Bacillariophyceae, Chlorophyceae, Desmidiaceae, Cyanophyceae, Euglenophyceae, Dianophyceae and 8 taxa zooplankton viz., copepoda, cladocera, rotifera were recorded during the study period. Abundance of phytoplankton varied from 1868-26125 cells L<sup>-1</sup>. The gross primary productivity varied from 300-875 mgC/m<sup>3</sup>/day. The estimated fish production potential (kg/ha/yr) based on net primary productivity (plankton based) was 240 kg/ha/year. Phytoplankton dynamics is controlled by a very complex interplay between abiotic and biotic factors. Analysis of data indicated that water temperature, electrical conductivity, water depth, nutrients (nitrate and phosphate) and zooplankton were found to be the key factors affecting the dynamics of phytoplankton. Fish yield has been increased from 42 to 192 kg/ha/yr through ecosystem-based culture-based fisheries management. The results of the study would be useful as a model for ecosystem-based fisheries management of small reservoirs.

**Suman Kumari, Lianthumluaia, Mishal P, U. K. Sarkar, G. Karnatak and B. K. Das**

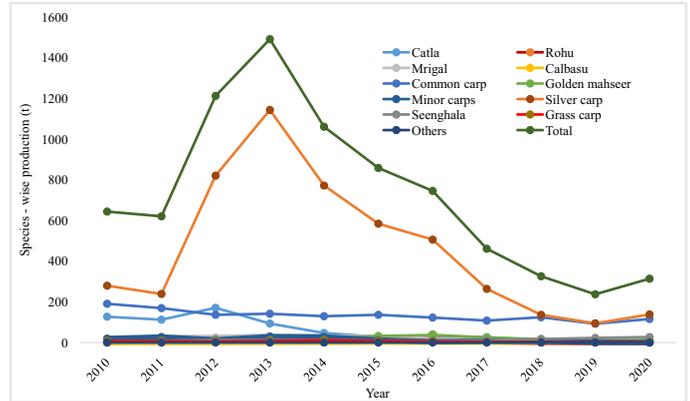
## Assessing spatial dynamics and fish production pattern in Gobindsagar Reservoir, Himachal Pradesh

Gobindsagar reservoir ( $31^{\circ}33'50.99''$  N,  $76^{\circ}22'47.13''$  E and  $31^{\circ}20'33.06''$  N,  $76^{\circ}45'11.52''$  E) on river Sutlej is one of India's largest reservoirs. The study indicated declining trend of fish diversity and fish production despite of stocking measures adopted by the fisheries department of Himachal Pradesh. The fish diversity is represented by only 15 species among the commercial catches as compared to previous studies which reported 46 species. The species diversity in the lentic zone of the reservoir was relatively higher than intermediate and lotic zone. The exotic carps *Hypophthalmichthys molitrix*



and *Cyprinus carpio* were recorded as the most dominant taxa contributing to nearly 80% of the catches while *Sperata seenghala* and *Labeo dyocheilus* were found considerably good in the commercial catches as well as experimental fishing catch among the native fish fauna. Contrary to this, the abundance of golden mahseer, *Tor putitora*, was very meagre which indeed warrants additional measures for its conservation and enhancement. The fish catch data analysis indicated that the two exotic carps, silver carp (63%) and common carp (18%) were the most dominant fish catch during the last decade

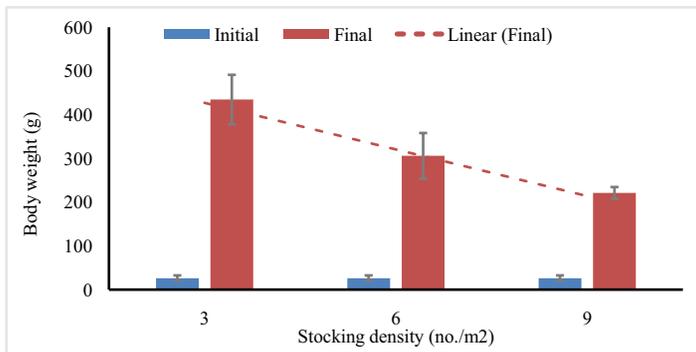
followed by catla (8%). The time series data indicated that silver carp catch decreased drastically after 2013. The spatial variation of fish production during the last decade indicated that the highest fish production was obtained in the lentic zone of the reservoir. The higher fish production in the lentic zone or the dam site might be due to the accumulation of nutrients in the lentic zone of the reservoir.



Fish production trend of Gobindisagar Reservoir during 2010-20

Lianthuamluaia, Mishal P., R. Chakraborty, A. K. Das, U. K. Sarkar and B. K. Das

### Growth performance of Indian Major Carps reared in CIFRI HDPE pens in floodplain wetlands



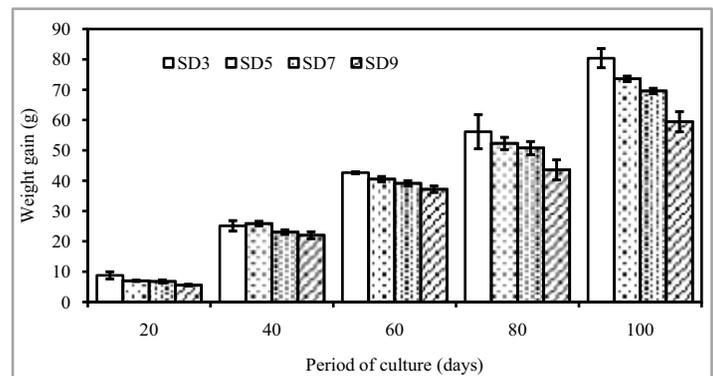
Growth performance of *L. catla* in pens at different stocking densities

Pen culture using CIFRI HDPE pen was carried out in three beels located in three districts of Assam for livelihood improvement of tribal fishers. *Cirrhinus mrigala* was candidate species in Charan Beel, Baksa district while the *L. rohita* was the candidate species in Bamuni Beel, Kamrup rural district and *Labeo catla* was the candidate species in Urpad Beel, Goalpara district of Assam. In all experiments, fishes were stocked @ 3, 6 and 9 no./m<sup>2</sup> in triplicates in pens each having an area of 500 m<sup>2</sup>. Fishes were cultured for three months and were fed @ 3-5% body weight using CIFRI CAGEGROW feed (28% crude protein: 5% crude fat). At the end of the culture period, it was observed that body weight (mean ± SE) of *C. mrigala* increased from 21.95 ± 4.17 g to 195.63 ± 23.02 g, 147.19 ± 20.27 g and 112.13 ± 16.54 g at stocking densities of 3, 6 and 9 no./m<sup>2</sup> respectively. For *L. rohita*, it was observed that fingerlings grew from 22.05 ± 3.39 g to 255.27 ± 31.25 g, 227.63 ± 23.61 g and 183.91 ± 18.90 g at stocking densities of 3, 6 and 9 no./m<sup>2</sup> respectively. In case of *L. catla*, it was observed that body weight of fingerlings increased from 26.05 ± 6.57 g to 434.61 ± 56.65 g, 306.15 ± 52.06 g and 221.13 ± 13.54 g respectively at stocking densities of 3, 6 and 9 no./m<sup>2</sup>. It was observed that in all three experiments the growth rate of fishes declined with an increase in stocking densities.

S. Borah, P. Das, A. K. Yadav, B. K. Bhattacharjya and B. K. Das

### Demonstration of *Labeo bata* culture in CIFRI HDPE pen in beel(s) of Assam

Pen culture using ICAR-CIFRI developed High-density polyethylene (HDPE) and *Labeo bata* as candidate species was conducted at Borkona Beel, a seasonally open flood plain wetland (90 ha water area) located in BARPETA district, Assam, India under WorldFish project. A total of 12 pens each having an area of 500 m<sup>2</sup> were installed in marginal area of the wetland having 1-2 m water depth. Fry of *L. bata* (0.47 ± 0.22 cm, 2.38 ± 0.30 g) were stocked in pens at four different stocking densities viz. 3 no. m<sup>-2</sup> (SD3), 5 no. m<sup>-2</sup> (SD5), 7 no. m<sup>-2</sup> (SD7) and 9 no. m<sup>-2</sup> (SD9) in triplicates. Fishes were fed with floating pelleted feed containing 28% crude protein and 5% fat twice daily at the rate of 3-5% body weight and cultured in pens for 100 days. Fish grew from 2.38 ± 0.30 g to 82.78 ± 3.18,



Change in average body weight of *L. bata* over the culture period of 100 days in pens



75.94± 0.89, 71.94± 0.89 and 61.81± 3.35 g after 100 days at stocking densities of 3, 5, 7 and 9 no. m<sup>2</sup>, respectively. Highest average body weight and WG%, SGR and DWG was obtained at lowest stocking density and lowest values at highest stocking density. Highest gross yield (249.48± 13.53 kg pen<sup>-1</sup>) and net yield (239.85± 13.53 kg pen<sup>-1</sup>) was obtained at SD9, which indicated that yield increased with increasing stocking densities. BCR was found to be highest (1.42) at SD7 followed by SD9, SD5 and least at SD3 (1.10). Post pen culture, monthly income of small-scale fishers (SSF) increased by 6.10% (SD3) to 40.50% (SD9).

**B. K. Das, S. Borah, A. K. Yadav, P. Das and B. K. Bhattacharjya**

## A report of freshwater sponge *Ephydatia fluviatilis* (Linnaeus, 1759) from protected habitat Kusheshwar Asthan Bird Sanctuary, Darbhanga, Bihar



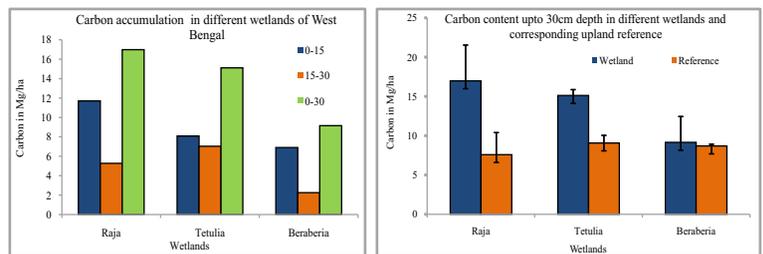
*Ephydatia fluviatilis* attached to wooden structure;  
A. Dormant sponge bodies (gemmules),  
B. A fully developed miniature sponge

An exploratory survey was carried out in the wetlands of Kusheshwar Asthan Bird Sanctuary, Darbhanga district, Bihar for generating baseline information on aquatic biodiversity in protected water bodies. Kusheshwar Asthan Chaur area has been notified as a Bird Sanctuary by Govt. of Bihar in 1994 under Wildlife Protection Act, 1972. A large colony of freshwater sponges was discovered on fixed wooden structure across the sanctuary, a perennial freshwater body. The morphology of the sponge is identified as *Ephydatia fluviatilis* based on gemmule spicule morphology under the animal kingdom (Porifera, Spongillidae). The organism is filter-feeding animal, sedentary, and constitutes an important component of the aquatic ecosystem. These organisms are cosmopolitan, have been reported from many freshwater ecosystems of the world such as rivers, lakes, and canals. The colour of these sponges is highly variable from green, brown to grey, which depend on water quality of habitat. The colonization of these organisms widely depends on the surrounding environmental conditions. These sponges in an adverse condition such as extreme summer and winter go into dormant stages such as gemmules formation. When the condition becomes favorable, a fully-grown miniature sponge developed from gemmules.

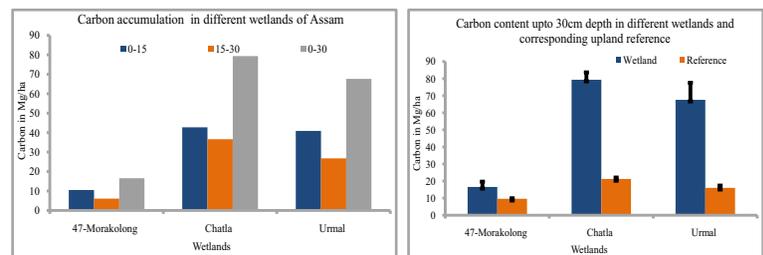
**Suman Kumari, Sajina A. M., Mukesh Kumar, U. K. Sarkar and B. K. Das**

## Carbon stocks in selected floodplain wetlands vis-à-vis reference upland sites

Three wetlands Raja, Tetulia and Beraberia in North 24 Paraganas District of West Bengal were selected for estimating C accumulation and storage in their soil vis-a-vis in soils of reference upland sites. It was estimated that up to 30 cm depth of wetland soil, 17.44 Mg C (1Mg=1 tonne) in Raja beel, 15.85 Mg C in Beraberia, and 15.11 Mg C/ha in Tetulia wetland was accumulated. The estimated C accumulation in reference upland sites of Raja, Beraberia and Tetulia was 7.59 Mg, 8.69 Mg and 9.07 Mg/ha respectively. A similar study was also conducted in three wetlands of Assam. It was observed that C storage, up to 30cm depth, was highest (79.36 Mg/ha) in Chatla wetlands, followed by Urmal (67.62 Mg-C/ha), But in 47-Morakolong wetland, only 16.57±3.1 Mg C/ha was accumulated up to 30 cm depth. The corresponding reference upland sites contained 21.18 Mg, 16.02 Mg and 9.6 Mg C ha<sup>-1</sup> respectively. Thus, it is evident that wetlands are more effective as C-sink than the upland soils and can thus help in mitigating global warming.



Carbon accumulation in soils of wetlands and the corresponding reference upland sites in West Bengal



Carbon accumulation in wetlands of Assam and corresponding reference sites



A view of Raja wetland

**S. K. Nag, B. D. Ghosh and U. K. Sarkar**

## Exploring ecological resilience and fisheries of a peri-urban wetland in lower Ganga basin in the context of climate change

A systematic study was undertaken in Raja Wetland (22°43'20.56"N, 88°24'6.48"E) located in the North 24 Parganas district of West Bengal to determine the ecological resilience and change of hydro-biology due to climate change and anthropogenic pressures. The wetland is semi-closed, covering an area of approximately 90 ha under capture-based fisheries. The wetland

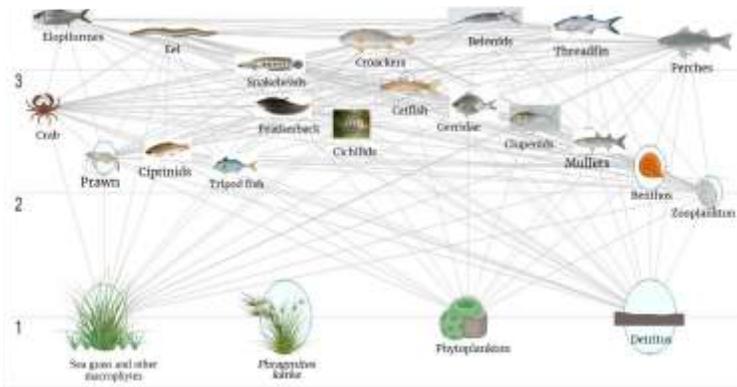
receives a high load of city sewage from urban catchment areas showing Trophic State Index (TSI) of  $83.01 \pm 2.09$ , indicating a highly eutrophic state. The water depth in the wetland is observed minimum of 0.36 m in summer season and maximum of 1.45 m in the peak monsoon season. The pH ( $7.77 \pm 0.09$ ), conductivity ( $763.6 \pm 184.32 \mu\text{S/cm}$ ), dissolved oxygen ( $6.44 \pm 1.28 \text{ mg/l}$ ), total alkalinity ( $179.97 \pm 32.12 \text{ mg/l}$ ) and Chlorophyll-a ( $52.29 \pm 14.83 \mu\text{g/l}$ ) concentration showed a comparatively higher value due to eutrophication. Macrophyte infestation is a menace to fishing during the dry season. The wetland has an annual fish yield of about 573.34 kg/ha/yr with a maximum catch during the monsoon season. The fish diversity of the wetland has decreased to the tune of 47.8% in the last two decades with the dominance of the exotic species. Currently, *Oreochromis niloticus* is dominating in the wetland through auto-recruitment and contributes about 70-80% of the total fish catch. The small indigenous fishes consist of *Amblybaryngodon mola*, *Trichogaster lalius* and *Puntius* spp. forms a minor part of the capture fisheries. Planktonic classes such as Bacillariophyceae and Chlorophyceae form major phytoplankton groups whereas molluscs, oligochaetes and chironomid larvae dominate the benthic community. The study suggests developing an appropriate mitigation strategy with the active participation of fishers for ecological restoration and sustainable management and conservation of this threatened wetland ecosystem.



