DCFR News

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

Agrisearch with a human touch

Vol. 15 No. 1 January-June 2012

FROM DIRECTOR'S DESK

The strategic utilization of the resources through production oriented programs besides to carry forward location specific, realistic and viable fish farming techniques, breeding protocols, feed and standardized husbandry practices is need of the hour. The present contribution of coldwater fisheries in inland sector is 1.5% (unorganized data) and is expected to increase upto 6% by 2025.

In the Indian sub-continent brown trout (*Salmo trutta fario*) and rainbow trout (*Oncorhynchus mykiss*) were transplanted and development of hill fisheries thus started in the selected locations of the country. The production of rainbow trout in the country is assumed to be 500 t in comparison to 500,000 t worldwide. Trout farming practices are advanced in the state of J&K and Himachal Pradesh both in Govt. and private sector. However, there is an urgent need to develop marketing strategy for the trout growers for better return. There is also requirement for processing and packaging, so that, farmers should get remunerative price. Although trout farming in Uttarakhand, Sikkim and Arunachal Pradesh is in practice, yet efforts are on to enhance the production through extensive culture programes.

Besides coldwater streams and rivers harbours large nos. of indigenous snow trout species (*Scizothorax sp.*), extensive efforts on culture and breeding program of these species are being taken up.

In mid altitude region of the entire belt, carp culture system is very popular and integrated with crop and animals. For the benefit of farmers, water conservation program through poly lining is also introduced which gives a better production than the conventional tanks. In order to increase the productivity, species diversification program is needed and accordingly efforts are being taken to include the following species viz. *N. hexagonolepis*, *O belangari*, *Semiplotus semiplotus*, *Labeo dyocheilus*, *Labeo dero*. An improved strain of common was brought from Hungary and bred successfully which shows substantially better growth. The seeds are also distributed to different states and farmers.

The world famous priced sport fishes mahseer and brown trout provide immense scope for the development of eco-tourism in these states, which inturn will provide conservation and livelihood security. Probable sites in all the states were identified and efforts are to be taken for the establishment of eco-tourism platforms.

The coldwater sector is unique and is entirely different from the warm water sector. Considering the vast resources available, there is immense potential to draw economic benefit for the prosperity of the people residing in these states. As such further, this sector needs special attention for the development of infrastructure facilities also.

(Dr P.C. Mahanta)

NEH Activity

Visit of Dr. S. Ayyappan, Honorable Secretary DARE and Director General, ICAR, New Delhi to the Mahseer Hatchery established by DCFR, Bhimtal at Eco-camp, Nameri, Tezpur, Assam

Fish Health Management

For the surveillance of viral diseases in trout, a team of Scientists visited the Government and private fish farms of Himachal Pradesh and Uttarkhand. The samples were collected at random from farms as the fish stock was healthy. Eight pooled samples were collected from trout farms in Himachal Pradesh. The samples were processed for virus isolation and for the detection of specific viruses by RT-PCR or PCR assay. The samples were tested for the presence of infectious pancreatic necrosis virus (IPNV), infectious hematopoietic necrosis virus and viral hemorrhagic septicaemia virus from different tissue samples. All the samples from Himachal Pradesh tested negative to the said viruses by RT-PCR and cytopathic effect was not observed when the cells were infected with the processed tissue material.

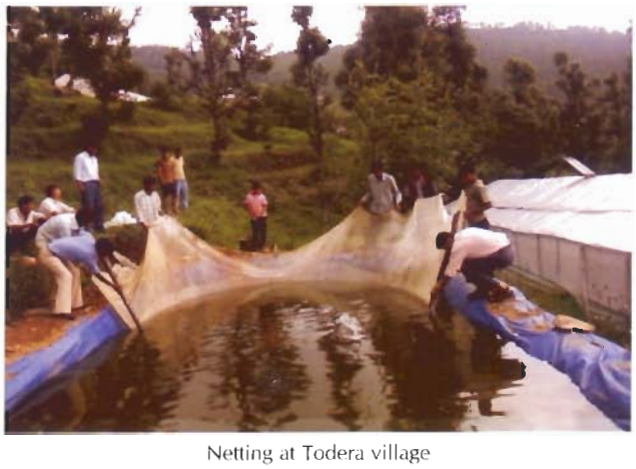
Sampling at Trout Farm Patlikhual

In Trout Farm of Chamoli District, a heavy mortality was observed in rainbow trout fry. To rule out the presence of viral infection they were sampled along with some table sized fish. From the 21 pooled samples one sample was found to be false positive for viral hemorrhagic septicaemia by RT-PCR. The nucleotide sequence of this PCR amplicon did not match the nucleotide sequence of VHSV which is good news. However, virus could not be isolated from any of the 21 samples. From Field Centre Champawat, twelve pooled samples were obtained in the month of May which tested negative to the said viruses by RT-PCR. Moreover, the results of the sampling done in the end of June are awaited.

Dead fry from trout farm near Chamoli (Left) and diseased fry right

Better fish production in polytanks under mid hills conditions

Farmers of the Doonagiri area have been adopted for field trial of polyculture of exotic carp in polytankd under All India Coordinated Research Project on Application of Plastic in Agriculture. The growth of the exotic carp; silver carp, grass carp and common carp is better in the polytanks rather than in earthen and cemented tanks. The average growth was observed as 600 gm for grass carp, 450 gm for common carp and 170 gm for silver carp in 12 months. This is due to the advantage of comparatively higher water temperature in the polytanks. Low temperature and the sharp diurnal fluctuation inside the earthen and cemented pond are the major factors of the slow growth of carps in cold climate of the hills. There is a smooth diurnal fluctuation of temperature inside the poly tanks, which favours the growth of the fish. The availability of the natural fish food organisms, plankton and periphyton is better in the polytanks due to the higher temperature.



Netting at Todera village

Broodstock rearing of minor carps, *L. dero* and *L. dyocheilus* in captive conditions

Fish of the both species having the age 2+ years and body weight as 150-350 g were collected using cast net from the Kosi river of Kumaon Himalayan region near Jim Corbett National Park (29°29.038¢ N and 79°08.777¢ E, Altitude 410 m asl) and reared for 12 months in the cemented tanks at Bhimtal. During brood care, fish were fed@ 3% of their body weight daily with conventional carp feed prepared by mixing Rice bran and MOC in the ratio of 1:1. Natural periphyton diet was also provided by placing bamboo splits and plastic sheet as substrate in pond water. Stock was observed weekly for the maturity, health and for secondary sexual characteristics. Gonadosomatic index (GSI) increased gradually from March to June and stock was ready to breed by end of June. Two weeks earlier maturity was observed than the previous year in case of *L. dyocheilus* due to the comparatively higher temperature.

L. dyocheilus

L. dero

Successful breeding of rainbow trout at State trout farm, Bairangna

Brooders of the age of 2+ years, weighing 200-250g were used for the breeding. On average 120-200eggs form the individual female were obtained. Onset of maturity was late in comparison to the brooder of 3+ years age. Breeding was started from 20th Jan., while it was from 2nd Jan. in the previous year and was continued upto 15th March. Late maturity and late breeding was due to the comparatively low temperature and younger brooders. A total of 1 lakh eyed ova have been produced.

Stripping of female rainbow trout

Consultancy work for the fisheries management and river ecology component under the cumulative survey of the Satluj basin

In connection with Institutional consultancy for cumulative survey of Satluj river basin, a team of the 3 Scientists visited the sampling sites for reconnaissance survey under the leadership of Himachal Forest Research Institute (HFRI), Shimla. The team visited the dam sites of 21 HEPs in operations and under construction including SJVN Limited, Kullu, Luhri project, Rampur HEP, Nogli Khad, Nathpa Jhakri HEP, Ganvi HEP, Sorang HEP, Japee Karchham Wangtoo project, Baspa HEP, Shyang HEP, Keshang HEP, NSL project Tidong, Jangi HEP, Kirang HEP, Chango Yongthang HEP, Sumra lari project, Samdo Kothang and Shongtong Karchham HEP etc. During the visit EIA and EMP for the fishery management component was discussed with the concern person of the respective project. Finally, 20 stations (Kol dam Gagos, Tattapani, Chaba, Parlok, Manglod, Nagli, Ganvi, Jhakri, Bhabanagar, Karchham, Baspa, Kesang, Tidong, Ropa, Khab, Leo, Changu, Samder, Morang and Shongthong) were decided for the coverage of whole river basin starting from Kol dam to Morang. A meeting was also held with the Director, HFRI at Shimla on 25th June for necessary instructions and discussion.

