ICAR-DCFR News

हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद

Agrisearch with a human touch

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FROM DIRECTOR'S DESK

During the last six months, ICAR-Directorate of Coldwater Fisheries Research has put concerted efforts focused on the development of coldwater fisheries sector. The notable research activities undertaken by the Directorate include attempts of captive maturation of golden mahseer, disease surveillance in coldwater fish farms, exploration of indigenous fish biodiversity in high altitudes and development of farm made feed for rainbow trout. Concurrently, various farmer oriented extension activities, frontline demonstrations, exhibitions and capacity building through training programmes and workshops were carried out. In particular, the Directorate organised a national workshop on 'Mahseer in India: resources, captive breeding, propagation, policies and issues' to address the major challenges in mahseer propagation and rehabilitation. Further, conforming to the Ministry of Agriculture's initiative to provide advisory to farmers, the "Mera Gaon Mera Gaurav" scheme has been initiated.

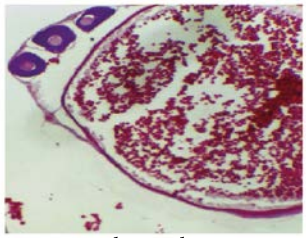
Many demonstrations and training programs were also organised under the Tribal Sub-Plan (TSP) and North-eastern Hill Region (NEH) plan. As a step towards species diversification, on farm experimental trials with *Osteobrama belangeri* along with Chinese carps are being undertaken. Moreover, a brood bank facility for *Semiplotus semiplotus* has been set up at Jasingffa Aqua Tourism Centre, Assam. I appreciate the meticulous efforts of all the scientists and staff for taking forward the Directorate a step ahead in its mission.

(A. K. Singh)
Director

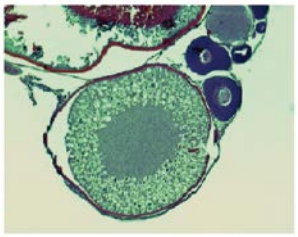
Research highlights

Comparative assessment of maturity status in wild and captive reared golden mahseer

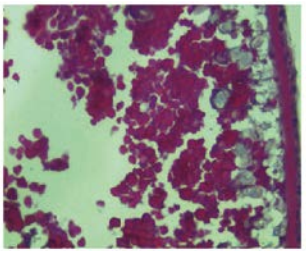
Generally golden mahseer (*Tor putitora*) does not mature in captivity. To decipher the possible bottlenecks of its non-maturity in captive conditions, an attempt was made to comparatively assess the maturity status of captive reared and matured wild fish, in terms of different sex steroids and gonadal histology. For this purpose, adult golden mahseer (avg. weight, 423 ± 86 g) were collected from Kakrighat and Ramnagar stretches of river Kosi in Uttarakhand and maintained in floating cages at Bhimtal lake. The physico-chemical parameters of water at different collection sites were recorded. Ovarian histology showed compact yolk globules and denser granulosa and thecal cells in the oocyte of wild caught fish as compared to pond reared females. Likewise, a relatively lower level of serum estradiol was observed in captive reared females of golden mahseer. Estimation of stress parameters such as serum cortisol levels, superoxide dismutase and glutathione peroxidase activities indicated the prevalence of oxidative stress in captive reared mahseer as compared to wild individuals.



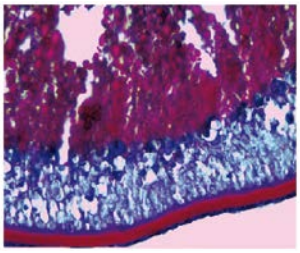
Pond reared; 10X



Wild caught; 10X



Pond reared; 40X



Wild caught; 40X

In silico identification of kisspeptin gene in snow trout and golden mahseer from two different transcriptome libraries