*Oreochromis niloticus* catch

Mishal P., Aneek Ray, B. D. Ghosh, Arijit Das, G. Karnatak and U. K. Sarkar

### Impact Assessment of *Phragmites karka* on ecosystem functioning of Chilika lagoon, India



Flow diagram of Chilika lagoon ecosystem

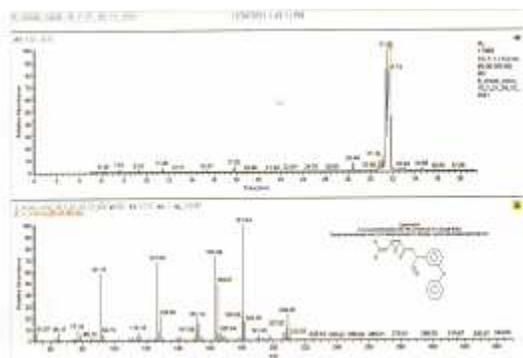
*Phragmites karka*, commonly known as “Nala grass” the nuisance causing exotic macrophytes in Chilika lagoon is hampering the productivity and navigation. Its luxurious and rapid growth is a matter of concern for the sustainability of this ecosystem. A study has been carried out to assess its impact on ecosystem functioning of Chilika lagoon through mass balanced (Ecopath with Ecosim) modeling. In this context, three scenarios were created viz. the real Chilika lagoon ecosystem scenario, lagoon ecosystem without *P. karka* group scenario, and lagoon ecosystem with *P. karka* group but devoid of seagrass and other aquatic weeds. It was found that the scenario without *P. karka* is more stable and mature as the stability indicator, “overhead” (system reserve) is 67.45% and the maturity indicator TPP/TR value is at 3.23. Though, the system reserve and maturity indicator were found as 57.74 % and 7.8, respectively in presence of *P. karka* in the Chilika ecosystem. The macrophyte (*P. karka*)

is also found as the least utilized group in the system and its huge biomass converts to detritus.

Prajna R. Swain, P. K. Parida, P. Panikkar, S. K. Nag, B. K. Behera and B. K. Das

### High concentration of pesticide in wastewater carrying canals in the East Kolkata Wetland ecosystem

Wastewater from domestic, industries, and storm water is often found containing different polluting substances like metals, pesticides, drugs, medicines, industrial chemicals and antimicrobials used in personal care products. As a result, these substances pose risks to the ecosystems and human health hazards in wastewater-based agri- and aqua-culture. The water collected from the Chowbaga



storm-water canal ( $22^{\circ}32.224' \text{N}$ ,  $88^{\circ}26.558' \text{E}$ ), one of the important waste waters carrying canals in the East Kolkata wetland ecosystem was analyzed for pesticide residues. Cypermethrin, a pesticide widely used in agriculture, aquaculture and fisheries was detected at a surprisingly high concentration ( $12356 \mu\text{g/l}$ ). The compound was also detected in water ( $1.3\text{-}8.2 \mu\text{g/l}$ ) and fish flesh and gill ( $\sim 100 \mu\text{g/kg}$ ) in one of the wetlands located a few kilometers downstream of the canal.

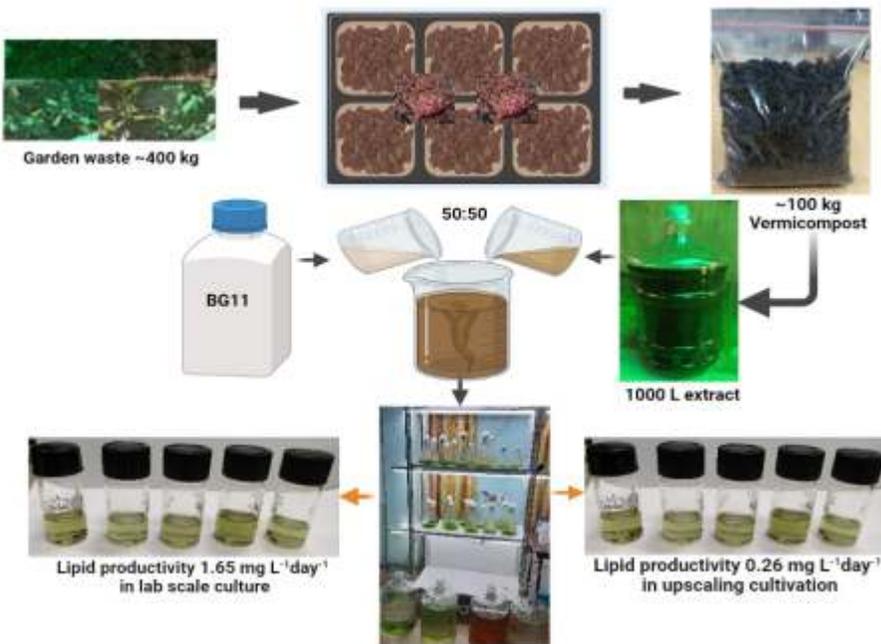
S. K. Nag, Soma Das Sarkar, Keya Saha, Satabdi Ganguly and S. Bandyopadhyay

## Sub-lethal acute toxicity of Butachlor on *Labeo rohita*

Butachlor at two sub-lethal concentrations  $1/50^{\text{th}}$   $LC_{50}$ -96 h ( $12.42 \mu\text{g L}^{-1}$ , BT1) and  $1/10^{\text{th}}$   $LC_{50}$  96 h ( $62.1 \mu\text{g L}^{-1}$ , BT2) was exposed to investigate its impact on *Labeo rohita* ( $25.54 \pm 2.3$  g) for a period of 72 h. Fish exposed to butachlor had adverse effects by reducing the number of red blood cells, white blood cells, hemoglobin, and hematocrit. The biochemical parameters like superoxide dismutase, glutathione-s-transferase, glutamate-oxaloacetate transaminase, and glutamate-pyruvate transaminase, cortisol, heat shock protein (HSP70 and HSP90), serum protein, albumin, globulin, and triglyceride were increased upon the exposure of butachlor. However, serum immunoglobulin-M and serum complement 3 were found to be decreased in *L. rohita* exposed to butachlor. This study found that *L. rohita* exposure to butachlor had adverse effects on hematology, oxidative and metabolic enzymes, stress hormones, and immune competency.

Vikas Kumar, H. S. Swain, B. K. Das, A. Upadhyay, Mitesh H. Ramteke and Vikash Kumar

## Converting the solid garden wastes to nutrient-rich culture media: An innovative technology for microalgae-based biodiesel



Garden wastes of the institute were converted into vermicompost manure and its extract (aerobic and anaerobically digested) was prepared and tested as nutrient source to enhance growth performance and lipid production from a freshwater microalga (*Graesiella emersonii* MN877773). The efficacy of the extract was then tested in combination with BG11 medium. The mixotrophic cultivation of microalgae in anaerobically digested vermicompost extract at 1:1 combination with BG11 medium enhanced the cell biomass ( $0.64 \text{ g d. wt. L}^{-1}$ ) and lipid productivity ( $3.18 \text{ mg L}^{-1} \text{ day}^{-1}$ ) of microalgae by two times. The test combination also improved the saturated (methyl palmitate) and monounsaturated fatty acids (oleic acid) content in the microalgae. The quality of biodiesel complies with the vehicular properties of biodiesel standards provided by India, the USA, and Europe except cold filter plugging property. The combination was also found to improve the cell biomass ( $0.041 \text{ g L}^{-1}$ ) as compared to BG11 medium in mass-scale cultivation. Hence, the study evidenced that *G. emersonii* grown in media supplemented with garden waste-based vermicompost extract had significant potential for mass-scale bioproduct production.

Soma Das Sarkar, Santhana Kumar V. and B. K. Das

## Ethanol fruit extract of *Terminalia arjuna* exhibits novel antifungal and anti-inflammatory properties

A study was executed to explore the prospective bioactive principles of aquaculture importance from the ethanol fruit extract of *T. arjuna*. The fruit extracts were subjected to initial antibiogram study with *Aphanomyces invadans* and then back efficacy study was conducted with fractionated ethanolic fruit extract of *T. arjuna*. The most active fraction was further analyzed for its potential antifungal and anti-inflammatory compounds. The purified samples were subjected to high resonance liquid chromatography and mass spectroscopy (HRLCMS) coupled with Orbitrap. The analyses showed the presence of Kanosamine ( $m/z$  161.06915 g/mol) which is recognized as an anti-fungal agent. This could be probable reason for showing antifungal activity of ethanol fruit extract along with ethanol bark extract of *T. arjuna*. In addition, sample matrix showed the traces of 4-Hydroxycoumarin ( $m/z$  162.03185 g/mol), 3-Hydroxyanthranilic acid ( $m/z$  153.04194 g/mol), and Carbaprostacyclin ( $m/z$  332.23314 g/mol). Among those, Prostacyclin and its analogues (prostanoids) are potent vasodilators and possess antithrombotic, antiproliferative and anti-inflammatory properties. Similarly, 4-Hydroxycoumarin and 3-Hydroxyanthranilic acid were also assumed to possess anti-inflammatory activities. The comparative area that corresponds to their concentration in the sample matrix was as follows, 220869.224, 268357.1, 5223926 for Carbaprostacyclin, 3-Hydroxyanthranilic acid, and 4-Hydroxycoumarin, respectively. This is an indication that ethanol fruit extract is an ample source of important bioactive compounds that could be further studied for their possible utilization in aquaculture and human welfare applications.

D. K. Meena, B. K. Das and A. K. Sahoo

## Technology Demonstration

### Culture-based fisheries at Vembanad wetland system

ICAR-CIFRI Kochi Centre has taken up culture-based fisheries in extensive fish farming systems associated with Vembanad wetland as a part of the climate-resilient fisheries programme under NICRA. Six thousand seeds of Pearlsport (*Etroplus suratensis*) were stocked in the farming systems located at Elamkunnappuzha on 9<sup>th</sup> December 2021. The programme envisages multi-stocking and multiple harvesting strategies for sustained livelihood to the farmers associated with a wetland.



Vembanad wetland

### Thankam Theresa Paul, U. K. Sarkar, B. K. Das, S. Manoharan and Albin Albert

### Demonstration of culture-based fisheries (CBF) for livelihood improvement of beel-fishers of Assam

Culture-based fisheries were demonstrated in seven closed beels (Charan, Saren, Bamuni, Go, Lakhnabandha, Sat Bhoni, and Borboibeel) of Assam. A total of 2.66 lakh advance fingerlings of Indian major carps and minor carps were released in these seven beels.

### B. K. Bhattacharjya, P. Das, S. Borah, A. K. Yadav and B. K. Das

### Demonstration of cage culture of *Osteobrama belangeri* in Takmu pat of Manipur



Takmu pat

For the first time in Manipur the Institute, in collaboration with the Department of Fisheries, Govt. of Manipur, carried out cage culture of *Osteobrama belangeri*. ICAR-CIFRI provided 10 no. of net cages, 4 tonnes of CIFRI CageGrow feed and 17000 fingerlings of *O. belangeri*. After 8 months of rearing, the final weight of the fish ranged from 62.7-154.6 g. The harvested fish (approximately 10,000 numbers) were released in the wetland for stock enhancement.

### Demonstration on Electronic Data Acquisition System (eMatsya)

A demonstration programme for *e-matsya* was arranged for the Department of Fisheries, Government of Tamil Nadu at the Office of the Commissioner of Fisheries, Chennai on 21 Sep 2021. Forty fishery officers from different districts of Tamil Nadu attended the demonstration.



Demonstration of culture-based fisheries in beels of Assam



Demonstration of e-matsya



Demonstration on mass production of Black Soldier Fly

### Demonstration on "Mass production of Black Soldier Fly for utilization as fish feed"

A demonstration programme was arranged on 'Mass production of Black Soldier Fly for utilization as fish feed' on 16 December 2021, at Peechi, Trissur, Kerala. The Officials of Department of Fisheries, Govt. of Kerala and fish farmers at Peechi, Trissur, Kerala attended the programme



Vol.26, No.1  
ISSN : 0972-0774

# सिफरी समाचार CIFRI NEWS

(July - December 2021)

## Ranching Activities

### Restoration of fish species in river Ganga: ICAR-CIFRI's initiatives

The institute has been continuously making efforts to restore and conserve the indigenous fish species in different inland water bodies. Especially ranching programmes of the institute in river Ganga have been lauded in different fora. In continuation of the tradition, on the great occasion of 'National Fish Farmer's Day' ranching programmes were organized at Daspara Ghat, Barrackpore; Prayagraj, UP and Garhwal, Uttarakhand on 10 July 2021. In Daspara Ghat, Barrackpore fifty thousand advanced fingerlings of Rohu, Catla and Mrigal were released, in addition to tagging and releasing of five hundred adult carps for



Mahseer ranching at Garhwal, Uttarakhand on 10<sup>th</sup> July 2021

identifying the fundamentals of migration range.

Another multi-location river ranching programme under NMCG project was organized at 5 different places like Maharajpur, Sahebganj, Farakka, Jangipur, and Berhampore covering Jharkhand and West Bengal States on 05 August 2021 to celebrate 'Azadi Ka Amrut Mahotsav'. A total of 5 lakh IMC fingerlings were ranched.

On 06 October 2021, another ranching programme was organized under the 'Azadi Ka Amrut Mahotsav' under NMCG project at Gandhi Ghat, Barrackpore, West Bengal in which 75 thousand fingerlings of IMC (*Labeo rohita*, *Labeo catla* and *Cirrhinus mrigala*) were ranched. The event was graced by Dr. Trilochan Mohapatra, Secretary, DARE & Director General, ICAR and Dr. Joykrushna Jena, Deputy Director General (Fisheries Science), ICAR. In addition to this, 50 catla fishes (*Labeo catla*) were tagged and released in the river for migration study and to take conservation measures.

Four river ranching programmes were organized during November 2021 in which 2.9 lakh fish fingerlings of Indian Major Carps and indigenous fish species were ranched at different banks of river Ganga, namely Barendrapara Ghat (Howrah), Chandannagar (Hooghly), Sangam nose (Prayagraj) and Gandhi Ghat (Barrackpore). Srimat Swami Atmapriyananda Ji Maharaj, Vice-Chancellor of Ramakrishna Mission Vivekananda Educational and Research Institute graced the ranching programme at Barendrapara Ghat on 01 November 2021. Dr. Joykrushna Jena, DDG of ICAR (Fisheries Science) was the chief Guest in ranching programme at Prayagraj.



Ranching at Sangam Nose, Prayagraj, 15 November 2021



Ranching of IMC seeds at Daspara Ghat, Barrackpore, 10<sup>th</sup> July 2021



Ranching at Gandhi Ghat, Barrackpore, West Bengal on 06 Oct 2021



IMC tagging at Gandhi Ghat, Barrackpore, West Bengal on 06 Oct 2021

## Scheduled Tribe Component (STC) Activities

The institute is striving to uplift the socio-economy and livelihoods of the tribal folk by disseminating the inland fisheries management technologies in various parts of the country. During the period under report an initiative was taken in collaboration with ICAR-CIHS Regional research Station and Krishi Vigyan Kendra, Malda to build the capacity of the tribal women and also to address the nutritional security. A five days capacity building program on "Inland Fisheries Management" was organized at the Institute headquarters, Barrackpore during 21-25 Sep 2021. Awareness and input distribution programme for *Yaas* (super cyclone) affected fishers of Sagar Island of West Bengal was carried out on 20 October 2021. Fish seed, fish feed, lime was distributed to 98 tribal fishers. Sri B. C. Hazra, Hon'ble Minister, Sundarbans Affairs, Govt. of West Bengal highly appreciated the initiative of the institute. The institute demonstrated inland fisheries technologies in collaboration with Rathindra Krishi Vigyan Kendra in Ashadulla Village, Sriniketan, Birbhum. The institute also conducted a scientist-women SHG interface meet at Rathindra KVK, Sriniketan, Birbhum on 07 Dec 2021. Fisheries inputs like fish seed, fish feed, lime were distributed under STC and SCSP. In another programme, inputs like fish seed, fish feed and lime were distributed to the ST beneficiaries living in different villages under Kakdwip block of South 24 Parganas of West Bengal on 15 Dec 2021. A sensitization and input distribution programme was carried out in remote villages of Sundarban under Gosaba block of South 24 Parganas of West Bengal on 17 December.



