

वार्षिक प्रतिवेदन  
**ANNUAL REPORT**  
**2010-11**



**Central Institute of Fisheries Education**  
Mumbai - India  
[www.cife.edu.in](http://www.cife.edu.in)



# CIFE

## वार्षिक प्रतिवेदन

## Annual Report 2010-11



### Central Institute of Fisheries Education

Off Yari Road, Panch Marg, Andheri (W), Mumbai 400061

[www.cife.edu.in](http://www.cife.edu.in)







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# 1 Preface



The Year 2011, a very special year for Central Institute of Fisheries Education (CIFE) as we are 50 years young with huge volume of experience accumulated and infused by our predecessors during the past five decades. The Year 2010-2011 was indeed a remarkable experience with a galaxy of VIP's and dignitaries making their presence in the year-long commemorative functions and celebrations. The institute recorded many memorable achievements during the year adding color and glitter to the Golden Jubilee Celebrations.

Inspite of some manpower constraints, our 50 years of journey in the pursuit of Fisheries Education and Research has been made possible with absolute support and dedication of all our colleagues right from 1961 till today and is hall marked from time to time. The wonderful milestones and creation of new facilities, courses and infrastructure in terms of new campus, new innovations and research as well as interactions with industry make us feel proud. It was not easy for CIFE in these 50 years to manage in a dynamically changing environment of fisheries as well as human resources development. With

all this, we have gone ahead and have done the best possible within the framework of available resources.

This report presents comprehensive information on the various activities and achievements of the institute during the year 2010-2011 under the heads; Research, Education, Extension, Publications, Linkages and Collaborations, Honors and Awards, etc. CIFE could make creditable achievements during this year and we have reasons to be proud when we look back at the end of 50 years.

During the year, 17 Ph. D and 45 M. F. Sc students passed out while 49 Ph. D and 72 M. F. Sc students were enrolled for the next batch. Some notable research and fisheries development achievements include development of biosensors for transgenic zebra fish, demonstration of carp culture in salt affected areas in Satara district of Maharashtra; development of strategies for enhancement of fish production in Dimbhe reservoir, Maharashtra and impact of Juvenile fishery on fish production along the west coast of India.

We are happy to record some remarkable achievements of our students. Fifteen out of seventeen posts of Agricultural Research Service (ARS) this year were bagged by our students. Mr. Mujahid Khan A. Pathan, M. F. Sc. IIInd year student secured second position in National Level Elocution contest and Mr. A. P. Muralidhar received Best Poster Award during Xth Agricultural Science Congress, NBFGR, Lucknow. Mr. Feroze Khan, S. won First place in India and Third place in Asia Pacific region in Altech Young Scientist Competition for



his M.F.Sc. dissertation work. Five students were selected as Best Fisheries Graduates in India by Professional Fisheries Graduates Forum of India and seventeen Masters students from Post Harvest Technology and Fish Business Management participated in XIX Commonwealth Games held in Delhi during 3-14 Oct, 2010 and provided their services in food auditing by sampling and testing of food for sensory and microbiological quality.

I am extremely grateful to Dr. S. Ayyappan, Director General, ICAR and Secretary, DARE, Govt. of India for his visionary leadership and support in all our endeavors. I am thankful to Dr. B. Meenakumari, Deputy Director General (Fisheries), Dr. S. D. Singh and Dr. Madan Mohan from the SMD for their co-operation and support. My sincere thanks are due to Members of Board of Management, Chairman and Members of Research Advisory Committee, Members

of Academic Council, Institute Research Council, Extension Council, Board of Examiners and other Institute-level committees for their cooperation and support. My special thanks are due to the Publication Team for bringing out this annual report well in time. My compliments are due to all scientists, staff and students of CIFE for their valuable contributions and hard work.

***Excellence is not a one time act, it is a continuous process and we are committed to march ahead for global leadership and excellence in fisheries education and research.***

( W. S. Lakra )  
Director/Vice-Chancellor

# 2 Executive Summary



The institute continued to contribute significantly in its mandated activities of fisheries research, education and extension during the year 2010-2011. The year started with a Vice Chancellors' Conference on 'Sharing of Novel strength in Agricultural Universities' which was inaugurated by Dr. R. S. Paroda and attended by 44 participants including 20 Vice-chancellors. This was followed by Indian Aqua-Invest Congress and Expo where the issues highlighted were potential and various constraints in aquaculture development and policy framework.

The Golden Jubilee celebrations started with a National Seminar on Diversification of Aquaculture through locally available species at Kolkatta Centre. It had six technical sessions and a special session for awarding the students and research scholars. Farmers-Scientists Interface and Farmers day interactive workshop was also held and based on the interactions with farmers; two best farmers were given awards. A brainstorming session on HRD initiatives for improving quality of outputs of CIFE was held at Lonavla and opportunities to achieve academic excellence were explored.

During the year 17 Ph.D and 45 M.F.Sc students passed out while 49 Ph.D and 72 M.F.Sc students were enrolled for 2010-13 and 2010-2012 batches respectively. As in previous years, this year too fifteen out of seventeen posts of Agricultural Research Service (ARS) were bagged by our students. Five students were selected as Best Fisheries Graduates in India by Professional Fisheries Graduates Forum of India. Two students have got

ICAR-IRF fellowship and will be pursuing Ph.D at INRA, France and 17 Masters students from Post Harvest Technology and Fish Business Management participated in XIX Commonwealth Games held in Delhi during 3-14 Oct, 2010 and provided their services in food auditing by sampling and testing of food for sensory and microbiological quality.

Significant research achievements through generation of new information development, refinement and up-scaling of technologies and tools for sustainable aquaculture and fisheries production were made in 24 institutional, 29 externally funded, 7 NAIP-funded, 4 newly initiated coordinated research projects on aquatic radio-ecology and 2 contract research projects.

The institute focused its attention on utilization of large tracts of wasted inland areas such as salt affected, swampy, flood prone etc. Repeated trials of tiger shrimp, *P. monodon* were carried out in three ponds in inland saline waters with an yield of 500-617 kg/ha in 90-94 days with 40 -60% survival and FCE of 1.72 - 1.90 and the ponds were further stocked with *Chanos chanos* with seed procured from Mandappam. Monoclonal antibody-based rapid diagnostic test for the detection of *Macrobrachium rosenbergii* Nodavirus (MrNV) and Extra Small Virus (XSV) of *Macrobrachium rosenbergii* was developed. The genes for MrNV and XSV, the causative agents of WTD were sequenced and submitted to gene-bank (Accession No: HQ637179.1 and HQ637180.1). Diagnostic sensitivity of these tests was found to be 96.66%, 90%, and 80% respectively. Use of fluorescent transgenic zebra fish





biosensors for monitoring genotoxic pollutant aimed at developing biosensors for transgenic zebra fish genotoxicity and heavy metal toxicity in aquatic environment were developed. Out of 83 individuals screened for all the biosensors only seven were found to be positive making the integration 8.4%.

The institute has been able to create a visible impact in salt affected areas of Karad taluka in Satara district of Maharashtra through a project on A Value Chain on Fish Production in Fragile Agricultural Lands and Unutilized Aquatic Resources in Maharashtra. Carp seed production successfully demonstrated at three stages i.e., spawn to fry, fry to fingerling and fingerling to yearlings. Carp culture was also successfully demonstrated to the farmers. Carp hatchery and *Spirulina* culture units are established on common property of farmers. A village resource centre (VRC) was established on government allotted land at Shere village and equipped with audio-visual aids.

Strategies for enhancement of production in Dimbhe reservoir, Maharashtra were developed through management interventions and community participation. The Institute created an impact by stocking the reservoir with 8 lakh 56 thousand fingerlings of major carps. Fish catch data of five years indicated that earlier catch was mainly composed of minor varieties or *Chela spp.* Later years showed a steady increase in Catla and other carps.

