



सीफा समाचार CIFA NEWS

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भा.कृ.अनु.प.-केन्द्रीय मीठाजल जीवपालन अनुसंधान संस्थान
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ICAR-CENTRAL INSTITUTE OF FRESHWATER AQUACULTURE
(An ISO 9001 : 2015 Certified Institute)



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DIRECTOR'S DESK

Greetings to all the readers!!

This edition of the Newsletter brings to you the key research achievements, success stories, capacity-building programmes conducted, Farmers-Scientists interaction meetings organized, advisory services provided, MoUs signed, progress made under different flagship programmes viz., NEH, STC and SCSP along with other significant accomplishments of ICAR-CIFA. We have made great strides in our research accomplishments which include the evaluation of the growth performance of hilsa larvae in recirculating aquaculture system (RAS) and, the production of the new generation of CIFA-GI Scampi® and supply of breeder seed to multiplier hatcheries. A challenge test conducted with Jayanti rohu families against *Aeromonas hydrophila* showed a wide variability of



survival ranging from 33.3 to 100%. It is pertinent to mention that the Institute received the trademark for disease-resistant rohu against *A. hydrophila* (AhR Jayanti). Besides, the first detection of Tilapia Parvovirus (TiPV) from India was reported by the Institute which caused mass mortality in farm conditions. Also, the causative agent of mortality in *Heteropneustes fossilis* (stinging catfish) in biofloc culture was identified as *Pseudomonas putida*. The role of rohu RBCs in innate immunity was confirmed by expression of TLRs and NLRs. A comparative transcriptome analysis was conducted to determine the mRNA expression abundance between anterior thoracic vertebrae in non-Ostariophysi (*Oreochromis niloticus*) and modified thoracic vertebrae in Ostariophysi (*Labeo rohita*). Another study revealed that peninsular carp, *Hypselobarbus pulchellus* can utilize dietary carbohydrate at least up to 50% level, giving scope for protein sparing by carbohydrate in the diet. During 37th Annual Institute Research Council Meeting of the Institute held during the period, the progress and achievements of different projects were deliberated and discussed.

In pursuit of our ongoing effort to reach the farming community with our proven technologies, the Institute has successfully demonstrated CIFA-GI Scampi[®] in carp-scampi polyculture system in Jagatsinghpur, Odisha; established a catfish hatchery at a private farm in Morigaon district, Assam and provided hand-holding to a progressive fish farmer from Howrah (W.B.) for mass scale production of live food culture.

The ICAR-CIFA, Bhubaneswar, Odisha celebrated its “36th Annual Day” on 1 April 2023 with zeal, enthusiasm and fervour wherein Padma Shri Prof. S. Ayyappan, Former Secretary, DARE and DG, ICAR, New Delhi was the chief guest. The institute also organized/celebrated various other programs such as the Happiness Program, World Intellectual Property Day, World Environment Day, World Blood Donor Day, International Day of Yoga, and Rajbhasha Quarterly Workshop wherein, staff members of ICAR-CIFA participated. The institute also launched *Jan Bhagidari* events to create awareness about India’s G20 presidency in which a series of events were organized.

Under the extension activities, four training programmes were organized during April-June 2023 quarter, in which 61 farmers/students got trained on different aspects of freshwater aquaculture. Several Farmers-Scientists Interface Meetings/Awareness Programmes were organized to sensitize the farmers at different locations. In addition, more than 130 stakeholders visited the institute for Exposure Visits. The institute’s technologies were showcased in different exhibitions across the country including the one at Varanasi under the aegis of G-20 meeting. Forty-six soil, water and fish disease samples of the farmers were analysed and their queries were addressed during this period.

The institute has signed 4 MoUs with different organizations/ entrepreneurs for the supply of breeder seed

of improved rohu ‘Jayanti’ and Improved catla for the development of broodstock and dissemination of seed to the fish farmers. Two other MoUs were signed with academic and research organizations to facilitate academic, research, training and outreach activities in various disciplines and promote entrepreneurship in aquaculture.

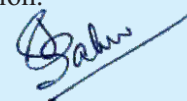
Besides promoting incubatees through different modalities, Institute’s ABI unit organized seven training programmes on ‘Detailed Project Report preparation and economic aspects of aquaculture’ to about 300 AFOs and ADFOs of Govt. of Odisha from 30 districts of the state. During this quarter, one Technology Licensing and one Technology commercialization (ToT) agreement were also signed.

Under NEH, ICAR-CIFA organised a Fish Festival in Assam, a capacity-building programme for farmers of Nagaland on “Scientific aquaculture” at Dimapur and inaugurated an aquarium unit with local indigenous fish species. A Scientists–Extension–Farmers interface meeting on pig-cum-fish farming was organized at Karbi Anglong district of Assam. The institute established an Aquaculture Field School (AFS) at Kalong Kapili, Kamrup Metro, Assam. We had a fruitful meeting and discussion with the Minister of Fisheries, Govt. of Assam to enhance collaboration, especially in the areas of chitala breeding and rearing, and pabda hatchery.

Under STC, ICAR-CIFA successfully organized two-day Exposure visit-cum-Capacity building programme on “Integrated Aquaculture for tribal beneficiaries” for Tribal women beneficiaries belonging to particularly vulnerable tribal groups (PVTGs) of Gajapati and Rayagada districts of Odisha. Under SCSP, a Fish Harvest Mela cum Scientists-Farmers interface programme was organized to promote scientific carp culture at Phiringia. A low-cost model of Integrated Advanced Aquaculture System (IAAS) (a setup of RAS with aquaponics) has been developed and established in Kuchipudi, Bapatla district, Andhra Pradesh for the demonstration to the beneficiaries under SCSP.

I earnestly hope that the information included in the newsletter will be helpful to all the stakeholders with newer information on the freshwater aquaculture and activities of this Institute.

My sincere gratitude to Dr. Himanshu Pathak, Secretary DARE and DG, ICAR, New Delhi and Dr. J.K. Jena, DDG (Fisheries Science), ICAR, New Delhi for their dedicated support and continuous guidance to this Institute. I sincerely compliment my colleagues for their hard work and thank the editorial team for their efforts and commitment in bringing out this publication.



(Pramoda Kumar Sahoo)
DIRECTOR

RESEARCH HIGHLIGHTS

Growth performance of Hilsa in recirculating aquaculture system (RAS)

Five-day old hilsa larvae produced from on-boat breeding trial of wild fish at Godakhali were reared in a recirculating aquaculture system at stocking density of 200 number/m³ water with mixed zooplankton and artificial feed at Kalyani Centre. After 20 weeks of rearing, hilsa larvae grew to 10-15 g with a survival percentage of 16.7%. A total of 1001 fingerlings were harvested and released in a 0.1 ha-earthen pond.



(Reported by: A. Das, A. Hussan, S. Adhikari, S. Nandi)

Collection of wild stock of *Macrobrachium rosenbergii*

The riverine stock of *M. rosenbergii* (132 nos. broodstock) was collected from Alanka river (a distributary of the river Mahanadi), Jagatsinghpur, Odisha on 19 April 2023 and transported to ICAR-CIFA. The collected stock was kept in isolation and screened for the presence of nodavirus. The stock was found virus-free and being used for crossing with generation 14 (G14) broodstock.

(Reported by: B.R. Pillai, D. Panda, B. Mishra and S. Sahu)

Production of the new generation of CIFA-GI Scampi® (Year Class 2023)

Mate allocation and breeding for the production of the new generation of CIFA-GI Scampi® was initiated in March 2023. Till date, 68 full sib families of the latest generation were produced with total breeder seed output of 1.48 lakh. The post larvae were transferred to the nursery for further rearing in small nylon hapa

of 2x1x1m³ dimension fixed in 100m³ capacity concrete nursery tanks for the production of 2023-year class. Nursery rearing of 68 full sib families is in progress. A total of 1.08 lakh breeder seed of 2023 year class of CIFA-GI Scampi® was supplied to multiplier hatcheries for broodstock raising.

(Reported by: B.R. Pillai, D. Panda, B. Mishra and S. Sahu)

PIT tagging of 2022 year class Jayanti rohu and Improved catla

Total 1494 nos. Jayanti rohu fingerlings belonging to 40 full sib families along with control and resistant groups and 712 improved catla fingerlings from 38 full-sib families have been PIT (Passive Integrated Transponder) tagged and released into five communal rearing ponds for the ongoing selective breeding programme.