Input distribution to the fishers of Rishia Reservoir, Odisha



Seed stocking at Vazhani dam

In Odisha at Balidiha and Badjod Dam, Mayurbhanj District, the pen culture demonstration-cum-reservoir fisheries enhancement programme was inaugurated by the Union Minister of State for Jal Shakti and Tribal Affairs, Shri Tudu on 11<sup>th</sup> and 31<sup>st</sup> December 2021, respectively. An awareness camp was also organized along with the demonstration programme. Kochi centre of the institute organized seed ranching and awareness programme on 'Sustainable Fisheries for Livelihood Enhancement in Reservoirs' in Vazhani Dam on 10 July 2021 on the occasion of National Fish Farmer's Day. The fishers were provided with 2500 pearlspot (*Etrophus suratensis*) seeds, which were released in the reservoir. The Research Station also distributed four fiberglass fishing coracles to the tribal fishers of the Vazhani Dam and Kanjirapuzha reservoir of Palakkad district.

In Gujarat, the tribal beneficiaries were identified for STC interventions in Ukai reservoir in Tapi District and Dev dam in Panchmahal district of Gujarat. An awareness programme on "Anti-Microbial Resistance in Fish" was conducted on 24 November 2021 at Dev dam in Bhamariya village (Panchmahal district).

## Activities under SCSP

Under the SCSP program stocking has been done in five beels of Murshidabad for enhancing the wetland fish production. Stocking of the auto breeder fish, *Systemus sarana* was carried out in five wetlands of North 24 Parganas. The institute has also adopted eight new sewage-fed wetlands of the East Kolkata wetlands and provided 8 nos of HDPE pens, 8 coracles, and 30 tons of fish feed to the PFSC members of wetland fishers.

Through SCSP, Institute has helped the SC fishers of Jharkhand for enhancing the fish production from reservoirs in collaboration with the fisheries department. Inputs like 14 pens, 28 ton fish feed, fish seeds, and boats were distributed to the fish farmers of seven reservoirs of Jharkhand. To support the *Yaas* (the super cyclone) affected fishers of the Sunderban area (Amtoli, Sahebkhali, Sagar island, Kultali), the institute has distributed fishery inputs like fish seed, fish feed and lime to 1150 farmers. Two mass awareness cum input distribution programs were organized at Darjeeling and Kalimpong and 12000 nos. of Amur carp and grass carp fingerlings and 7000 kg feed were distributed among 100 fish farmers of both the districts. The institute has developed one new cluster at Satyabhamapur, Cuttack and 15 ornamental units were distributed to them. During this period, 3 numbers of capacity building program (including one off-campus), 10 mass awareness programmes and two stakeholders meetings were organized.



Coracle distribution at Kanjirapuzha



Beneficiaries at Hingalganj, Sundarbans



Vol.26, No.1  
ISSN : 0972-0774

# सिफरी समाचार CIFRINEWS

(July - December 2021)

## Extension and Transfer of Technology Activities

### Trainings Conducted

Sr. No.	Name of the training	Date	Participants	Venue
1.	One day training on GeM	23Jul 2021	2 staff from ICAR CIFE, Kolkata centre	CIFRI, Barrackpore
2.	Enhancing reservoir fisheries for livelihood and nutritional security	29Jul 2021	50 participants	CIFRI, Barrackpore
3.	Production enhancement through pen culture in inland open waters	29 Jul 2021	120 participants	ICAR-CIFRI RC, Guwahati
4.	Collaborative training programme with MANAGE, Hyderabad on Nutrismart fish' to boost the nutritional security of the rural women	10-12 Aug 2021	44 participants (Students, KVK personnel, Assistant Professor)	ICAR-CIFRI, Barrackpore
5.	Hilsa fisheries conservation and livelihood improvement in River Ganga	11Aug 2021	92 fishers and farmers	CIFRI, Barrackpore
6.	Electronic Data Acquisition System (eMatsya)	21Sep 2021	40 fishery officers from different districts of Tamil Nadu	RRC Bangalore
7.	Fisheries enhancement options for beels	29 Sep to 01 Oct 2021	33 fishers	46-Morakolong beel, Morigaon, Assam
8.	Estimation of fish productivity in inland open waterbodies	01 Oct 2021	31 Fisheries Development Officers of Kakinada, AP	RRC Bangalore
9.	अंतर्स्थलीय खुले जल में वैज्ञानिक हस्तक्षेप के माध्यम से मछुआरों की आय में वृद्धि	04-11 Oct 2021	144 fishers, students, department officials, and entrepreneurs from UP, Bihar, Jharkhand, WB, Rajasthan, Haryana	RRC Allahabad
10.	Impact of COVID-19 on ecology and fisheries of river Ganga	18 Oct 2021	100 participants including farmers, entrepreneurs, students and teachers from different Universities	RRC Allahabad
11.	Strategies for enhancing fish production from beels	29-30 Oct 2021	50beel fishers	Lakhanabandhabeel, Nagaon, Assam
12.	Virtual training-cum-workshop on "Catch Estimation Methods for Inland Open Waterbodies"	08 Nov 2021	35 participants from 10 state fisheries departments of India	CIFRI, Barrackpore

Contd.....



Rupahibeel, Nagaon, Assam, 9-11 Nov 2021



Sensitization programme on hilsa fisheries, 11 Aug 2021

## Contd.. extension and transfer of technology activities

Sr. No.	Name of the training	Date	Participants	Venue
13.	Fisheries enhancement options for beels	09-11 Nov 2021	25beel fishers	Rupahibeel, Nagaon, Assam
14.	'Inland fisheries management' sponsored by Govt. of Bihar	17-23 Nov 2021	29 fish farmers from Nawada dist., Bihar	CIFRI, Barrackpore
15.	Strategies for enhancing fish production from beels	23-25 Nov 2021	35beel fishers	Danduabeel, Morigaon district
16.	Pen farming for production and livelihood enhancement in floodplain wetlands	24-26 Nov 2021	58beel fishers	Lakhanabandhabeel, Nagaon, Assam
17.	'Inland fisheries management' sponsored by Govt. of Bihar	30 Nov-06 Dec 2021	30 fish farmers from Mujaffarpur	CIFRI, Barrackpore
18.	'Inland fisheries management' sponsored by Govt. of Bihar	14-20Dec 2021	30 fish farmers from Sitamarhi	CIFRI, Barrackpore
19.	'Inland Fisheries Management' under ARYA farmers' training	27-31 Dec 2021	40 fish farmers from Bhagalpur KVK, Bihar	CIFRI, Barrackpore
20.	'Inland fisheries management' sponsored by Govt. of Bihar	28 Dec-03 Jan 2022	30 fish farmers from East Champaran	CIFRI, Barrackpore



NFDB sponsored training, 15-17 Dec 2021



Trainees from Mujaffarpur, Bihar 30 Nov 2021

## Mass Awareness Camps

Name of the Camp	Purpose	Date	Venue	Participants
Management of beel eco-systems of Assam for sustainable fisheries	To create awareness on sustainable beel fisheries management	10 Jul 2021	ICAR-CIFRI RC, Guwahati	85 beel fishers
Livelihood enhancement scope in reservoir fisheries	Sustainable Fisheries for Livelihood Enhancement in Reservoirs	10 Jul 2021	Vazhani Dam, Thrissur	30 fishers
Ecosystem-based management for fisheries and aquaculture of NER	To create awareness on ecosystem based fisheries management	10 Jul 2021	ICAR-CIFRI RC, Guwahati	300 fishers
Reservoir Fisheries Management for Sustainable Development	To create awareness on ecosystem based fisheries management	10 Jul 2021	Manchanabele Reservoir, Ramanagara District, Karnataka	150 beneficiaries participants

Contd.....



## Mass Awareness Camps

Name of the Camp	Purpose	Date	Venue	Participants
Livelihood enhancement through inland fisheries	To create awareness on scope of livelihood improvement through reservoir fisheries	10 Jul 2021	Umetha village, Vadodara	65 fishers
Culture based fisheries for sustainable development	To create awareness on benefit of CBF	04 Aug 2021	Kariyala village, Chitradurga, Karnataka	40 fisher folks from Gayatri reservoir, Chitradurga District.
National campaign on System Diversification in Aquaculture under AzadiKaAmrut Mahatso	Fisheries enhancement in inland open waters	01 Sep 2021	Kanhirapuzha Dam, Palakkad	40 fishers
Enclosure culture for enhanced fish production from beels	To create awareness on enclosure culture in beels	07 Sep 2021	Ghorajanbeel, Kamrup, Assam	42 fishers
International Year of Millets – 2023 Campaign on Nutri-garden and Tree plantation	To create awareness on nutri-garden and health benefits of millet as food	17 Sep 2021	Ghorajanbeel, Kamrup, Assam and Kumbalangi, Ernakulam, Kerala	20 and 15 fishers
Hilsa and Dolphin conservation in river Ganga under the NMCG programme	To create awareness on hilsa and dolphin conservation	20 Sep 2021	Farakka, Murshidabad Dist. of West Bengal	216 fishermen
Antimicrobial resistance in culture-based fisheries	To create awareness on antimicrobial resistance in CBF	23 Nov 2021	Vanivilassagar reservoir, Chitradurga, Karnataka	52 fishermen
Antimicrobial resistance in fish	To create awareness on antimicrobial resistance in fish	24 Nov 2021	Lakhanabandhab eel, Nagaon, Assam	58 fishers
			Vadodara centre	50 fishers
Cage culture for enhanced fish production from Dumbur reservoir of Tripura	To create awareness on cage culture in reservoirs	07 Sep 2021	Gandacherra, Dhalai district of Tripura	50 fishers

Contd.....



Mass awareness camp on culture-based fisheries for sustainable development” by ICAR-CIFRI, Bangalore Regional Centre



Sensitization of inland fish farmers and fishers on the “Antimicrobial Resistance in Culture-based Fisheries”

## Contd.. mass awareness camps

Name of the Camp	Purpose	Date	Venue	Participants
Enclosure culture for fish production in reservoir	To create awareness about enclosure culture as a livelihood option for the displaced farmers	29 Oct 2021	Mapithel dam, Kamjong district, Manipur	38 fishers
Climate change and its deleterious impacts on wetland fisheries under NICRA	To create awareness on deleterious impacts on wetland fisheries	04 Dec 2021	Chand wetland, Nadia, West Bengal	54 fishers
Mass production of Black Soldier Fly for utilization as fish feed	To create awareness on new fish feed options	16 Dec 2021	Peechi, Trissur, Kerala	Officials of Department of Fisheries, Govt. of Kerala and fish farmers of Peechi, Trissur, Kerala
Endocrine Disrupting Chemicals (EDCs) and Fish health management in collaboration with C-DAC, Kolkata	To create awareness on EDC and fish health	23 Dec 2021	Charanbeel, Morigaon, Assam	60 fishers



Awareness programme on "Reservoir Fisheries Management for Sustainable Development" by ICAR-CIFRI, Bangalore Regional Centre

## Exhibitions Participated

ICAR-CIFRI participated in XV Agricultural Science Congress & ASC Expo

**Date**  
13-16 Nov 2021

**Venue**  
Institute of Agricultural Sciences, BHU, Varanasi





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# सिफरी समाचार CIFRINEWS

(July - December 2021)

## Staff Corner

Mr. Subhankar Dey joined as Finance & Accounts Officer at Barrackpore on 08 Nov 2021



## New Appointments



Shri Rajdip Dutta joined as Assistant at Guwahati on 28 Sep 2021

## Superannuations

Name & Designation	Last Place of Posting	Date of Superannuation
Mr. Debasis Saha, Technical Officer	Barrackpore	31 Aug 2021
Mr. Giridhari Paramanick, Technical Assistant	Barrackpore	30 Sep 2021
Mrs. Shyamali Mitra, Assistant	Barrackpore	31 Oct 2021
Dr. SKS Hameed, Asstt. Chief Technical Officer	Barrackpore	31 Oct 2021
Dr. Sanjay Bhowmick, Chief Technical Officer	Barrackpore	31 Dec 2021
Dr. S. Dam Roy, Principal Scientist	Kolkata	31 Dec 2021

## Promotions

Name & Designation	Place of posting	Promoted to the post of	With effect from
Mr. Raushan Kumar, Assistant	Barrackpore	Assistant Administrative Officer	20 Jul 2021
Mrs. Shyamali Mitra, Assistant	Barrackpore	Assistant Administrative Officer	20 Jul 2021
Mr. M. Pennappa, SSS	Bengaluru	Technician	20 Jul 2021
Mr. M. Mari, SSS	Bengaluru	Technician	20 Jul 2021
Mr. P. V. Shajil, SSS	Kochi	Technician	20 Jul 2021
Mr. Munshi Ram Rana, SSS	Prayagraj	Technician	20 Jul 2021
Mr. Ratan Das, SSS	Barrackpore	Technician	20 Jul 2021
Mr. Binod Kumar Sahani, SSS	Barrackpore	Technician	20 Jul 2021
Mrs. S. Sumithra Devi, Assistant	Bengaluru	Assistant Administrative Officer	02 Nov 2021

## Intra - Institutional Transfer

Name & Designation	From	To
Shri K. Lohith Kumar, Scientist	ICAR-CIFRI, Barrackpore	Research Centre, ICAR-CIFRI, Vadodara
Shri Wakambam Anand Meetei, Scientist	Research Centre, ICAR-CIFRI, Vadodara	ICAR-CIFRI, Barrackpore
Shri U. S. Ram, Skilled Support Staff	ICAR-CIFRI, Barrackpore	Regional Centre, ICAR-CIFRI, Prayagraj
Mr. Shravan K. Sharma, Scientist	ICAR-CIFRI, Barrackpore	Regional Centre, ICAR-CIFRI, Prayagraj

## Inter - Institutional Transfer

Name & Designation	From	To
Mr. Tasso Tayung, Scientist	ICAR-CIFRI, Barrackpore	ICAR Research Complex for NEH Region, Umiam
Dr. Monika Gupta, Scientist	Regional Centre, ICAR-CIFRI, Prayagraj	NBFGR, Lucknow
Mr. N.V.R.N. Murty, SFAO	ICAR-CIFRI, Barrackpore	ICAR-CRIDA, Hyderabad
Dr. Sonalika Sahoo, Scientist	NBSSLUP, Nagpur	Regional Centre, ICAR-CIFRI, Bangalore



Mrs. Shyamali Mitra (at the middle)



Dr. SKS Hameed (at the left)



Mr. N.V.R.N. Murty (at the right)

## Meetings



Review meeting on NASF hilsa

### Webinar on 'Impact of COVID-19 on ecology and fisheries of river Ganga'

The webinar was arranged on 18 Oct 2021 in online mode by the Prayagraj regional research centre. About 100 participants including farmers, entrepreneurs, students, and teachers from different universities participated in the webinar.

### Meeting-cum-demonstration on mass production of black soldier fly

Bengaluru Regional center of the institute and ICAR-National Bureau of Agricultural Insect Resources, Bengaluru jointly organized a one-day meeting-cum-demonstration on 'Mass production of Black soldier fly for utilization as fish feed' at Government Fish Seed Hatchery at Peechi, Thrissur district, Kerala. Around 35 participants from the State Department of Fisheries, Private fish hatcheries and farmers participated in the programme. Dr. Preetha Panikkar, Principal Scientist & HoRC, ICAR-CIFRI Regional Centre Bengaluru and Dr. Amala Udayakumar, Scientist (Entomology) organized the meeting. Mrs Joemol, Assistant Fisheries Extension Officer, Government Fish Seed Hatchery, Peechi coordinated to conduct the meeting.



Training cum workshop on catch estimation

### Review meeting of NASF hilsa project

A review meeting was held for the NASF project entitled "Captive breeding of hilsa, *Tenualosa ilisha*. Phase II" on 03 August 2021 both in-person and virtual mode where the Director, project PI along with the Co-PIs attended. Dr. B. K. Das, Director, requested all the partner Institutes to take initiatives to overcome the constraints faced in executing the project activities under COVID pandemic conditions and damages caused by the "Yaas". Dr. S. Samanta, Dr. D. N. Chattopadhyay, Dr. D. De, and Dr. S. Dasgupta presented the objective-wise progress made during the last 6 months and discussed the proposed research plan of actions to be performed in next 3 months followed by budget utilization of the respective ICAR partner Institutes.