Kisspeptin has drawn widespread attention for its functional significance in the stimulation of gonadotropic axis and release of gonadotropin hormone in different organisms. The vital role of the expression of this gene in vitellogenesis process during ovarian maturation has been reported in several cultured fish species. Using next generation sequencing through Illumina MiSeq platform with 2x150 bp paired end read length in a single channel, Kisspeptin 1 gene was identified in two important coldwater fish species i.e. snow trout, *Schizothorax richardsonii* and golden mahseer, *Tor putitora* from their respective cDNA libraries. In snow trout, a cDNA sequence of kisspeptin 1 with 307 bp encoding 102 amino acids was obtained (GenBank accession no. KJ872500) and in golden mahseer, a partial mRNA sequence of kisspeptin 1 with 318 bp encoding 106 amino acid was obtained (GenBank no. KM504155).

Surveillance of coldwater fish diseases in Himachal Pradesh

Base line data was generated for National Surveillance Programme on Aquatic Animal Diseases (NSPAAD) by gathering information from three rainbow trout farms in Kangra District. Spleen and kidney were collected from 10 individual fish sampled from the three farms. Tissue samples from different fish farm were pooled, processed and analyzed by RT-PCR for the presence of IPNV and VHSV. All the samples tested negative. Further when these samples were inoculated in CHSE-214 and BF2 cells, no cytopathic effect was observed.

Use of *Azolla* in supplementary feed of minor carp *Labeo dyocheilus*

The free-floating aquatic weed *Azolla* was tested as protein supplement (22% crude protein) in the diet of herbivorous minor carp *Labeo dyocheilus*. *Azolla pinnata* and *Azolla microphylla* were grown in coldwater conditions and a paste of the fresh *azolla* was added (30-40%) in the formulated feed having 28% protein level. Growth performance of the minor carp fingerlings was found to be similar between *Azolla* incorporated diet and the control diet containing rice polish and mustard oil cake. In economic terms the incorporation of *Azolla* in the diet of *L. dyocheilus* resulted in the reduction of feed cost up to 25%.

Farm made feed for rainbow trout

Fish meal is the most commonly used and preferred protein source in the feed formulations for rainbow trout to supply all the essential amino acids. However, it is very expensive and not easily available to the farmers. Therefore, a poultry/fish offal based farm made trout feed having 35% crude protein was developed. The performance of this farm made feed was not equivalent to the available commercial trout feed, nevertheless it can be used as a cost-effective and simple alternative by rainbow trout growers.

Exploration of indigenous coldwater fish germplasm

To strengthen brood banking of indigenous coldwater ornamental fishes in ICAR-DCFR, Bhimtal, an exploratory field trip was organized to collect fish germplasm from the stretch of river Kali located in the district of Pithoragarh, Uttarakhand. During the exploration undertaken on 23-24 December 2014, sampling was conducted in 15 different locations with the help of local fishermen. About 200 live fish specimens of *Barilius sp.*, *Tor sp.* and *Nemacheilus sp*. were collected. The exploration was coordinated by Dr R.S. Patiyal.

Extension activities and awareness programmes

Aquaculture initiatives under Tribal Sub-Plan

- Based on feasibility surveys that included environmental, social and resource considerations, few villages in the border district Pithoragarh of Uttarakhand was found to be suitable for rainbow trout culture. Consequently, two trout raceways were constructed in Teentola and Dharchula villages of Pithoragarh, under the TSP programme of ICAR-DCFR. Five more similar raceways are further under construction in Munsyari region. Likewise, a carp pond was constructed in the land of Mr. Khusal Ram, Chyanchyangre village, Pithoragarh at an altitude of 2100 m above msl, under the DBT societal programme of livelihood security.

- Under TSP, ICAR-DCFR also supports trout culture activities in Leh, Jammu & Kashmir for improving the socio-economic status of the resident tribal populations. Initially, three existing raceways were repaired and five new raceways were constructed for four beneficiaries in Chushout Shamma village. On the occasion of

seed and feed distribution, ten thousand rainbow trout fingerlings (average weight 10 g) were stocked in the raceways by Dr. A.K. Sikka, Deputy Director General (NRM), ICAR. Trout feed was also distributed to the beneficiaries. Dr. Sikka appreciated the efforts of all the involved organizations.