HEP Karchham Dam site

Development of microsatellite markers from a partial genomic library of mahseer (*Tor putitora*)

The golden mahseer, *Tor putitora* (Family: Cyprinidae) is the most commercially important cold water fish of the Himalayan region and under the Fish Genetic Stock (ICAR) Outreach programme we studied seven geographically isolated population of *Tor putitora* (Jia Bhoreli river at Bhalukpong, Arunachal Pradesh, Satluj river at Bhakara, Himachal Pradesh, Beas river at Jogindernagar, Himachal Pradesh, Kosi river at Ramnagar, Uttarakhand, Walwhan dam, Lonavla, Maharashtra, Chenab river at Anji, Jammu & Kashmir and Ravi river at Basoli, Jammu & Kashmir during April 2009 to January 2012) for morphological (Truss morphometric and length and weight) and molecular analysis (Mt-DNA- Cyto b and ATPase 6/8 gene) & microsatellite). Due to lack of microsatellite markers of this species we used 13 microsatellite loci previously through cross species amplification in *T. putitora* to study the genetic diversity of different populations. But those markers were not so informative. Hence, we developed some novel microsatellite markers of this species for the first time by constructing a partial genomic library. 348 individuals of *Tor putitora* were collected from six geographically isolated location of India. Total genomic

DNA was isolated from fin tissue samples using proteinase k and phenol chloroform method (Sambrook *et al.* 1989). Genomic DNA was digested with MboI (Fermentas), separated on a 1.2% agarose gel and fragment of 300 to 600 bp were excised and purified with Nuclospin-Extract-Kit (Macherey- Nagal). The purified fragments was ligated into BamHI digested and CIAP treated pUC19 vector (Fermentas), transformed into *E.coli* DH5á competent cell and grown on LB (Luria-Bertani) agar plates containing ampicillin, X-Gal and IPTG for selection of recombinant clones. Around one thousand positive clones were obtained which were confirmed through R.E. digestion. These clones were preliminary screened for microsatellite motifs using colony hybridization [oligonucleotide probes $(GT)_{30}$, $(AC)_{30}$, $(TA)_{30}$ and $(CT)_{30}$ were used for screening] and colony PCR (using universal M13 F and R primers and one of the repeat containing probe). 30 positive clones were identified and plasmid DNA was isolated from these selected clones using Nuclospin-Plasmid-Kit (Macherey-Nagal). All isolated plasmids were sequenced in both direction using Big dye terminator 3.1(ABI) in automated genetic analyzer (ABI 3130). The sequences were annotated after trimming vector sequences. Forward and reverse sequences were aligned using CLC genomics work Bench (version 5.1). Out of 30 sequences, 20 contain repeat motif of di-nucleotides. 22 primer pairs were designed from 20 sequences using CLC genomics work Bench (version 5.1) and Primer 3 Plus software. The sequences along with primers were submitted to NCBI GenBank (Acc nos. JX270775-JX270794). Validation of these primers is in progress.

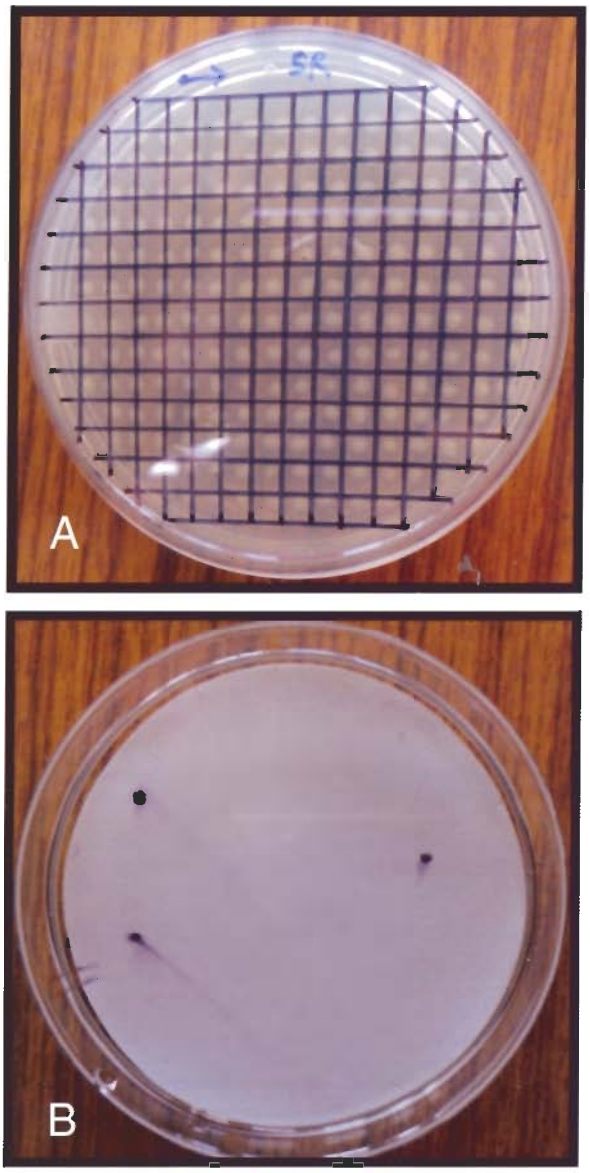
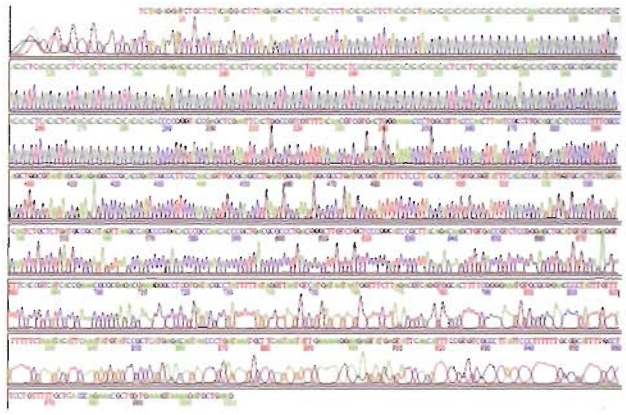


Figure 2: (A) Grid plate with white recombinant clones. **Figure (B)** shows the blue insoluble precipitate which confirms microsatellite containing clones after colony hybridization.



Sequence containing CA repeats of clone TP-19

Performance of chocolate mahseer *(Neolissochilus hexagonolepis)* in pond aquaculture of Kumaun Himalaya: Project (Code: AQ -- 03)]

The rearing of chocolate mahseer is being carried out in the hatchery complex of DCFR, Bhimtal to evaluate the growth performance of chocolate mahseer in the pond environment. Growth performance of chocolate mahseer under poly-culture system shows that they were highly correlated ($r^2 = 0.80$) with the growth of golden mahseer. The physico-chemical parameters and biological factors of the experimental ponds were maintained adequate for good growth of the fishes. Analysis of length weight relationship of monoculture and polyculture shows that the non–linear model was comparatively better to its corresponding linearized model. Length-weight relationship, condition factor and relative condition factor of chocolate mahseer shows

polyculture of chocolate mahseer and adult Mahseer

that this fish was found in good condition in terms of general well being to its new culture environment. Fry of chocolate mahseer are carni-omnivore, while the advanced fingerling and yearling are herbi-omnivore. Presence of sand and mud in the gut shows that fish is column to bottom dweller. The results of the present investigation revealed that chocolate mahseer at the temperature ranging from 19 – 23 °C gained maximum growth compared to the other months in both the culture systems. Chocolate mahseer doesn't show any competition while culturing with golden mahseer and common carp. Their growth performance results also indicate that both the species under culture were highly correlated with each other.

[Project (Code: AQ – 10)]: Evaluation of seed rearing techniques of common carp and golden mahseer for stock enhancement in semi-temperate Himalayan lakes using floating cages.

Stock enhancement in open water bodies is of important concern to increase fish productivity in these water bodies. However, protocols for *in situ* seed rearing upto advanced fingerling stage for stocking in coldwater lakes and reservoirs are not in place. To optimize the *in situ* rearing density of golden mahseer upto advanced fingerling stage for stock enhancement, fry of golden mahseer has been stocked in four stocking densities viz. 60 nos/m^3, 70 nos/m^3, 80 nos/m^3 and 90 nos/m^3. Periodic monitoring of growth and water quality parameters were done.

Monitoring water quality parameters

Water quality parameters are the important indicators of the health status of the rearing water body. Parameters like temperature, alkalinity, free CO2, pH, TDS, phosphate, nitrate, ammonia, sulphate, dissolved

Sampling for estimating water quality parameters

oxygen, nitrite, pH, alkalinity are critical for the growth and survival of fish. Hence, regular periodic monitoring of these water quality parameters was done. For the analysis of these parameters, standard methods (APHA, 1998) were adopted. The values of these water quality parameters during the rearing period are given in the table 2.

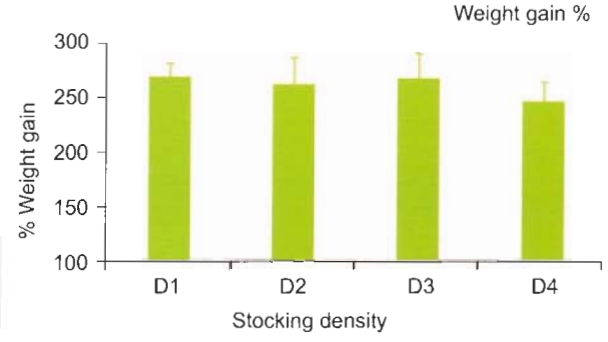
Table 2: Water quality parameters of the cages of different stocking densities.

Parameters	D1	D2	D3	D4
Temperature (°C)	6.8–11.7	6.7–11.7	6.8–11.7	6.8–11.7
pH	8.0–8.6	8.2–8.9	8.4–8.8	8.4–8.7
DO (mg/L)	5.6–8.2	5.2-8.4	5.4-8.6	5.6-8.4
Free C02 (mg/L)	0–10	0–8	0–10	0–8
TDS (mg/L)	95.9–96.6	97.0–7.5	96.4–97.1	95.0–97.2
Nitrate (mg/L)	3.0–5.0	3.1–5.0	2.6–5.0	2.7–5.0
Ammonia (mg/L)	0–0.02	0–0.02	0–0.07	0–0.07
Phosphate(mg/L)	0.3–1.0	0.07–1.0	0.18–1.0	0.3–1.0
Sulphate(mg/L)	14–16	15–16.6	14–15	12–15
Total hardness(mg/L)	90–120	88–116	86–116	89–110
Total alkalinity(mg/L)	91–94	88–90	86–91	84–90

Sampling for growth performance

Periodic monitoring of growth has been continuing. Upto May, 2012 the weight gain% in all the density

groups viz. 60nos/m^3, 70nos/m^3, 80nos/m^3 and 90nos/m^3, were 266.12±14.45, 260.65±25.08, 265.12±24.1 and 244.26±18.92 % respectively (See graph).