Webinar on impact of COVID-19

### Training-cum-workshop on catch estimation methods

The institute conducted a one-day virtual training-cum-workshop on "Catch Estimation Methods for Inland Open Waterbodies" on 08 November 2021 for various State Fisheries Dept. officials of India. The programme was aimed to provide the basic understanding of sampling strategies and their implementation for the estimation of fish catch in various inland open waterbodies. Dr. B. K. Das, Director briefed about the fish catch scenarios of the country and objectives of the programme. Dr. Malay Naskar, Principal Scientist elaborated on fish catch estimation techniques for estuarine, wetland, reservoir, river. The lecture was followed by a demonstration of fish catch estimation from different water bodies.



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# सिफरी समाचार CIFRINEWS

(July - December 2021)

## Regional Workshop on 'Open water fisheries enhancement of Northeast Region of India'



The institute organized an interactive regional workshop on 'Open water fisheries enhancement of Northeast Region of India' on virtual mode on 20 December 2021. The major objectives of this workshop were to appraise the state Department of Fisheries about the open water fisheries management guidelines/ technologies developed by ICAR-CIFRI; to understand research support requirements and to explore collaborative work programmes. Dr. B. K. Bhattacharjya, Head (Actg.) ICAR-CIFRI Regional Centre, Guwahati & PI of NEH project explained the background of the workshop. Dr. B. K. Das, Director discussed in detail the recent interventions and activities carried out by ICAR-CIFRI in the Northeastern states of India. Directors of Fisheries of NE states and their representatives from Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura were present. Dr. Arun Pandit, Principal Scientist, and coordinator of the workshop proposed vote of thanks.

## Interactive workshop on 'Cage culture in Umiam reservoir'

The interactive workshop was organized by the Guwahati Regional Centre of the Institute, in collaboration with ICAR Research Complex for NEH Region, Umiam at Umniuh Khwan village of Umiam, Meghalaya on 21 December 2021. The programme was attended by 55 tribal farmers (including 25 women) of locality under the Ri-Bhoi Farmers' Union. On this occasion, a leaflet on "Management of open water fisheries in Meghalaya: ICAR-CIFRI interventions" was released. A total of 9000 nos. of fish fingerlings were released in cages installed in the reservoir and four tons of CIFRI-CAGEGROW feed was provided to the beneficiaries for use in cage culture.



## Events

### Platinum Jubilee Lecture Series

**Lecture No. 1:** CIFRI : Remembering with Reverence by **Dr. S. Ayyappan**, Former Secretary, DARE and DG, ICAR on 03 August, 2021



**Lecture No. 2:** Indian fisheries : Introspection to course correction by **Dr. Dilip Kumar** on 28 October, 2021

**Lecture No. 3:** Organic contaminants of emerging concern for aquatic ecosystems by **Dr. Rai S. Kookana** on 26 November, 2021





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# सिफरी समाचार CIFRINEWS

(July - December 2021)



## Technology Transfer License Agreement of 'ICAR-CIFRI ARGCURE'

CIFRI ARGCURE technology transfer license agreement was signed by Dr. B. K. Das, Director of the Institute, and Mr. Sariful Islam, Managing Director, Glaucus Agrochem Pvt. Ltd., Kolkata on 7 July 2021 in the virtual presence of Dr. J. K. Jena, Deputy Director General (Fisheries Sciences), ICAR and Dr. Sudha Mysore, CEO, Agrinnovate India Ltd. New Delhi. The technology was licensed on a non-exclusive basis for manufacturing and sale for 5 years.

## National Fish Farmers Day

The institute celebrated "National Fish Farmers Day" at

headquarters and all the centres on 10 July 2021 along with National Campaign on Ecosystem based management for sustainable fisheries. A total of four webinars were organized simultaneously from different regional centers and Head Quarter in different regional languages covering more than 8000 farmers, students, community leaders, FPOs, etc. On field awareness programmes were also organized in Mahi River Basin Gujarat, Vazhani Reservoir, Thissur, Kerala, Manchanabele reservoir, Ramagara, Karnataka; Ganga River, Farakka and Hooghly estuary. Ranching programme was also organized in Prayagraj, and Barrackpore for restoration of biodiversity. This national campaign under NICRA was organized at Media wetland, North 24 Parganas, W. B. on Ecosystem based management for sustainable fisheries on National Fish Farmers Day, 10 July 2021 as part of "Bharat Ka Amrut Mahotsav" to create awareness on "Climate Smart Wetland Fisheries". To support the livelihoods of the fishers CIFRI also distributed gillnets to the fishers of marginal community. Shri Pratap Chandra Sarangi, Hon'ble Minister of State, Ministry of Fisheries, Animal Husbandry and Dairying graced the occasion as Chief Guest. Dr. Joykrushna Jena, Deputy Director General (Fisheries Science) was also present in the interaction session.



National campaign on ecosystem management for sustainable fisheries

## 75<sup>th</sup> Independence Day



75<sup>th</sup> Independence Day, Azadi Ka Amrut Mahotsav was celebrated at the Institute with great fanfare. All the staff including scientists, research scholars along with their family members gathered on the occasion. Dr. B. K. Das, Director, hoisted the national flag in the grand ceremony. In his address, he congratulated all the members of ICAR-CIFRI on 75th anniversary of Indian independence. He congratulated everyone for working together

and getting the prestigious Sardar Patel Best ICAR institute Award for 2020. He thanked all CIFRIANS for contributing to the nation-building. He also added that in the last five years four technologies have been commercialized, four patents, six trademarks, and 2 designs have already been registered.



Awareness at Debighat, Nawabganj, W. B.

## 16<sup>th</sup> Parthenium Awareness Week

The institute observed Parthenium Awareness Week during 16-22 August to ensure parthenium free campus under the aegis of Swachh Bharat Abhiyaan. Various



awareness programs and demonstrations regarding the health and environmental hazards posed by parthenium were organized. The uprooted weeds were put in the vermicompost pit of the Institute. In addition, outreach programs regarding parthenium awareness were conducted in the villages surrounding Khalsibeel, Nadia and Beladanganbeel of North 24 Parganas districts of West Bengal.



## Fit India Freedom Run 2.0

The Institute organized Fit Indian Freedom Run 2.0 under the aegis of Azadi Ka Amrut Mahotsav on Sept 09, 18 and 25, 2021. The event was organized as per the call of the Ministry of Youth Affairs and Sports, Govt. of India to



commemorate the Azadi ka Amrut Mahotsav. The institute staff resolved to include physical activity of at least 30 minutes daily in their lives, i.e. *Fitness ki dose, aadba ghanta roz*. The run was also aimed at making the general public aware of this noble initiative, and to make the “Jan Bhagidari se Jan Andolan” a grand success. The Run commenced at 7.00 am from the Institute Hqs. at Fishery Gate, Manirampur and came back after reaching Chiriamore, Barrackpore which is around 5 km from the institute headquarters.



## हिन्दी सप्ताह 2021

संस्थान में दिनांक 14-20 सितंबर 2021 के दौरान हिंदी सप्ताह का आयोजन किया गया। इस वर्ष कोविड-19 महामारी के कारण हिन्दी सप्ताह का उद्घाटन तथा अन्य प्रतियोगिताएं ऑनलाइन मोड में आयोजित की गईं। जिसमें संस्थान मुख्यालय के साथ इसके क्षेत्रीय केन्द्रों/स्टेशनों (इलाहाबाद, बंगलौर, गुवाहाटी, वडोदरा, कोलकाता और कोच्चि) ने भी भाग लिया। इस उद्घाटन समारोह की मुख्य अतिथि डॉ.



(श्रीमती) विजय लक्ष्मी सक्सेना, महाध्यक्ष (निर्वाचित), भारतीय विज्ञान कांग्रेस संस्था तथा विशिष्ट अतिथि डॉ. अशोक कुमार सक्सेना, पूर्व महाध्यक्ष, भारतीय विज्ञान कांग्रेस संस्था उपस्थित थे। संस्थान के निदेशक डॉ. बि. के. दास ने गृह मंत्रालय, राजभाषा विभाग द्वारा निर्देशित राजभाषा प्रतिज्ञा की शपथ ऑफलाईन/ऑनलाईन पर उपस्थित समस्त अधिकारियों/कर्मचारियों को दिलवायी। संस्थान के निदेशक महोदय कहा कि यदि शिक्षा व्यवस्था को सुदृढ़ करना है तो मातृभाषा को मजबूत करना चाहिए। उन्होंने कहा कि मातृभाषा से किसानों तक पहुंचाना चाहिए। इस अवसर पर संस्थान की हिंदी सिफरी मासिक समाचार पत्रिका, अंक अगस्त 2021 तथा “अलवण जल एवं मत्स्य पारिस्थितिकी” पुस्तक का विमोचन किया गया। हिंदी सप्ताह समापन समारोह दिनांक 21 सितम्बर, 2021 को ऑफलाईन/ऑनलाईन मोड में किया गया। हिंदी सप्ताह के दौरान आयोजित प्रतियोगिताओं के विजेताओं को पुरस्कार वितरण किया गया।

## Campaign on Nutri-Garden and Tree Plantation

As a part of the International Year of Millets 2023, a Campaign on nutri-garden and tree plantation (*PoshanVatika* and *Vriksa ropan mahaabhiyan*) was organized by the institute on 17 September 2021. 200 saplings of fruits viz. mango, guava, lichi, lemon, jackfruit, pomegranate, jamun, coconut, bael, custard apple, java apple, sapota and health trees like neem, tuls were planted at institute headquarters and its regional Centres. Apart from this 117 saplings were also planted at different outreach locations viz Chamardaha and Chanta beel in North 24 Parganas and Kolaghat Hilsa field station. An awareness meeting where, Dr. B. K. Das, Director, enlightened the staff regarding the importance of including millets in their daily diet for a healthy life, was organized.





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## Field Day at Khalsi Wetland, West Bengal

The institute organized a 'field day' at the Khalsi wetland of Haringhata Block, District Nadia, West Bengal on 24 September 2021 for sensitizing the women beneficiaries on diversified income-generating enterprises under the DBT project titled "Empowering women of Wetland-dependent fisherfolk community of lower Gangetic plain through cost-effective technologies". A total of 71 participants from the adjacent villages of the Khalsi wetland took part in the programme. The project PI Dr. Aparna Roy encouraged them to continue their hard work in the successive years. The other project scientists Dr. A.K. Bera and Dr. Arun Pandit (ICAR-CIFRI), Prof. Pintoo Bandopadhyay, Dr. Sanchita Mandal (BCKV, Kalyani) also spoke on the occasion. The sensitization programme was followed by stocking of 420 kg good quality IMC fingerlings in four pens installed in the wetland and also providing CIFRI Cagegrow feed.



Field day at Khalsi Wetland, West Bengal



World Rivers Day

## World Rivers Day

The Institute, in association with National Mission for Clean Ganga (NMCG), Ministry of Jal Shakti celebrated "World Rivers Day" at Farakka, West Bengal in river Ganga on 26 September 2021 with a special focus on dolphin conservation. The major objective was to create awareness among the fishermen and public to keep rivers clean and to conserve the aquatic biodiversity. On this occasion, 78 adult hilsa of average weight 250g were ranched at the upstream of Farakka barrage.

## Dr. J. K. Jena, DDG (Fy. Sc), ICAR Visited Moyna Fish Hub

Dr. J. K. Jena, DDG (Fy. Sc), ICAR, New Delhi visited the Moyna fisheries Hub, Moyna, Purba Medinipur, WB on 09 Oct 2021. Around 8000 ha of depressed lands in seven blocks of surroundings have been brought under intensive fish culture providing livelihood support to more than 5 lakh people directly or indirectly in Moyna. Dr. Jena was accompanied by Dr. B.K. Das, Director, ICAR-CIFRI, Barrackpore along with Scientists of ICAR-CIFA & CIFRI. Dr. Jena got appraised about the constraints faced by the fishers in an aquafarmer's



1<sup>st</sup> hand information from a fish trader

interactive meet. Dr. Jena & Dr. Das addressed the people of Moyna through Pally Bangla FM Radio run by the Ramakrishnayan Society of Moyna.



Dr. Jena interacting with aquafarmers at Moyna

## MOU with Directorate of Fisheries, Government of Odisha

The Institute signed a Memorandum of Understanding (MOU) with the Directorate of Fisheries, Government of Odisha, on 28 October 2021 at Cuttack, Odisha for a consultancy programme on "Environmental and aquatic animal health monitoring in Hirakud reservoir under cage culture program". The MOU was signed by Dr. B.K. Das, Director, and Sri S R Pradhan, IAS, Director, Directorate of Fisheries, Government of Odisha. On this occasion Mr. Devananda Bhanja, Additional Director; Mr. Sashi Acharya, Joint Director and Sri Prasanta Panigrahi, ADF, Inland Fisheries from Directorate of Fisheries, Odisha.



## Field Day at Takmu Pat, Manipur

The Institute in collaboration with the Department of Fisheries, Govt. of Manipur had successfully carried out culture of the endemic carp, *Osteobrama belangeri* in HDPE modular cages in Takmu pat, Bishnupur district of Manipur under the NEH component of ICAR-CIFRI. On the occasion of final harvesting and release of fish, a field-day was conducted on 28 October 2021 at the cage culture site. About 50 fishers participated in the programme.



Field day at Takmu Pat, Manipur

## Vigilance Awareness Week



The Institute observed "Vigilance Awareness Week" from 26 October to 01 November 2021 focusing on the theme area "Independent India@75: Self-reliance with integrity" maintaining the COVID 19 protocols. The week-long observance was started with the administration of a pledge to the officials and staff on 26 October by the Director. Large numbers of posters, banners, placards were displayed at the campus premises showing the ill effects of corruption and the commitment of

CIFRI toward zero tolerance on corruption. On the next day, all the staff formed a human chain showing the unity in fighting the corruption. Walkathon, quiz programme, extempore, and lecture by Shri Rajeev Lal, Jt. Director (Adm.)-cum-Registrar were the other programmes. Shri Jayadevan A., IPS, Supdt. of Police and HoB, EO-IV, CBI, Kolkata was the Chief Guest in the concluding ceremony on 1st November.



Shri Jayadevan A., IPS, addressing the staff

## Ganga Utsav 2021

The Institute celebrated 'Ganga Utsav 2021' at Barrackpore, Farakka, and Prayagraj in river Ganga during 01-03 November 2021. The NMCG, Ministry of Jal Shakti, Government of India has put forward the Ganga Utsav-2021 River festival with major objective of "Jan Bhagidari" in revival of Ganga with a focus on encouraging stakeholder engagement and public participation. ICAR-CIFRI carried out a series of activities like 'Ganga Aarti', river ranching programme of hilsa and small indigenous fish species, 'Ganga Pratigya', rolling of ICAR-CIFRI-NMCG tableau at various ghats, mass awareness programme, quiz competition, rangoli and painting competition and a cultural evening. Dr. Nabarun Bhattacharya, Senior Director, C-DAC graced the valedictory function.



## DDG (Fy), ICAR Inaugurated 'Matsyalok Guest House' at ICAR-CIFRI, Prayagraj

Dr. J. K. Jena, Deputy Director General (Fisheries), ICAR, New Delhi, inaugurated five rooms guest house at Prayagraj Regional center of the Institute on 15 November 2021. Dr. B.K. Das, the director, was also present on the occasion. The inaugurated guest house has been named 'Matsyalok' to serve the people engaged in fisheries sector. The DDG (FY) addressed the scientists and staff of the center and motivated & inspired for the better research and development of the fishery and fishermen.

## World Fisheries Day

Dr. J. K. Jena, DDG (Fy. Sc.) inaugurating the guest house

ICAR-CIFRI celebrated World Fisheries Day-2021 focusing on the theme 'Riverine fisheries conservation and the sustainability' on the bank of river Ganga at Farakka on 21 November. On this occasion, Shri. R. Azhagesan, General Manager, Farakka Barrage Project, Dr. Sandeep Behera, Biodiversity consultant NMCG, New Delhi graced the occasion. Dr. D.K. Meena, Scientist, ICAR-CIFRI



World Fisheries Day celebration at Farakka



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briefed on hilsa fisheries improvement programme undertaken by the institute in the river Ganga. More than 1500 fishermen and public participated in the programme. In another location ICAR-CIFRI conducted an awareness programme in Khalsi beel regarding Ecosystem-based wetland management. 67 farmers from the Khalsi Udbastu Unnayan Samiti participated in the awareness programme.