Species diversification initiatives in North-East hill region

- ICAR-DCFR in partnership with Rajiv Gandhi university, Itanagar, Arunachal Pradesh, initiated a project on 'Development of broodstock for king fish, *Semiplotus semiplotus*'. To begin with, a brood bank facility for *Semiplotus* was started at Jasingffa aqua tourism centre, Nagaon, Assam. Moreover, fingerlings of *Semiplotus* were collected from natural water bodies of Arunachal Pradesh and are being reared in captive condition.

- Another collaborative project on "Culture of *Osteobrama belangeri* along with Chinese carps for production and livelihood upliftment in Thoubal district of Manipur" has been taken up by ICAR-DCFR and Krishi Vigyan Kendra, Thoubal, Manipur. Under this project, 10 fish farmers were selected and initial stocking have been done in their ponds.

Front line demonstrations

- Under ICAR-DCFR's tribal sub-plan programme, front line demonstration (FLD) of composite fish culture was organized for the tribal farmers of Udhamsingh nagar district of Uttarakhand. During the FLD, water quality monitoring, health management, netting, fish handling and feeding were demonstrated to the farmers. Overall under the TSP scheme, 10 fish ponds were constructed and fingerlings of catla, rohu, grass carp, silver carp and common carps were stocked. On 8th November 2014, harvesting was done after about one year culture duration, and average growth of all species was 1 kg/year. The production was satisfactory for the farmers. Further, 1300 fingerlings of silver carp, grass carp and common carp were stocked in 7 new ponds created under TSP.
- Another front line demonstration of composite fish culture was carried out for the farmers of Pangu, Himkhola, Chalmachilanso and Gothi villages in Pithoragarh district of Uttarakhand, with the financial support of Department of Biotechnology. Different aspects of fish culture like water quality monitoring, health management, netting, fish handling, feeding and length-weight recording was demonstrated to the farmers. Further, post harvest baseline information pertaining to income generation through fish culture was made. It was observed that fish (silver carp, grass carp and common carp) production was about 3000 kg/ha/yr in these remote hilly areas, where fish culture has been introduced for the first time.

Technical support for rainbow trout farming in Sikkim

The scientific team of ICAR-DCFR led by Dr. N.N. Pandey provided the requisite technical support to the Directorate of Fisheries, Sikkim in developing rainbow trout broodstock, breeding, seed production, feed formulation and health monitoring. Healthy trout broodstock was maintained at the state trout farm in Uttarey and during this breeding season, 3 lakh eyed ova and 1.5 lakh advanced fingerlings were produced. Further, individual brood fish were selected at Uttarey for stock improvement, with the production target of 5 lakh eyed ova in the next breeding season. Also, a wooden stripping stand was designed to reduce physical stress of the brood fish and to simplify the entire stripping operation. The device was introduced and practically demonstrated to the trout farmers in Sikkim.

Advisory for fish farmers

The scientific team at ICAR-DCFR is regularly involved in providing technical support to fish farmers and state fisheries department units in the hill states through personal visits and communication mediums. In particular, a delegated team of scientist visited the farm sites of 34 trout growers in Sree badam, Uttarey, Begha and upper Rimbi villages of west Sikkim. Growth and health of the farmed fish was assessed through field sampling. Farm-specific advisory concerning appropriate stocking density and water flow, grading of growing stock, farm made feed and maintenance protocols for individual raceway was offered. Similarly, the scientific team also visited trout farmers in Kullu

valley, Himachal Pradesh and offered inputs concerning farm made feed formulations using poultry offal/fish offal and selection of broodstock. In Uttarakhand, the farmers were advised to do carp farming in polytanks with the integration of horticultural crops and this was successfully adopted by the farmers of Todera and Dudhauli villages in Almora district. Specific technical guidance was provided with respect to design of polytank, selection of species and stocking density. To strengthen these farm advisories, ICAR-DCFR has also initiated the "MERA GAON MERA GAURAV" scheme. Each scientist of this Directorate will

be in constant touch with farmers of the adopted village to facilitate the flow of technical information.