(Reported by: K. Murmu, A. Rasal, A. Paul, L. Sahoo and J. K. Swain)

Disease resistance against *Aeromonas hydrophila* infection in Jayanti Rohu™ families

A challenge test was conducted with 31 families of Jayanti rohu fish ranging from 10-300 g (582 nos.) and a varied level of survival ranging from 33.3% to 100.0% was observed in different families. F53, F41, F39 and F43 families showed 100% survival against *A. hydrophila* challenge when challenged at a dose of 1.25x10⁷ CFU/20 g of fish whereas, the lowest survival was observed for F19 (Fig. 1).

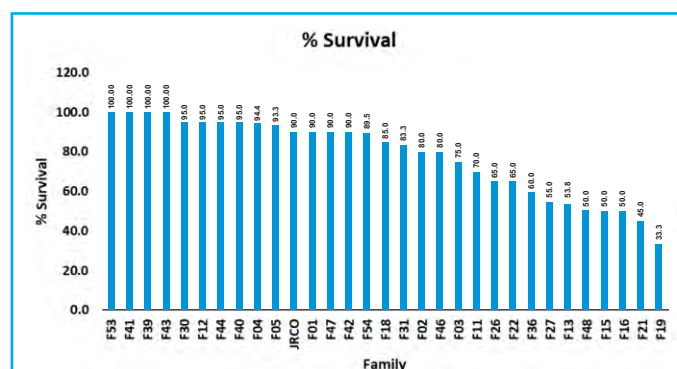


Fig. 1. Percentage survival of different Jayanti Rohu™ families against *A. hydrophila* challenge

(Reported by: K. Murmu, A. Rasal, A. Paul and P. K. Sahoo)

First report of Tilapia Parvovirus (TiPV) infection and associated mortality in tilapia

Tilapia Parvovirus (TiPV) is the first putative member of the family *Parvoviridae* proven to infect a teleost host i.e. tilapia. In recent times, several cases of tilapia mortality in farm conditions have been reported. In September 2022, a mortality case of tilapia was recorded in the Balasore district (E 21° 27' 1.25892" and N 87° 2' 2.86361") of Odisha. Further, during June 2023, several tilapia farms at different locations of Odisha, i.e. State Fisheries farm, Kausalyaganga; ICAR-CIFA, Kausalyaganga and two polyculture farms at Samantarapur, and Sundarpada, Khordha

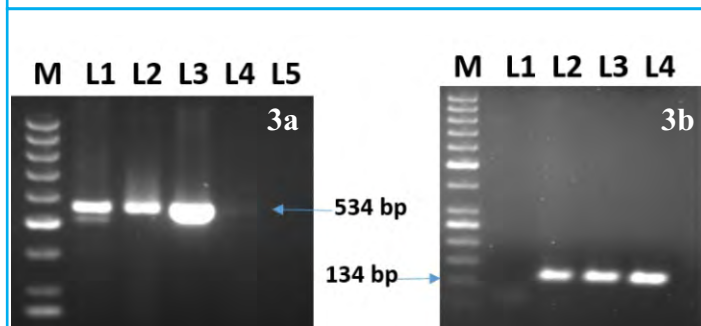
District experienced high mortality of tilapia with overt clinical signs. Affected fish showed lethargy, loss of appetite, opaqueness of eyes, scale loss, swimming near the pond edge, redness on body with hemorrhages on operculum, base of fins and belly areas (Figs. 2a,b). In all these polyculture ponds, heavy mortality was observed only in tilapia. The etiological agent was identified as TiPV for all these cases using level-III diagnostics (Figs. 3a-c). The other cohabitated fish species showing sporadic mortalities (catla and rohu) were found to be negative for TiPV. In conclusion, our study is the first detection of TiPV that could impact tilapia production in the country, hence, needs immediate attention.



Fig. 2a. TiPV infected tilapia



Fig. 2b. Mass mortality of tilapia



Figs. 3a, 3b. Representative image of TiPV samples amplified with TiPV-1607F and TiPV-2141R primer set and TiPV qF/R primer set.

>TIPV134 CIFA Isolate
AGACGGAAAAAGAACGGGGAAATATGGAAGAATTGGTTTCCTGGATACACCGAGCAACGA
GGAGATAGCCGAGCAGTTTCGACTACCTAATACTTCTGTCTTGCTTTTTTGGACATGCTATGC
CTTGTAATTTTTACCTGCTCTGCTTTTTTGGACATGCTATGACTACTCTTTTTTTCTCACCT
GTGATGA

>TIPV534 CIFA Isolate
GATGGGGGTGAAAATGAACGGGCAGCATTGAGTAATAGAATGGTCATATTTCTGTTTTAC
AATGAAGATGACTAAGAAACGCCACAGGAAGGAGCCGGAAGCACCAGCTGCAACCACTTG
TAGACCCGGCTAAAAGAGTAGCCGAGCAAGAGATAAAGACTCAAGCGGGAAGAGCAAGA
GCGTGGTTGACAGCGCAAGCAGCAACAGGTGATCGCTCAACTGGGGCCAGTGATAGGC
GGAGCGGTAGCACCTTTTCTGCCACCGATAGTGACGCGGGAGCCGACAAATTACAGTCTT
TCTGGGAAGCGCTGCGGAGAGCTTATCGGGGGCCACAACCGAGAGCCTCCAGCACAGG
CGGCGAGCCAAGTAGCAAACGCGCCAACACAGGAGGACTTATCGGCAGCGCCTGCACCAC
AGCTGAGTACAACCTAAGACCCGGTCCGAGCAGGATCCAGCAATTCGGGAGACGGGAATT
CAGACCCGGGACATTGGAGAATTGTTTCTGGATACACCGAGCAACGAAGGGAGAT

Fig. 3c. Sequence information of TiPV-CIFA isolate

(Reported by: A. Paul, S. Mohanty, S. Parida, S. Padhiary, S. Biswal and P. K. Sahoo)

Bacterial disease occurrences and cause of mortality in stinging catfish, *Heteropneustes fossilis* under the biofloc culture system

Mortality of the *H. fossilis* (stinging catfish) in ICAR-

CIFA biofloc culture system was investigated and the etiological agent was identified. Fishes showing white patches starting at the fish's tail spreading to the dorsal side of the entire body were taken for bacterial

isolation. Bacteria were isolated and characterised using both biochemical and molecular techniques. The isolated bacteria's 16S rRNA gene sequencing showed that it shared 99% of its sequence identity with *Pseudomonas putida* confirming its identity. Koch's postulate was satisfied by intraperitoneal injection of 1.14×10^7 CFU/ml to *H. fossilis* fingerlings and mortality was observed with typical signs, whitish patches on body surface and reddening under fins and ventral region, and the pathogenic

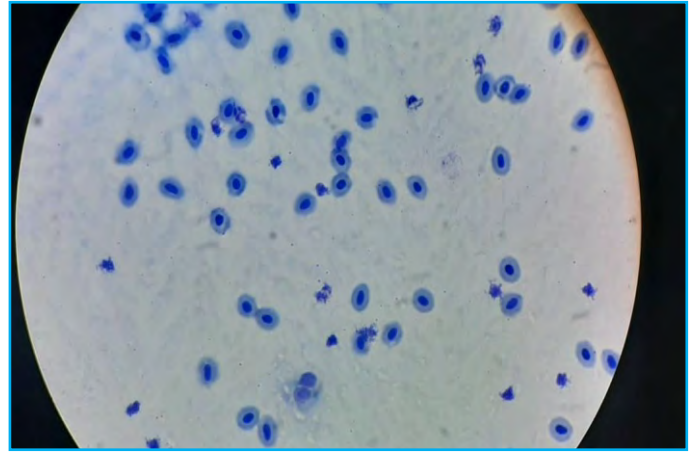


bacterium was isolated from the challenged fishes with clinical signs. Understanding the pathology and pathogenesis of this infections in cultured stinging catfish would help in the control of this disease in biofloc culture system.

(Reported by: P. Choudhary, S. N. Sahoo and P. C. Das)

Expression of Toll-like receptors and NOD-like receptors by red blood corpuscles (RBCs) in *Labeo rohita*

While the primary functions of RBCs are typically associated with the gaseous exchange, several recent reports highlight that nucleated red blood cells can play a significant role in regulating the body's innate immune response. While investigating this on the rohu (*Labeo rohita*), we have observed that RBCs in this fish species express several pattern recognition receptors belonging to the family of toll-like receptors (TLRs) and NOD-like receptors (NLRs), and can exert their critical role in responding against a variety of fish pathogens. To investigate the function of rohu RBCs, they were purified from the whole blood through the density gradient centrifugation with the use of HiSepTMLS 1077 (Density - 1.007 ± 0.0010).