Evaluation of fipronil resistant bacteria

was done for their bioremediating capacity. PCR Product sequence analysis was done to find out which bacterial species were having fipronil resistance. The fourth and final writeshop on “Documentation of ITK’s in Fisheries Sector” of Central Region of India was held during 10-14 August, 2010. Impact of juvenile fishery on fish production along the west coast of India was studied. Data on total of 36 species of fish have been collected from the landing centres which includes Porbander and Veraval from Gujarat, union territory of Diu and Sassoon Docks, New Ferry Wharf, Versova, Bhyander and Mirkarwada from Maharashtra. The juvenile percentages of most of the species were found to be around 70-80 %.

The Institute organized various extension education / transfer of technology related programmes and activities. A total of 58 short term training programmes were organized at the Headquarters and its four research centres in which the participants were imparted skills in various aspects of aquaculture. The Institute also participated in 20 exhibitions held at various places across the country, showcasing the achievements and services being provided towards the fisher and farming communities. Among distinguished visitors, Dr. R. S. Paroda, Former D.G., ICAR, Shri. Trivendra Singh Rawat, Honorable Minister of Agriculture, Dairy and Fisheries, Uttarakhand, and Shri Rajiv Maharshi, Additional Secretary, Department Of Agricultural Research and Education, Ministry of Agriculture (DARE), Govt. of India visited the Headquarters, Mumbai. About 367 visitors including students,



farmers, academicians, policy makers and other stakeholders from various colleges and universities and from different parts of the country visited the Institute and its centres at different times of the year to acquaint themselves with the activities of the Institute.

Infrastructure development work of Phase- III progressed well. Construction of slab of third floor and fourth floor of the main academic building and Type IV quarter has been completed. Construction of International hostel, Boys and Girls hostel and Type V quarters is in progress.

A total of 59 research papers were published in refereed journals with high impact factors. Apart from this, a number of review papers, popular articles, books, book chapters and bulletins were also published during the year. The faculty participated in 96 workshops, conferences, seminars, symposia and congresses. Faculty attended 22 training programmes and delivered 21 invited lectures at different places. The Institute organized 18 workshops, 28 meetings, 6 invited lectures by eminent scientists, one Writeshop and two CAFT programmes. The meetings of IRC, RAC, BOM, Academic Councils and Extension Councils were held regularly.



# Chapter 3 Introduction



The Central Institute of Fisheries Education (CIFE) was founded on 6<sup>th</sup> June 1961 under the Government of India with the assistance of Food and Agriculture Organization of the United Nations/ United Nations Development Programme to impart professional training and education to the in-service personnel of the expanding fisheries development sector of the country. The institute came under the administrative control of the Indian Council of Agricultural Research on 1<sup>st</sup> April 1979. The Deemed to be University status was accorded to CIFE on 29<sup>th</sup> March 1989; subsequently, the scope and mandate have been widened to include education as well as research. Though the fisheries sector in India has metamorphosed from the subsistence level into a thriving industry, the vast majority of the fishing communities all along the Indian coast and in inland areas still struggle hard to make a decent living.

Initially, CIFE was housed in the Institute of Science building, Bombay, and in 1964, it was shifted to a rented building at Masjid Bunder, Bombay. However in March 1967, the Institute moved to an independent campus at Seven Bungalows, Versova, in the western suburbs of Bombay. Presently, it is housed in the newly developed serene

and expansive Yari Road Campus. Yari Road Campus has a B+G+2 Academic Building that houses state of the art laboratories, class rooms, faculty and staff chambers, chambers of the Director and Joint Director, conference hall, community hall, aquarium, examination and academic cells, etc. Apart from wet-laboratories, ponds and hatcheries, library building, staff quarters and ladies hostel, CIFE also possess two training-cum-research vessels, MFV Saraswati and MFV Narmada, which are used for teaching and research activities related to oceanography and navigation.

There are six major functional divisions at CIFE equipped with full-fledged laboratories, seven sections and twelve cells. Apart from the headquarters in Mumbai, the Institute has four centers located in different aqua-climatic regions (Kolkata in West Bengal, Kakinada in Andhra Pradesh, Powarkheda in Madhya Pradesh, and Rohtak in Haryana) of the country with farms and infrastructural facilities for imparting hands-on training to students, farmers and development personnel as well as to conduct need-based research projects. The CIFE at present offers specialization in eleven disciplines at Masters level and in ten disciplines at Doctoral level covering the areas of Aquaculture, Aquatic Environment Management, Fish Genetics, Fish Biotechnology, Aquatic Animal Health Management, Post Harvest Technology, Fisheries Extension, Fish Physiology and Biochemistry, Fish Nutrition and Feed Technology and Fisheries Economics and Business Management. In addition to these academic programs, the institute also conducts need based Professional and







Entrepreneurship Development Programs and short term training programs with more emphasis on practical aspects and skill development.

Quality assurance in higher fisheries education is receiving greater attention these days in the light of globalization of education and WTO. Accreditation of an institution is an indicator of quality education. The CIFE has been accredited by ICAR and is now being accredited by NAAC.

## Vision

To be a world-class organization providing leadership in fisheries education and research

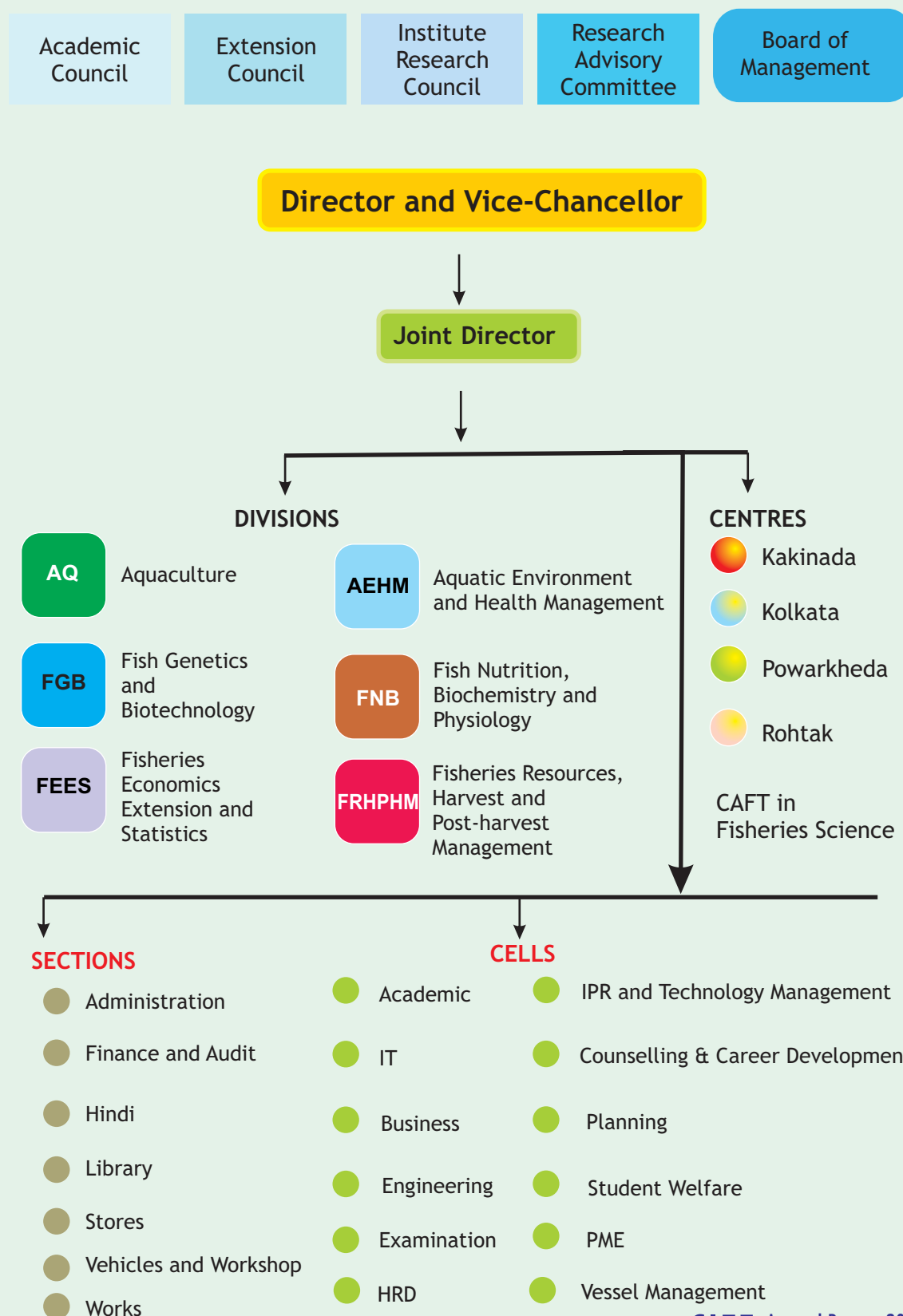
## Mission

To achieve academic and research excellence by creating state-of-the-art infrastructure and globally competitive faculty