Supply of rainbow trout eyed ova to state fisheries department

On 3rd February 2015, about 20,000 rainbow trout eyed ova produced in Chirapani field centre of ICAR-DCFR were supplied to the Department of Fisheries, Uttarakhand. The concerned Inspector of Fisheries, Mr. Kanak Shah and Dr. Ramesh Chalal received the healthy consignment from Dr. S. Chandra at Champawat.

Exhibitions

The research and development activities of ICAR-DCFR in coldwater fish species were highlighted and exhibited at several conferences and kisan melas. Notable displays were put up in the 10th Indian Fisheries and

Aquaculture Forum at ICAR-NBFGR, 12th Agricultural Science Congress at ICAR-NDRI, International symposium on Biodiversity at Haridwar, 96th Agro industrial exhibition - Krishi kumbh at GBPUAT, Krishi vigyan mela at ICAR-IARI and Regional agriculture fair at ICAR-IVRI.

Workshops and Training programmes

- ICAR-DCFR organized a two day national workshop on 'Mahseer in India: resources, captive breeding, propagation, policies and issues' at Guwahati on 22nd-

23rd December, 2014. Over 133 scientists from all over the country participated in the workshop. In view of the persisting threats to wild population of different mahseer species (*Tor putitora, T. tor, T. khudree and Neolissocheilus hexagonalepis*), it was unanimously agreed to have a national concerted effort to artificially propagate selected species for conservation and aquaculture purposes. During the occasion, a manual 'Mahseer research and development: a journey by DCFR' was released. An exhibition was also organized, in which different fisheries institutes and NGOs participated. Many renowned scientific leaders like Dr. A.K. Singh, Dr. K.K Vass, Dr. P.C Mahanta, Dr. A.P. Sharma, Dr. S.N. Ogale, Prof. W. Vishwanath, Dr. S.K. Das, Dr. P. Nautiyal, Prof. M.H. Balkhi and Prof. R.S. Chouhan took part and deliberated the various strategies to be adopted to save mahseer from extinction. The plenary session was chaired by Mr. Hemanta Narzary, Commissioner and Secretary, Department of Fisheries, Govt. of Assam. The workshop was co-ordinated by Dr. D. Sarma and the team of scientists consisting Dr. M.S. Akhtar, Dr. S. Chandra, Mr. Rajesh M. and Mr. A.K. Giri.

- National Fisheries Development Board (NFDB) sponsored training programme on 'Management practices of Jhora fisheries' was organized at Kalimpong, Darjeeling district of West Bengal during 15th-19th January 2015. The key objective of the training was to impart technical knowhow regarding organic management practices for chocolate mahseer (*Neolissochelius hexagonalepis*), common carp (*Cyprinus carpio*) and grass carp (*Ctenopharyngodon*

idella) in Jhora fisheries pond. Smt. Nhamu Lamu Sherpa, Executive Director, Gorkhaland Territorial Administration graced the occasion as chief guest of the inaugural session and motivated the participants to adopt fish farming as an alternative livelihood. The training was attended by a diverse group of 33 participants including officials from different state fisheries departments, KVKs and farmers. Detailed lectures and field demonstration at Jhora fish pond were included in the training. The program was co-ordinated by Dr. D. Sarma, Dr. S.K. Gupta and Mr. Ritesh Tandel.