The purity of the isolated RBCs was verified through microscopical observation following Giemsa staining. In response to the *Aeromonas hydrophila* and *Edwardsiella tarda* infections, rohu RBCs expressed several TLRs (TLR2, 3, 4, 5) and NLRs (NOD1, 2) and activated their signaling pathways resulting in significantly ($p < 0.05$) enhanced expression of interleukins (IL-8, IL-1 β) and interferon (IFN-I) genes. Further, *in-vitro* stimulation of the purified RBCs with the lipopolysaccharide, also supported these observations. Together, these findings highlight the role of rohu RBCs in enhancing the innate immunity against various pathogenic invasions.

(Reported by: S. Mahapatra, B. Ganguly, S. Pani, A. Saha and M. Samanta)

Identification of candidate genes associated with Weberian apparatus in rohu, *Labeo rohita*

To identify putative candidate genes involved in the development of Weberian apparatus, comparative transcriptome analysis was conducted to determine the mRNA expression abundance between anterior thoracic vertebrae in non-ostariophysi e.g. *Oreochromis niloticus* (Nile tilapia) and modified thoracic vertebrae i.e., Weberian apparatus in ostariophysi e.g. *L. rohita* (rohu). A total of 25 and 21 million high quality reads were generated through RNA sequencing, respectively. *De novo* transcriptome assembly was performed using trinity v2.11.0 and 98,943 contigs were finally yielded from *L. rohita* with an average contig length of 983 base pairs and N50 of 1,943 base pairs whereas, 81,344 contigs were obtained with avg. contig length 1186 bp and N50 of 2,512 from *O. niloticus* (Table 1).

Table 1. *De novo* transcriptome assembly

	<i>Labeo rohita</i>	<i>Oreochromis niloticus</i>
Contigs	98,943	81,344
N50	1943	2512
Avg. contig length	983	1186
Total assembled bases	97,327,171	96,498,710

(Reported by: P. Das, L. Sahoo, P. Nandanpawar and N. Priyadarshini)

Effect of dietary fatty acids on neuropeptide gene expression in *Labeo catla*

Fecundity, egg and larval quality in fish depend on the broodstock diets. Therefore, in the present study, two diets were formulated using fish oil (FO) and linseed oil (LO) as lipid sources and tested to record their effect on carp gonadal development. Besides, how fatty acids regulate the reproduction at molecular level in a seasonal breeder carp species, *L. catla* was studied. The formulated feeds were fed to the fishes at

2 percent of their body weight. Brain, pituitary, ovary, and liver samples were collected at the end of 30 days of feeding. The FO-based diet feeding increased the *Tac3b* mRNA expression whereas the LO-based diet increased the *Tac3a* mRNA expression in the brain of *catla* brood fish (Figs. 4a and 4b). So from the present study, it can be concluded that types of fatty acids influence the expression of tachykinin genes in freshwater carp species.

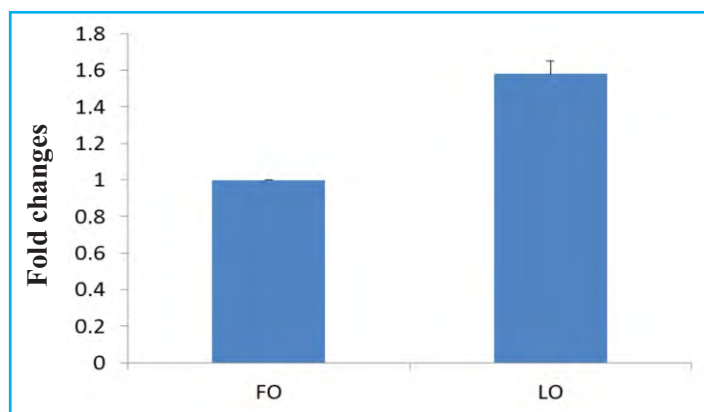


Fig. 4a. Relative changes in *Tac3a* mRNA expression in the brain of female catla after feeding with FO and LO based diets

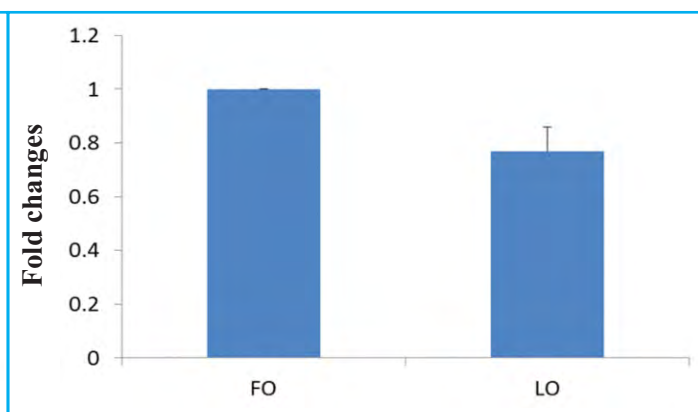


Fig. 4b. Relative changes in *Tac3b* mRNA expression in the brain of female catla after feeding with FO and LO based diets

(Reported by: R. Patro, A. Saha, M. Samanta and S. S. Giri)

Yolk sac absorption rate in *Channa striata* larvae

Availability of adequate food at the transition phase, from the lecithotrophic to the exogenous feeding stage, is crucial for *C. striata* larval development. Inadequate supply and improper food at this stage lead to larval mortality. The timing of feeding is also important for larval survival. Keeping the facts in view, the yolk absorption rate of *C. striata* was measured from hatching till three days old larvae. A large proportion of yolk absorption (64%) took place within the first 24 hours of hatching. A steady and gradual decline in yolk content was observed at 48-72

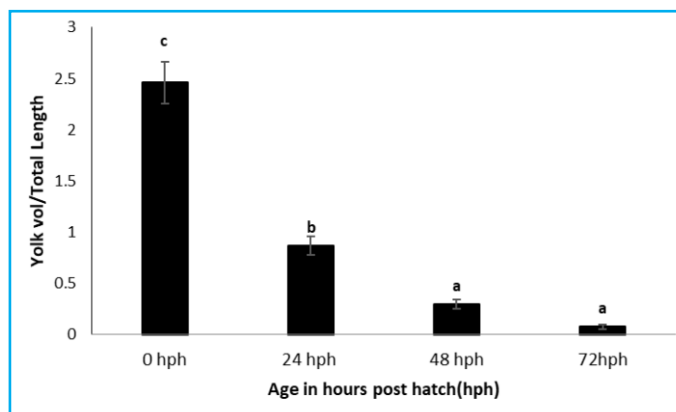


Fig. 5. Rate of yolk sac absorption in *Channa striata* larvae

hours post-hatching. By 72 hours post-hatching, the yolk was fully absorbed (Figs. 5 and 6). Therefore, live

food must be provided to the larvae at 48-72 hours post-hatching.