## Mandate

- To conduct post graduate academic programs in core and emerging disciplines of fisheries science
- To conduct basic and strategic research in frontier areas of fisheries
- To conduct demand-driven training and educational programs for different stake holders in fisheries sector
- To provide technical support, inputs for policy development and consultancy services

## Organization and Management







## Staff Position

Category wise	CIFE Staff	Sanctioned	In Position
	RMP	2	2
	Scientific	106	71
	Technical	106	105
	Administrative	63	53
	Skilled Supporting	70	69
	Non Ministerial	01	01
	<b>Total</b>	<b>348</b>	<b>301</b>
Centrewise	Personnel	Sanctioned	In Position
	Head Quarters	75+2	56+2
	Kolkata	11	07
	Kakinada	06	03
	Rohtak	05	04
	Powerkheda	07	02
	<b>Total</b>	<b>104+2</b>	<b>72+2</b>

## Budget

Sl. No.	Head	Sanctioned	Received	Expenditure Incurred
1.	Plan	1200.00	2050.00	1971.91
2.	Non-plan	2103.50	2768.59	2952.19
3.	CAFT	1.76(Opening balance)	8.59	10.27
4.	SDU	1.67	268.31	259.48
Sl. No.	Head	Balance C/f	Receipt in this year	Total
1.	AP Cess	5.88	0.17	6.05
2.	Externally Funded Projects	233.17	650.07	883.24

**Target: 200.54**

**Achieved: 183.93**

# 4 Educational Achievements



In the year 2010-11, 17 Ph.D. and 45 M.F.Sc. students completed their respective programmes successfully.

S. No.	Name of the programme	No. of successful students
1	<b>Ph.D.</b>	<b>17</b>
	Fisheries Resource Management	06
	Aquaculture	02
	Indian Aquaculture	03
	Mariculture	01
	Fish Biotechnology	02
	Fish Genetics	02
	Fisheries Business Management	01
2.	<b>M.F.Sc.</b>	<b>45</b>
	Aquaculture	07
	Fisheries Resources Management	03
	Post-Harvest Technology	06
	Fish Genetics & Biotechnology	06
	Fish Pathology & Microbiology	06
	Fish Nutrition & Biochemistry	04
	Fish Business Management	04
	Fisheries Extension	05
	Aquatic Environment Management	04
	<b>Total</b>	<b>62</b>



The enrollment details are given below:

<b>Ph.D. (2010-2013 batch)</b>		<b>49</b>
<b>S.No.</b>	<b>Discipline</b>	<b>On roll</b>
1.	Fisheries Resource Management	08
2.	Aquaculture	13
3.	Post Harvest Technology	05
4.	Fish Biotechnology	03
5.	Fish Genetics	01
6.	Aquatic Animal Health Management	05
7.	Fish Nutrition and Biochemistry	07
8.	Fisheries Extension	04
9.	Aquatic Environment Management	02
10.	Fish Business Management	01
<b>M.F.Sc. (2009-2011 batch)</b>		<b>72</b>
<b>S.No.</b>	<b>Discipline</b>	<b>On roll</b>
1.	Aquaculture	13
2.	Fisheries Resource Management	08
3.	Post Harvest Technology	07
4.	Fish Genetics & Breeding	04
5.	Fish Biotechnology	04
6.	Fish Nutrition & Feed Technology	05
7.	Fish Physiology & Biochemistry	04
8.	Fisheries Economics	04
9.	Fisheries Extension	09
10.	Aquatic Environment Management	06
11.	Aquatic Animal Health Management	08

The academic activities of the CIFE-Deemed University are enumerated for the current year 2010-11 as under :

#### Admissions :

- 1) Following is the list of M.F.Sc. students admitted in the year 2010. (2010-12 batch)

Sl.No.	Name	Regn.No
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#### Aquaculture

1	Mr. Jose Antony	AQ-246
2	Mr. Aditya Kumar	AQ-247
3	Ms. Christina Lalramchhani	AQ-248
4	Ms. Babita	AQ-249
5	Ms. Syed Talia Mushtaq	AQ-250
6	Mr. Sambid Swain	AQ-251
7	Ms. Gunjan Karnatak	AQ-252
8	Mr. Venkatesh Ramrao Thakur	AQ-253
9	Mr. R. Rajesh Kumar	AQ-254
10	Mr. Lokesh Paul	AQ-255
11	Mr. Ramesh Tripathi	AQ-256
12	Ms. Shilta M.T.	AQ-257
13	Yassine Mubarakali Gameredinn	AQ-258

#### Fisheries Resource Management

1	Ms. Divya Viswambharan	FRM-224
2	Mr. Ranjith R.K.	FRM-225
3	Ms. Jasmin F.	FRM-226
4	Mr. Subal Kumar Roul	FRM-227
5	Mr. Karan Kumar Kishor	FRM-228
6	Ms. E.M. Chhanda Prajandarshini	FRM-229
7	Mr. Wakambam Anand Meetei	FRM-230
8	Ms. Bushra Shabnam	FRM-231

#### Post Harvest Technology

1	Ms. Sarika K.	PHT-66
2	Mr. Abhishek Thakur	PHT-67
3	Mr. Devananda Uchoi	PHT-68
4	Mr. V. Kamalendra	PHT-69
5	Ms. Sreelakshmi K.R.	PHT-70



6	Ms. Priya E.R.	PHT-71
7	Mr. G. Janarthanan	PHT-72

#### **Fish Genetics & Breeding**

1	Ms. Priyanka C. Nandan Pawar	FGB-01
2	Ms. Nimmy Jousy	FGB-02
3	Mr. Manish Kumar Kundan	FGB-03
4	Ms. Sujatarani Behera	FGB-04

#### **Fish Biotechnology**

1	Ms. Suvra Roy	FBT-01
2	Mr. Mohan Ramesh Badhe	FBT-02
3	MR. Labrechai Mog Chowdhury	FBT-03
4	Mr. Pradeep Kumar	FBT-04

#### **Aquatic Animal Health Management**

1	Ms. Tanuja Abdulla	AAH-01
2	Mr. Bhartendu Vimal	AAH-02
3	Mr. Vikas Kumar	AAH-03
4	Mr. Chandra Bhushan Kumar	AAH-04
5	Mr. S. Ayathulla Rabbani	AAH-05
6	Mr. S. Ezhil Nilavan	AAH-06
7	Mr. Kusunur Ahamed Basha	AAH-07
8	Mr. Raju Baitha	AAH-08

#### **Fish Nutrition & Feed Technology**

1	Ms. Shamna N.	FNFT-01
2	Mr. K. Ramana Kumar	FNFT-02
3	Mr. R. Arunkumar	FNFT-03
4	Mr. C. Grace Angel	FNFT-04
5	Mr. Fawole Femi John	FNFT-05