Parliamentary Committee on Official Language

## Inspection by the Parliamentary Committee on Official Language

The second sub-committee of the Parliamentary Committee on Official Language inspected the progress made in the implementation of Official Language in the offices of Kolkata, West Bengal from 22-23 November 2021 including the ICAR-CIFRI. The convener of the committee, Smt. Ranjanben Dhanjay Bhatt and other members expressed satisfaction over the efforts being made by the institute to comply with the Official Language Policy and appreciated the publication work of the institute. The members of the committee indicated the areas of improvement related to working in Hindi.

The ICAR has designated the 3<sup>rd</sup> December as "Agricultural Education Day" to commemorate the birth anniversary of first President of Independent India and Union Minister of Agriculture, Bharat Ratna, Dr. Rajendra Prasad. The objective of this day is to expose students to various facets of agriculture and its relevance to country's development, inspire them and attract them towards agriculture, so that they develop interest in agriculture and allied subjects, choose professional career after schooling, engage themselves in agriculture and related activities or become agripreneurs in future. The day was fervently observed at the institute headquarters on 03 December 2021. The director and all HoDs spoke on the occasion. Dr. A.K. Das delivered a lecture on importance and relevance of agriculture education.

## Agricultural Education Day



Lecture by Dr. A.K. Das on Agri. Education Day

## Women in Agriculture Day

To recognize the efforts and contribution of women in agriculture, Indian Council of Agricultural Research celebrates 4<sup>th</sup> December every year as 'Women in Agriculture Day. On this occasion, a brainstorming session was organized at the Institute. All the scientists, technical officers and students working in the institute participated in this brainstorming session. Dr. Sajina AM, Scientist. Dr. Suman Kumari, Scientist, Ms. Hena Chakraborty, Young Professional-II and Dr. Shreya Bhattacharya, Young Professional-II presented views on women's participation in agriculture. The brainstorming session was presided over by the Director of the Institute, Dr. BK Das and he appreciated the efforts and dedication of all the women employees for their research as well as in the institute building activities.



Lecture by the staff on Women in Agriculture Day

## World Soil Day

The 'World Soil Day 2021 was organized by the institute on 5<sup>th</sup> December 2021 at Barrackpore Headquarters through online and offline mode to highlight the importance



World Soil Day

of soil health for agricultural production and maintaining environmental health. Prof. Pabitra Mani, eminent soil scientist and Head of the Department, Bidhan Chandra Agricultural University, (BCKV), Mohanpur, West Bengal was present as the chief guest in this programme.

## Climate-resilient Fisheries Initiative at Elamkunnapuzha

Kochi Centre of the Institute stocked 6,000 seeds of pearl spot in culture-based fisheries establishments associated with Vembanad lake at Elamkunnapuzha on 09 Dec 2021 as a part of climate-resilient fisheries programme taken up under NICRA project. The stocking programme was inaugurated by Mr. Sinoj Kumar, Vice-president, Ezhupunna Grama Panchayat and Mr. Joy K. J., ward member in the presence of Dr. Thankam



Climate-resilient fisheries activities at Elamkunnapuzha

Dam, Mayurbhanj District, Odisha on 11 Dec 2021. The Minister stressed disseminating the benefits of the Reservoir Fisheries Development Programme to the local community. Dr. B.K. Das, Director, briefed about the activities being carried out by the Institute in Odisha. The institute installed two pens in each reservoir for fingerling raising. About 250 Fishermen participated in each programme.

### Site Selection for Cage Culture at Krishnarajasagar and Almatti Reservoirs

The Department of Fisheries, Government of Karnataka has selected Krishnarajasagar (KRS) and Almatti reservoirs for the installation of cages for fish culture and subsequently requested ICAR-CIFRI to identify suitable sites in the reservoir for the installation of cages. Scientists and other officials from Bengaluru Centre surveyed these reservoirs on 13 -15 December 2021. The sites were recommended based on the water quality parameters, circulation and pollution, availability of sheltered bays, access to land and water transportation, water fluctuations permitting minimum depth.



Activities for site selection for cage culture

'Nadi Utsav' to create awareness on river ecosystem among the different stakeholders including the people living in and around the Ganga riverbank area. Dr. B. K. Das, Director emphasized the role of river festivals in different major rivers of the world and sought the people's participation for keeping the river health in good condition. Dr. Sandeep Behera, Biodiversity Consultant NMCG highlighted the importance of the River Festival and



National campaign on climate resilient inland fisheries

Theresa Paul, Scientist and was participated by fish farmers of the area. The programme envisaged multi-stocking and multiple harvesting strategies for sustained livelihood to the farmers associated with wetland.

### Union Minister of State of Jal Shakti and Tribal Affairs Inaugurated ICAR-CIFRI Pen Culture-cum-Reservoir Fisheries Enhancement Programme

Shri Bishweswar Tudu, Hon'ble Union Minister of State for Jal Shakti and Tribal Affairs inaugurated the ICAR-CIFRI Pen Culture Demonstration-cum-Reservoir Fisheries Enhancement Programme at Balidiha and B a d j o d



Hon'ble Union Minister of State at the ICAR-CIFRI pen culture demonstration site

The sites were recommended based on the water quality parameters, circulation and pollution, availability of sheltered bays, access to land and water transportation, water fluctuations permitting minimum depth.

### Nadi Utsav

The Institute in association with National Mission for Clean Ganga (NMCG), celebrated "Nadi Utsav" at Seoraphully Nistarini Ganga Ghat on 22 December. The Ministry of Jal Shakti, Government of India has put forward



Nadi Utsav

important activities carried out by the NMCG towards river health, ecosystem and biodiversity conservation. Cultural programmes and Ganga Aarati were organized in which more than 150 people representing local fishermen, public, and representatives from Wildlife Institute of India (WII) were present.

### National Campaign on Climate Resilient Inland Fisheries

Several national and regional level campaigns were organized on "Climate-Resilient Inland Fisheries" as a part of the "Bharat Ka Amrut Mahotsav", a programme to commemorate 75 Years of India's Independence to sensitize and create awareness about climate change and mitigation at the local level at various freshwater (Media on 29 Oct, Raja wetlands on 06 Nov, Chand on 04 Dec, and Bermajur wetland on 29 Dec of WB) and coastal wetlands (Bermajur wetland, WB) gathering more than 200 fishers.



Vol.26, No.1  
ISSN : 0972-0774

# सिफरी समाचार CIFRINEWS

(July - December 2021)



Ganesh Puja, 10 Sep 2021



Rashtriya Ekta Diwas 31 Oct 2021



Ganga Aarti on 24 Nov 2021



Minister Srikanata Mahato visited CIFRI Barrackpore and saw the facilities on 18 Dec 2021



Hon'ble PM's programme on climate resilient agri. technologies



Receiving Ganga Mashal at Barrackpore on 23 Nov 2021



Hon'ble PM's lecture on Zero Budget Natural Farming on 16 Dec 2021



Two Scientists probationers of ICAR-NAARM presented their work experiences at the institute on 31 Dec 2021

## Other Events

## Swachhta Activities

### Special Swachhta Campaign during 02-31 October 2021



Pledge taking at Barrackpore



Mask distribution at Seoraphuli ghat, WB



Plantation by Bengaluru Centre



Painting on Swachhta theme



Cleaning activities at Prayagraj



Demonstration of compost making at Barrackpore

### SwachhataPakhwada from 16-31 December



Cleaning of parthenium at Barrackpore



Cleaning activities at Vadodara



Swachhta rally at Barrackpore



Cleaning activities at Prayagraj



Lab Cleaning activities at Barrackpore



Cleaning activities at Barrackpore Bus stand



Vol.26, No.1  
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# सिफरी समाचार CIFRINEWS

(July - December 2021)

## Awards / Recognitions

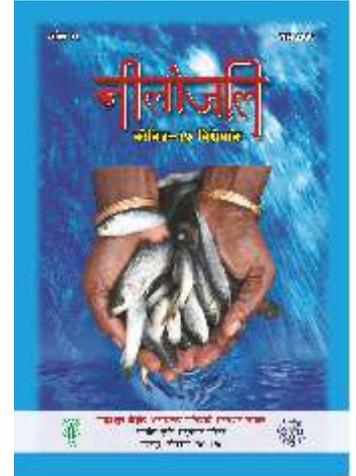
### The institute was conferred with Sardar Patel Outstanding ICAR Institution Award 2020

under Large Institute Category on ICAR Foundation Day. The Award was shared with the ICAR-Central Institute of Agricultural Engineering, Bhopal. The award was conferred by Shri Narendra Singh Tomar, Honourable Minister of Agriculture and Farmers Welfare on 93<sup>rd</sup> ICAR Foundation Day and Award Ceremony on 16<sup>th</sup> July 2021. Institute received Rs. 5 Lakh cash award with citation. The Institute has been acknowledged for significant scientific and technological progress towards generating knowledge base for ensuring the sustainability of inland open water ecology, aquatic biodiversity, fisheries, nutritional and livelihood securities.



The institute was also bestowed with the **Agri-Food Award of Excellence 2021** award and handed over by Prahlad Singh Patel, Hon'ble MoS, Ministry of Food Processing Industry, Govt. of India at New Delhi on 12 November 2021. It is recognition for its remarkable contribution to the food sector.

The institute magazine "Nilanjali" received **Ganesh Shankar Vidyarthi Protsahan Purashkar** for C regions.



Dr. B. K. Das, Director was conferred with **Rafi Ahmed Kidwai Award** for Outstanding Research in Agricultural Sciences under Animal & Fisheries Sciences Category. The award carries a cash reward of Rs. 2.5 lakhs and citation. The award has been shared with Dr. Ashok K Tiwari, Director, ICAR-CARI, Izatnagar.



Dr. B. K. Das

## PhD Degree Awarded



Dr. H. S. Swain



Dr. D. K. Meena

Scientist and discipline	Date of awarding degree	Awarding University/Institution	Title of the PhD thesis
Dr. H. S. Swain, Aquaculture	05 Nov 2021	ICAR-Central Institute of Fisheries Education, Mumbai	Studies on growth and immunological responses of <i>Labeo rohita</i> (Ham. 1822) and <i>Pangasianodon hypophthalmus</i> (Sau. 1878) in cage based polyculture
Dr. D. K. Meena	05 Nov 2021	ICAR-Central Institute of Fisheries Education, Mumbai	Evaluation of herbal extracts of Arjuna ( <i>Terminalia arjuna</i> ) on growth, immune responses and disease resistance in <i>Labeo rohita</i> (Ham, 1822)

## अनुसंधान उपलब्धियाँ

### जलदापारा राष्ट्रीय उद्यान परिसर के निकट तोरसा नदी में इलेक्ट्रोफिशिंग

इलेक्ट्रिक फिशिंग अर्थात अवैध तरीके से मछली पकड़ना जो जलदापारा राष्ट्रीय उद्यान परिसर के निकट तोरसा नदी में निरंतर तौर पर किया जा रहा है। हालांकि इस प्रक्रिया के विनाशकारी प्रभाव को देखते हुए इसे सरकार द्वारा निषेध किया गया है पर इसके बावजूद भी कोडलबस्ती क्षेत्र के स्थानीय मछुआरों द्वारा इसका अभ्यास किया जा रहा है। स्थानीय जनजाति मछुआरे आमतौर पर इस प्रक्रिया में बिजली के लिए मोटरकार या बाइक की बैटरी का उपयोग करते हैं। आमतौर पर दो आदमी ऐसे तरीकों का संचालन करते हैं, एक आदमी बिजली का झटका देकर मछलियों को अचेत करता है तथा दूसरा एक त्रिकोणीय स्कूप नेट द्वारा अचेत मछलियों को इकट्ठा करता है। यह देखा गया कि इलेक्ट्रो-फिशिंग से एक घंटे में लगभग 750 ग्राम छोटी देशी मछलियाँ पकड़ी जाती हैं। पकड़ी गई मछलियों में प्रमुख हैं: ओम्पोक पाबदा, चन्ना स्टीवर्टी, क्रॉसोकिलस लैटियस, गारा लेमटा, सिस्टोमस सराना, टोर पुटीटोरा, ओम्परियस बेंडालिस, निओलिसोकिलस हेक्सगोनोलेपिस, मैक्रोनेथस पैन्कलस और लुप्तप्राय प्रजाति जैसे पुटीटोरा महासीर आदि। हालांकि यह इस प्रक्रिया की लागत व्यय कम होती है पर यह अत्यंत विनाशकारी पद्धति है जो स्थायी मत्स्य पालन के लिए अत्यंत हानिकारक है, क्योंकि इसमें मछली की लार्वा और पोना मछलियाँ संपूर्णतः नष्ट हो जाती हैं।

दिबाकर भक्त, आर. के. मन्ना, संगीता एम. नायर, आर. सी. मांडी और बि. के. दास

### बांदा क्षेत्र में केन नदी में मछली और मछली पालन का मूल्यांकन

राष्ट्रीय जल विकास अधिकरण (एनडब्ल्यूडीए) द्वारा उत्तर प्रदेश के बांदा खंड में केन नदी में मरौली और पैलानी में दो नए बैराज प्रस्तावित किया गया है। इस संदर्भ में भाकूअनुप-केन्द्रीय अंतर्स्थलीय मात्स्यिकी अनुसंधान संस्थान ने एनडब्ल्यूडीए टीम के साथ पैलानी (बांध स्थल), पथरी (पैलानी की ऊपरी क्षेत्र), नारी (पैलानी के निचले क्षेत्र), मरौली (बांध स्थल) और भूरागढ़ (मरौली के ऊपरी क्षेत्र) का दौरा किया। सर्वेक्षण में केन नदी पर इसके विभिन्न हिस्सों, अर्थात् भूरागढ़ और नारी क्षेत्र के 63 किमी विस्तार क्षेत्र में स्थानीय मत्स्य प्रजातियों के 43 जेनेरा, 19 फैमिली और नौ ऑर्डर से संबंधित कुल 55 प्रजातियों को दर्ज किया गया। इनमें से 20 प्रजातियों के साथ साइप्रिनफॉर्मिस की प्रचुरता देखी गई। इसके बाद सिलुरिफॉर्मिस (17 प्रजातियाँ) पाई गई। भूरागढ़ और नारी के बीच केन नदी में मछलियों की पकड़ संरचना लगभग समान दर्ज की गई। विदेशी मछली प्रजातियों में से साइप्रिनस कार्पियो 30 प्रतिशत, तिलापिया लगभग 35 प्रतिशत, भारतीय मेजर कार्प प्रजातियाँ 30 प्रतिशत और कैटफिश लगभग 20 प्रतिशत पाई गई।

अबसार आलम, ए. के. साहू और बि. के. दास

### ब्रह्मपुत्र नदी के स्वदेशी प्रजाति, 3. बैडिसबलोसाईरस कुलेन्डर एंड ब्रिट्ज, 2002 की संरचनात्मक और गुणनात्मक विशेषताएँ

मीठा जलक्षेत्रों में पाई जाने वाली डुवार्फ गिरगिट मछली, बैडिसबलोसाईरस कुलेन्डर और ब्रिट्ज, 2002 बैडीडा फैमिली की मछली है और स्थानीय रूप से डम बेचेली के नाम से जानी जाती है। यह असम के ब्रह्मपुत्र नदी जल में वितरित पायी जाती है जिसके पृष्ठ भाग में टेढ़े-मेढ़े काले धब्बों की दो पंक्तियाँ पाई जाती हैं। यह मछली लाल-नारंगी रंग की होती है जिसके पार्श्व भाग पर अनियमित बिखरे नीले-काले धब्बे होते हैं। इसके पंख नारंगी लाल रंग के पृष्ठीय, गुदा और पुच्छ के साथ युक्त होती हैं। पृष्ठीय पंख में पहले कुछ किरणों पर स्थित एक बड़ा काला धब्बा होता है, और पुच्छ के पेडुक्ल के केंद्र में एक और बड़ा काला धब्बा मौजूद होता है। अपने आकर्षक और रंगीन पैटर्न के कारण, इसे एक सजावटी मछली और एक्वैरियम व्यापार के रूप में प्रयोग किया जाता है। ब्रह्मपुत्र नदी से इस प्रजाति की कुल 30 मछलियों को एकत्र किया गया और इसकी संरचनात्मक और गुणनात्मक विशेषताओं के लिए अध्ययन किया गया था। इस मछली की लंबाई और वजन क्रमशः 3.6-5.1 सेमी और 0.54-1.27 ग्राम के बीच पाया गया। गुणनात्मक तौर पर इस मछली के पृष्ठ पख में 16-17 मेरुदंड धारियाँ, पृष्ठ पख में 8-11 धारियाँ, वक्ष भाग में 6-7 धारियाँ, गुदा भाग में 8-10 धारियाँ और पुच्छ भाग में 12-14 धारियाँ पाई जाती हैं। नर मछली की तुलना में मादा मछली आकार में छोटी, थोड़ी सुस्त और गोलाकार होती है।