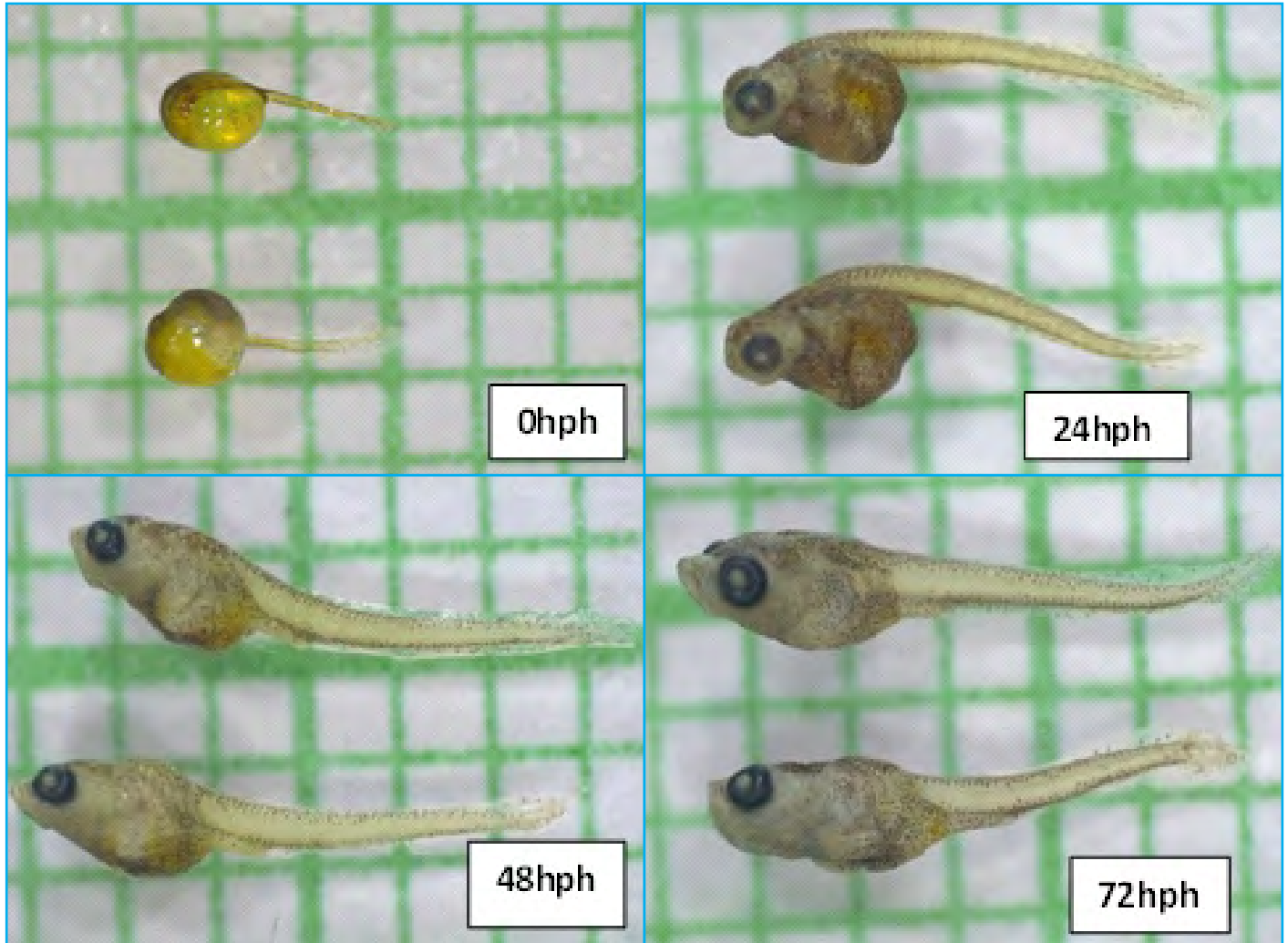


Fig. 6. Representative images of differences in the size of yolk sac and whole larvae melanization in the larvae of *Channa striata* from time of hatching to 72 hours old larvae.

(Reported by: R. Kumari, R. Kumar and G. M. Siddaiah)

Effect of dietary taurine in insect meal-based diet on growth performance of *Channa striata* fingerlings

The effect of supplementing graded taurine levels to the insect (Black soldier fly, BSF) meal-based diet on the growth and nutrient utilization of *C. striata* (7.8 ± 0.12 g average weight) was assessed. Five iso-nitrogenous (42% CP) and iso-lipidic (10% EE) with or without taurine-supplemented insect meal-based diets and one control (fish meal) diet were fed to fingerlings for 9 weeks. The feed intake was similar in

all the experimental groups ($P > 0.05$). The growth performance in terms of weight gain and specific growth rate (SGR) was significantly higher ($P < 0.05$) in the control diet than that of the insect meal-based diets (Fig. 7). Feed efficiency was higher in fingerlings that consumed fishmeal-based control diet, however, it was not influenced by taurine supplementation in the diets. The results indicated that the taurine supplementation to the insect meal-based diet does not help in improving the growth performance of *C. striata* fingerlings when compared to that of the fishmeal-based diet.

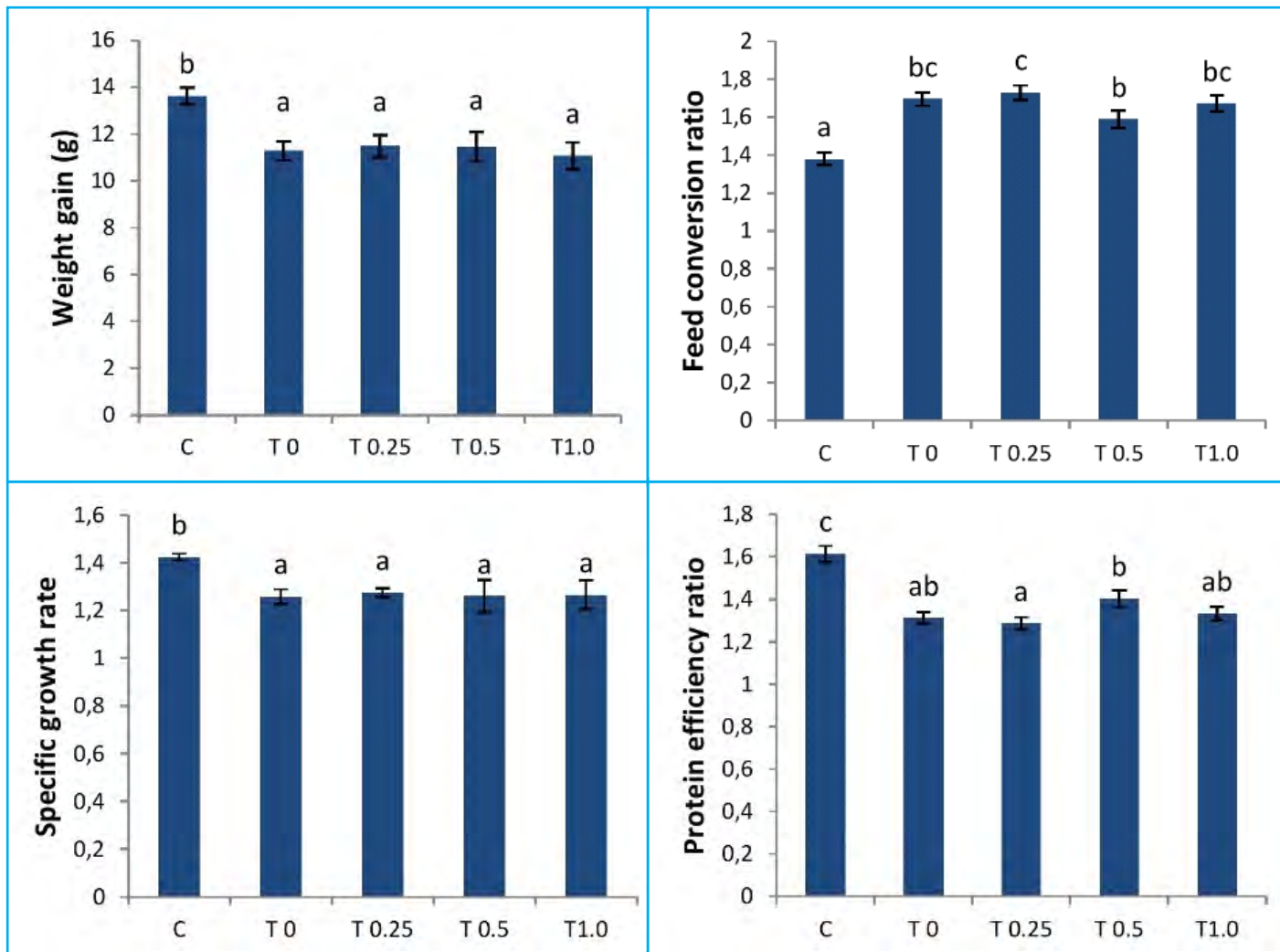


Fig. 7. Dietary taurine supplementation on growth performance of *Channa striata* fingerlings

(Reported by: G. M. Siddaiah, R. Kumari and R. Kumar)

Utilization of dietary available carbohydrate by the peninsular carp *Hypselobarbus pulchellus*

H. pulchellus fingerlings were fed for 90 days with iso-nitrogenous and iso-lipidic diets formulated using ingredients to contain varying levels of Nitrogen free extracts (NFE) (T1 - 34.50%, T2 - 40.50%, T3 - 44.80%, T4 - 48.20%, T5 - 50.30%) and their growth parameters as well as carcass composition and gut digestive enzymes were analyzed. Varying NFE levels

from 35 to 50% did not affect ($P > 0.05$) the growth, food conversion ratio (FCR) and protein efficiency ratio (PER). At the end of the trial, the whole-body composition analysis indicated that moisture and crude fat levels were the lowest in T1, with no significant variation in crude protein levels across the different treatments. Gut amylase activity was higher with the highest NFE diet and lower with the lowest NFE diet (Fig. 8). No difference ($P > 0.05$) in protease and lipase activities was recorded.