#### **Fish Physiology & Biochemistry**

1	Mr. Ankur Jamwal	FPB-01
2	Mr. Rajesh M.	FPB-02
3	Mr. S. Chandrasekar	FPB-03
4	Mr. Dilip Kumar Singh	FPB-04



### Fisheries Economics

1	Ms. Shiwangi Gupta	FEC-01
2	Mr. Sushil Subhash Solanke	FEC-02
3	Mr. Manish Rastogi	FEC-03
4	Mr. Apu Das	FEC-04

### Aquatic Environment Management

1	Ms. Teena Jayakumar T.K.	AEM-14
2	Ms. Smrutirekha Satapathy	AEM-15
3	Mr. Arun Kumar O.R.	AEM-16
4	Mr. Shailendra Mohan Raut	AEM-17
5	Mr. Kapil Sukhadeo Sukhane	AEM-18
6	Ms. Gnanam C.	AEM-19

### Fisheries Extension

1	Mr. Parag Saikia	FEX-16
2	Mr. N. Koteswari	FEX-17
3	Mr. P. Sandeep	FEX-18
4	Ms. Bala Thongam	FEX-19
5	Mr. Kaling Padung	FEX-20
6	Mr. Bhaskar Chakravarty	FEX-21
7	Mr. C. Lloyd Chrispin	FEX-22
8	Mr. Leo Cyril Antony	FEX-23
9	Mr. Jackson Paul M.	FEX-24





2) Following is the list of Ph.D. students admitted in the year 2010.

(2010-13 batch)

Sl. No. Regn. No. Name

#### Fisheries Resource Management

1	Ph.D. - 380	Mr. Ramkumar S.
2	Ph.D. - 381	Ms. Swatipriyanka Sen
3	Ph.D. - 382	Ms. Arya P.
4	Ph.D. - 383	Mr. Lianthuamluaia
5	Ph.D. - 384	Ms. Sangeeta Mandal
6	Ph.D. - 385	Mr. Pralaya Ranjan Behera
7	Ph.D. - 386	Mr. Yumnarn Bedajit Singh
8	Ph.D. - 387	Mr. Golam Ziauddin

#### Aquaculture

9	Ph.D. - 388	Ms. Srijila C.K.
10	Ph.D. - 389	Mr. Mukesh Kumar Bairwa
11	Ph.D. - 390	Mr. Charan R.
12	Ph.D. - 391	Mr. Aritra Bera
13	Ph.D. - 392	Mr. J. Raymond Jani Angel
14	Ph.D. - 393	Mr. Naveen Chandru V.
15	Ph.D. - 394	Mr. Tandel Riteshkumar Shantilal
16	Ph.D. - 395	Mr. Janglenmang Baite
17	Ph.D. - 396	Mr. Vijay Balkrishna Shikhare
18	Ph.D. - 397	Mr. Raghavendra C.H.
19	Ph.D. - 398	Mr. Manohar Lal Ojha
20	Ph.D. - 399	Mr. Sashikant Jaychand Meshram
21	Ph.D. - 400	Ms. Monika Gupta

#### Post Harvest Technology

22	Ph.D. - 401	Mr. Biswajit Bal
23	Ph.D. - 402	Ms. Remya S.
24	Ph.D. - 403	Mr. Ajay Anand G.
25	Ph.D. - 404	Ms. Jesmi Deb Barma
26	Ph.D. - 405	Mr. Chabungbam Aken Singh

### **Fish Genetics**

27 Ph.D. - 406 Mr. Satyanarayana Yanda

### **Fish Biotechnology**

28 Ph.D. - 407 Mr. Sivakumar N.  
29 Ph.D. - 408 Ms. Kavita Kumari  
30 Ph.D. - 409 Mr. Mayekar Trivesh Suresh

### **Fish Nutrition & Biochemistry**

31 Ph.D. - 410 Mr. Jitendra Kumar Jakhar  
32 Ph.D. - 411 Mr. Himadri Saha  
33 Ph.D. - 412 Mr. Vikas Phulia  
34 Ph.D. - 413 Mr. Pankaj Kumar  
35 Ph.D. - 414 Mr. Shashi Bhushan  
36 Ph.D. - 415 Mr. Oyas Ahmed Asimi  
37 Ph.D. - 416 Ms. Pooja Bhatt

### **Fish Business Management**

38 Ph.D. - 417 Mr. Pankaj H. Mugaonkar

### **Fisheries Extension**

39 Ph.D. - 418 Mr. Sabari Shankar S.  
40 Ph.D. - 419 Ms. Banti Debnath  
41 Ph.D. - 420 Mr. Yumlembam Jackie Singh  
42 Ph.D. - 421 Mr. I. Sivaraman

### **Aquatic Animal Health Management**

43 Ph.D. - 422 Mr. Anutosh Paria  
44 Ph.D. - 423 Mr. Saravanan K.  
45 Ph.D. - 424 Ms. Mary Lini R.  
46 Ph.D. - 425 Mr. Rakesh Das  
47 Ph.D. - 426 Ms. T. Neeraja

### **Aquatic Environmental Management**

48 Ph.D. - 427 Ms. Deepti Ram Mohan Nair  
49 Ph.D. - 428 Ms. Manimekalai D.



### Number of Ph.D. students who have submitted thesis

S.No	Regd. No.	Students Name	Title of Thesis	Guide Name
1.	IAC-190	Mr.Uma Shankar Prasad	Macroalgal Biodiversity of Selected Intertidal Shores of Mumbai	Dr.Geetanjali Deshmukhe
2.	IAC-209	Mr.Shailesh Saurabh	Immune Responses of Indian Major Carp, <i>Labeo rohita</i> (Hamilton) to Freshwater Fish Louse, <i>Argulus infestation</i> .	Dr. P.K.Sahoo
3.	FG-273	Mr.Tapas Chakraborty	Molecular Mechanism of Estrogen Dependent Germ Cell Reduction in Medaka <i>Oryzias Latipes</i> (Temminck & Schlegel, 1846).	Dr.Aparna Choudhari
4..	MC-201	Ms. Neetha S.David	Studies on Optimum Carrying Capacities of Mariculture Systems by Modelling Trophic Interactions.	Dr.K.Sunil Mohamed
5.	AQ-267	Ms.Sipra Mohapatra	Comparative Performance of <i>Bacillus subtilis</i> , <i>Lactococcus lactis</i> and/or <i>Saccharomyces cerevisiae</i> as a Probiotic in the Diet of <i>Labeo rohita</i> (Hamiton).	Dr.K.Pani Prasad
6.	AQ-288	Mr.Sanjay Kumar Gupta	Physio-biochemical Responses to Fipronil Induced Toxicity in <i>Cyprinus carpio</i> Fry (Linnaeus, 1758) and its Amelioration through Microbial Levan	Dr.Neelam Saharan
7.	FG-219	Mr. Chethan P.Shetty	Genetic Studies on Growth Traits and Muscle Fibre Dynamics in Three Stocks of <i>Macrobrachium rosenbergii</i> .	Dr.S.Jahageerdar
8.	IAC-237	Mr. Ashisa Kumar Prusty	Growth and Immune Response of Fenvalerate Challenged <i>Labeo rohita</i> (HAM.) Fingerlings Pre-exposed to Vitamin C and E Enriched diet.	Dr.M.P.S.Kohli
9.	FRM-203	Ms. Vidya R.	Stock Delineation of <i>Priacanthus hamrur</i> (Forsskal, 1775) from Indian Waters.	Dr.R.S.Biradar