- NFDB sponsored training programme on 'Culture and breeding of important coldwater fish species' was organised at Rajiv Gandhi university, Arunachal Pradesh during 20th to 24th January 2015. The training program was focused on scientific farming techniques to augment fish production in the state. The participants were given an overview of the propagation and rearing practices of different coldwater species viz., rainbow trout, mahseer, snow trout, *Semiplotus* and other minor carps. The honourable vice chancellor of Rajiv Gandhi university, Prof. T. Mibang graced the occasion as chief guest and Mr. J. Taba, Director, Department of Fisheries, Arunachal Pradesh was guest of honour in the inaugural session. 24 participants including officials of state fisheries departments, KVKs, asst. professors, research scholars and progressive farmers attended the training. The program was co-ordinated by Dr. D. Sarma, Dr. S.K. Gupta and Mr. Ritesh Tandel.

- NFDB sponsored training programme on 'Coldwater fish farm management in mid hills' was organized at ICAR-DCFR field centre at Champawat, during 27th-31st January 2015. About 30 farmers of Uttarakhand attended the training. Dr. A.K. Singh inaugurated the programme and emphasized the need for culture expansion of coldwater fishes in mid hills. Various aspects of farm and hatchery management, as well as breeding and seed production practices of rainbow trout and carps were elaborated. A training manual was also released on the occasion. The training was co-ordinated by Dr. S.K. Srivastava, Dr. S. Chandra, Dr. R.S. Patiyal and Mr. S.K. Mallik.

- NFDB sponsored training programme on 'Prevention and control of diseases in rainbow trout' was organized at Bhimtal, during 10th-14th March 2015. It was attended by 20 participants from state fisheries department, KVK and universities. Several aspects of commonly occurring diseases in rainbow trout farms, causative agents, diagnostic symptoms and control measures were taught and discussed in detail. The participants also visited ICAR-DCFR field centre at Champawat to get a practical perspective of health management in rainbow trout rearing systems. The course material was compiled as a comprehensive manual and released. In his keynote address, Dr. A.K. Singh emphasized the importance of intensifying rainbow trout farming and the need to address challenges related to trout health management. The training was co-ordinated by Mr. S.K. Mallik, Dr. S. Chandra, Dr. B.S. Kamalam, Dr. N. Shahi, Dr. R. S. Haldar and Dr. S. K. Srivastava.

- NFDB sponsored training programme on 'Common fish diseases in mid-hill fish tanks and their control' was organized at Champawat, during 18th-22nd March 2015. It was attended by a group of 30 fish farmers from Uttarakhand. The training encompassed the means of maintaining healthy fish stock and its importance in maximizing production. Field visit to progressive fish farmers' ponds in Bheti village (Lohaghat) was also arranged. The training was coordinated by Dr. S. Chandra, Dr. S.K. Srivastava, Dr R.S. Patiyal, Mr. S.K. Mallik, Dr S.K. Gupta, Mr. R.K. Tandel and Mr. A.K. Giri.

- Under the NSPAAD scheme, a training program on fish diseases was conducted for fish farmers at Dudhauli, Almora, Uttarakhand, on 30th March 2015.

Important events

Honourable Minister of State for Planning and Defence visited ICAR-DCFR, Bhimtal

Shri Rao Inderjit Singh, Minister of State for Planning and Defence, Government of India visited ICAR-DCFR,

Bhimtal on 5th November 2014. Dr. A.K. Singh apprised the minister about the various research activities being carried out in the Directorate. Shri Singh visited all the laboratories and facilities of the Directorate including fish farm and mahseer hatchery, where he was shown the ongoing experiments and available fish stocks. The minister appreciated the efforts of the Directorate towards the development of low input fish farming technologies to enhance the livelihood of hill dwellers. On the other hand, he expressed concern over the depleting populations of endemic fishes in coldwater streams and lakes.

Republic Day celebration

Dr. A.K. Singh, Director, hoisted the national flag on 26th January 2015 in a staff gathering. In his republic day

address, he highlighted the vision of the Directorate and encouraged all the scientists and staff members to cooperate and work together to realise it.

Swachh Bharat Abhiyan

ICAR-DCFR joined the national 'Clean India Mission' launched by Government of India and carried out a cleanliness drive at Bhimtal on 2nd October 2014.