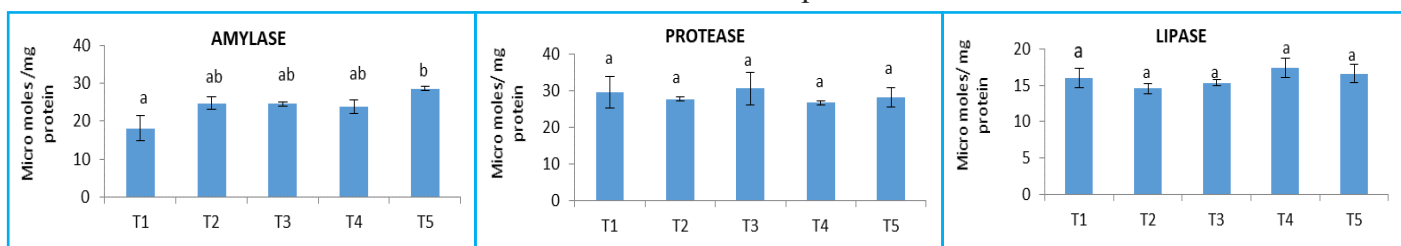


Fig.8. Activity of gut digestive enzymes (micromoles/hour/mg protein)

The study revealed that *H. pulchellus* can utilise dietary carbohydrate at least up to 50% level, giving

scope for protein sparing by carbohydrate in the diet.

(Reported by: B. Gangadhar)

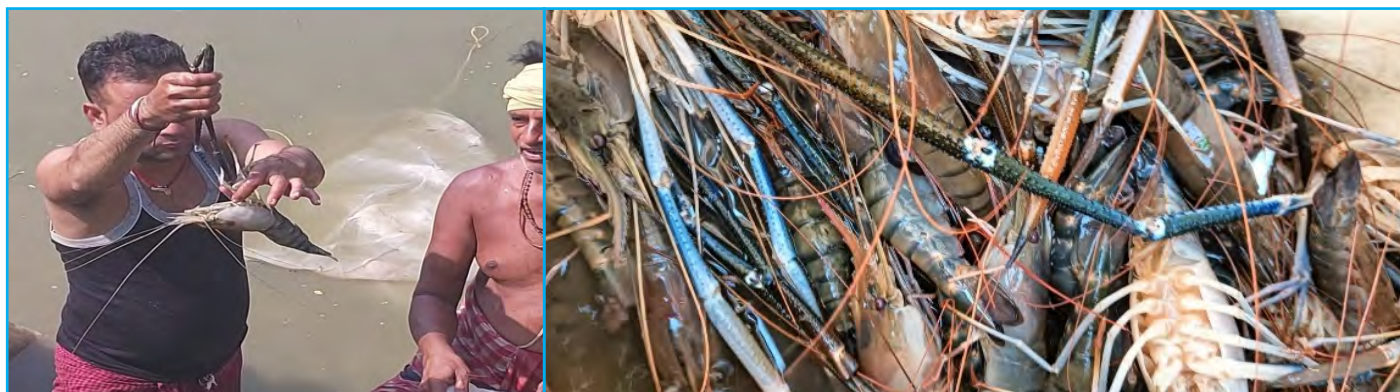
SUCCESS STORY

Successful demonstration of ‘CIFA-GI Scampi’[®] in Jagatsinghpur, Odisha

Mr. Bapi Parida, from Jagatsinghpur district of Odisha is a young progressive farmer who has been doing carp culture for the last five years. He was selected for on-farm performance evaluation of the new generation (G14) of CIFA-GI Scampi[®] in carp-scampi polyculture system under PMMSY (Scampi) project of ICAR-CIFA, Bhubaneswar. He prepared the pond as per the protocol provided by the project team and stocked advanced carp fingerlings in the 0.07 ha pond in the 1st week of July while the post larvae of CIFA-GI scampi[®] were stocked on 06 August 2022. The stocking densities of carp and scampi were

maintained @ 13,000 nos and 15,000 nos per ha, respectively. The farmer was provided with fish feed from the project. After 250 days of culture, Mr. Parida achieved a production of 879 kg of scampi and 10,758 kg of carp per ha with survival of 72% and 88%, respectively. Mr. Parida has successfully adopted and executed the CIFA technology by culturing CIFA-GI Scampi[®] in carp-scampi polyculture system and earned a remarkable production of carp and scampi with a higher profit margin of about Rs. 8.58 lakh per ha in 250 days.

(Reported by: B.R. Pillai, D. Panda, S. Sahu and B.Mishra)



Catfish hatchery establishment at Jagiroad, Morigaon district, Assam with the technical support of ICAR-CIFA

Shri Safir Ahmad, A&F AGRO Partnership Firm, Jagiroad, Morigaon district, Assam has been doing carp farming since 2019. He got interested in establishing a hatchery for catfishes because of the huge demand for the seeds. He undertook hands-on training on broodstock management, induced breeding, larval rearing, live feed production and grow-out culture of catfishes at ICAR-CIFA, Bhubaneswar, Odisha during the year 2022. Subsequently, he established a hatchery at Jagiroad,

Morigaon district, Assam for seed production of singhi, magur, cavasius and pangasius with the technical support of ICAR-CIFA for mass scale seed production. He also received financial support under PMMSY from the State Fisheries Department, Govt. of Assam for the hatchery construction. So far, he has produced 1.6 lakhs singhi seeds, 0.4 lakhs magur seeds, 0.75 lakhs cavasius seeds and 4.6 lakhs pangas fingerlings and supplied to the farmers of Assam and Arunachal Pradesh. He has also sold 6 tonnes of marketable size pangas produced from his farm. He has earned a net profit of Rs 6.84 lakhs from the sale of catfish seeds and market size fish.



(Reported by: S. Ferosekhan and S.K. Sahoo)

Mass scale production of live food culture in Howrah, West Bengal

Imran Ali Mollah, a progressive fish farmer and resident of Birshibpur area of Ulberia, Howrah district, W.B. got trained on techniques of mass scale production of live food culture from RRC, ICAR-CIFA, Rahara and is involved in the outdoor

production of a huge amount of live foods, particularly Green water, Brachionus, Moina and Daphnia. He was also trained to differentiate Moina and Daphnia morphologically and the techniques to culture them separately for feeding catfish larvae.

(Reported by: R. N. Mandal)

IMPORTANT EVENTS

ICAR-CIFA celebrated 36th Annual Day

The ICAR-CIFA, Bhubaneswar, Odisha celebrated its “36th Annual Day” on 1 April 2023. Padma Shri Prof. S. Ayyappan, Former Secretary, DARE & DG, ICAR and Chairman, Karnataka Science and Technology Academy graced the occasion as Chief guest. Dr. J. K. Jena, DDG (Fisheries Science), ICAR, New Delhi and Prof. Sabita Acharya, Vice Chancellor, Utkal University, Bhubaneswar were also present as Guests of honour. Dr. P.K. Sahoo, Director, ICAR-CIFA welcomed the chief guest, dignitaries and delegates. He highlighted the Institute’s achievements through species diversification, dissemination of CIFA-GI Scampi® as well as signing MoUs with various research and academic organisations.

Padma Shri Prof. S. Ayyappan reminisced and appreciated the contribution of ICAR-CIFA in livelihood upliftment of farming communities across the country. He emphasized on establishing connection between researchers and the farmers at the ground level, as well as advised the scientists to make endeavours to deliver good science and thereby bring happiness and prosperity to the common people. He also appreciated publication productivity of the scientists as well as its impactful outreach activities. Dr. J. K. Jena, DDG (Fisheries Science) highlighted that by the year 2047 India has to produce 34 million tonnes of fish, of which the freshwater aquaculture sector alone has to contribute 25 million tonnes. To achieve this target, the Institute has a pivotal role to play. Prof. Sabita Acharya, Vice Chancellor, Utkal University, Bhubaneswar, applauded the research





efforts of ICAR-CIFA and wished for close collaboration with the University including students and faculty exchange programs for mutual advantage.

The representatives of ICAR-CIWA; ICAR-CHES; ICAR-CTCRI; ICAR-NRRI; OUAT; NFDB and ICAR-CIFA's retired employees also participated in the event. During the occasion, eight publications of the Institute were released. The Winners of four memorial awards, instituted in the name of Smt S Susheelamma; Dr Girish Chandra Chaudhury; Dr T Ramaprabhu and Dr B R Mohanty for the year 2022 were also felicitated on the occasion.