10.	FRM-231	Mr.Ramalingaiah.D.	Biology and Population Studies on <i>Oreochromis niloticus</i> (Linnaeus,1758) and <i>Oreochromis mossambicus</i> (Peters, 1852) from Selected Reservoirs of Nellore Region, Andhra Pradesh.	Dr.S.K.Chakraborty
11.	FBM-280	Mr.Suman Sekhar Samal	Brackishwater Aquaculture Development in East Coast States of India : Critical Evaluation of Policies, Regulations and Programs.	Dr.R.S.Biradar
12.	FB-247	Mr.Arup K. Choudhary	Cellular and molecular Responses to Thermal Stress in <i>Labeo rohita</i> (Hamilton)	Dr.A.K.Pal
13.	FRM-281	Ms.Sajina A.M.	Stock Structure Analysis of Horse Mackerel, <i>Megalaspis cordyla</i> (Linnaeus, 1758), along Indian Coast	Dr.S.K.Chakraborty
14.	FRM-206	Mr.Anil Pawse	Stock Discrimination of <i>Lactarius lactarius</i> (Bloch and Schneider, 1801) from Indian Waters	Dr.S.K.Chakraborty
15.	FRM-283	Ms.Soma Das	Morphological and Molecular Characterization of <i>Sargassum</i> spp. from Selected Locations along Indian Coast.	Dr.Geetanjali Deshmukhe
16.	FRM-259	Mr.Debabrata Panda	Biology and Stock Assessment of two species of Carangids from Mumbai Waters	Dr.S.K.Chakraborty
17.	FB-213	Mr.Janmejay Parhi	Molecular Cloning and Characterisation of Interferon Gene from <i>Labeo rohita</i> .	Dr.M.Makesh



## Number of M.F.Sc. students who have submitted Dissertations

Sl.No.	Regd. No.	Students Name	Name of Guide	Title of Dissertation
1.	AEM-04	Lianthuamluaia	Dr.P.K.Panday	Characterization of Arsenic resistant bacteria and evaluation of their remediation capacity
2.	AEM-05	Shashi Bhushan	Dr.Shukla S.P	Optimization of Growth Condition for Outdoor Mass Cultivation of <i>Spirulina platensis</i>
3.	AEM-06	Manimekalai, D	Dr. C.S. Purushothaman	Characterization of Hydrocarbon-degrading bacteria from polluted sites
4.	AEM-07	Deepti R. Nair	Dr. Vennila A.	Nutrient and Microbial Dynamics during the Decomposition of <i>Acanthus Illicifolius</i> and <i>Avicennia Marina</i> Leaf Litter
5.	AQ-226	Mukesh Kumar Birwa	Dr. V.K.Tiwari	Effect of rearing temperature on growth and maturation of Gold Fish, <i>Carassius auratus auratus</i> (Linnaeus, 1758)
6.	AQ-228	Abhay Kumar Giri	Dr.Neelam Saharan	Carbohydrate utilization and immune status of <i>Labeo rohita</i> fingerlings fed with chromium
7.	AQ-229	Aritra Bera	Dr. Paramita Sawant	Effect of Hypoxia on Physiological Responses of Gold Fish, <i>Carassius auratus</i> (Linnaeus, 1758)
8.	AQ-230	Charan, R.	Dr. G.Venugopal	Effect of Aromatase Inhibitors on Gonadal Maturation of Stunted Year Lings on Rohu ( <i>Labeo rohita</i> )
9.	AQ-232	Sapan Kumar Patra	Dr.N.K.Chadha	Manipulation of reproductive parameters through altered photoperiod regimes in Gold Fish, <i>Cararrius auratus auratus</i> , (Linnaeus, 1758)



10.	AQ-233	Srijila C.K.	Dr. Babita Rani	Effect of short term feed restriction and subsequent feeding on compensatory growth of Rohu, <i>Labeo rohita</i> (Hamilton, 1822)
11.	AQ-234	J. Raymond Angel	Dr. Kiran Dube	Growth enhancement in Peal spot, <i>Etroplus suratensis</i> (Bloch, 1790) using molecular techniques
12.	FNB-36	Pankaj Kumar	Dr.K.K.Jain	Studies on alternate feeding of normal and low protein diet on growth performance of <i>Labeo rohita</i> (Ham.) fingerlings
13.	FNB-39	Ranjan Singh	Dr.Munil Kumar	Utilization of maize by-product in diet of <i>Labeo rohita</i> fingerlings
14.	FNB-40	Antony J. Prabhu	Dr. Sanjay Jadhao	Nutritional strategies to counter effects of endosulfan and temperature on productive and physiology in Tilapia
15.	FNB-41	Ferosekhan, S.	Dr.Subodh Gupta	Development of Chitosan Nanoparticle based delivery system of Yeast RNA for <i>Labeo rohita</i> Fingerlings
16.	FRM-212	Swatipriyanka Sen	Dr.Ashok Jaiswar	Stock identification of Indian scad <i>Decaptenes russellil</i> (Ruppell, 1830) along the Indian coast
17.	FRM-213	Pralaya R. Behera	Dr. S.K.Chakraborty	Marine Ichthyofauna Biodiversity off Mumbai Coast
18.	FRM-214	Amod A. Salgaonkar	Dr.R.S.Biradar	A study of temporo-spatial changes in inland water bodies of Ratnagiri district using Remote Sensing and GIS
19.	FBM-30	Shirke Swapnil S.	Dr. Nalini Ranjan Kumar	A comparative study of traditional and modern marine fish supply chain in Mumbai District





20.	FBM-31	Brijesh Kumar	Dr.R.S. Biradar	An Economic Analysis of Fish Production and Marketing in Bharatpur District of Rajasthan
21.	FBM-32	Ramkumar, K.	Dr. Swadesh Prakash	An Analysis of Aquaculture Credit Utilization Pattern of Fish Farmers in Thanjavur District of Tamil Nadu
22.	FBM-33	Rashmi S. Ambulkar	Dr. Arpita Sharma	Study of Leadership Styles and Approaches of Leaders of Fisheries, Agriculture and Veterinary Education in Maharashtra
23.	FGB-36	Nagulu Banoth	Dr.Gopal Krishna	Estimation of the growth curve parameters of <i>Macrobrachium rosenbergii</i>
24.	FGB-37	Trivesh S. Mayekar	Dr.R.S.Rana	Molecular characterization of Leptin (obese) Gene from Asian Sea bass, <i>Lates calcarifer</i> (Bloch, 1790)
25.	FGB-38	Mohd. Ashraf Rather	Dr.Rupam Sharma	Development of Polymer based pituitary Hormone nanoparticles for fish breeding
26.	FGB-39	Kavita Kumari	Dr.Aparna Choudhary	Expression Studies of Salt Homeostasis Genes in <i>Penaeus monodon</i>
27.	FGB-40	Satyanarayana Yanda	Dr. S.Jahageerdar	Pedigree assigning and parentage determination in <i>Macrobrachium rosenbergii</i> using microsatellite markers
28.	FGB-41	Sankar, M	Dr.A.K.Reddy	Breeding larval development and characterization of 16S ribosomal RNA gene in <i>Microbrachium vilosimanus</i>



29.	FPM-37	Rakesh Das	Dr.R.P.Raman	Heamato-immunological and biochemical responses in <i>Labeo rohita</i> (Ham.) treated with dietary <i>Ocimum sanctum</i> extract
30.	FPM-38	Mary Lini R.	Dr.K.Pani Prasad	Studies on the Effect of <i>Aeromonas hydrophila</i> Infection on CASPASE-3 Expression and Activity in Rohu, <i>Labeo rohita</i> (Hamilton)
31.	FPM-39	T.Satish Kumar	Dr. K.V.Rajendran	Detection and Quantification of Laem-Singh Virus (LSNV) in different species of Penaeid shrimps
32.	FPM-40	Saravanan K.	Dr.M.Makesh	Molecular cloning and characterization of Immunoglobulin M Heavy chain Gene in Rohu, <i>Labeo Rohita</i> (Ham.)
33.	FPM-41	Anutosh Paria	Dr. K.V.Rajendran	Off-target effect of dsRNA on prophenoloxidase (propo) expression in <i>Penaeo is monodon</i>
34.	FPM-42	Dhamotharan,K.	Dr.Gayatri Tripathi	Immunologicalisation of $Na^+$ , $K^+$ - ATPase in the Gills of <i>Panaeus mosodon fabricius</i>
35.	FEX-05	Manali S. Pawar	Dr.Mishra Sumanta	A Study on Fisheries Extension Service Delivery System in Maharashtra
36.	FEX-06	Ajay Anand, G.	Dr.S.N.Ojha	Performance Appraisal of Field Functionaries in Department of Fisheries, Tamilnadu
37.	FEX-07	Vichare Priyanka S.	Dr.Ananthan P.S	A Study on Effect of Migration on Livelihood of Coastal Fishers in Maharashtra