Dr. A.K. Singh, Director led the way and all the staff of the Directorate actively participated in sanitizing the premises in and around the campus. The Director also urged the staff to take up the challenge initiated by the honourable Prime Minister on a routine basis.

Visitors

Several student and researcher groups from esteemed institutes such as St. Andrew's College, Gorakhpur; College of Veterinary, AAU, Gauhati, Assam; West Bengal University of Animal & Fishery Science, Kolkata; University

of Calcutta, Kolkata; Kumaon university, Nainital; and Woodbridge school, Sattal, visited the Directorate and interacted with the scientists.

Awards and Recognition

- Dr. M.S. Akhtar (Scientist) was conferred "Dr. M.S. Swaminathan award for the Best Indian Fisheries Scientist of the year 2013" by the Professional Fisheries Graduate Forum, during the 10th Indian Fisheries and

Aquaculture Forum held at NBFGR, Lucknow.

- Dr. R.S. Haldar (Asst. Chief Technical Officer) was conferred "Fellow of the Academy of Environmental Biology, India" by the Academy of Environmental Biology, Lucknow.

International Visit

Dr. D. Sarma and Dr. R.S. Patiyal participated in the International training workshop on 'coldwater or cool water fish aquaculture' held at Heilongjiang River Fisheries Research Institute of the Chinese Academy of Fishery Sciences from 9th-28th October 2014. They gained exposure in recent advances of coldwater fish rearing, breeding, genetic improvement and feed/health management. The various insights gained will certainly help in aligning and executing future research programmes that will benefit fish farmers in Indian uplands.

Farewell

- Dr. B.S. Ananda Kumar, Scientist was transferred to ICAR-Central Institute of Freshwater Aquaculture, Regional Research Centre, Bengaluru, by the Council. He was relieved from the Directorate with good wishes on 31st December, 2014.

- Shri. Hayat Singh, LDC retired on 30th January 2015, after several years of active service. ICAR-DCFR family wishes him a happy and healthy post-retirement life.

विभिन्न शोध गतिविधियों के अर्न्तगत इस अवधी में नदियों एवं तालाबों में पाली गयी सुनहरी मादा महाशीर के परिपक्वता स्तर का तुलनात्मक मूल्यांकन हेतु तालाबों एवं नदियों की मछलियों की डिम्ब ग्रंथि के ऊतक विज्ञान का अध्ययन किया।

जलजीव रोग पर राष्ट्रीय निगरानी कार्यक्रम के अर्न्तगत हिमांचल के कांगडा जिले के तीन रेन्बो ट्राउट फार्मों से 10 अलग–अलग मछलियों के सलीन (मज्जा) एवं किडनी (गुर्दा) के नमूने एकत्र किऐ। उनको VHSV व IPNV की उपस्थिति में RT-PCR द्वारा विश्लेषण किया गया।

रेन्बो ट्राउट के आहार के लिए फार्म में उपलब्ध मछली/मुर्गों के मांस के लदड़ो (छीछड़े) से युक्त 35 प्रतिशत कच्चा प्रोटीन युक्त आहार का विकास किया गया।

निदेशालय, भीमताल में शीतजल की देशी सजावटी मछलियों के प्रजनन बैंक को मजबूती प्रदान करने के लिए काली नदी से निमैचिलस, टौर, बैरिलियस प्रजातियों के लगभग 200 जीवित मछलियां संग्रहित की गयी। अरूणांचल प्रदेश के प्राकृतिक स्त्रोतों से सेमिप्लोटस के अध्ययन हेतु अंगुलिकाओं को संग्रहित कर तालाबों में पाला गया तथा कृषि विज्ञान केन्द्र थोउबाला मणिपुर के साथ संयुक्त रूप से ओस्टीयो ब्रामा बेलंगारी मछली पर परियोजना प्रारम्भ की गयी है।