Category	Winner
Dr T. Ramaprabhu Memorial Award	Mr Sandeep Kumar Panda YP-II, AICRP on PEASEM, ICAR-CIFA
Dr B. R. Mohanty Memorial Award	Ms Ipsita Iswari Das, JRF, DBT-AEDF Project, ICAR-CIFA
Smt. S. Susheelamma Memorial Scholarship (2021-22)	Ms, Sradha Samarpita Sahoo Pratap Sasan Girls High School, Balakati, Khordha
Girish Chandra Chaudhuri Memorial Scholarship (2021-22)	Ms. Archana Priyadarshini D/o Mr. Bhikari Charan Bhoi, LDC 3rd year +3 Science, Anmol College, Pubasasan

Happiness Program

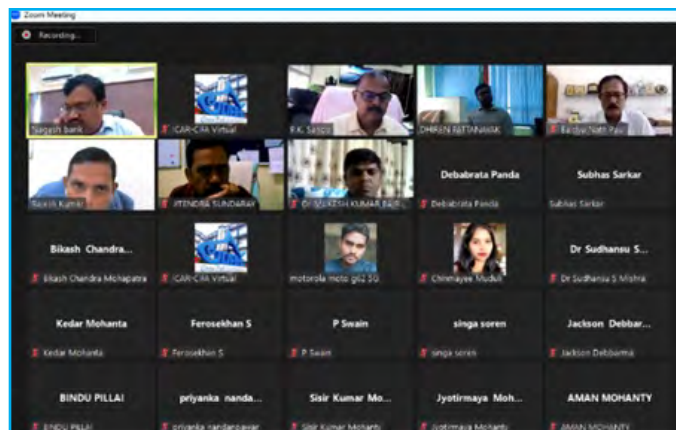
A "Happiness Program" was organised by The Art of Living-Bhubaneswar Branch at ICAR-CIFA during 17-20 April 2023. This program focused on Yoga, Pranayam and Sudarshan Kriya in which 18 staff members participated.



Celebration of World Intellectual Property Day

ICAR-CIFA organized a Webinar on the occasion of

"World Intellectual Property" Day with the theme 'Women and IP: Accelerating Innovation and Creativity' on 26 April 2023. Dr. P. K. Sahoo, Director, ICAR-CIFA and Chairman of the programme shared with the participants about the different types of intellectual property (patents, copyrights, trademarks, designs, etc.) developed by the institute in his opening remarks. He also emphasized that women scientists of the institute have contributed immensely to the development of various intellectual property rights. Two eminent lectures were arranged on the occasion,



and more than 60 participants from the institute participated in the programme. The first lecture was delivered by Shri Dhiren Pattnayak, Examiner of Patents and Designs and NIPAM officer, Indian Patent Office, Kolkata, on the topic "Intellectual Property Rights". The second lecture was delivered by a woman scientist, Dr. Arpita Sharma, Principal Scientist and Head, FEES, ICAR-CIFE, Mumbai, on the topic "Netting Equality: Examining Gender Representation in Fisheries and Dairy Patents." Both lectures were followed by a question-and-answer session. The programme ended with a vote of thanks by Dr. Rajesh Kumar, Senior Scientist and Member Secretary, ITMU.

37th Annual IRC

The Institute conducted the 37th Institute Research Council Meeting during 3-5 May 2023. Dr. P. Das, Member Secretary, IRC, welcomed the Chairman and members of IRC. He presented the overview of the institute-based and externally funded projects along with the agenda of the IRC. He also mentioned that considerable work is being carried out under the different developmental programmes like STC, SCSP and NEH. The Director and Chairman, IRC expressed his sincere thanks and gratitude to three outgoing Senior Colleagues for their sincere and immense contributions for freshwater aquaculture research and development. He appraised the house about the vision and expectations of the Hon'ble DG, and DDG (Fishery Sciences). Further, discussions were held regarding rationalizing ICAR and improving the



governance as well as revenue generation to assess the impacts of research in quantifiable terms with the existing facilities and way-out to increase the revenue of institute. He also mentioned the points made by the RAC members on advanced aquaculture techniques such as biofloc, RAS etc. During the meeting, all the

project investigators presented the achievements of respective projects/programs and thorough discussion took place to review the progress and new project proposals were also discussed.

World Environment Day

World Environment Day was observed by the Institute on 5 June 2023 by planting more than 100 Areca palm (*Areca catechu*) on the Institute premises by the staff members. The plantation drive on this day was arranged to spread the message of Mission LiFE i.e., "Lifestyle for environment" tree plantation campaign of Govt. of India. Also along with KVK, Khordha 220 mango saplings were distributed in the nearby village.

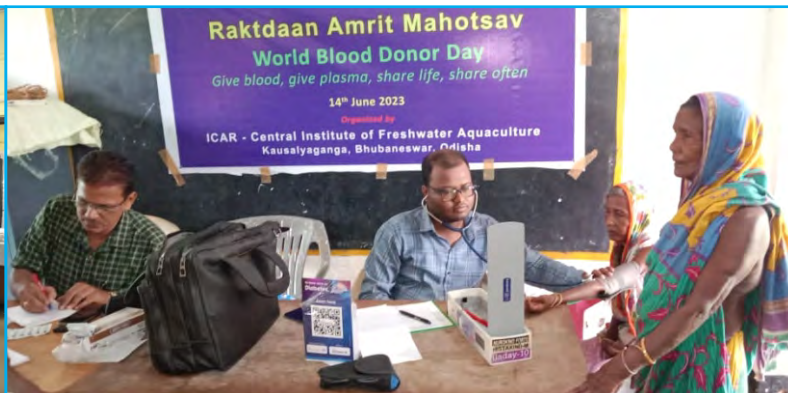


World Blood Donor Day

The Institute celebrated the 'World Blood Donor Day' on 14 June 2023 as a part of "Raktdaan Amrit Mahotsav" approved under "Azadi Ka Amrit Mahotsav" and to mark the birthday of Karl Landsteiner (1868-1943), an Austrian Biologist and physician, the founder of modern blood transfusion, who also discovered the ABO blood groups. A blood donation camp was organized at Capital Hospital, Bhubaneswar where 12 donors from the Institute donated blood to save the life of ailing patients. Further, a health camp was organised at Village Sangalai Sasan, Gudiapokhari, Puri District where

blood groups, blood sugar levels, blood pressure and general health of 35 villagers were examined and they

were made aware of the importance of blood grouping and encouraged to volunteer as blood donors.



International Day of Yoga

The Institute celebrated “International Day of Yoga” on 21 June 2023. “Y-Break at workplace-Yoga at Chair” protocol introduced by Ministry of Ayush, Govt. of India with an aim to get De-stressed, Refreshed and Re-focused at the workplace was practised and awareness was made among the staff. Additionally, various protocols of Yoga were practised by the staff members of the institute with the slogan “Yoga for overall health and well-being and ensuring sustainable lifestyle”.



Rajbhasha Quarterly Workshop

The Institute conducted Rajbhasha Quarterly Workshop on "Easy to work in Hindi through technical facilities" on 21 June 2023 wherein, staff members of ICAR-CIFA participated.



Launching of Jan Bhagidari events to create awareness about India’s G20 presidency

G20^{3rd} Education Working Group meeting was held at Bhubaneswar and ten Anchor and twenty-five Standalone Institutions were identified for organizing and coordinating Jan-Bhagidari events starting from 1 April 2023 to raise awareness and imbibe the spirit of participation and ownership with India’s G20 Presidency in the State of Odisha. IIT, Bhubaneswar was the Nodal Institute and ICAR-CIFA closely worked with them. A range of activities such as swachhhta, plantation, webinar, training programmes, exposure visits by school children etc. with active participation of civil society were worked out.



ICAR-CIFA launched Jan Bhagidari events on the eve of celebrating its 36th Annual Day on 1 April 2023 with a special lecture delivered by Padma Shri Prof. S.



Ayyappan, Former Secretary, DARE & DG, ICAR on the topic “Fish to 2030”. It was attended by entire staff members and students of the institute. Dr. J. K. Jena, DDG (Fisheries Science), ICAR was also present on the occasion.

The institute organized a Mental Health and Meditation Programme under “Har Ghar Dhyam” campaign for all the staff on 12 April 2023. During this occasion, the faculties from The Art of Living-Bhubaneswar branch educated the staff regarding the importance of maintaining sound mental health through regular meditation.

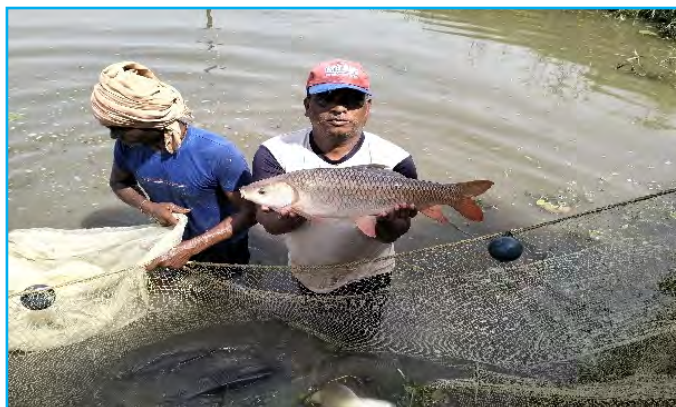


ICAR-CIFA organized a training program on "Freshwater Aquaculture" for SC farmers from Dhenkanal and Kandhamal districts under the DST livelihood project at its Kausalyaganga campus from 24 to 26 April 2023. The program aimed at transferring scientific knowledge on freshwater fish farming to promote the overall development of SC people. Around 50 SC beneficiaries mostly women SHG members attended the program.