38.	FEX-08	Sabari Shankar S.	Dr. Sheela Immanuel	An Analysis of Knowledge Level of Fisherfolk about Marine Fisheries Management and Conservation Measures
39.	FEX-09	Banti Debnath	Dr. Arpita Sharma	Indigenous Technical knowledge in Fisheries of Tripura
40.	PHT-52	Jesmi Debbarma	Dr. S. Basu	Studies on control of fish spoilage and fish borne pathogens by application of essential oils
41.	PHT-53	Biswajit Bal	Dr. B. B. Nayak	Isolation and characterization of <i>Yersinia</i> from Seafood of North Mumbai Region
42.	PHT-54	Remya S.	Dr. S. Basu	Physico-Chemical Characteristics and oxidative stability of Pufa fortified shrimp analogues
43.	PHT-55	Kousalya Devi S.	Dr. B. B. Nayak	Isolation and Identification of Shiga like Toxin-producing <i>Escherichia coli</i> (STEC) from Fish and Shellfish of North Mu
44.	PHT-56	Jitender Kumar J.	Dr. S. Basu	Extraction and characterisation of gelatin from Ghol ( <i>Protonibea Diacanthus</i> )
45.	PHT-57	Laly S. J.	Dr. G. Venkateshwarlu	Study on lipid quality of Indian mackerel during different cooking methods



## Institutional Projects

### 1. Aquatic Environment and Health Management Division

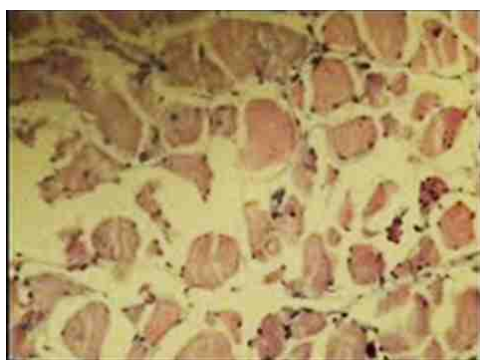
**1. Project title: Commonly occurring parasitic diseases of freshwater ornamental fish in Mumbai region - Devising herbal based therapy**

**Project Duration: - 2008-2011**

**Project Personnel: PI- R.P. Raman, Co-PIs- Chandra Prakash, Kundan Kumar**

#### Achievements:

Two parasites have been isolated from goldfish and have been identified as *Argulus* sp. and *Lernaea* sp. Treatment experiments were conducted using two herbal ingredients, viz., Azadirachtin (EC 25%) from Som Phytopharma, and Piperine from Sigma-Aldrich. *Argulus* of heavily infested goldfish was gently picked and put into a petri dish with the help of a soft brush. Ten live active parasites were manually transferred into a petri dish. They were treated with 1, 5, 10, 15 and 20 ppm Azadirachtin. Every half an hour, the number of killed parasites was counted. Parasitic dead



*Muscular degeneration at the site of Argulus infection.*

was considered when the organism did not exhibit any movement after 5 minutes of observation and after a slight touch with a feather forceps. The experiments were conducted in triplicate and compared with a

control under the same test conditions with 2% DMSO but without any extract. The complete mortality of this parasite was observed in 20 ppm Azadirachtin. Similarly, experiments were conducted with 1, 2, 3, 4 and 5 ppm of Piperine against the *Argulus* spp. Complete parasite mortality was observed in 5.0 ppm Piperine. Further research work is in progress.

**2. Project title: Development of monoclonal antibody based immunodiagnostic technique to quantify immune response in *Cirrhinus cirrhosus* and *Pangasianodon hypophthalmus***

**Project Duration: - 2010-2013**

**Personnel: PI- M. Makesh, Co-PIs- K.V. Rajendran, Suresh Babu**

#### Achievements:

*Cirrhinus cirrhosus* and *Pangasianodon hypophthalmus* were immunized intraperitoneally with bovine serum albumin emulsified in Freund's complete adjuvant. The fish were boosted twice at 15 days interval with BSA in Freund's incomplete adjuvant. The fish were anaesthetized and bled from the caudal vein. Serum was separated and the immunoglobulin was purified using BSA CL-Agarose columns. The purified IgM was eluted in 0.5 ml fractions and an aliquot was run on SDS-PAGE. Those elutes giving specific band of IgM heavy chain and light chain were pooled, dialysed and concentrated. The molecular weight of heavy chain and light chain of IgM of *C. cirrhosus* and *P. hypophthalmus* were estimated by SDS-PAGE. The molecular weight of heavy



chain and light chain of IgM of *C. cirrhosus* were 88 kDa and 27 kDa, respectively, while the molecular weight of heavy and light chain of *P. hypophthalmus* were 63 and 23 kDa respectively. The total IgM purified was estimated and was used to immunize balb/c mice for the purpose of monoclonal antibody production. IgM was emulsified with equal quantity of Freund's complete adjuvant and administered to mice intraperitoneally at the rate of 50 µg per mice. The mice were boosted twice at 14 days interval with the same dose of antigen emulsified in Freund's incomplete adjuvant. A final I/V booster was given three days before fusion and the sensitized B-lymphocytes were harvested from the immunized mice and were fused with myeloma cells using PEG as the fusogen. The fused cells were plated in HAT medium in 96-well tissue culture plate previously seeded with feeder cells. The hybridoma clones are being screened by ELISA for the secretion of antibodies.

**3. Project title: Isolation, identification and characterization of common pathogens of *Pangasius* stocks.**

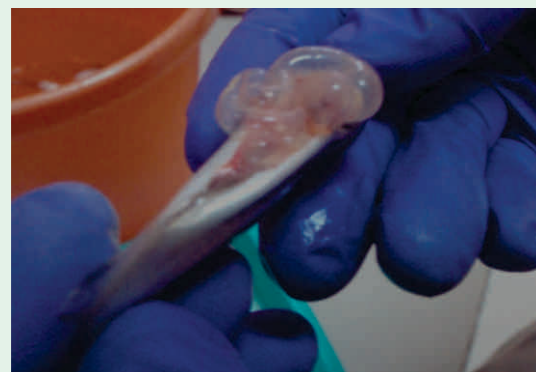
**Project Duration:** - 2010-2013

**Personnel:** PI- K. Pani Prasad Co-PIs- Gayatri Tripathi, R.P. Raman, Kundan Kumar

**Achievements:**

Samples of *Pangasius* were collected from Bhiavaram, Andhra Pradesh and Thane region of Maharashtra and isolation of bacteria has been done. After the biochemical characterization, it was

confirmed as *A. hydrophila*. The bacteria isolated were resistant to a large number of antibiotics. Gill tissue showed most degenerative, necrotic, proliferative diffuse changes on histopathological examination of various tissues from *Pangasius hypophthalmus* diseased fishes. There were no parasites or cyst formation in the tissue sections.