The growth performance shows that there is no significant (p>0.05) difference in weight gain% in all the stocking density groups.

Nutrient profiling and evaluation of fish as a dietary component (Project code: NP3)

Nutrient profiling in terms of proximate composition (Crude fat, crude protein, moisture, ash), fatty acid,

amino acid and minerals composition of selected five edible fish *(Tor putitora, Neolissocheilus hexagonolepis, Schizothorax richardsonii, Oncorhynchus mykiss, Cyprinus carpio)* species and estimating variations in nutrient composition of different species raised from different habitats, culture systems and level of management practices were carried out.

The moisture, crude protein (CP), crude fat and ash content were 74.00-79.24 gm/100gm, 15-19.44 gm/100gm, 0.5-5.18 and 1-1.37%, respectively.

Protein had a well-balanced amino acid composition, with high amounts of proline (96.37 mg/g CP), aspartic acid (85.23 mg/g CP), tyrosine (83.84 mg/g CP), glycine (69.87 mg/g CP), serine (66.63 mg/g CP), arginine (65.26 mg/g CP), isoleucine (64.56 mg/g CP) and tryptophan (61.63 mg/g CP). The highest amino acid score was observed for tryptophan (560) followed by isoleucine (230).

Total monounsaturated fatty acids were the highest (35.88%) followed by saturated fatty acids (34.51%) and polyunsaturated fatty acids (PUFA) (31.39%). Oleic acid (C18: 1) was dominant, followed by palmitic acid (C16:0), linoleic acid (C18: 2n-6), palmitoleic acid (16:1n-7), stearic acid (C18:0), DHA (C22: 6n-3), linolenic acid (C18: 3n-3), myristic acid (C14:0) and EPA (C20: 5 n-3). The ratio of n-3/n-6 PUFA was 0.77. Among the minerals analyzed, Ca, Na, Fe, Zn, Se and Mn highest followed by K.

Sample Analysis in Env. Fish Biol. & Nutrient Profiling Lab, DCFR

Clinico epidemiological survey in three different states viz. Assam (Dung Dang, Kalang Paur, Mali Bagan, Bogi Bari, Borbila villages), Arunachal Pradesh (Rama Camp, Dirang Basti, Shergaon, Yewang, Dhum, Dirang) and Meghalaya (Maw-Punkshaid, Pyllum, Nongsder, Umroi) during June –July 2011. Surveyed More than Thousand rural populations in each states and data were recorded and analyzed statistically.

Review workshop of the Outreach Project

Clinico epidemiological survey in NEH region

Ocular infection in rainbow trout

Brood stock of 3+ year old *Oncorhynchus mykiss* reared in raceways at Champawat farm developed white opacity of eye lens. Total about 20-25% trout population found infected. At initial stages of disease, feed intake was normal and fishes remained in good condition. In advance stages of eye infection which took about 2-3 months, liquefaction of cortical region was observed. Degeneration of lens with complete blindness of both the eyes in about 65% infected population reported with mortality rate of 30-40% in severely infected fishes. Although, few diseased trout showed healing of eyes however, complete blindness with minute eye lens of one or both eyes recorded. However, in extreme cases, loss of whole eye ball along with other substances with a hemorrhagic hole like appearance noticed. Transmission and infectivity declined with reduction of temperature in winter months and severely both eye infected female trout showed poorly developed ovary during breeding season. Majority of one+ year old trout juveniles (weight 97-109.5g/size 205-225mm) found free of this infection. Detailed etiological, hematological, histopathological, gonadosomatic and hepatosomatic studies along with devising control measures on this economically important disease is under progress

Eye lens opaqueness

Different stages of eye infection

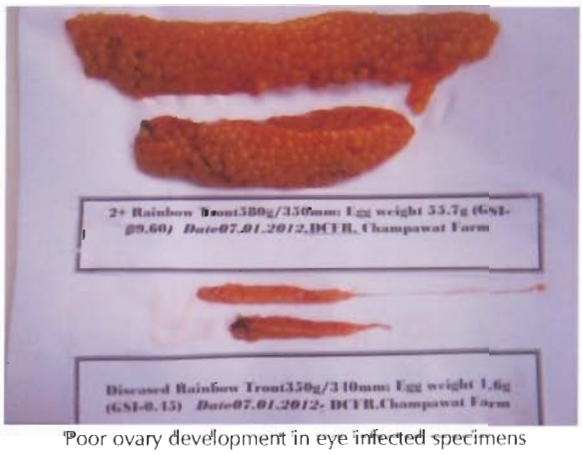
Different stages of eye infection

Trout brooders with eye lenses opaqueness

Terminal stage of eye infection

Healed infected eye with complete blindness

Died trout specimens showing complete Loss of eye ball



Poor ovary development in eye infected specimens

Unstrapped trout brooders kills in raceways at Champawat farm

Stray incidence of healthy trout kills in raceways recorded from last week of February 2012 and still continuing till June. Died specimens showed swelling of body cavity and genital opening. Examination of died trout specimens showed dead and putrefied decomposed eggs in the abdominal cavity. GSI in these females recorded from 2.38-19.18% and development of new ovary also found with weight of 3.48-3.64 g. Slower absorption of matured eggs, presence of putrefied eggs in body cavity for a longer duration is probably resulting to infection in internal organs leading to mortality of fish. Detailed study to identify the predisposing factor is underway for such trout loss in raceways.

Swollen trout abdomen

Swelling of genital opening

Putrefied eggs in body cavity

Investigation of ornamental fish resources in coldwater region of India

Survey was carried out by team of DCFR Champawat to investigate the occurrence of coldwater ornamental fish resources in different river system of Uttrakhand. Seven stretches of river namely Saryu, Koshi, Gaggas and Ramganga were selected for sampling purpose during 25th to 27th may 2012. Air temperature and flow rate of the stream were measured at the sampling sites. Different parameters viz. physical integrity of the streams, habitat, species richness, fish diversity, water quality and biological parameters were examined. For collection of fishes, cast net of mesh size 0.5 cm employed at different habitats of the stream. Two Glyptothorax specimen were found on the bank of river Saryu. Other fishes collected were *Barilius bendelensis, Garra gotyla gotyla., Tor putitora*, and *Schizithorax richardsonii*. At the stercth of river Koshi near Hawalbagh we could observed only *Barilius* sps. In the Gaggas river, flow rate was 10 meter/min, water was very clear and width of the stream was 2-5 meters. Rich algal growth was noticed on the sides of the river. In the catch, *Barilius bendelensis* was dominant. At Chhonani stretch of Ramganga, we collected different maturing stages of *Garra* sps, and two sps of *Barilius*. Another stretch of Ramganga near Masi was surveyed, where we found *Garra*, *Barilius*, *Crrosocheilus* sps, *Puntius* sps. and Nemachielus sps. We also observed a large number of spawn of *Barilus* sps lying on the river bank where flow of water was negligible. Water was very clear, transparent and sides of the bank were full of algal mat.

North eastern region of India is considered as the Hotspot for the biodiversity of ornamental fishes. Keeping this view, a survey was undertaken in the month of march 2012, near the streams of Dimapur, Nagaland and collected *Colisa fasciatus, Colisa lalia, Chela sps, Danio aequipinnatus, Danio rerio, Nemàcheilus sps. Puntius sps., Garra sps Badis badis sps.* and *Glossogobius sps.* Water quality parameters, length and weight of the specimen were recorded. Some specimens were preserved in the absolute alcohol and brought to the laboratory of DCFR Champawat for further study.

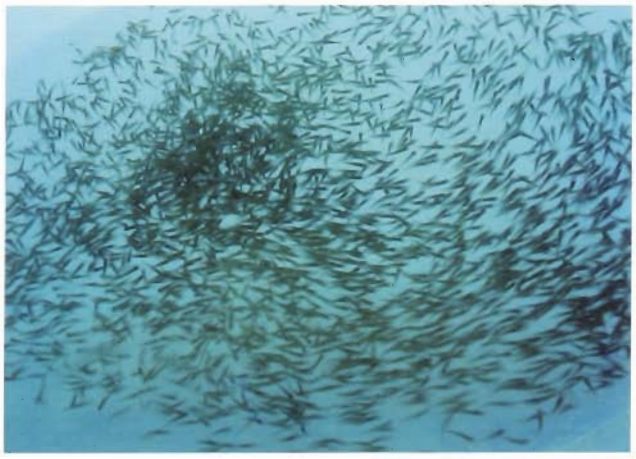
Exploration of ornamental fishes at river Saryu

Scientist recording length and weight of fishes at survrey site of river Koshi

Dissection of fishes was carried out to observed the Gonadal development at survey site of Gaggas river

Seed production of golden mahseer

The DCFR, Bhimtal has done tremendous achievements in seed production of golden mahseer during this year. One Lakh advance fry of golden mahseer was produced in the hatchery complex. 50,000 nos. was sold to Fisheries Federation, Bhopal; 10,000 nos. sold to College of Fisheries, Pantnagar, 5000 nos. was sold to lake authority of Deoria Taal. Apart from earning revenue from the hatchery, the seed produced in the hatchery were ranched in the different water bodies of Kumaun and Northeastern region for conservation and rehabilitation. The seed produced also used for conducting experiment in the DCFR, Cage unit.