Technology Developed

ICAR-CIFA had applied for Trade Mark Registration for “AhR Jayanti” rohu (*Aeromonas hydrophila* resistant Jayanti rohu) with Application number: 5427043 during April 2022. In April 2023 the trademark for disease resistant rohu against *Aeromonas hydrophila* (AhR Jayanti) was accepted and will be advertised in the Trade Marks Journal, under the provisions of section 20(1) of the Trade Marks Act, 1999.



“AhR Jayanti” rohu

EXTENSION ACTIVITIES / TECHNOLOGY TRANSFER

Training Programmes

S. N.	Title of Training Programme	Duration	No. of participants		
			Male	Female	Total
1.	Training programme on “Freshwater pearl farming for entrepreneurship development” for the fish farmers of Gajapati district of Odisha	11-13 April 2023	19	00	19
2.	Training programme on “Freshwater Aquaculture” for SC fish farmers of Kandhamal & Dhenkanal districts of Odisha	24-26 April 2023	23	27	50

3.	Training cum exposure visit on different aquaculture activities for B.Sc. and M.Sc. students of DAV University, Jalandhar, Punjab	26-27 April 2023	02	27	29
4.	In-plant training programme for final year B.F.Sc. students of College of Fisheries, CAU, Tripura	12-23 June 2023	17	25	42
Total			61	79	140



Exposure Visit

	No. of groups	No of visitors	Male	Female
April 2023	2	61	61	0
May 2023	2	68	50	18
June 2023	1	1	0	1
Total	5	130	111	19

Exhibition

S.N.	Title of Exhibition	Venue	Date/Duration
1.	Agriculture Chief Scientists of G-20 Meeting	Hotel Taj Ganges, Varanasi	17-19 April 2023
2.	North East Livestock and Aquaculture Expo	Trade Center, Assam	18-20 April 2023
3.	36 th Foundation Day of IIWM	ICAR-IIWM, Bhubaneswar	11 May 2023
4.	14 th Krishi Fair-2023	Sharadhabali Ground, Grand Road, Puri	30 May-3 June 2023
5.	G20 Agriculture Ministers Meeting	Hyderabad	15-17 June 2023



Technical guidance

Months	Samples tested			Tech. queries
	Water	Soil	Fish disease	
April 2023	12	06	02	20
May 2023	17	06	11	34
June 2023	17	20	05	42
Total:	46	32	18	96

Farmers Meet and Awareness programme

- One-day Farmers-Scientists interface meet was held under Farmer First Project on 5 April 2023 at Barijanga village, Balianta block, Khordha. Around 150 beneficiaries including farmers and farm women attended the programme.
- A Farmer-Scientist Interface programme for the skill development of men and women SC fish farmers at Raitala, Dhenkanal was held on 21 April 2023 under the DST livelihood project. Around 150 beneficiaries attended the programme.
- An online awareness cum sensitization meeting on 'Freshwater Fish Disease Surveillance' was conducted under 'National Surveillance Programme for Aquatic Animal Diseases-Phase II' (NSPAAD-II) on 18 May 2023. In the program, a team of scientists from ICAR-CIFA and the DFOs and AFOs of Govt. of Odisha were present (a total 86 participants) along with Odisha state nodal and co-nodal officers of NSPAAD-II, Sri Pratap Ekka and Sri B.B.J. Sahu. During the program, all the state fisheries officials were made aware of the fish disease surveillance program running in the state along with an objective of increasing timely disease reporting to ICAR-CIFA for better service to the farmers.
- On 24 May 2023, the Institute organized a one-day Farmer-Scientist Interface program on "Freshwater Aquaculture" at Balandapada village, Phiringia block, Kandhamal. The program aimed to enhance the skills of men and women SC fish farmers in the adopted villages of Kandhamal district under the DST livelihood project. Around 170 beneficiaries mostly from the women SHGs attended the program.
- PMMSY-Cluster Seed Village (CSV) project has been implemented since 2020 with an aim to develop the cluster of the fish seed of Indian Major Carps (IMCs) to meet the fish seed demand and timely seed availability. For the year 2023-24, 26 farmers from the tribal district, Mayurbhanj and 29 farmers from Balasore, Odisha were newly selected for the implementation of the PMMSY-CSV project. A team of scientists and research scholars visited the farmers pond and selection was made based on pond conditions. An on-field training cum interaction programme was conducted among all the farmers to train them on the nursery rearing of IMCs. The major inputs for the pre-stocking management like bleaching powder, lime, manure, and cover nets were distributed to the farmers. Soon after the commencement of the breeding, the spawn will be stocked in respective places.



OTHER EXTENSION ACTIVITIES

MoUs signed:

During this quarter, the Institute has signed MoUs

with the following organizations for undertaking collaborative work.

S.N.	Name of the Institute	Date Singed	Purpose
1.	Shri Debjit Barman, Nankar Bhaira, Nalbari, Guwahati-781369, Assam	1.4.2023	Supply of breeder seed of improved rohu 'Jayanti' and Improved catla (by ICAR-CIFA) for development of broodstock and dissemination of seed to the fish farmer for better yield for a period of five years (1.4.2023 – 31.3.2028).
2.	Shri Jyotish Talukdar, Kalong Kapili (NGO), Bagabari, Kamrup, Assam - 782402		
3.	Shri Ravichandran, Arvind Fish Farm, Manargudi, Tamil Nadu-614001		
4.	Shri Saurav Kumar Biswal, Tirtol, Jagatsinghpur-754137, Odisha		
5.	The Neotia University (TNU), Sarisa, Diamond Harbour Road, West Bengal 743368	17.04.2023	For facilitating academic, research, training and outreach activities in various disciplines of agriculture and allied sciences including basic sciences for students.
6.	Association for Innovation Development of Entrepreneurship in Agriculture (a-IDEA) Centre for Agri-Innovation of ICAR-NAARM, Hyderabad	26.05.2023	To promote entrepreneurship in agri and allied sectors and Organizing/ Co-hosting the events/programs/ activities related to agriculture startups, Co-incubation, Value added services and Co-Networking Opportunities.



ABI activities

The following activities were undertaken by the ABI during the reporting period:

Thematic area	Inputs
Entrepreneurs/incubators admitted for incubation	8
Entrepreneurs/incubators graduated	2
Entrepreneurs/startups initiated their business	1
Entrepreneur Development Programme (EDPs) organized	1
Business Plan prepared	2
Technology Licensing Agreements	1
Technology commercialization	ToT signed (Fish Hydrolysate)

Training on 'Detailed Project Report preparation and economical aspects of aquaculture' for Assistant Fisheries Officer and Assistant District Fisheries

Officer to Govt. of Odisha was organized where around 300 officials from 30 districts of Odisha were trained in seven batches during April-June 2023.



1st Batch Training programme on "Entrepreneurship Development and DPR preparation" to AFO and Addl FOs, Govt of Odisha during 24-27 April, 2023
ICAR- CENTRAL INSTITUTE OF FRESHWATER AQUACULTURE

Mr. Sachidananda Das, an entrepreneur from Berhampur has received a grant of 15 lakhs (HDFC bank) and 5 lakhs from Incubation Centre of IIT, Bhubaneswar for an innovative project of Black soldier fly (BSF) larval rearing with the support of ABI, ICAR-CIFA, Bhubaneswar. He has also installed one insulated container for BSF larval rearing at technology park of ABI.

Distinguished Visitors

Padma Shri Prof. S. Ayyappan, Former Secretary, DARE and DG, ICAR, New Delhi; Dr. J. K. Jena, Deputy Director General (Fisheries Science), New Delhi and Prof. Sabita Acharya, Vice Chancellor, Utkal University, Bhubaneswar visited the institute on the occasion of ICAR-CIFA Annual Day on 1 April

NEH Activities

ICAR-CIFA organised FISH FESTIVAL at Guwahati, Assam

ICAR-CIFA organised a FISH FESTIVAL in the North-East Livestock-Aquaculture-Poultry Expo during 18-20 April 2023 at Maniram Dewan Trade Centre, Guwahati, Assam in coordination with NFDB, Hyderabad and P2C Communications, New Delhi. ICAR-CIFA in association with NFDB, ICAR-CIFRI, College of Fisheries, Raha, Assam; College of Fisheries, Agartala, Tripura; FISHFED, Assam and



Women Co-operative Society, Manipur and Assam organised the FISH FESTIVAL to serve fish cuisines of North-East regions to promote fish as health food and increase the domestic consumption of fish. The Institute also displayed an exhibition stall to showcase freshwater aquaculture technologies for dissemination to farmers, students and various stakeholders to increase aquaculture production in the North-Eastern region. More than 400 farmers and stakeholders visited the exhibition and fish festival stalls. ICAR-CIFA technology leaflets were distributed to all the visitors. The activities were organized with funding support from PMMSY, Ministry of Fisheries, AH&D, GoI to develop the aquaculture sector of the country.