नीति शर्मा, एस. येंगकोकपम, डी. बोरदोलाई, यू. के. सरकार और बि.के. दास

### टोंस नदी में पांच पर्वतीय मछली प्रजातियों के संरक्षण उपाय

टोंस नदी में मत्स्य प्रजाति विविधता के साथ-साथ उनकी संरक्षण स्थिति के आकलन के लिए एक सर्वेक्षण किया गया। इसमें 4 फैमिली की कुल 10 मछली प्रजातियों को दर्ज किया गया। टोंस नदी के कुछ भाग में ट्राउट प्रजातियों जैसे ऑनकोरिकस माइकिस (रेनबो ट्राउट), साल्मो टूटा (ब्राउन ट्राउट), साइजॉजोथोरेक्स रिचर्डसोनी (कॉमन स्नोट्राउट), साइजॉजोथोरेक्स प्रोगैस्टस (डिन्नाह स्नोट्राउट), साइजॉजोथोरेक्स लैबिएटस (कुन्नर स्नोट्राउट), साइजॉजोथोरेक्स प्लागियोस्टोमास (हिल ट्राउट) की प्रचुरता देखी गई। अध्ययन में ब्राउन ट्राउट की प्रचुरता परियोजना स्थलों पर पाई गई जो मानसून अवधि (जुलाई से अगस्त तक) में प्रजनन के लिए नदी के ऊपरी क्षेत्र में अभिगमन करते हैं। इसी प्रकार, स्नोट्राउट, जो परियोजना स्थल के निचले हिस्से में प्रचुर हैं, प्रजनन के लिए शीतऋतु के आरंभ अथवा मानसून पश्चात (नवंबर से जनवरी तक) अभिगमन करते हैं। इस मछलियों के टैगिंग द्वारा इनके अभिगमन मार्ग का अध्ययन तथा उनके संरक्षण हेतु पर्याप्त जल निकासी किया गया था। इस प्रक्रिया में कुल 49 मत्स्य प्रजातियों को चिह्नित करके उन्हे नदी के ऊपरी और निचली भाग में छोड़ा गया। इसमें कुल 10 प्रतिशत मछली स्थानीय मछुआरों द्वारा पकड़ी गई और इससे अभिगमन मार्ग का आकलन किया गया। प्रजनन काल और प्रवासी मार्ग के आधार पर, फिश पास डिजाइन किए गए थे जिससे जलाशय में जलस्तर के अनुरूप फिश पास का गेट खोला और बंद किया जा सके। फिश पास में अपेक्षित जल प्रवाह 1.5-1.7 मीटर प्रति सेकेंड बनाए रखा जाना चाहिए।

बि. के. दास, ए. के. साहू, डी. के. मीना और के. मंडल

### अभिगमन अध्ययन द्वारा गंगा नदी में हिल्सा की जैव ऊर्जा विज्ञान और नदी के संरक्षण स्थल संबंधी सूचनाएँ

मछलियों के अभिगमन मार्ग का पता लगाने के लिए टैगिंग सबसे उपयुक्त पद्धति है। लाइव हिल्सा को गंगा नदी में फरक्का बैराज के ऊपरी और निचली दोनों भागों में अभिगमन मार्ग और प्रवृत्ति के अध्ययन के लिए टैग किया गया था। इसके लिए हिल्सा मछली (औसत लंबाई 28.5 से. मी. और वजन 209 ग्राम) को टैग किया गया और उन्हे गंगा नदी के अलग-अलग घाटों, निमाई तीर्थ घाट, चापदानी, बैद्यवाटी से पकड़ा गया। इस अवधि के दौरान ये मछलियाँ गंगा में फरक्का बैराज से 225 किमी नीचे की ओर अभिगमन कर चुकी हैं (अनुमानित वेग -1.9 किमी घंटा)। इस 225 किमी अभिगमन मार्ग में लगभग 70 किमी मीठाजल ज्वारीय खंड है। इससे यह पता चलता है कि हिल्सा मछली न केवल एकतरफा बल्कि ज्वारीय प्रवाह के साथ ऊपर अथवा नीचे भी अभिगमन करती है। अभिगमन में उनके वजन में लगभग 34 ग्राम की कमी देखी गई। अभिगमन के दौरान मछली के शरीर भार में कमी जैसे आँकड़े प्रथम बार दर्ज किया गया है, हालांकि, इस संबंध में और भी शोध की आवश्यकता है।

ए. के. साहू, डी. के. मीणा, मितेश रामटेके, संधाना के. वी., सुनीता प्रसाद और बि. के. दास



## हुगली-मातलह नदी मुहाना में ज्वारनदमुख सेट बैगनेट जाल को मैक्रोप्लास्टिक से खतरा

ज्वारनदमुख में प्रयुक्त होने वाले सेट बैग नेट या बैग नेट हुगली-मातलह मुहाना प्रणाली में मछली पकड़ने के मुख्य गियर में से एक है जिससे कुल ज्वारनदमुख मछली पकड़ का लगभग 70 प्रतिशत अंश प्राप्त होता है। यह शंकु आकार का मछली पकड़ने का गियर है (लंबाई 25-27 मीटर और चौड़ाई 6-7 मीटर)। हालांकि, इन जालों का आकार और अन्य विशेषताएँ स्थल और लक्षित प्रजाति विशिष्टता के अनुसार भिन्न होते हैं। पर इस गियर जाल को मछली पकड़ पद्धति को एक अत्यधिक विनाशकारी पद्धति माना जाता है क्योंकि इसमें बहुत सी मछलियों के पोंनों और किशोर मछलियां मर जाती हैं। हुगली-मातलह नदी मुहाना के एक सर्वेक्षण में पाया गया है कि मुहाना के ऊपरी और मध्य हिस्सों में जल में उपस्थित प्लास्टिक तत्व मत्स्य पालन के लिए एक खतरे के सूचक हैं। सर्दियों के नमूने से पता चला है कि बिड़लापुर (हुगली मुहाना), और संदेशखली (मटला मुहाना) के मत्स्य पकड़ संरचना में मैक्रोप्लास्टिक क्रमशः 65 प्रतिशत और 90 प्रतिशत पाए गए हैं। मुहाना के मध्य भाग में मैक्रो-प्लास्टिक स्तर निचले हिस्से की तुलना में अधिक पाया गया जिसका कारण शहर के अपशिष्ट पदार्थों का नदीय जल में प्रवाहित होना हो सकता है। इन कचरा पदार्थों में खाद्य रैपर, बोटल और टक्कन, बैग, घरों आदि को साफ करने वाले पदार्थ तथा मछली पकड़ने के जाल आदि शामिल थे। इस तरह का प्लास्टिक कचरा न केवल मछली पकड़ने की क्षमता ह्रास के साथ परिचालन जाल के टिकाऊपन को कम करता है।

दिबाकर भक्त, आर. के. मन्ना, संगीता एम. नायर, चायना जाना, एस. मंडल, एस. सामंत और बि. के. दास

## सुंदरवन में गैस्ट्रोपोड और मैंग्रोव की पारस्परिक क्रिया

सुंदरवन के पाथर प्रतिमा और फ्रेजरगंज में गैस्ट्रोपोड (लिट्टोरिया मेलानोस्टोमा, एल. स्कैबरा, नेरीटार्टि कुलेटा) और मैंग्रोव प्रजातियों (एविसेनिया मरीना, ए.अल्बा, सेरियोपस्टागल और एजिसरस कोर्निकुलेटम) के बीच पारस्परिक संबंधों की जांच की गई। दोनों स्थलों पर अन्य मैंग्रोव प्रजातियों की तुलना में एल. मेलानोस्टोमा और मैंग्रोव प्रजाति एविसेनिया मरीना का जुड़ाव अधिकतम पाया गया। एल. मेलानोस्टोमा की प्रचुरता 9-65 गैस्ट्रोपोड प्रति मैंग्रोव (ए. मरीना) पाई गई। दोनों की अधिकतम चढ़ाई 1.67 मीटर तक दर्ज किया गया। हालांकि, 1.0 मीटर की ऊंचाई पर मैंग्रोव प्रजातियों में नेरीटार्टिकुलता में कम बहुतायत (2-8 नेरीटार्टिकुलता प्रति पेड़) पाया गया। ए. अल्बा/ए. मरीना के मध्य भाग की ऊंचाई पर घनत्व और औसत व्यास पाथरप्रतिमा में अधिक और स्थल विशेष पर काम पाया गया जिसका कारण कम यहाँ लोगों का आवागमन कम देखा गया। हालांकि, सूखे सबस्ट्रेट की तुलना में एन. आर्टिकुलता अधिकतर अनुकूल गीली मिट्टी जुड़ा हुआ देखा गया। एल. मेलानोस्टोमा वितरण लंबाई समूह 150-159 मिमी और उसके बाद 200-249 मिमी, जबकि एन. आर्टिकुलता की उच्चतम लंबाई 249-300 मिमी पाया गया। मैंग्रोव से जुड़े मैक्रोबेंथिक प्रजातियों की बहुतायत 26-68 ind. प्रति वर्ग मीटर के बीच पाई गई जिसमें सेरिथिडेसिन गुलाटा के प्रचुरता थी।

प्रणव गोर्गोई, एस. दामरॉय, टी.एन. चानू, ए. मित्रा और बि.के. दास

## नेत्रावती-गुरुपुर मुहाना के तलछट में मौसमी बदलाव, जैवतत्वों की संभावित उपलब्धता और फास्फोरस प्रजातियों की पारिस्थितिकी पर खतरा

त्रावती-गुरुपुर मुहाना तटीय शहर मैंगलोर से होकर गुजरता है अतः मुहाना पारिस्थितिकी तंत्र में फॉस्फोरस एक महत्वपूर्ण संचालक कारक है। नेत्रावती-गुरुपुर मुहाना प्रणाली की सतह तलछटों में फास्फोरस और उनकी जैव उपलब्धता का निर्धारण करने के लिए, कैल्शियम बाउंड (Ca-P), आयरन बाउंड (Fe-P), एल्युमिनियम बाउंड (Al-P) एकसचेंजेबल (EUP) और ऑर्गेनिक-(Org-P) सहित पांच फास्फोरस रासायनिक प्रजातियों की प्रचुरता का मूल्यांकन करने के लिए अनुक्रमिक निष्कर्षण प्रक्रिया का उपयोग किया गया था। मानसून के बाद और मानसून के मौसम में कुल फास्फोरस क्रमशः 435-810 मिलीग्राम प्रति किग्रा और 257.9-699.1 मिलीग्राम प्रति किग्रा पाया गया। दोनों मौसमों में आयरन बाउंड (Fe-P) परचूर पाया गया। आधे से अधिक तलछट अकार्बनिक फास्फोरस जैव-उपलब्ध था जिसे जल में छोड़ा जा सकता है। हालांकि, कुछ मामलों को छोड़कर औसत फास्फोरस प्रदूषण सूचकांक तलछट में उपस्थित कुल से कम पाया गया।

अजय साहा, एम. फिरोज खान, एम.ई. विजय कुमार, एस. सामंत और बि. के. दास

## भारत के तीन संरक्षित राष्ट्रीय उद्यानों (भितरकनिका, जलदापारा और झारखंड जलप्रपात) में प्लवक की गतिशीलता

भारत के तीन संरक्षित राष्ट्रीय उद्यानों, भितरकनिका (बारदिया, चरदिया, दंगमल और जयनगर), जलदापारा (होलॉंग नदी, चिराखाना, तोर्सा नदी और कोडालबस्ती) और झारखंड जलप्रपात (हुंडरू, दशम, जोन्हा, और पंचघाग) में प्लवक विविधता का अध्ययन किया गया। भितरकनिका (ओडिशा) में अध्ययन के दौरान, पादपप्लवक की 19 प्रजातियों में बैसिलारियोफाइसी 86.17 प्रतिशत क्लोरोफाइसी 7.57 प्रतिशत और साइनोफाइसी 6.25 प्रतिशत दर्ज किया गया। बैसिलारियोफाइसी की प्रमुख प्रजातियां हैं- सिलिंड्रोथेकेक्लोस्टेरियम (दंगमल) और फ्रेगिलेरिया प्रजातियां (बारदिया और चरदिया)। जंतुप्लवकों में कॉपोड्स (44.17 प्रतिशत) का प्रभुत्व देखा गया। उसके बाद प्रोटोजोआ (41.78 प्रतिशत) और रोटिफेरा (14.03 प्रतिशत) का स्थान आता है। जलदापारा (पश्चिम बंगाल) में प्लवक विविधता में पादपप्लवक की 20 प्रजातियां और जो जंतुप्लवक की दो प्रजातियां, क्लोरोफाइसी (40.5 प्रतिशत) अधिक देखी गई। इसके बाद बैसिलारियोफाइसी (37.68 प्रतिशत), साइनोफाइसी (16.86 प्रतिशत) और डेस्मिडेसी (4.95 प्रतिशत) पाए गए। क्लोरोफाइसी में प्रमुख तौर पर पीडियास्ट्रम और माइक्रोस्पेरा प्रज्जतीयां दर्ज की गईं। झारखंड जलप्रपात 22 पादपप्लवक और दो जंतुप्लवक प्रजातियों की विविधता अधिकतम बैसिलारियोफाइसी (82.26 प्रतिशत) और सायनोफाइसी (5.6 प्रतिशत), क्लोरोफाइसी (6.8 प्रतिशत) और डेस्मिडेसी (5.34 प्रतिशत) के कम उपलब्धता को दिखाता है। जंतुप्लवकों में कॉपोड (85.46 प्रतिशत) और रोटिफर (14.53 प्रतिशत) पाए गए। इस अध्ययन से जलवायु परिवर्तन के परिपेक्ष्य में विभिन्न प्लवक विविधता के बारे में जानकारी प्राप्त हुई।

संगीता एम. नायर, आर. के. मन्ना, दिबाकर भक्त, अभिजिता सेनगुप्ता, एस. सामंता और बि. के. दास

## त्रिपुरा के डंबूर जलाशय की इक्विथो जीवों की विविधता

डंबूर (गुमटी) जलाशय त्रिपुरा के गोमती और धलाई जिलों में फैला हुआ है। इस जलाशय को बराक, राइमा और सरमा नदी घाटियों से जल प्राप्त होता है। जलाशय से कुल 51 फिनफिश प्रजातियों को दर्ज किया गया। मछली प्रजातियों की संरचना में 21 प्रजातियों में साइप्रिनफोर्म ऑर्डर अधिकतम (41 प्रतिशत) पाए गए। इसके बाद पर्सीफोर्म (24 प्रतिशत), सिलुरिफोर्म (20 प्रतिशत), सिनब्रांकीफोर्म (8 प्रतिशत), ओस्टियोग्लोसिफोर्म (4 प्रतिशत), बेलोनिफोर्म और क्लूपीफोर्म (1.5 प्रतिशत प्रत्येक) दर्ज किए गए। इनकी विविधता अध्ययन में यह देखा गया कि साइप्रिनिडे (19 प्रजातियों) ने 37 प्रतिशत बागरिडे और चन्नीडे (प्रत्येक 8 प्रतिशत), सिलुरिडे और मास्टेसेम्बेलिडे (प्रत्येक 6 प्रतिशत), नोटोटेरिडे और एम्ब्रेसिडे (प्रत्येक 4 प्रतिशत) और बेलोनिडे, ओस्क्रोनेमिडे, गोबिडी, सिकिलिडे और नंदीडे का कुल मछली विविधता में प्रत्येक 2 प्रतिशत पाए गए। देशी प्रजातियों के अलावा, जलाशय से छह विदेशी प्रजाति की मछलियां (साइप्रिनस कार्पियो, टेनोफेरिगॉडोन आईडेल, हाइपोथालमिकथिस मोलिट्रिक्स, एच. नोबिलिस, पंगासियानोडोन हाइपोथाल्मस और ओरियोक्रोमिस नाइलोटिकस) भी पाई गईं, जो देशी मछली के अतिजीविता के लिए चिंता का विषय हो सकती हैं।