Fry of mahseer

Packaging of mahseer seed

Technical lecture by Dr. Sarma, PS on seed production of mahseer

DCFR Project on " Sustainable Utilization of Mountain Fishery Resources-a Partnership Mode

ARUNACHAL PRADESH

Department of Zoology, RGU, Itanagar

a. Exploration of commercial and food fishes from Arunachal Pradesh

Several field trips were undertaken in rivers and lakes of East Siang, and west siang districts of Arunachal Pradesh .Major river of these two districts is almighty Siang. In addition to river Siang, random sampling were performed in numbers of big tributaries, certain small streams and several perennial water bodies along with the record of local fish landing (landing sites mainly Pasighat ana Along) in the markets of each of the districts respectively. Table 1 represents the most preferred food fishes from those water bodies.

b. Basic biological studies on *Semiplotus semiplotus* : Reproductive Biology

For the purpose, reared fishes in the cemented cisterns as wellas freshly collected river samples were

used. As per requirement of the study, fishes were sacrificed as and when required. Among the biological feature *in-situ* breeding biology was given due importance for tracing out reproductive strategy of the fish in general. Knowledge acquired from the study will be immense value in developing captive breeding of the fish for seed production and artificial propagation. So, investigations and achievements were made on the following reproductive aspects related to breeding biology in particular.

Department of Fisheries, Govt. of Arunachal Pradesh

Modification of trout hatchery at Shergaon and Nuranang has been done

- Breeding and rearing of Brown Trout has been carried out during November- January 2008-12 successfully. 10,00,000 seeds were produced in the farm. Hatchery produced seeds were reared in the farm and also ranched in the high altitudinal lakes and rivers of Arunachal Pradesh
- 10,000 nos. of rainbow trout eyed ova were transported from J&K to Arunachal Pradesh and reared at Shergaon trout farm. The survival percentage of hatching and rearing was quite good under the agro climatic conditions of the farm.
- Breeding and rearing activities of chocolate mahseer was carried out in 2008 at mahseer hatchery at Iduli fish farm, Rowing, Arunachal Pradesh.
- The studies on commercial important species of lakes and rivers of Arunachal Pradesh were carried out by the Department of Zoology, Arunachal Pradesh.
- The project on establishment of golden mahseer hatchery has been successfully completed at Eco-camp, Nameri National Park, Tezpur. Installation of mahseer hatchery has been done and the fingerlings of golden mahseer were stocked in the brood stock pond of the hatchery complex.

Activities at Shergaon Trout farm, Arunachal Pradesh by Dr.D. Sarma, Principal Scientist

SIKKIM

ICAR Research Complex for NEH region, Tadong, Sikkim and Department of Fisheries, Sikkim

Very few persons engaged in fishing and most of them are doing it as a recreational activity. The Body weight and percent availability of catch fish species at the site and period of sample collection is depicted in. The frequency of fish species found in the river during sample collection by gill net fishing in the river tributaries was mostly *Neolisocheilus hexagonolepsis, Schizophorax progastus, S. richardsonii, Garra gotyla, Gara annandalei* and balilius sp.

Samples was collected from varying altitude during summer, monsoon and winter months in the month of April, June, July, August November, January and February .More than 100 number of water samples were collected during the reporting period from various streams and small rivers namely Teesta and Rangeet tributaries, natural lakes, samples from private ponds and tanks as well as government fish farm.

The sampling site during reporting period are of varying altitude, streams and rivers ranged from 702 to 11398 ft asl and natural lakes 1144 to 14000 ft asl. The govt. fish farm and hatchery are situated at the altitude between 726 to 8537 ft asl.. Water samples from Fish ponds and tanks available with farmers located mostly at higher altitude from 3000 to 8619 in North district was collected.

Constraints

Scheduled programs on sample collections are difficult to follow up due to unpredicted weather conditions, land sliding and poor accessibility at the sampling site.

- Successfully trout breeding and rearing has been carried out in Uttaray and Yoksum Trout Farms of Sikkim.

Trout farm of Sikkim

UTTARAKHAND

Department of Fisheries, Govt. of Uttarakhand

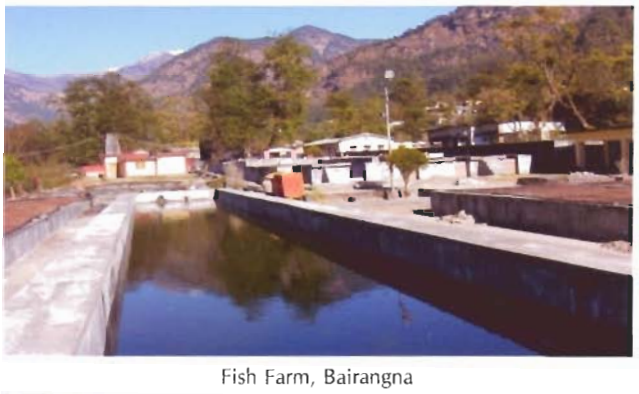
Rainbow trout breeding at State fish farm, Bairangna

- During the period produced 2,20,000 eyed ova & 1, 50,000 fry with 84% fertilization, 86% hatching. (Incubation period 61 days) at water temperature 4-11°C
- Successful breeding of Rainbow trout/ brown trout and produced 2,40,000 eyed ova and 1,70,000 fry with 94% fertilization, 96% hatching
- More production of eggs was achieved with good brood stock management and feeding
- Breeding performance was better due to high rainfall, better ova house practices and appropriate feeding
- Good health of the brooder resulted as high fertilization rate, big ova size (4-4.2mm) and healthy hatchlings

HNB Garhwal University, Sri Nagar

1. The sampling locations were selected on the basis of altitudinal variation and source of the river/stream. The fish samples were collected from the local fishermen at sampling site.
2. Preservation and identification of collected fish samples have been performed.
3. Taxonomic richness and compositions of fish species were observed at various stations in the rivers/streams of Garhwal and Kumaon region of Uttarakhand.
4. Total 3 fish species were collected during the daily sampling in the first week of each month during 2012. During sampling *Schizothorax plagiostomus* was abundant (> 65%) in the collection except February 10 and followed by *S. richardsonii*. *Glyptothorax* spp. was observed only in December.

Length-weight analysis has been performed for the following fish species; *Schizothorax plagiostomus*, *S. richardsonii, Barilius bendelisis and Barilius vagra*.



Fish Farm, Bairangna

Trout raceways

Ova house

HIMACHAL PRADESH

Department Of Fisheries, Cskhp Agri. Uni., Palampur, H.P.

1. An extensive survey of River Ravi and Beas has been conducted for detail study to collect the fish fauna in relation to existing pysico-chemical

condition and to explore commercially important fish species. As such six sites were selected on different tributaries of River Ravi based on fishery information and altitude viz. 2 sites (Near Village Chandoli & Chaned village) on Chaned Nala, 8 sites (Chaminu Bridge and Saroh) on Sal, Bhakhani Nala at Rakh, Odra near Sultanpur, Dunali nala near Dunali village and Gahra nala near Gahra village. Seven sites were selected on River Beas which are located on different tributaries starting from Pandoh to down stream near Nagrota Siriyan viz. Kamand on Uhl, Mandi near confluence of Suketi with Beas, Tribeni and Chobu on Binwa, Naun Thural, Tripal on Baner, Kotla on Dehar . As per fishery information of River Ravi only 10 to 12 fish species were collected by fisherman. Further from river Beas about 30 fish species were recorded from different tributaries. Five sites were selected on River Satluj such as Spiti, which joins satluj at Khab, Nogli Khud that originate from Rohru Hill and join the main river near Nogli bridge, Rampur and main fisheries of this khud is Snow trout. The next is Sainj khud near Sainj, Machyada Khud and Bhadras. But due to heavy rain no fish was caught.

2. Runoff water harvesting technology for coldwater aquaculture in the hills: The water harvesting model for demonstration to the farmers at Fish Far, CSKHPKV is under construction and excavation of a check dam has been completed for collection of rain water. One nursery pond of 15x3x1.5 meter has been constructed to rear the new commercially important fish species. In this regard some suitable fish species has been identified and collected to study the biology.

   An extensive survey of district Hamirpur has been conducted and two areas has been selected for water harvesting located at Gwardu village near Toni Devi. The water analysis pertaining to the selected sites was done viz. pH 8.63 and 8.52, Dissolved oxygen 7.4 and 7.6mg/l. The water temperature during the first week of March was recorded 15.8^{0}C, which is found suitable for aquaculture. Another survey of district Chamba was conducted during month of March and one site selected near Sihunta where the water from natural water channels can be diverted and stored for aquaculture.

JAMMU & KASHMIR

The work related to the Exploratory Survey of Fish biodiversity in Jammu and Kashmir with special reference to commercially important species was carried during 2010 at Gurez Valley (sites G1 – G4), during 2011 at Jammu (sites J1 – J14) and Kashmir provinces (sites K1 – K24).

A: The Physico-chemical parameters of waters were determined as under:

Parameter	Equipment/Method used
Ambient Temperature	Celsius thermometer
Sp. Conductivity	Digital conductivity meter
pH	Digital pH meter
Chlorides	Titrimetric with AgNO3 (Mackereth *et al.*, 1978)
Carbon dioxide	Titrimetric with NaOH (Mackereth *et al.*, 1978)
Dissolved oxygen	Winkler modified method (APHA, 1998)
Alkalinity	Titremetric with H_2SO_4 (Mackereth *et al.*, 1978)
Hardness	Titremetric with EDTA (Mackereth *et al.*, 1978)
NO_3- N	Salicylate method (Mackereth *et al.*, 1978)
Phosphate (T.P.P.)	Stannous Chloride method (APHA, 1998)

B: FISHES

Fishes from river Jhelum were collected by using caste net and the catch was recorded as gm/hr, while as in the fast flowing streams of Kashmir and Gurez fishing was done by Electro Fisher and the catch was recorded as gm/half an hour. In Jammu region fishes were collected by the help of cast net and the catch was recorded as gm/hour.