तकनीक विस्तार गतिविधियां

जनजातीय उपयोजना के अन्तर्गत उत्तराखण्ड के पिथौरागढ़ जिले के सीमांत ग्रामों में रेन्बो ट्राउट की खेती हेतु धारचूला के तीनतोला में दो ट्राउट तालाबों का निमार्ण किया गया तथा मुन्स्यारी क्षेत्र में पांच तालाबों के निमार्ण हेतु किसान एवं भूमि का चयन किया गया। लेह, जम्मू एवं कश्मीर में भी वहां पर पूर्व से विद्यमान 3 तालाबों का जीर्णोद्धार किया तथा 5 नएं तालाब निर्मित करवाए। मत्स्य पालकों को मत्स्य आहार वितरित किऐ और 10,000 ट्राउट अंगुलिकाऐं संचयित करायी। साथ ही पिथौरागढ़ के उंचाई वाले क्षेत्रों में प्रथम बार 3000 किग्रा./हैक्टे./वर्ष के अनुसार कार्प मछली का उत्पादन हुआ।

निदेशालय के वैज्ञानिकों द्वारा पर्वतीय राज्यों के राज्य मात्स्यिकी विभागों, स्थानीय मत्स्य पालकों को तकनीकी सहायता प्रदान करने हेतु "मेरा गाँव मेरा गौरव" नाम से एक नवीन गतिविधियों की शुरूआत भी की जिसमें वैज्ञानिकों द्वारा एक–एक गांव का अंगीकरण किया।

प्रदर्शनी

अपनी अनुसंधान गतिविधियों के प्रचार एवं प्रसार हेतु निदेशालय द्वारा विभिन्न सेमिनारों, संगोष्ठियों, एवं किसान मेलों में प्रदर्शनी लगाई जिसमें से दसवां इण्डियन फिशरीज एण्ड एक्वाकल्चर फोरम एन.बी.एफ.जी.आर लखनऊ, 12वीं विज्ञान कांग्रेस एन.डी आर आई, करनाल, इन्टरनेशनल सिम्पोजियम हरिद्वार; किसान मेला पन्तनगर एवं कृषि विज्ञान मेला आइ वी आर आई बरेली मुख्य है।

प्रशिक्षण एवं कार्यशाला

निदेशालय द्वारा इस दौरान गोहाटी में **"रिसोर्सेज, कैप्टिव ब्रिडिंग, प्रोपागेशन, पॉलिसीज एण्ड इश्यूज"** पर दो दिवसीय कार्यशाला, राष्ट्रीय मात्स्यिकी विकास बोर्ड (NFDB) द्वारा प्रायोजित प्रशिक्षण कार्यक्रम "मैनेजमेंट प्रैक्टिसेज ऑफ **जोहरा** फिशरीज" बंगाल के कलिपोंग जिले में, अरूणांचल प्रदेश के राजीव गाँधी विश्वविद्यालय ईटानगर में "कल्चर एण्ड ब्रीडिंग ऑफ इम्पौरटैंट कोल्डवाटर फिश रिर्सासेज" तथा भीमताल में "प्रीवेंसन एण्ड कन्ट्रोल ऑफ डिजिज इन रेन्बो ट्राउट" पर आयोजित किया गया।

पुरस्कार

डॉ0 एम.एस. अख्तर, वैज्ञानिक को वर्ष 2013 को सर्वोत्तम भारत मात्स्यिकी वैज्ञानिक का डॉ0 एम.एस. स्वामीनाथन पुरस्कार प्रदान किया गया।

अन्तर्राष्ट्रीय प्रशिक्षण

निदेशालय के दो वैज्ञानिकों डॉ0 डी0 शर्मा, प्रधान वैज्ञानिक एवं डॉ0 आर.एस. पतियाल, वरिष्ठ वैज्ञानिक ने दि0 9–28 अक्टूबर, 2014 को चीन में चाइनीज अकादमी ऑफ फिशरीज साइंस संस्थान द्वारा "कोल्डवाटर अथवा कूल वाटर फिश एक्वाकल्चर" पर आयोजित कार्यशाला में भाग लिया।

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