Capacity building programme for farmers of Nagaland

ICAR-CIFA, Kausalyaganga, Bhubaneswar, Odisha organised a capacity building programme for farmers of Nagaland on "Scientific aquaculture" under NEH programme on 13 May 2023 at Dimapur. The event



was organised to improve the aquaculture productivity in the state of Nagaland by enriching the farmers with know-how on recent developments in

freshwater aquaculture technologies. The event was attended by more than seventy participants including scientists, extension officials, and farmers of different districts of Nagaland.

Inauguration of Public Aquarium at Dimapur, Nagaland

A training was arranged with 67 participants at State Govt. farm at Dimapur, Nagaland on composite fish culture and integrated farming system (IFS) on 13 May 2023. An aquarium unit with local indigenous fish species (43 aquarium tanks) was inaugurated by Dr P.K. Sahoo, Director, ICAR-CIFA, and Director of Fisheries and aquatic resources, Govt. of Nagaland in presence of Joint Director and DDF, Dept. of Fisheries, Nagaland.



Scientist-Extension-Farmers interface meeting on pig-cum-fish farming at Bormanthi, Karbi Anglong District, Assam

ICAR-CIFA organised a Scientists–Extension–Farmers interface meeting on pig-cum-fish farming at Bormanthi, Karbi Anglong district of Assam on 14 May 2023 as a part of celebrating Azadi Ka Amrit Mahotsav under NEH programme. The event was

attended by more than thirty participants including scientists, extension officials and progressive farmers of Karbi Anglong district. The technical session also included the visit of scientists to pig-cum-fish farming demonstration ponds of the beneficiaries. During the visit to each farmer pond, feeding management, health management and overall soil and water quality management were discussed on the farm sites.



ICAR-CIFA established an Aquaculture Field School (AFS) at Kalong Kapili, Assam

ICAR-CIFA established an Aquaculture Field School (AFS) at Kalong Kapili, Bagibari, Kamrup Metro, Assam, which was inaugurated by Dr P. K. Sahoo, Director, ICAR-CIFA on 15 May 2023. The AFS would serve as a knowledge centre of aquaculture technologies in the farmers' field for the benefit of the people of Assam and adjoining states. More than fifty



participants including scientists, extension officials, bankers and farmers attended the event. Dr. Sahoo mentioned that the AFS at Kalong Kapili would serve

as a centre to provide technological information including improved varieties of Jayanti rohu and Improved catla, soil and water quality analysis services, etc.

Meeting of ICAR-CIFA team with Minister of Fisheries, Govt. of Assam at Guwahati

A meeting was held with the Hon'ble Minister of Fisheries, Govt. of Assam with the Director, ICAR-CIFA and team on 15 May 2023 at Guwahati, where he emphasized more collaboration with ICAR-CIFA pertaining to chitala breeding and rearing, and pabda hatchery in the state. He appreciated ICAR-CIFA's activities for the development of livelihood of fish farmers of Assam.



STC

Exposure visit cum Capacity building programme on "Integrated Aquaculture for tribal beneficiaries" on the occasion of Azadi Ka Amrit Mahotsav & Jan-Bhagidari

ICAR-CIFA successfully organized two days "Exposure visit cum Capacity building programme on Integrated Aquaculture for the Tribal beneficiaries" on the occasion of Azadi Ka Amrit Mahotsav & Jan-Bhagidari during 07-08 June 2023 at ICAR-CIFA, Bhubaneswar. The programme was inaugurated by Dr. Pradeep Rout, OAS (SAG), Addl. Secy. to Govt. & Pvt. Secy. to Hon'ble Minister of Panchayati Raj and Drinking Water; Forest, Environment, Climate Change; Information & Public relations Dept., Govt. of Odisha and Dr. P.K. Sahoo Director, ICAR-CIFA. A total of 47 participants from Gajapati and Rayagada

district, Odisha attended the programme. Tribal women beneficiaries belonging to particularly vulnerable tribal groups (PVTG), SOURA and DONGRIA KANDH group along with officials from Saura Development Agency and Dongaria Kandha Development Agency, Chatikona, Rayagada participated. During the two-day programme, the trainees were provided training and demonstration on carp culture, tilapia culture, catfish culture, ornamental fish culture, bio floc, feed formulation and feeding management, health management, integrated farming system development, tuber crop farming, horticulture, backyard poultry and duckery. The participants were taken to the institutes' farm facilities; KVK, Khordha and NFDB-National Freshwater Fish Brood Bank farm for exposure visit and demonstration of various activities.



SCSP

Odisha

ICAR-CIFA in association with the Department of Fisheries, Kandhamal, Government of Odisha, successfully organized a Fish Harvest Mela cum Scientists-Farmers interface programme to promote

scientific carp culture. The event was held at Ratanga Bandha, Phiringia on 7 June 2023 and witnessed enthusiastic participation from farmers, scientists, and government officials. More than 150 farmers participated in the interface meet.



Andhra Pradesh

A low-cost model of Integrated Advanced Aquaculture System (IAAS) (a setup of RAS with aquaponics) was developed for the demonstration to the beneficiaries under SCSP. A small unit of IAAS was established in Kuchipudi, Bapatla district, Andhra Pradesh. It has two circular fish tanks (1.5 m

height x 1.5m dia) with, two rectangle tanks for fodder crop (10x4x2 ft) and six pvc pipes (10 ft length; 3 inch dia) fabricated for aquatic plants. The IAAS has equipped with automated filters and high pressure pump for water circulation. Continuous aeration was provided to the fish tanks using high blow aerators. The carp fry (0.05±0.12 g) was stocked in the fish

tanks @ 1000 number per cubic meter. The shoot of Napier grass, *Pennisetum purpureum* with an average initial height of 80-100 mm was planted in the rectangular tank containing semi-solid mixture of sand and clay. Vegetable plants (tomato and chilly, 80 mm size respectively) were planted in hydroponic tanks. Total culture period was 90 days.

At the end of the culture period, significant increases in the fish and plant growth were observed. The average weight and length of fish were recorded as

10.56±1.02 g and 9.50±1.25 cm, respectively. The fish weight gain and specific growth rate, FCR was recorded (Table 2). The survival of fish was recorded at about 90%. The Napier grass was grown at an average height of 160.53±3.58 mm and a cumulative weight of 20 kg per tank in 30 days. Vegetable plants were grown at optimum height and flowering was started after 30 days. The total biomass of Napier grass was recorded 120 kgs in 90 days (Table 3).



Table 2. Growth performance of rohu juveniles in IAAS

Parameters	Observations
Initial weight (g)	0.05±0.12
Initial Length (cm)	1.86±0.56
Final weight (g)	10.56±1.02
Final Length (cm)	9.50 ±1.25
Weight gain (g)	10.05±0.82
SGR	5.93±0.26
FCR	1.61±0.13
Survival	90%

Table 3. Growth parameters of Napier grass (*Pennisetum purpureum*)

Parameters	Observations
Initial Shoot length (cm)	8.50±1.69
Final Shoot length (cm)	160.53±3.58
Root length (cm)	12.77±1.46
Shoot to root ratio length	0.65±0.12
Gross weight (kg)	120.5±2.34

PROMOTION

- Dr N.K. Barik, Sr. Scientist promoted to Principal Scientist w.e.f. 17 August 2018.
- Dr Khuntia Murmu, Sr. Scientist promoted to Principal Scientist w.e.f. 1 April 2022.

TRANSFER/JOINING

- Shri Prakash Kumar Behera, Technical Officer (T-5) joined at ICAR-CIFA w.e.f. 8 May 2023 on transfer from ICAR-CIFE, Kolkata Centre.

RETIREMENTS

- Shri Sunakar Nandi, Asst. Administrative Officer on 30 April 2023
- Shri Suratha Ku. Naik, Technical Officer (T-5) on 31 May 2023
- Smt. Smita Acharya, Private Secretary on 31 May 2023
- Shri Lingaraj Muduli, Technical Officer (T-5) on 30 June 2023
- Shri Premanand Bisoi, Skilled Support Staff on 30 June 2023





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