Workshop on "Sustainable Utilization of Mountain Fishery Resources of NEH Region" during 24-25 March 2012 at IIBM, Guwahati

Directorate of Coldwater Fisheries Research, Bhimtal organized a national workshop on "**Sustainable Utilization of Mountain Fishery Resources of North East Region**" during 24 – 25 March, 2012 at IIBM, Guwahati. Over 150 eminent scientists, academicians, students, govt. officials, KVKs, farmers, entrepreneurs and other stakeholders from Northeastern region and other parts of India participated in the workshop and deliberated in a common platform.

Sri Basanta Das, Hon'ble Minister of Fishery and Public Relations, Govt. of Assam inaugurated the workshop. Dr. K. M. Bujarbruah, Vice Chancellor, AAU, Jorhat, Assam; Mr. A. K. Roy, IAS, Secretary to Govt. of Assam, Department of Fisheries; Dr. S. V. Ngchan, Director, ICAR Research Complex for NEH Region, Barapani, Shillong, Meghalaya graced the inaugural function. During the deliberations, the minister as well as other eminent dignitaries urged DCFR to act as a Centre of Excellence for the development of coldwater fisheries sector in the entire region.

The workshop was organised in order to give emphasis for the sustainable development of coldwater fisheries sector in Northeastern region and aimed to address the specific issues on resource assessment, upland aquaculture, human resource development & livelihood security, fish based eco-tourism, fish nutrition, disease and biotechnology and other relevant aspects and also in fulfilling the same informed Dr. P.C. Mahanta, Director.

Dr. Debajit Sarma, Principal Scientist and Organizer of the workshop presented the theme presentation and emphasized the scope and potential of coldwater fiat culture in NEH region.

The progressive farmers and NGOs from different North Eastern states *viz.* Nagaland, Sikkim, Assam, Arunachal Pradesh and Meghalaya were felicitated on the occasion for their significant achievements in fish production. The Institute also organised an 'Exhibition cum Aquarium Show' where products, publications and technologies were showcased.

Inaugural speech by Hon'ble Minister of Fisheries, Govt. of Assam Shri Basanta Das ji

Key note address by Dr. P.C.Mahanta Director, DCFR

Release of Souvenir by the Dignitaries

Dignitaries in the dias

Honour to the progressive farmer of Nagaland

Honour to the progressive farmer of Manipur

Delegates present in the workshop

Delegates present in the workshop

Training programme on "Surveillance of Diseases in Coldwater Aquaculture" at Sikkim

A training programme on "Surveillance of Diseases in Coldwater Aquaculture" was conducted at ICAR Research Complex for NEH region, Regional Centre, Tadong, Gangtok, Sikkim from 14th-18th Feb., 2012. The training programme was funded by National Fisheries Development Board Hyderabad. The programme was inaugurated by Dr Tika Lucksom, Director, Department of Animal Husbandry & Veterinary Services, Govt. of Sikkim in the presence of Dr J.G. Varshney, Joint Director, and ICAR Research Complex for NEH region, Regional

Centre, Sikkim and Mr D. K. Pradhan, Director Department of Fisheries, Government of Sikkim who were the guests of honour. The objective of the training was to enable the participants in recording and reporting the diseases in coldwater sector. A total of 17 fisheries officers and a subject matter specialist from KVK East Sikkim, participated in the programme. For the first time in coldwater fishery sector, an attempt was made to bridge the gap between the Scientists and the field workers so that they too are aware of the fish diseases, their preventive and control measures. A practical demonstration for the collection of samples from diseased fish was also held to familiarize the participants.

Illustrative talks were delivered by Dr Amit Pande, Dr N.N. Pandey and Dr D. Thakuria. Possible threat of diseases caused by various infectious agents like viruses, bacteria, fungi and parasites were discussed along with their ways of prevention. Besides this, due importance was also given to non-infectious diseases. Biosecurity issues were discussed in detail for which Dr A. Sen, Pr. Scientist & Head Animal Health Division, ICAR Research Complex for NEH Region Barapani was the invited speaker.

Inaugural Function and demonstration of sampling procedures

Training progarmme on "Practical orientation on intensive grow out practices for Golden and Chocolate mahseer"

A training programme on "Practical orientation on intensive grow out practices for Golden and Chocolate mahseer" was organized by Directorate of cold water fisheries (DCFR), Bhimtal at NRC, Mithun, Nagaland from 27th February to 2nd March 2012 for the State Govt. officials of north east region of India. The programme was attended by the participants (State fisheries officers, Farmers, Students and Media persons) from Nagaland, Sikkim and Arunachal Pradesh. The objective of the programme was to develop trained manpower to carry out activities in respect to breeding and culture of Golden and Chocolate mahseer the hill states of north east India.

In the Inauguiral address, Dr. Debajit Sarma, Principal scientist and Course director DCFR, Bhimtal welcome all the guests and participants. Dr. Sarma highlighted the importance of the training programme as Chocalate mahseer has good prospects for culture potential in the Nagaland region. Choacalate mahseers, (*Neolissochilus hexagonolepis*) declared as the "state fish" of the Nagaland and its propagation through scientific aquaculture practices would enable to elevate the livelihood and nutritional security of the poor farmers. Dr. Chandan Rashkhowa, Director, NRC Mithun informed that overall coldwater aquaculture is unexpanded in the state. Rivers, dams and reservoir having great prospects for fisheries development, which needs to be explored. Director of fisheries, Govt. of Nagaland graced the occasion as the chief guest of the function. He emphasized upon the commercial importance of the mahseer both as food fish and game fish. Since mahseer has good consumer preference and longer shelf life, so could be candidate species for aquaculture in the Nagaland.

Dr. Debajit Sarma delivered a presentation on salient achievement of DCFR and ongoing research activities of the Institute including field center Champawat. He also delivered a lecture on " Breeding and Rearing of Golden and chocolate Mahseer, for hill region".

Dr. S.K. Gupta, scientist, DCFR Champawat delivered a lecture on role of nutrition and feeding strategies in mahseer culture.

A field visit to state fish farm at Kohima was organized on 28th Feb, where participants were given hands on practical demonstration about the pond preparation method as well as importance of water quality management for aquaculture. Incidence of disease outbreak in coldwater fisheries sector is major constraints. To avoid the mass mortality at the crucial time is very important to save the stock. In this context, Dr. S. K. Mallik drew attention about important bacterial and parasitic diseases commonly encountered in the coldwater aquaculture sector in India and their remedial measure to prevent the attack of diseases.

A lecture on ecotourism and sport fisheries development through endogenous tourism in PPP Mode was delivered by the Dr. Atul Borgohain, Professor, Assam Veterinary College Khanaparra.

Valedictory function was held on 2nd March 2012, in which participants expressed their satisfaction and gave feedback on the training programme in the presence of Director NRC, Mithun, Deputy Director (Govt. of Nagaland), Scientist and staff of the institute. At the conclusion of the programme vote of thanks was proposed by Dr. Sumant kumar mallick, scientist from DCFR, Bhimtal.

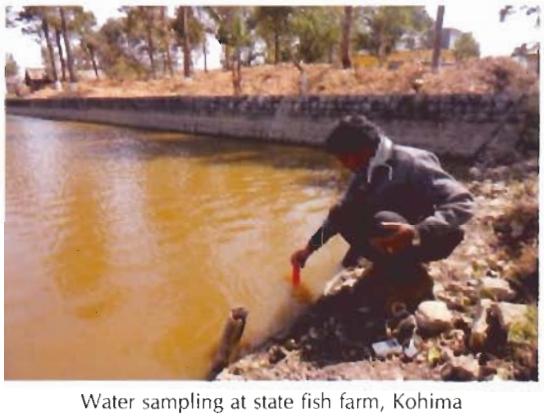
TRAINING PHOTOGRAPHS

Inauguration of training programme

Digniearies on the dias

Key Note Address by Dr. D. Sarma, Principal Scientist and Course Director

Field visit to state fish farm, Kohima



Water sampling at state fish farm, Kohima

Certificate distribution by Director, NRC, Mithun

Vote of thank proposed by S.K. Mallik

Trainees along with the scientists and resource persons

MEETING/CONFERENCES/WORKSHOP ETC.

Flag hosting on republic day by the director

Visit of Fisheries students

DCFR Institute Management Committee Meeting

Research Advisory Committee Meeting

Dignetarious visit to DCFR

Lecture given by Dr. A. Barat, Ps

Silver Jubilee Lecture given by Dr. Brij Gopal & Falicitation

DCFR Celebrates World Environtment Day

Engagements

- Dr Amit Pande participated in the National Consultation on "Development of Surveillance programme for Aquatic Animal Diseases" held at NBFGR Lucknow from 17th-18th April 2012.
- Dr Amit Pande participated in the National Wokshop on "Fish Cell Line: Development and Storage" held at NBFGR Lucknow on 19th April 2012.
- Dr Amit Pande presented a Radio talk on "Sheet jal machliyon ke rog aiwam niwanran" at AIII India Radio, Almora on 23rd May 2012.
- Dr D. Thakuria and Dr Anasnda Kumar B.S. relieved on study leave for pursuing PhD at Indian Veterinary Research Institute, Izatnagar.

Seminars/training attended

- Mr. M.S. Akhtar attended the national workshop on "Sustainable Utilization of Mountain Fishery Resources of North East Region" held at Khanapara, Guwahati during 24 – 25th March, 2012, organized by DCFR, Bhimtal.
- Mr. M.S. Akhtar delivered **the theme presentation on 'Fish Nutrition'** in the national workshop on "Sustainable Utilization of Mountain Fishery Resources of North East Region" held at Khanapara, Guwahati during 24 – 25th March, 2012, organized by DCFR, Bhimtal.

Extension activities

Farm advisory services were given to 20 farmers for carp culture and 3 farmers for trout culture of District-Champawat, Chamoli and Pithoragrah by S.K.Gupta in month of March 2012.