एस. सी. एस. दास, डी. देबनाथ, बी. के. भट्टाचार्य, ए. के. यादव, बी.सी. रे, एम. शाय देवी और बि. के. दास

## जलाशयों में पिंजरों में पेरिफाइटन आधारित मछली उत्पादन हेतु सिस्टोमस सराना प्रजाति पालन

ओडिशा सालिया जलाशय (गंजम जिला) के तीन अलग-अलग पेरिफाइटन सबस्ट्रेट्स के साथ पिंजरों में सिस्टोमस सराना का पालन किया गया। इसके लिए सिस्टोमस सराना के अंगुलिकाओं (20.87 ± 1.13 ग्राम) को चार प्रकार से संचयित किया गया— कंट्रोल (बिना किसी पेरिफाइटन सबस्ट्रेट के), उपचार 1 (बांस सबस्ट्रेट), उपचार 2 (गन्ना खोई सबस्ट्रेट) और उपचार 3 (मच्छर जाल सबस्ट्रेट)। प्रत्येक उपचार दो आयताकार एचडीपीई पिंजरे (6 मीटर × 4 मीटर × 3.5 मीटर में किया गया। बांस के फट्टों को जोड़ कर 1 वर्ग मीटर का एक फ्रेम बनाया गया। इसी प्रकार, गन्ने की खोई का बंडल बनाकर उसमें मच्छरदानी लगाकर एक चौकोर फ्रेम में काटा गया। प्रत्येक पिंजरे में पेरिफाइटन विकास के लिए सतह क्षेत्र को समान रखा गया। मछलियों को तैरते हुए फीड (कैजग्रो फीड) दिन में दो बार दिया गया। चार महीने के पालन के बाद इन अंगुलिकाओं का औसत वजन उपचार 1 (138.53 ± 14.63 ग्राम) में सबसे ज्यादा था, इसके बाद उपचार 3 (113.73 ± 15.26 ग्राम), उपचार 2 (106.53 ± 13.45 ग्राम) और नियंत्रण (102.63 ± 16.35 ग्राम) में देखा गया। सबसे कम एफसीआर उपचार 1 (1.50 ± 0.01) में प्राप्त किया गया था जबकि नियंत्रण में एफसीआर 1.67 ± 0.02 देखा गया। बांस सबस्ट्रेट वाले उपचार में पालित मछली में एक प्रोटीन अनुपात (2.192 ± 0.04) और फीड रूपांतरण अनुपात (0.66 ± 0.01) उच्च पाए गए। उपरोक्त अध्ययन उष्णकटिबंधीय अंतर्स्थलीय खुला जल में पिंजरों में अन्य प्राकृतिक (गन्ना खोई) और कृत्रिम (मच्छर जाल) सबस्ट्रेट की तुलना में पेरिफाइटन उत्पादन के लिए और एस सराना का पालन बांस सबस्ट्रेट की दक्षता को इंगित करता है।

बि. के. दास, ए. उपाध्याय, एच. एस. स्वैन, एम. एच. रामटेके, वी. कुमार, वाई. अली, ए. सेनगुप्ता और बी. के. नस्कर

## अंतर्स्थलीय जलों में स्थापित नर्सरी पिंजरों में अमूर कार्प, साइप्रिनस कार्पियो हेमेटोटेरस (मार्टेस, 1876) के और उत्तरजीविता का मूल्यांकन

अमूर कार्प कॉमन कार्प की ही आनुवंशिक रूप से उन्नत एक प्रजाति है। इसकी पालन लागत कम होती है और अत्यंत उपयोगी है। इसलिए, इसे अंतर्स्थलीय जलों में स्थापित पिंजरों में मछली पालन में प्रजाति विविधीकरण हेतु उपयुक्त प्रजाति के तौर पर माना जाता है। अप्रैल से जुलाई 2021 तक झारखंड के मैथन जलाशय में स्थापित नर्सरी पिंजरों में अमूर कार्प के विकास प्रदर्शन का मूल्यांकन किया गया। इसके लिए अमूर कार्प (आकार रू 3.10 ± 0.10 सेमी, शरीर भार रू 0.47 ± 0.05 ग्राम) के पौनों को सिफरी जी आई पिंजरों मॉडल पिंजरों (5 मीटर × 5 मीटर × 2.5 मीटर) में तीन अलग-अलग संचयन घनत्व पर एक ही आकार के तीन पिंजरों रखा गया— निम्न संचयन घनत्व (100 मछली प्रति घन मीटर); मध्यम संचयन घनत्व (200 मछली प्रति घन मीटर) तथा उच्च संचयन घनत्व (300 मछली प्रति घन मीटर)। मछलियों को दिन में दो बार शरीर के वजन के 3-6 प्रतिशत की दर से सिफरी केजग्रो फीड खिलाया गया। लगभग 90 दिनों के पालन के बाद मछलियों का औसत आकार 100 मछली प्रति घन मीटर, 200 मछली प्रति घन मीटर और 300 मछली प्रति घन मीटर के स्टॉकिंग घनत्व पर क्रमशः 45.07 ± 4.55 ग्राम, 40.09 ± 2.49 ग्राम और 38.05 ± 2.00 ग्राम दर्ज किया गया। इनकी उत्तरजीविता प्रतिशत 52.67 से 61.33 के बीच पाया गया। पिंजरों के स्थापना स्थलों के संदर्भ में पानी और तलछट की गुणवत्ता में कोई महत्वपूर्ण अंतर (चञ्च 0.05) नहीं देखा गया है।

मितेश एच. रामटेके, एच. एस. स्वैन, ए. उपाध्याय, विकास कुमार, एस. कुमारी, आर. पाल और बि. के. दास

## पतरातू जलाशय, झारखंड में पादपलवक समुदायों के स्थानिक-सामयिक गतिकी और पर्यावरण लक्षण

अध्ययन अवधि के दौरान पादपलवक के कुल 46 टैक्सा जैसे, बैसिलेरियोफाइसी, क्लोरोफाइसी, डेस्मिडिसी, साइनोफाइसी, यूग्लेनोफाइसी, डायनोफाइसी और जन्तुपलवक के कुल 8 टैक्सा अर्थात कोपोडा, क्लैडोसेरा, रोटिफेरा दर्ज किए गए। पादपलवक की प्रचुरता 1868-26125 कोशिका प्रति लीटर तथा सकल प्राथमिक उत्पादकता 300-875 उहहउउधदिन देखी गई। शुद्ध प्राथमिक उत्पादकता (पलवक आधारित) अनुमानित मछली उत्पादन क्षमता 240 किग्रा हेक्टेयरध्वर्ष थी। पादपलवक गतिकी को अजैविक और जैविक कारकों के बीच एक जटिल परस्पर क्रिया द्वारा नियंत्रित किया जाता है। आंकड़ों के विश्लेषण में जन्तुपलवक की गतिशीलता को प्रभावित करने वाले प्रमुख कारक जैसे जल का तापमान, विद्युत चालकता, जल की गहराई, पोषक तत्व (नाइट्रेट और फॉस्फेट) पाए गए। पारिस्थितिकी तंत्र तथा पालन आधारित मत्स्य प्रबंधन के माध्यम से मछली उपज 42 से 192 किग्रा प्रति हेक्टेयर प्रति वर्ष प्राप्त किया गया। प्राप्त आंकड़े छोटे जलाशयों में पारिस्थितिकी तंत्र आधारित मात्स्यिकी प्रबंधन के लिए एक मॉडल तैयार करने में उपयोगी होंगे।

सुमन कुमारी, लियांथुमलुआ, मिशाल पी., यू.के. सरकार, जी. कर्नाटक और बि.के. दास

## हिमाचल प्रदेश के गोबिंदसागर जलाशय में स्थानिक गतिशीलता और मछली उत्पादन का आंकलन

सतलुज नदी पर स्थित गोबिंदसागर जलाशय भारत के सबसे बड़े जलाशयों में से एक माना जाता है। अध्ययन ने हिमाचल प्रदेश के मत्स्य विभाग द्वारा अपनाए गए संचयन उपायों के बावजूद मछली विविधता और मछली उत्पादन में गिरावट देखी गई। वर्तमान अध्ययन में मछली पकड़ में केवल 15 प्रजातियों को दर्ज किया गया जबकि पहले 46 प्रजातियों को पाया गया था। जलाशय के स्थिर धारा प्रवाह क्षेत्र में प्रजातियों की विविधता मध्यम और अधिक वेग वाले क्षेत्र की तुलना में अपेक्षाकृत अधिक पाई गई। विदेशी कार्प प्रजाति, हाइपोथालमइथिस मोलिट्रिक्स और साइप्रिनस कार्पियो मत्स्य पकड़ में लगभग 80 प्रतिशत पाए गए, जबकि स्पेराता सिंगाला और लैबियो डायोचिलस का प्रतिशत भी अधिक पाया गया। इसके विपरीत, गोल्डन महासीर, टोर पुटीटोरा का अंश कम था अतः इनके इसके संरक्षण और वृद्धि के लिए निदान उपायों की आवश्यकता है। मछली पकड़ के आंकड़ों से संकेत मिलता है कि पिछले दशक के दौरान दो विदेशी कार्प, सिल्वर कार्प (63 प्रतिशत) और कॉमन कार्प (18 प्रतिशत) सबसे प्रमुख थे, इसके बाद कतला (8 प्रतिशत) पाए गए। समयबद्ध आंकड़ों के अनुसार वर्ष 2013 के बाद सिल्वर कार्प के पकड़ में बहुत अधिक भारी कमी आई है। पिछले दशक में मछली उत्पादन की स्थानिक भिन्नता के अनुसार जलाशय के स्थिर धारा प्रवाह क्षेत्र में सबसे अधिक मछली उत्पादन प्राप्त किया गया जिसका कारण इस क्षेत्र में बांध के कारण पोशाक तत्वों का जमा होना है जिससे जलाशय के इस भाग में मछली उत्पादन अधिक हुआ।

लियानथुमलुआइया, मिशाल पी., आर. चक्रवर्ती, ए. के. दास, यू. के. सरकार और बि. के. दास

## बाढ़कृत मैदानों में सिफरी एचडीपीई पेन में पालित इंडियन मेजर कार्प प्रजातियों का विकास

आदिवासी मछुआरों की आजीविका में सुधार के लिए असम के तीन जिलों में स्थित तीन बीलों (चरणबील, बामुनीबील और उरपदबील) में सिफरी एचडीपीई पेन में मछली पालन किया गया। बक्सा जिले के चरणबील, में सिरहिनस मृगला, कामरूप जिले के बामुनीबील में एल रोहिता गोलपारा जिले के उरपदबील में लेबियो कतला को पाल गया। प्रति परीक्षण में तीन समान पेनक्षेत्र (500 वर्ग मीटर) और संचयन घनत्व में मछलियों को 3, 6 और 9 मछलियाँ प्रति वर्ग मीटर की दर से रखा गया। मछलियों को तीन महीने के लिए सिफरी केजग्रो फीड (28 प्रतिशत अशोधित प्रोटीन रू 5 प्रतिशत अशोधित फैट) उनके शरीर भार के



Vol.26, No.1  
ISSN : 0972-0774

# सिफरी समाचार

(July - December 2021)

3-5 प्रतिशत की दर से दिया। संवर्धन अवधि के अंत में यह देखा गया कि सी. मृगला का शरीर का वजन विभिन्न संचयन घनत्व (3, 6 और 9 मछलियाँ प्रति वर्ग मीटर) पर क्रमशः (21.95<sup>°</sup> 4.17 ग्राम से बढ़कर 195.63<sup>°</sup> 23.02 ग्राम, 147.19<sup>°</sup> 20.27 ग्राम और 112.13<sup>°</sup> 16.54 ग्राम स्टॉकिंग घनत्व 3, 6 से बढ़ गया। इसी प्रकार एल रोहिता के अंगुलिकाओं में 22.05<sup>°</sup> 3.39 ग्राम से बढ़कर 255.27<sup>°</sup> 31.25 ग्राम, 227.63<sup>°</sup> 23.61 ग्राम और 183.91<sup>°</sup> 18.90 ग्राम वृद्धि देखी गई। एल कतला के अंगुलिकाओं के शरीर का वजन 26.05<sup>°</sup> 6.57 ग्राम से बढ़कर 434.61<sup>°</sup> 56.65 ग्राम, 306.15<sup>°</sup> 52.06 ग्राम और 221.13<sup>°</sup> 13.54 ग्राम हो गया। यह देखा गया कि तीनों प्रयोगों में स्टॉकिंग घनत्व में वृद्धि के साथ मछलियों की वृद्धि दर में गिरावट आई है।

एस. बोरा, पी. दास, ए. के. यादव, बी. के. भट्टाचार्य और बि. के. दास

## असम के बील (बील) में सिफरी एचडीपीई पेन में लेबीओ बाटा का पालन

असम के बारपेटा जिले में स्थित बोरकोनाबील एक खुला बाढ़कृत आर्द्रभूमि हैं जिसमें वर्ल्डफिश परियोजना के तहत भाकृअनुप-सीआईएफआरआई द्वारा विकसित उच्च घनत्व पॉलीथीन एचडीपीई पेन में लेबीओ बाटा का पालन किया गया। इसके लिए 500 वर्ग मीटर वाले क्षेत्र में कुल 12 पेन (1-2 मीटर पानी की गहराई वाली आर्द्रभूमि) स्थापित किए गए और इन पेन में एल. बाटा (0.47±0.22 सेमी, 2.38±0.30 ग्राम) के पौनों को चार अलग-अलग संचयन घनत्वों पर संचयित किया गया। इन मछलियों को 3-5 प्रतिशत शरीर के वजन की दर से 28 प्रतिशत क्रूड प्रोटीन और 5 प्रतिशत वसा युक्त फ्लोटिंग पेलेट चारा खिलाया गया और 100 दिनों के लिए पेन में पालन किया गया। इसमें यह देखा गया कि 100 दिनों के बाद मछली के वजन में 2.38±0.30 ग्राम से 82.78±3.18 ग्राम, 75.94±0.89, 71.94±0.89 और 61.81±3.35 ग्राम तक बढ़ा है। सबसे कम संचयन घनत्व पर उच्चतम विकास देखा गया। उच्चतम सकल उपज (249.48±13.53 किलोग्राम प्रति पेन) और शुद्ध उपज (239.85±13.53 किलोग्राम प्रति पेन) यह दिखाता कि संचयन घनत्व में वृद्धि के साथ उपज में वृद्धि हुई है। इस पेन पालन से छोटे मछुआरों की मासिक आय 6.10 प्रतिशत बढ़कर 40.50 प्रतिशत हो गया।

बि. के. दास, एस. बोरा, ए. के. यादव, पी. दास और बी. के. भट्टाचार्य

## दरभंगा, बिहार के कुशेश्वरस्थान पक्षी के अभयारण्य संरक्षित मत्स्य आवास में मीठाजल स्पंज प्रजाति, एफिडेटिया फ्लुवियाटिलिस (लिनिअस, 1759) पर एक रिपोर्ट

बिहार के दरभंगा जिले के कुशेश्वरस्थान पक्षी अभयारण्य में स्थित आर्द्रभूमि (चौर क्षेत्र) में संरक्षित जलीय जैव विविधता पर आधारभूत जानकारी हेतु सर्वेक्षण किया गया। कुशेश्वरस्थान को सरकार द्वारा वन्यजीव संरक्षण अधिनियम, 1972 के तहत 1994 में बिहार का पक्षी अभयारण्य के रूप में अधिसूचित किया गया है। इस अभयारण्य में एक बारहमासी मीठा जल क्षेत्र में लकड़ी के ढांचे पर मीठाजल स्पंज प्रजाति को देखा गया। इस स्पंज प्रजाति की पहचान एफिडेटिया फ्लुवियाटिलिस के रूप में की गई है। यह जीव फिल्टर-फीडिंग और सुस्त होता है और यह जलीय पारिस्थितिकी तंत्र का एक महत्वपूर्ण घटक माना जाता है। ये विश्व के मीठाजल क्षेत्रों जैसे नदियों, झीलों और नहरों में पाए जाते हैं। इनका रंग हरा, भूरा तथा स्लेटी होता है जो इनके आवास जल की गुणवत्ता पर निर्भर करता है। अत्यधिक गर्मी और सर्दी जैसी प्रतिकूल स्थिति में ये स्पंज निष्क्रिय अवस्था में चले जाते हैं। जब स्थिति अनुकूल हो जाती है, तो ये एक पूर्ण विकसित लघु स्पंज विकसित हो जाते हैं।