## 2. Aquaculture:

**1. Project title: Developing strategies for fisheries enhancement of Dimbhe reservoir, Maharashtra through management interventions and community participation**

**Project Duration:** - 2006-2011

**Personnel:** PI- M. P. S. Kohli Co-PIs- Neelam Saharan, Kiran Dube Rawat, Latha Shenoy, V. K. Tiwari, Chandra Prakash

**Achievements:**

During the year Reservoir has been stocked with 8 lakh 56 thousand fingerlings of major carps. For improving of productivity of the reservoir, Dhencha (*Sasbania aculate*) has been planted. Soil organic carbon got increased from 0.45% to 0.70%; Net primary productivity of the reservoir has increased from 225 mg / C / cubic meter / day to 265 mg C / cubic meter / day. Fish catch data of five years indicated



that earlier catch was mainly composed of minor varieties or *Chela* spp. Later years showed a steady increase in Catla and

other carps. During the year 2006, carps caught were 750g to 1kg, whereas during 2007-2008, 2-3 kg, during 2008-2009 4-5 kg and during 2009-2010 onwards even 6-7 kg catla and other carps are being reported in the catch. In the year 2006-07 the Catla and other carp catch was 3670 kg, in 2007-08 it was 10240 kg, 2008-09 it was 11567 kg and in 2009-10 it was 16340 kg, showing a steady increase in production of catla and other carps. The gross sales of the fish increased from Rs 5.10 lakh to Rs 7.43 lakh in the year 2009-10 as compared to 2006-2007. Current rate of carps is Rs 60/- per kg and of chela is Rs 18/- per kg.

**2. Project title: Environmental impact of Fipronil : Presence in water and soil, effect of Fipronil and its metabolites on common edible fish *Labeo rohita* (Rohu) and bioremediation studies.**

**Project Duration: - 2008 - 2011**

**Personnel: PI-Neelam Saharan Co-PIs- Prem Dureja, P. K. Pandey and Gayatri Tripathi**

**Achievements:**

Isolation of fipronil resistant bacteria from fipronil fortified aquatic media was done. Characterization of fipronil resistant bacteria was carried out.

Evaluation of isolated bacteria was done for fipronil resistance and selected isolates for their bioremediating capacity. PCR Product sequence analysis was done to find out which bacterial species were having fipronil resistance. The following bacterial types were found to be fipronil resistant after sequencing result.



*Staphylococcus epidermidis* (FJ613563.1) matching 99%, *Bacillus* sp (HM160520.1) matching 99%, *Bacillus cereus* (GQ985504.1) matching 97%, *Comamonas aquatica* (HQ292695.1) matching 97%. The bacteria were isolated and characterized on the basis of their shape, color, size and opacity. Pure bacteria (separately) were cultured in the nutrient agar media having different concentration of fipronil, like 0.5ppm, 1ppm, 2ppm, 5ppm, 10ppm, 15ppm, 20ppm, 50ppm, upto 100ppm. All bacteria grown upto 100ppm fipronil were observed which indicates all the bacteria having fipronil resistance upto 100ppm. Pour plate method was followed to observe different bacterial colony numbers. Bioremediation studies were carried out @ 10ppm and 20ppm concentration of fipronil with bacterial culture at the interval of 5 day and 10 day period.

### 3. Fisheries Economics, Extension and Statistics Division:

#### 1. Project title: Documentation of ITK's in Fisheries Sector

**Project Duration:** - 2009-2011

**Personnel:** PI- Dr. Arpita Sharma, Co Pls- Rupam Sharma, S.P. Shukla, R.S. Biradar, Paromita Sawant, Suresh Babu, G. Venugopal

#### Achievements:

This project envisaged to document the



wide range of existing information about ITK in the fisheries sector of India and to develop resource books through writeshop approach. The ITK themes were fish harvesting, aquaculture, processing, therapeutics, water quality, biodiversity. About 81 ITKs from the North East, 75 ITKs from the East coast, 67 ITKs from West Coast and 78 ITKs from Central region were documented. Seminar and a Writeshop on 'Pracheen Sahitya Mein Matsya Evam Matsyiki Sampada at CIFE, Mumbai and Gurukul Kangdi university, Haridwar has resulted in a book on Fish and Fisheries in ancient literature in Hindi.

#### 2. Project title: An appraisal of public sector extension delivery system in

#### fisheries

**Project Duration:** April 2009 to March 2012

**Personnel:** PI- Sheela Immanuel Co-Pls- S.K. Mishra, N.R.Kumar, P.K.Roy, V. Harikrishna and Somdutt

#### Achievements

Data were collected from 72 fishermen from Maharashtra and 21 state department officials. The state department of fisheries of Maharashtra are actively involved in the implementation of Maharashtra Marine Fishing Regulation Act (MMFRA) in coastal districts of Maharashtra, leasing of inland water bodies, implementing fishermen welfare schemes, supply of OBM, and IBM to artisanal fishers providing saving cum relief scheme and group accident insurance schemes to fishers conducting long term and short term training. Regarding the development competency of staff of DoF, it was observed that 73.10 per cent had managerial skills followed by technical knowledge (72.67), communication skill (55.20%) social mobilisation skill (53.80%) and training skill (53.67%). So it can be inferred that there is need to improve training skills, communication skills and social mobilization skill of the DoF staff. It was observed that 'Lack of staff strength' was perceived as major constraint by 72.73 per cent DoF staff in delivery of extension services, followed by Infrastructural facilities available with the DoF for training and demonstrations.

#### 3. Project title: Impact Analysis of Food Safety Measures on Export of Fish and

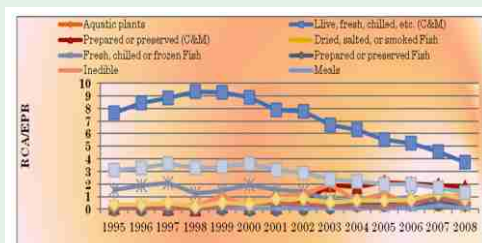
## Fish Products from India

**Project Duration:-2009-2012**

**Personnel: PI-** Nalini Ranjan Kumar, **Co-PIs-** Sheela Immanuel, Swadesh Prakash

### Achievements:

Export of marine products from India has



*Export competitiveness of Indian fish and fish products*

export of marine products from India has increased from less than 2 percent during 1995 to more than 15 percent during 2008.

Export of seafood from India to EU was banned for some time about 6 months during 1997 due to non-compliance of HACCP. Since then it is continuously increasing except during 2007, year of implementation of food traceability. The export to USA rose after the implementation of HACCP in processing facilities in India after 1999 and reached peak during 2002. The issue of residues of different substances and Bio-terrorism Act of USA led to decline export during 2004. The antidumping duty by US on export of shrimp from India further led to decline. Export to Japan started declining owing to muddy smell issue and with the implementation of New Food Safety Basic Law during 2002, the export to Japan declined drastically.

Meanwhile, Indian export to South East Asia, China & Hong Kong and Middle East is increasing. The export competitiveness of Indian marine products was worked out by estimating revealed comparative advantage (RCA) and presented in Fig. 1, which indicates that the export competitiveness on overall basis has declined during the period and decline is steeper during the recent past. However, export competitiveness in case of processed/ preserved products and others like meals, oils, inedible and aquatic plant has increased. India should export value added products which will increase export competitiveness of marine products and increase income and employment in this particular sector which is dominated by poor.

## 4. Project title: Performance Appraisal of Non-Governmental Organizations in Fisheries Development,

**Project Duration: - 2008 - 2011**

**Personnel: PI-** S.K. Mishra, **Co-PIs-** .N. Ojha, Sheela Immanuel, Arpita Sharma, Swadesh Prakash, Archana Sinha

### A. Findings on NGO field functionaries

Only 14.29% of the field functionaries possessed professional diploma/degrees in fisheries or allied subjects. Their





major source of fisheries information was their own NGO staff (83.04%) followed by 'Trainings and Workshops'. 'Inadequate infrastructural facility for training and demonstrations' (73.21%) was perceived as their major constraint followed by 'Inadequate technical training' provided (71.43%) and 'Inadequate funds for undertaking different activities'.

#### **B. Findings on NGO beneficiary fish farmers/fishers**

57.00% of beneficiaries were fully satisfied with the performance of the NGOs in fulfilling their expectations and needs, while 27.83% partially satisfied and 15.17% were not satisfied.