Best management practices (BMP) for polyculture of exotic carps in hills was discussed by S.K.Gupta with farmers of Kumaon region during the Farmer scientist interface meet organized by Krishi Vigyan Kendra, Lohaghat on 28th may 2012.

Demonstration of growth of champa-1 & Champa-2 was arranged at farmer's pond during Field day at Village-Toli , Patti block Champawat on 5th March 2012 by S.K. Srivastava and S.K.Gupta.

Frontline demonstration was organized at farmer's pond of Raghubar datt Morari, Village- Bheti, Karnaarayat, Champawat village on 16th June 2012 by S.K. Srivastava and S.K.Gupta for culture practices of improved strain of Champa-1 and Champa-2.

Technique of polyculture of exotic carps in hills was discussed with farmers during the participatory technology development programme organized by Paryavaran sanrakshan samitee Pati, Champawat on 10th January 2012 by S.K. Srivastava and S.K.Gupta

Training progarmme

Conducted and organized the NFDB sponsored training programme on "Practical orientation on intensive grow out practices for golden and chocolate mahseer" at NRC, Nagaland during 27th Feb to 2nd march 2012

PUBLICATIONS

1. Akhtar, M.S., Pal, A.K., Sahu, N.P., Ciji, A. and Meena, D.K. 2012. Effects of dietary pyridoxine on growth and physiological responses of Labeo rohita fingerlings reared in high water temperature. *Israeli Journal of Aquaculture-Bamidgeh*. Vol. 64.777-783.
2. Akhtar, M.S., Pal, A.K., Sahu, N.P., Ciji, A. and Gupta, S.K. 2012. Effects of dietary pyridoxine on growth and physiological responses of *Labeo rohita* fingerlings reared exposed to endosulfan. *Pesticide Biochemistry and Physiology*. Vol. 103. 23-30.
3. Meena, D.K., Meena, K., Das, P., Prusty, A.K. and **Akhtar, M.S.** (2012). Probiotics: Present status and future prospects in aquaculture. *Fishing chimes,* Vol. 32(1): 135-138.
4. **S. K. Gupta**, A. K. Pal, N. P. Sahu, N. Saharan, S. C. Mandal, Chandraprakash, M. S. Akhtar and A. K. Prusty (2012). Dietary microbial levan ameliorates stress and augment immunity in *Cyprinus carpio* fry (Linnaeus, 1758) exposed to sublethal toxicity of fipronil. (Accepted) *Aqculture Research*

Book chapter

- **Akhtar, M.S** and Sarma, D. 2012. Role of nutrition in aquaculture, *In:* Mahanta, P. C., Sarma, D., Ali, S., Dandadhar Sarma and Akhtar, M. S. (Eds.), Souvenir – workshop on sustainable utilization mountain fishery resources in North East region, Organized by DCFR, Bhimtal in Guwahati during 24-25th March, 2012. Pp: 74-79.

अनुसंधान उपलब्धियाँ

मत्स्य स्वास्थ्य प्रबन्धन

हिमाचल प्रदेश और उत्तराखण्ड के प्राइवेट और सरकारी ट्राउट फार्मों में वायरस की पहचान करने के लिए निदेशालय के वैज्ञानिकों के एक दल ने सर्वेक्षण किया और अलग–अलग फार्मों से ट्रउट सैम्पलों को एकत्र किया। हि0प्र0 के ट्रउट फार्मों से आठ नमूने लिए गए और विशिष्ट वायरस RT-PCR अथवा PCR ASSAY की पहचान करने के लिए तथा उनको अलग करने की प्रक्रिया अपनाई गई। नमूनों के विभिन्न पेशीय उतकों कें वयरल हैमोरेजिक सैप्टोसिमिया वायरस इन्फैक्सियस हिमैटोपोइटिक निक्रोसिस वायरस तथा इन्फैक्सियस पैन्क्रियोटिक निक्रोसिस वायरस (IPNV) की उपस्थिति का पता

करने मे परीक्षण किया गया। हि0प्र0 से एकत्रित सभी नमूनों में संक्रमण ऋणात्मक पाया गया। उनमें RT-PCR तथा साइटोपैथिक का प्रभाव नही देखा गया।

चमोली जिले के ट्राउट फार्म में रेन्बों ट्राउट के जीरा में भारी मात्रा में मर्त्यता देखी गयी। यहां से एकत्रित 21 नमूनों में से एक में RT-PCR वायरस का संक्रमण पाया गया। चम्पावत स्थित मत्स्य प्रक्षेत्र से 12 सैम्पल्स एकत्रित किये गए। ये सैम्पल्स मई के महिने में एकत्रित किये गए किन्तु इनमें RT-PCR वायरस का प्रभाव नही देखा। गया इसके अतिरिक्त नमूनों (सैम्पल्स) का एकत्रीकरण जून माह के अंत में किया गया जिसका परिणाम आना अभी शेष है।

मध्य पर्वतीय क्षेत्रों के पौलिटैंकों में बेहतर मत्स्य उत्पादन

दूनागिरी क्षेत्र के मत्स्य पालकों ने कृषि क्षेत्र में प्लास्टिक के अनुप्रयोग पर आधारित भारतीय समन्वित अनुसंधान परियोजना कें अन्तर्गत पौलिटैंकों में विदेशी कार्प का पालन किया। मिट्टी तथा सीमेंट के तालाबों की अपेक्षा पौलिटैंकों में विदेशी कार्प, सिल्वर कार्प व कामन कार्प में बेहतर वृद्धि देखी गयी। ग्रास कार्प में 600ग्र., कामन कार्प में 450ग्र. तथा सिल्वर कार्प में 170ग्र. तक समान्य वृद्धि थी। यह वृद्धि 12 महिनों में प्राप्त की गयी। यह वृद्धि पौलीटैंकों के तुलनात्मक रूप से जल के अधिक तापक्रम के कारण थी पौलिटैंको में पानी के तापक्रम का दैनिक उतार–चढ़ाव बहुत अच्छा था जो मछली की वृद्धि के लिए अच्छा था। अधिक तापमान के कारण पौलीटैंकों में भोजन तत्व प्लवक, पैरीफाइटन आदि बहुत अच्छे थे।

तालाबों में लेवियोडायोचिलस लेवियों डेरो व माइनर कार्प के प्रजनकों का पालन पोषण

कुमायूं हिमालय के जिम कार्बेट के समीप कोसी नदी में कास्ट नेट का प्रयोग कर (29029,038 उत्तर व 790,08.777' पूर्व) दो वर्ष से अधिक तथा 150–350 ग्र. भार वाली उपरोक्त दोनो प्रकार की प्रजातियों को पकड़ा गया और भीमताल कें सीमेंट के बने तालाबों में 12 महीनो तक पाला गया। पालन अवधी के दौरान मछली को उनके शरीर के भार के बराबर पारम्परिक रूप से तैयार किया गया आहार चावल की भूसी और एम ओ सी युक्त भोजन 1:1 के अनुपात में दिया गया। इसके साथ–साथ उनकों प्राकृतिक पैरीफाइटन आहार भी दिया गया। मत्स्य भण्डार के स्वास्थ्य, परिक्वता और जननांकीय विशेषताओं का पता लगाने के लिए हर सप्ताह निरीक्षण किया गया। गोनैडोसोमैटिक सूचकांक (GSI) में मार्च से धीरे–धीरे वृद्धि हुयी और जून के अंत तक ये प्रजनन के लिए तैयार हो गए। पिछले वर्ष की तुलना में लेवियोडायोचिलस के सम्बन्ध में अपेक्षाकृत अधिक तापक्रम के कारण दो सप्ताह पूर्ण परिपक्वता देखी गयी।

राज्य ट्राउट फार्म, बैरांगना में रेन्बो ट्राउट का सफलतापूर्वक प्रजनन

दो वर्ष से अधिक एवं 200–250ग्र. के प्रजनकों का प्रजनन हेतु प्रयोग किया गया। प्रत्येक मादा से अलग–अलग 120–200 अण्ड़े प्राप्त किये गए। प्रजनन कार्य 20 जनवरी से शुरू किया गया जबकि पिछले वर्ष यह 2 जनवरी से किया गया था और 15 मार्च तक चला था। देर से परिपक्वन और देर से प्रजनन का मुख्य कारण तुलनात्मक रूप से निम्न तापक्रम और प्रजनकों का युवा होना था। कुल एक लाख आइड ओवा का उत्पादन हुआ।

क्युमूलेटिव सर्वेक्षण के अन्तर्गत सतलज बेसिन में मात्स्यिकी प्रबन्धन और नदी पारस्थितिकी घटकों के लिए परामर्श कार्य

संस्थान ने अपने परामर्श सेवाओं के तहत अपने तीन वैज्ञानिको का एक दल हिमाचल प्रदेश वन अनुसंधान संस्थान, शिमला को सतलज नदी का भ्रमण करने हेतु भोजन यहां उन्होने विभिन्न निर्माणध्ीन परियोजनाओं का भ्रमण किया। अन्ततः 20 स्थलों का जो पूरे नदी बेसिन से आरम्भ होकर कोल बाँध से मोरांग तक थे, पर चर्चा करने का निर्णय लिया। इसके साथ ही हिमाचल प्रदेश वन अनुसंधान संस्थान के निदेशक के साथ 25 जून को एक बैठक भी हुयी।

महाशीर (टौर प्युटिटोरा) की आंशिक जीनोमिक लाइब्रेरी से माइक्रोसैटेलाइट मारकर्स का विकास