सुमन कुमारी, सजीना ए. एम., मुकेश कुमार, यू. के. सरकार और बि. के. दास

## चयनित बाढ़कृत आर्द्रभूमि में कार्बन संचयन

आर्द्रभूमि के महत्वपूर्ण कार्यों में से एक है- इसकी कार्बन पृथक्करण क्षमता जो वैश्विक तापमान वृद्धि और जलवायु परिवर्तन को संतुलन में सहायता करता है। पश्चिम बंगाल के उत्तर 24 परगना जिले में तीन आर्द्रभूमि - राजा, तेलुलिया और बेराबेरिया की मिट्टी में कार्बन संचय और भंडारण अनुमान में यह देखा गया कि आर्द्रभूमि में मिट्टी की गहराई 30 सेमी तक है जिनमें राजा बील में 17.44 मिलीग्राम कार्बन प्रति हे. (1 मिलीग्राम = 1 टन), बेराबेरिया में 15.85 मिलीग्राम कार्बन प्रति हे. और टेलुलिया आर्द्रभूमि में 15.11 मिलीग्राम कार्बन प्रति हे. जमा था। राजा, बेराबेरिया और टेलुलिया के उच्चभूमि स्थलों में अनुमानित कार्बन संचय क्रमशः 7.59 मिलीग्राम, 8.69 मिलीग्राम और 9.07 मिलीग्राम प्रति हेक्टेयर पाया गया। ऐसा ही एक अध्ययन असम की तीन आर्द्रभूमियों में भी किया गया था जिसमें यह देखा गया कि चातला आर्द्रभूमि में कार्बन संचयन 30 सेमी गहराई तक उच्चतम (79.36 मिलीग्राम प्रति हेक्टेयर) था, इसके बाद उर्मल (67.62 मिलीग्राम कार्बन संचयन प्रति हेक्टेयर) था, लेकिन 47-मोराकोलों आर्द्रभूमि में, केवल 16.57 3.1 मिलीग्राम कार्बन संचयन प्रति हेक्टेयर 30 सेमी गहराई तक था। संबंधित उच्चभूमि स्थलों में क्रमशः कार्बन संचयन ६ हेक्टेयर 21.18 मिलीग्राम, 16.02 मिलीग्राम और 9.6 मिलीग्राम पाया गया। इस प्रकार, यह स्पष्ट है कि आर्द्रभूमि में कार्बन संचयन ऊपर की मिट्टी की तुलना में अधिक प्रभावी हैं और इस प्रकार ग्लोबल वार्मिंग को कम करने में मदद कर सकते हैं।

एस. के. नाग, बी. डी. घोष और यू. के. सरकार

## जलवायु परिवर्तन के संदर्भ में निचली गंगा बेसिन के शहरी क्षेत्र में स्थित आर्द्रक्षेत्र की पारिस्थितिक के लचीलापन और मत्स्य पालन पर अध्ययन

पश्चिम बंगाल के उत्तर 24 परगना जिले में स्थित राजा आर्द्रभूमि में जलवायु परिवर्तन और मानवजनित दबाव के कारण पारिस्थितिक लचीलापन और हाइड्रो-बायोलॉजी के परिवर्तन का निर्धारण हेतु अध्ययन किया गया। यह आर्द्रभूमि आंशिक तौर पर एक बंद आर्द्रभूमि है, जिसके 90 हेक्टेयर क्षेत्र में प्रग्रहण मात्स्यिकी की जाती है। इस आर्द्रभूमि में शहरी क्षेत्रों से अवशिष्ट पदार्थ प्रवाहित किया जाता है (ट्रॉफिक स्टेट इंडेक्स 83.01 ± 2.09) जिससे जल में पोषक तत्वों की मात्रा बढ़ जाती है खपीएच (7.77 ± 0.09), चालकता (763.6 ± 184.32 μS प्रति सेमी), घुलित ऑक्सीजन (6.44 ± 1.28 मिलीग्राम प्रति ली.), कुल क्षारीयता (179.97 ± 32.12 मिलीग्राम प्रति ली.) और क्लोरोफिल-ए (52.29 ± 14.83 माइक्रोग्राम प्रति ली.), आर्द्रभूमि में जल की गहराई गर्मी के मौसम में न्यूनतम 0.36 मीटर और मानसून के मौसम में अधिकतम 1.45 मीटर दर्ज की गई है। शुष्क मौसम के दौरान मछली पकड़ने के लिए मैक्रोफाइट संक्रमण एक बड़ा खतरा है। आर्द्रभूमि में लगभग 573.34 किलोग्राम हेक्टेयर वर्ध की वार्षिक मछली उपज होती है, जिसमें मानसून के मौसम के दौरान अधिकतम पकड़ होती है। विदेशी प्रजातियों की प्रचुरता के साथ पिछले दो दशकों में आर्द्रभूमि की मछली विविधता में 47.8 प्रतिशत की कमी देखी गई है। वर्तमान में, प्राकृतिक प्रजनन के कारण ओरियोक्रोमिस नाइलोटिकस की प्रचुरता आर्द्रभूमि में दर्ज की गई जिसका अंश कुल मछली पकड़ में लगभग 70-80 प्रतिशत है। छोटी देशी मछलियों में एंक्लीफेरिंगोडोन, ट्राइकोगैस्टरलियस और पुंटियस प्रजातियाँ शामिल हैं। बैसिलारियोफाइसी और क्लोरोफाइसी जैसे प्रमुख प्लवक वर्ग देखे गए हैं जबकि बैथिक प्रजातियों में मोलस्क, ओलिगोकीट और किरोनोमिड प्रमुख थे। अध्ययन के अनुसार पारिस्थितिक पुनरुद्धार और स्थायी प्रबंधन से और इस संकटग्रस्त आर्द्रभूमि संरक्षण के लिए मछुआरों की सक्रिय भागीदारी के साथ एक उपयुक्त शमन रणनीति विकसित करने की आवश्यकता है।

मिशाल पी., अनीक रे, बी. डी. घोष, अरिजीत दास, जी. कर्नाटक और यू. के. सरकार

## भारत के चिलिका लैगून की पारिस्थितिकी पर फ्राम्माइट कारका का प्रभाव आंकलन

फ्राम्माइट कारका, जिसे आमतौर पर चला घास के रूप में जाना जाता है, चिलिका लैगून में विदेशी मैक्रोफाइट के विकास और नौपरिवहन को बाधित कर रहा है। इसका प्रचुर और तेज विकास इस पारिस्थितिकी तंत्र की स्थिरता के लिए चिंता का विषय है। मास बैलेंस (इकोपैथ विद इकोसिम) मॉडलिंग के माध्यम से चिलिका लैगून के पारिस्थितिकी तंत्र पर इसके प्रभाव का पता लगाने के लिए एक अध्ययन किया गया है। इस संदर्भ में, तीन परिदृश्य बनाए गए— चिल्का लैगून की वास्तविक पारिस्थितिकी तंत्र आधारित परिदृश्य, पी. कारका रहित लैगून पारिस्थितिकी तंत्र आधारित परिदृश्य, और पी. कारका सह पर समुद्री घास और अन्य जलीय खरपतवारों से रहित लैगून पारिस्थितिकी तंत्र। इन परिदृश्यों के अध्ययन में यह पाया गया कि पी. कारका रहित परिदृश्य स्थिरता संकेतक के रूप में अधिक स्थिर और परिपक्व है (67.45 प्रतिशत) है। हालांकि, चिल्का पारिस्थितिकी तंत्र में पी. कारका की उपस्थिति में सिस्टम रिजर्व और परिपक्वता संकेतक क्रमशः 57.74 प्रतिशत और 7.8 देखे गए।

प्रज्ञा आर. स्वैन, पी.के.परिदा, पी. पणिक्कर, एस. के. नाग, बी. के. बेहरा और बि. के. दास

## ईस्ट कोलकाता वेटलैंड पारिस्थितिकी तंत्र में प्रवाहित अपशिष्ट जल में कीटनाशक की उच्च सांद्रता

घरेलू, उद्योगों और नहर जल के अपशिष्ट में आमतौर पर धातु, कीटनाशक, दवाएं, औद्योगिक रसायन और सौन्दर्य प्रसाधन उत्पादों में उपयोग किए जाने वाले रोगाणुरोधी जैसे विभिन्न प्रदूषणकारी पदार्थ पाए जाते हैं। अतः ये पदार्थ अपशिष्ट जल आधारित कृषि और जलीय पारिस्थितिक तंत्र और मानव स्वास्थ्य के खतरों पैदा करते हैं। ईस्ट कोलकाता वेटलैंड पारिस्थितिकी तंत्र में प्रवाहित अपशिष्ट जल को चौबागा नहर से एकत्र किया गया। इस जल में जलीय कृषि और मत्स्य पालन में उपयोग होने वाला कीटनाशक, साइपरमेथिन की उच्च सांद्रता (12356 माइक्रोग्राम प्रति ली.) पायी गयी। इस तत्व को जल (1.3–8.2 माइक्रोग्राम प्रति ली.) और मछली के मांस और गिल (100 माइक्रोग्राम प्रति किलोग्राम) पाया गया।

एस. के. नाग, सोमा दास सरकार, केया साहा, शताब्दी गांगुली और एस बंदोपाध्याय

## लेबियो रोहिता पर बुटाक्लोर की विषाक्तता

लेबियो रोहिता बुटाक्लोर के विषाक्त प्रभाव के लिए दो सांद्रता पर 72 घंटे के लिए जांच की गई। इसमें यह देखा गया कि ब्यूटाक्लोर के संपर्क में आने वाली मछली लाल रक्त कोशिकाओं, सफेद रक्त कोशिकाओं, हीमोग्लोबिन और हेमटोक्रिट के स्तर में कमी आई। साथ ही, सुपरऑक्साइड डिस्म्यूटेज, ग्लूटाथियोन-एस-ट्रांसफरज, ग्लूटामेट-ऑक्सालोसेटेट ट्रांसएमिनेज और ग्लूटामेट-पाइरूवेट ट्रांसएमिनेज, कोर्टिसोल, हीट शॉक प्रोटीन (HSP70 और HSP90), सीरम प्रोटीन, एल्ब्यूमिन, ग्लोब्युलिन और ट्राइग्लिसराइड जैसे जैव रासायनिक के स्तर में वृद्धि पायी गई। हालांकि ब्यूटाक्लोर के संपर्क में आई एल. रोहिता के सीरम इम्युनोग्लोबुलिन-एम और सीरम पूरक में कमी पाई गई। इस अध्ययन में यह पाया गया कि ब्यूटाक्लोर के संपर्क में आई एल. रोहिता मछलियों के हेमेटोलाॅजी, ऑक्सीडेटिव और चयापचय एंजाइम, तनाव हार्मोन और प्रतिरक्षा क्षमता में कमी दर्ज की गई।

विकास कुमार, एच. एस. स्वैन, बि. के. दास, ए. उपाध्याय, मितेश एच. रामटेके और विकास कुमार

## उद्यान कचरे को पोषक तत्वों से भरपूर अपरद में परिवर्तन सूक्ष्म शैवाल आधारित बायोडीजल के लिए एक नवीन तकनीक

तेजी से बढ़ते शहरीकरण, बदलते आहार उपभोग और औद्योगिकीकरण में अपशिष्ट प्रबंधन एक गंभीर चिंता का विषय है। इन पर्यावरणीय मुद्दों से निबटने के लिए घरेलू कचरे को पहले वर्मीकम्पोस्ट खाद में परिवर्तित करके इसके अर्क (एरोबिक और एनारोबिक) को पोषक स्रोत के रूप में तैयार किया गया। इसके लिए मीठाजल सूक्ष्म एलगा प्रजाति (ग्रेसिएलेमर सोनी Mn877773) के विकास और लिपिड उत्पादन को बढ़ाने के लिए अर्क की प्रभावकारिता का परीक्षण किया गया। बीजी11 के 1रू1 के संयोजन में अवायवीय रूप से पचने वाले वर्मीकम्पोस्ट अर्क में माइक्रोएलगा की मिक्सोट्रोफिक पालन से माइक्रोएलगे के सेल बायोमास और लिपिड उत्पादकता में दो गुना की बढ़त देखी गई। परीक्षण संयोजन ने माइक्रोएलगा में संतृप्त (मिथाइल पामिटेट) और मोनोअनसैचुरेटेड फैटी एसिड (ओलिक एसिड) के स्तर में भी सुधार देखा गया। कोल्ड फिल्टर प्लगिंग गुणों को छोड़कर बायोडीजल की गुणवत्ता भारत, अमेरिका और यूरोप द्वारा निर्धारित बायोडीजल मानकों के वाहन संबंधी गुणों के समान पाई गई है। यह संयोजन बड़े पैमाने पर खेती में बीजी11 की तुलना में सेल बायोमास (0.041 ग्राम प्रति लीटर) में सुधार के लिए भी पाया गया। इस अध्ययन ने यह प्रमाणित किया कि जी इमर्सोनी में वर्मीकम्पोस्ट के अर्क के साथ बड़े पैमाने पर जैव-उत्पाद उत्पादन के लिए महत्वपूर्ण क्षमता है।

सोमा दास सरकार, संथाना कुमार वी. और बि. के. दास

## टी. अर्जुन के इथेनॉल अर्क में फंफूदी शमन और दर्द निवारक गुण

टी. अर्जुन के इथेनॉल फल के अर्क से जलीय कृषि महत्व के संभावित जैव सक्रिय सिद्धांत पर एक अध्ययन किया गया। इस अर्क को एफेनोमाइसेस इंडेडान्स के साथ प्रारंभिक एंटीबायोग्राम अध्ययन किया गया और फिर टी. अर्जुन के अंशित एथेनॉलिक फलों के अर्क के साथ प्रभावकारिता अध्ययन किया गया था। तत्पश्चात, इसके संभावित फंफूदी शमन और दर्द निवारक गुणों का विश्लेषण किया गया था। शुद्ध किए गए नमूनों को ऑक्ट्रिपे के साथ उच्च अनुनाद तरल क्रोमेटोग्राफी और मास स्पेक्ट्रोस्कोपी (मैसुड) के अंतर्गत किया गया। विश्लेषण में फंफूदी निरोधी तत्व, कानोसामाइन की उपस्थिति को देखा गया। यह टी. अर्जुन के इथेनॉल छाल के अर्क के साथ इथेनॉल के अर्क की फंफूदी निरोधी गुण के कारण हो सकता है। इसके अलावा, नमूना मैट्रिक्स में 4-हाइड्रॉक्सीकौमरिन 3-हाइड्रोक्सेनथ्रानिलिक एसिड और कार्बाप्रोस्टेसाइक्लिन के लक्षण देखे गए। इनमें से, प्रोस्टेसाइक्लिन और इसके एनालॉग्स (प्रोस्टेनोइड्स) शक्तिशाली वासोडिलेटर हैं और इनमें एंटीथ्रॉम्बोटिक, एंटीप्रोलिफेरेटिव और दर्द निवारक गुण होते हैं। इसी प्रकार, 4-हाइड्रॉक्सीकौमरिन और 3-हाइड्रोक्साइथ्रानिलिक एसिड में दर्द निवारक गुण पाया गया। नमूना मैट्रिक्स में कार्बाप्रोस्टेसाइक्लिन के लिए, 3-हाइड्रोक्सेनथ्रानिलिक एसिड और 4-हाइड्रोक्सीकौमरिन की सांद्रता से यह संकेत मिल कि कि इथेनॉल फलों का अर्क महत्वपूर्ण जैव सक्रिय यौगिकों का एक बड़ा स्रोत है जिसका जलीय कृषि और मानव कल्याण में उनके संभावित उपयोग के लिए भावी अध्ययन किया जा सकता है।

डी. के. मीना, बि. के. दास और ए. के. साहू