सुनहरी महाशीर, टौर प्युटीटोरा (परिवार–साइपिनिडी) हिमालयी क्षेत्र की ठण्डे पानी की अर्थिक रूप से सबसे महत्वपूर्ण मछली है। फिश जैनेटिक स्टौक आउटरीच कार्यक्रम के अनतर्गत टौर प्युटिटोरा के 7 पृथक भौतिक स्थलों का अध्ययन किया गया। हमने इस प्रजति के लिए पहली बार कुछ अदृभुद माइक्रो सेटेलाइट मार्कर विकसित किया है और इसके लिए एक आंशिक जीनोमिक लाइब्रेरी का निर्माण किया है। भारत के 6 विभिन्न अलग–अलग स्थलों से टौर प्युटीटोरा के 348 नमूनों को एकत्र किया गया फिनौल क्लोरोफार्म (समब्रक् इत्यादि,1989) विधि तथा प्रोटीनेज 12 प्रयोग द्वारा पंख ऊतकों से जीनोमिक DNA को पृथक किया गया। लगभग 1000धनात्मक कृन्तक (clone) प्राप्त किऐ गए जिनका R.E पाचन के द्वारा पुष्टीकरण किया गया। 30 धनात्मक क्लोन्स की पहचान की गई तथा न्यूकोस्पिन प्लास्मिड–किट (मैखीरे–नागल) के प्रयोग द्वारा इन चयनित क्लोनों से प्लास्मिड DNA को अलग किया गया। सभी प्रथक प्लास्मिड दोनों दिशाओं में श्रृखंलाबृद्ध थे। इन श्रृंखलाओं को प्राइमर्स के साथ NCBI जीन बैंक को प्रस्तुत किया गया। इन प्राइमर्स का पुष्टिकरण का कार्य आभी प्रगति पर है।

कुमायूं हिमालय के तालाबों में चौकलेट महाशीर का प्रदर्शन

(परियोजना कोडः ए क्यू – 03) तालाब के पर्यावरण में चौकलेट महाशीर की वृद्वि में प्रदर्शन और मूल्यांकन के लिए उनकों डी.सी.एफ.आर. की हैचरी में पाला गया। पौली कल्चर प्रणाली में चौकलेट महाशीर को पालने पर यह पता चला कि वह सुनहरी महाशीर की वृद्वि से बहुत अधिक सह सम्बद्ध थी (r2=0.80)। तालाब के भौतिक रासायनिक माप दण्ड और जैविकीय कारक मछली की अच्छी वृद्वि के लिए उचित थे। चौकलेट महाशीर के लम्बाई भार सम्बन्ध, कन्डीशन फैक्टर तथा रिलेटिव पता चलता है कि में अपने नए पर्यावरण में बहुत अच्छी थी।

(परियोजना कोड 5 AQ-10): समतापीय हिमालयी झीलों में बहते हुए केजो में भण्डार–वृद्वि हेतु सुनहरी महाशीर व कामन कार्प के बीज पालन तकनीकियों का मूल्यांकन

प्राकृतिक जल स्रोतों में भण्डार वृद्वि का मत्स्य उत्पादकता को बढ़ाने के साथ महत्वपूर्ण सम्बन्ध है। सुनहरी महासीर के जीरों को चार भण्डारण घंनत्वों जैसे 60 nos/m3, 70 nos/m3 80 nos/m3 o 90 nos/m3 में संचयित किया गया। वृद्वि तथा जल की गुणवत्ता के मापदण्डों का समय –समय पर निगरानी की गयी। जल के मापदण्डों का विश्लेशण करने के लिए "स्टैंडर्ड विधि" (आफा 1998) का प्रयोग किया गया। पालन अवधी के दौरान इन जलस्रोतों के जल कें मापदण्ड नीचें सारणी में दिऐ गये हैं।

मापदण्ड	D1	D2	D3	D4
तपमान (डिग्री से.)	6.8–11.7	6.7–11.7	6.8–11.7	6.8–11.7
PH	8.0–8.2	8.2–8.9	8.4–8.8	8.4–8.7
अवमुक्त आक्सीजन (मिग्र/लीटर)	5.6–8.2	5.2–8.4	5.4–8.6	5.6–8.4
आवमुक्त कार्बनडाई आक्साइड (मिग्र/लीटर)	0–10	0–8	0–10	0–8
टी डी एस (मिग्र/लीटर)	95.9–96.6	97.0–7.5	96.4–97.1	95.0–97.2
नाइट्रेड (मिग्र/लीटर)	3.0–5.0	3.1–5.0	2.6–5.0	2.7–5.0
अमोनिया (मिग्र/लीटर)	0–0.02	0–0.02	0–0.07	0–0.07
फास्फेट (मिग्र/लीटर)	03–1.0	0.07–1.0	0.18–1.0	0.3–1.0
सल्फेट (मिग्र/लीटर)	14–16	15–16.6	14–15	12–15
कुल कठोरता (मिग्र/लीटर)	90–120	88–116	86–116	89–110
कुल क्षारीयता (मिग्र/लीटर)	91–94	88–90	86–91	84–90

आहार घटक के रूप में मछली का मूल्यांकन तथा न्यूट्रीन्ट प्रोफाइलिंग

चयनित पांच प्रमुख खाद्य मत्स्य प्रजातियों (टौर प्युटिटोरा, निओलिरसोचिलस हैक्सागोनोलिपिज, शाइजोथोरैक्स रिचार्ड सोनी ओन्कोरिकस माइकस, साइप्रिनस कार्पिओं) में वसीय अम्ल अमीनों अम्ल, तथा खनिज मिश्रण आदि का प्रोक्जीमेंट कम्पोजिशन (कच्चा वसा, कच्चा प्रोटीन, नमी, शख) के सम्बन्ध में न्यूट्रींट प्रोफाइलिंग किया गया।

नमी, कच्चा प्रोटीन, कच्चा वसा, व राख के अवयव क्रमशः 74.00–79.24 ग्रा/100ग्रा., 15–19.44ग्रा./100ग्रा., 0.5–5.18 तथा 1–1.3% थे। प्रोटीन में बहुत अच्छा संतुलित आमीनों अम्ल का मिश्रण था, जिसमें प्रोलाइन (96.37 मिग्रा./ग्रा. सीथी) एसपर्टिक एसिड (85.23 मिग्रा./ग्रा. सीथी), टायरोसाइन (83.84 मिग्रा./ग्रा. सीथी), लिसिन (69.87 मिग्रा./ग्रा. सीथी) सेटीन (66.63 मिग्रा./ग्रा. सीथी), एग्रीनाइन (65.26 मिग्रा./ग्रा. सीथी), आइसोल्युसाइन (64.56 मिग्रा./ग्रा. सीथी) तथा ट्रायप्टोफान (61.63 मिग्रा./ग्रा. सीथी) था। सबसे अधिक अमीनों अम्ल ट्रायप्टोफान (560) में, उसके पश्चात आइसो ल्युसाइन में (230) था। कुल मोनोअनसैचुरैटेड वसीय अम्ल सबसे अधिक 35.88% था। उसके पश्चात संतश्प्त (सैचुरेटेड) वसीय अम्ल 35.51% तथा पौलीअनसैचुरेटेड वसीय अम्ल (PUFA) 31.39% की मात्रा थी।

जून–जुलाई, 2012 में तीन विभिन्न राज्यों नामतः असम, अरूणाचल प्रदेश, तथा मेघालय में क्लीनिको एपीडिमिओलौजिकल सर्वेक्षण किया गया। इन क्षेत्रों में हजार से अधिक ग्रामीण जनसंख्या का सर्वेक्षण कर आकड़े एकत्र किए गए तथा उनका सांख्यिकीय विश्लेषण किया गया।

रेन्बो ट्राउट में आँख का सक्रंमण

चम्पावत स्थित मत्स्य प्रक्षेत्र में पाली गयी तीन वर्श से ऊपर की रेन्बो ट्राउट की आंख के लैंस में सफेद रंग की झिलली विकसित हो गयी थी। कुल 20-25% रेन्बों ट्राउट इस संक्रमण से ग्रस्त थी। संक्रमण के आरम्भिक स्तर पर मछलियों की आहार ग्राहय क्षमता सामान्य थी और वे अच्छी स्थिति में थी किंतु 2–3 माह के बाद यह संक्रमण चरम पर था तथा 65% मछलियों की दोनो आंखों में यह संक्रमण फैल गया। मछलियों में इस कारण अन्धापन हो गया। 30-40% मछलियां इस भयंकर संक्रमण से मर गयी, किन्तु एक वर्ष से अधिक आयु की मछलियां इस संक्रमण से दूर थी।

चम्पावत मत्स्य प्रक्षेत्र में ट्राउट प्रजनको का मइनर

फरवरी–जून माह के दौरान चम्पावत मत्स्य प्रक्षेत्र में ट्राउट प्रजनक काफी मात्रा मे मरे पाऐ गए जब इसका परीक्षण किया गया तो यह पाया गया कि उनके जननांगो मे सूजन पायी गयी थी तथा उसके अन्दर अण्डें सड़े हुए थे। मादा मछलियों में जी. एस. आई. 2.38-19.81% पाया गया। परिपन्व अण्डों में विकास की गति धीमी पायी गयी और कुछ सड़े अण्डे भी पाऐ गए। सम्मावतः इन अण्डों के कारण ही मछलियाँ मरीं। इस सम्बन्ध में अभी और परीक्षण प्रगति पर हैं।

भारत के शीतजल क्षेत्रों में सजावटी मत्स्य संसाधनों का अन्वेषण

निदेशालय के चम्पावत क्षेत्र के वैज्ञानिकों के एक दल ने उत्तराखण्ड की विभिन्न नदी प्रणालियों में शीतजल की सजावटी मत्स्य संसाधनों का पता लगाने के लिए एक सर्वेक्षण किया। इस उदेश्य से दिनांक 25 एन 27 मई, 2012 को सरयू, कोसी, गंगास, रामगंगा, नदियो के 7 स्थालों का चयन किया गया। इन क्षेत्रों के विभिन्न मापदण्डों जैसे–नदियो की भौतिक एकता, अरवास स्थल, प्रजातियों की बहुलता, मत्स्य विविधता, जल की गुणवत्ता, तथा जैविकीय मापदण्डों का परीक्षण किया गया। सरयू नदी के किनारे ग्लैप्रोथोरैक्स की 2 प्रजातियां पायी गयी अन्य मछलियां जो पकडी गयी वह थी बेरिलियस, गारा गोटयला, टौर प्युटिटोरा, षाइजोथोरैक्स रिचार्डसोनी, रूवालबाग के समीप कोसी नदी में बेरिलियस प्रजाति देखी गयी। गगास नदी का बहाव 10मीटर/मिनट था तथा इसका पानी साफ था। इस धारा की चौड़ाई 2–5 मीटर थी तथा इसके किनारों पर शैवालो की अच्छी बृद्धि भी पायी गयी। यहां बेरिलियस बेंडेलिसिस पर्याप्त मात्रा में थी। मासी के समीप एक अन्य क्षेत्र रामगंगा का भी सर्वेक्षण किया गया जहां पर गारा, बैरिलियस, कोसोचिलस, पंटियस तथा निमाचिलस प्रजातियों की बहुलता थीं। वही का पानी बिलकुल साफ, पारदर्शी तथा किनारों पर षैवालो का अच्छा जमाव था।

भारत का उत्तर–पूर्वी क्षेत्र सजावटी मत्स्य प्रजातियों का एक प्रमुख केन्द्र माना जाता है। इस दृष्टि से मार्च 2012 में दीमापुर, नागालैण्ड के समीप एक सर्वेक्षण किया गया और कोल्सीया फासीएटस, कोल्सीआ लालीला, बाडीस बाडीस, गारा, पंटियस, निमाचिलेस आदि का संग्रह किया गया। जल की गुणवत्ता प्रजातियों की लम्बाई, भार आदि सम्बन्धी आंकड़े एकत्रित किए गऐ। कुछ प्रजातियों को अल्कोहल

में संरक्षित किया गया और कुछ को आगे के अध्ययन के लिए निदेशालय के चम्पावत स्थित प्रयोगशाला में रखा गया।

सुनहरी महाशीर का बीज उत्पादन

इस वर्ष शा.मा.अनु. निदेशालय भीमताल ने सुनहरी महाशीर के बीज उत्पादन में जबरदस्त उपलब्धी प्राप्त की है। हैचरी परिसर मे सुनहरी महाशीर के 1 लाख जीरों का उत्पादन किया गया। मत्स्य संघ भोपाल को 50.000 बीज, मत्स्य कालेज पंतनगर को 10.000 बीज तथा देवरिया ताल झील प्राधिकारण को 5000 बीज बेचे गए। हैचरी से राजस्व प्राप्ति के अतिरिक्त हैचरी में उत्पादित बीजों को कुमायूं तथा उत्तर–पूर्वी क्षेत्रों के विभिन्न जल स्रोतो मे भी संरक्षित किया गया। उत्पादित बीजों को डी.सी.एफ.आर के केजों में भी अनुसंधान के लिए रखा गया।

कार्यशाला

दिनांक 24–25 मार्च 2012 को निदेशालय द्वारा आई.आई.बी. एम गुवहाटी में "सस्टेनेबल यूटीलाइजेशन औफ माउन्टेन फिशरी रिसोर्सेज औफ नार्थ–ईस्ट रिजन" शीर्षक पर एक कार्यशाला आयोजित की गयी। इस कार्यशाला के 150 से अधिक लब्ध प्रतिष्ठित वैज्ञानिकों, शिक्षाविदों, छात्रों सरकारी कर्मचारियों, कृषि विज्ञान केन्द्र के किसानों, उघमियों आदि ने भाग लिया। कार्यशाला का उद्घाटन असम सरकार के मात्स्यिकी एवं सार्वजनिक सम्बन्ध मंत्री माननीय श्री बसंत दास ने किया। कार्यशाला मे उत्तर–पूर्वी क्षेत्रों में शीतजल मात्स्यिकी क्षेत्रों के सतत् विकास, संसाधन मूल्यांकन, पर्वतीय मत्स्य पालन, मानव संसाधन विकास, आजीविका–सुरक्षा, मत्स्य आधारित इको टूरिज्म, रोग, जैव प्रौधोगिकी तथा अन्य सम्बन्धित मुदों पर जोर दिया गया।

प्रशिक्षण कार्यक्रम

- दिनांक 14–18 फरवरी, 2012 को भा.कृ.अनु.परि. के उत्तर–पूर्वी अनुसंधान क्षेत्र के टडोंग, गंगटोक (सिक्किम) में "सर्विलासेज औफ डिजिज इन कोल्डवाटर एक्वाकल्चर" पर एक प्रशिक्षण कार्यक्रम आयोजित किया गया। प्रशिक्षण कार्यक्रम राष्ट्रीय मात्स्यिकी विकास बोर्ड, हैदराबाद द्वारा वित्त पोषित था। कार्यक्रम का उद्घाटन डा0 टिका लकसोम, निदेशक डिपार्टमेंट औफ एनिमल हसबैन्ड्री ने किया। इस प्रशिक्षण में कुल 17 मात्स्यिकी अधिकारियों व कृषि विज्ञान केन्द्र, सिक्किम के सब्जैक्ट मैटर स्पेशलिस्टों ने भाग लिया। कार्यशाला मे प्रतिभगियों को रोगग्रस्त मछलियों से परिचित कराया गया साथ ही एकत्रित नमूनों का प्रयोगिक प्रर्दशन भी किया गया।
- दिनांक 27 फरवरी से 2 मार्च 2012 को निदेशालय द्वारा राष्ट्रीय अनुसंधान केन्द्र, मिथुल नागालैण्ड में प्रैक्टिकल ओरएिन्अेशन औन इन्टेंसिव ग्रो आउट प्रैक्टीसेज फौर गोल्डन एण्ड चौकलेट महाशीर पर एक प्रशिक्षण कार्यक्रम आयोजित किया गया यह प्रशिक्षण उत्तर–पूर्वी क्षेत्र के राज्य कर्मचरियों क लिए था इस कार्यक्रम में अरूणाचल प्रदेश, सिक्किम, तथा नागालैण्ड के राज्य मत्स्य अधिकरियों, कृषकों, छात्रो व मीडिया कर्मिको ने भाग लिया। इस प्रशिक्षण का मुख्य उद्देश्य उत्तर–पूर्वी भारतीय राज्यों के पर्वतीय क्षेत्रो में चाकलेट व सुनहरी महाशीर के प्रजनन तथा पालन कें कार्यो को प्रशिक्षित लोगो द्वारा आगे बढाना था।

सहभागिता

- दिनांक 17–18 अप्रैल, 2012 को डा0 अमित पाण्डे ने एन.बी. एफ.जी.आर लखनऊ में "डिवलपमैन्ट औफ सर्विलांस प्रोग्रम फौर एक्वेटिक एनिमल डिजिज" पर आयोजित राष्ट्रीय परामर्श पर भाग लिया।
- दिनांक 19 अप्रैल, 2012 को डा0 अमित पाण्डे ने एन.बी.एफ. जी.आर लखनऊ में "फिश सैल लाइन डिवलपमैंट एण्ड स्टोरेज" पर आयोजित राष्ट्रीय कार्यशाला में भाग लिया।
- दिनांक 23 मई, 2012 को डा0 अमित पाण्डे ने आल इण्डिया रेडियो आकाशवाणी अल्मोड़ा से "शीतजल मछलियों के रोग एवं निवारण" पर एक रेडियो वार्ता दी।

सेमिनार / प्रशिक्षण

- दिनांक 24–25 मार्च 2012 को श्री एम.एस.अख्तर ने निदेशालय द्वारा खानपारा, गोहाटी मे "सस्टेनेवल यूटीलाइजेशन औफ माउन्टेन फिशरीज रिर्सोसेज औफ नार्थ–ईस्ट" पर आयोजित राष्ट्रीय कार्यशाला में भाग लिया।
- दिनांक 24–25 मार्च 2012 को श्री एम.एस. अख्तर ने निदेशालय द्वारा खानपारा, गोहाटी मे "सस्टेनेवल यूटीलाइजेशन औफ माउन्टेन फिशरीज रिर्सोसेज औफ नार्थ–ईस्ट" पर आयोजित राष्ट्रीय कार्यशाला पर मत्स्य पोषण पर प्रस्तुतीकरण दिया।

Directorate of Coldwater Fisheries Research
(Indian Council of Agricultural Research)
Bhimtal-263 136, District-Nainital (Uttarakhand)

Published by : Dr P.C. Mahanta, Director, DCFR, Bhimtal (Nainital) Uttarakhand
Edited and compiled by : Dr Debajit Sarma, Dr S.K. Srivastava, Mr. Sumanta Mallik and Dr. M. S. Akhtar
Hindi translation by : Shri Amit Kumar Joshi
Assistance : Smt. Susheela Tiwari, Amit Saxena, Vijay Kumar and Sushil Kumar

DCFR NEWS is the official Newsletter of the Directorate of Coldwater Fisheries Research (ICAR), Bhimtal

Tel : 05942-247279; 247280 Fax: 05942-247693;
E-mail : dcfrin@rediffmail.com, dcfrin@gmail.com, directoratedcfr.res.in
Gram : MAHSEER

Printed at : M/s Royal Offset Printers, A-89/1, Naraina Industrial Area, Phase-I, New Delhi 110 028