#### **C. Findings on non-beneficiary rural stakeholders**

As per the other non-beneficiary rural stakeholders like rural leaders and academicians, the NGOs were doing very good work in 'Fish Technology Transfer' (81.00%); 'Community Mobilization (SHG formation)' (80.50%); in providing a 'Social Safety networks' (57.50%); 'Agricultural technology transfer' (52.50%) and 'Income Generating activities through micro-enterprises' (34.00%). Overall, 54.50% of them were fully satisfied with the performance of the selected NGOs followed by partially satisfied (33.00%) and not satisfied (12.50%).

#### **Conclusions:**

It is suggested that NGOs working in fisheries and allied areas must recruit qualified professionals, provide them necessary in-service and regular refresher training to update their

knowledge, improve infrastructural facilities for hands-on training.

#### **5. Project Title: Development of marketing Strategy for fish and fish-products for Coastal Areas**

**Project Duration: 2008-2011**

**Personnel:** PI- Swadesh Prakash Co-PIs- N.R. Kumar, S.K. Mishra, Rama Sharma

#### **Achievements:**

The study was an attempt to identify the existing marketing system and to determine its economic features and efficiency for fish marketing in eastern and western coastal areas of India. Purchase price, transportation and icing cost are the major determinants of selling price having positive and significant coefficients of 1.36026, 2.78497 and 2.44560, respectively. Majority of fishes are being sold in fresh (71%) followed by dry fish (16%) and preserved (11%). The highest post harvest losses about 35% occurred due to longer exposure at high temperature followed by 25% rough handling and excessive pressure during the transportation. A little damage in quality leads to sharp decline in the prices. Majority of large traders (70 %) have a



*Small fish selling at Near High way*

fixed backward and forward linkage for their business. Dried fish processing and trading may provide employment and income for large numbers of people through value-added activities for coastal communities in long-term. A number of constraints reported during the marketing are: perishability/spoilage of the product with RBQ 84.71, followed by high cost of transportation and icing, price fluctuation, lack of market information, lack of modern infrastructure. There is need to develop efficient transportation and integrated marketing information systems, adequate supply of ice, modern hygienic infrastructure to the landing/marketing site, etc.

#### 4. Fish Genetics and Biotechnology Division

**1. Project title: Performance Evaluation and Mass selection for Important Economic traits in *Penaeus* Species.**

**Project Duration:** - 2009-2012

**Project Personnel:** PI: Gopal Krishna, Co- PIs: Shrinivas Jahageerdar, A.K. Reddy, P. Gireesh Babu, S Dasgupta, A K Pal

##### Achievements



The *P. monodon* farmers were identified in the vicinity of west coast and the ponds were stocked with the post larvae of different families in the same pond. At the time of harvesting, larger animals were segregated and stocked in separate ponds for further maturation. The size of the animals ranged from 80 to 110 gm. The hormonal profile of the individuals is being studied to assess the maturity status. Also a biotechnological approach that is silencing of GIH gene using a DNA construct expressing lhrRNA is being used to see its effect on maturation. For this Primers to amplify the full length Gonad inhibiting hormone (GIH) gene of *P. monodon* were designed and got it synthesized from Bioserve biotechnologies Pvt Ltd., Hyderabad. Total RNA from the eyestalk of adult *P. monodon* was isolated using Trizol reagent and first strand cDNA prepared by RT-PCR. PCR conditions to amplify GIH gene were standardized and the 300 bp amplicon was cloned in pTZ57R vector and sent for sequencing for sequence confirmation.

The farmers have been identified for collection of the *P. indicus* and rear them for maturation in the pond. Wild collection of *P. indicus* stock was done during September-October 2010 in Kakinada and the juveniles were acclimatised at the centre and transported to CIFE, Mumbai. However, the juveniles could not survive for more than 15 days due to out break of disease.

**2. Project title: Genetic Evaluation and Genetic characterization of two new candidate species for aquaculture *Macrobrachium villosimanus* & *Osteobrama belangeri* (Pengba)**

**Project Duration:** - 2008-2011

**Project Personnel:** PI- A. K. Reddy, Co-PIs- Rupam Sharma, Gopal Krishna, Aparna Chaudhari, Gayatri Tripathi, Pavan Kumar, Gireesh Babu, and S.S.H. Razvi

**Achievements:**

#### ***Macrobrachium villosimanus***

*M. villosimanus* matured and bred under captive conditions 3-4 times during May-October, 2010. Breeding and larval rearing techniques standardized for commercial seed production. Incubation



period varied between 14-17 days, the larvae hatched and completed life-cycle in 24-27 days at salinity 10-12 ppt and identified 11 larval stages. The 12s rRNA, 16s rRNA and COI genes of *M. villosimanus* were cloned and sequenced. It was observed that *M. villosimanus* is more closely related to *M. malcomsoni* and *M. gangeticum* followed by *M. rosenbergii* as revealed by the 16s rDNA analysis. The nucleotide composition analysis showed that the 16s rRNA, 12s rRNA and COI sequences are AT rich in *M. villosimanus*. The intraspecific sequence divergence analysis revealed 73/563, 43/403 and 64/648 variable sites in 16s rRNA, 12s rRNA and COI sequences,

respectively. The 16s rRNA and COI sequences obtained for *M. villosimanus* were submitted to NCBI database (HM751940 and HM751939). Diploid Chromosome number found to be 116.

#### ***Osteobrama belangiri***

Pengba was successfully bred at CIFE Kakinada and Powarkheda Centers, and at CIFE, Mumbai. Spawn reared successfully in cement and earthen nursery ponds at CIFE Kakinada and Powarkheda Centers and achieved an average survival of 34%. Supplied spawn, fry and fingerlings to the farmers in Andhra Pradesh. Pengba attained an average size of 325 g, 275 g and 235 g at CIFE Kakinada, CIFE Powarkheda and CIFE Rohtak Centers in 12 months, respectively. In farmers ponds of Andhra Pradesh it attained an average size of 540g and 750g in 16 months and 2 years, respectively. At CIFE, Powarkheda centre the fish attained an average size of 450 g in 1 year and 4 months. At CIFE, Rohtak centre fish gained an average size of 175g within a year, at CIFE, Mumbai the Pengba attained a size of 225 g in a year in cement tanks.

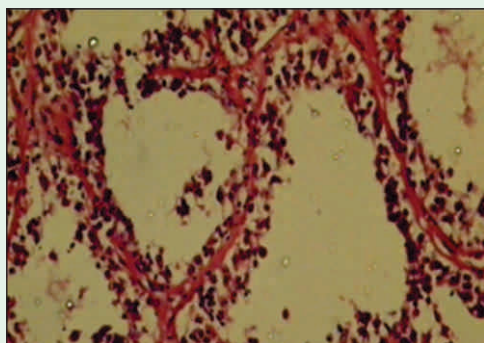
### **3. Project title: Characterization and nanoencapsulation of fish pheromones for using in Fish reproduction**

**Project Duration:** - 2008-2011

**Personnel:** PI- Rupam Sharma, Co-PI- Dilip Kumar, Munil Kumar, S. Gupta, S.D. Singh and Deepa Bhagat (PDBC)

#### **Achievements**

Nanoparticles of Gold, Silver and Chitosan were developed and characterized. The particle sizes were



found to be 87.6 nm, 212 nm and 125.8 nm for Gold, Silver and C h i t o s a n , respectively. Later on Nano particles of the pheromones already isolated from the water samples were developed and characterized. These nanoparticles have also been encapsulated with LH-RHA. Preliminary examination shows positive encapsulation. The particles showed a size range of 65 nm to 245 nm while analyzing through particle size analyzer for confirmation of the size of the particles. The electron microcopy study was conducted for all the nanoparticles. Further, histological studies were conducted on development of testes and ovary of *Clarias batrachus* in different seasons. The structure of inter-tubular septum of *C. batrachus* was compared with *C. gariepinus* and *L. rohita*. Effect of different stimuli on gonadal maturation in *C. batrachus* was also investigated.

#### 4. Project title: A Comparison of Genetic Parameters for Economic Traits in *Macrobrachium rosenbergii* Reared in Different Production Environments

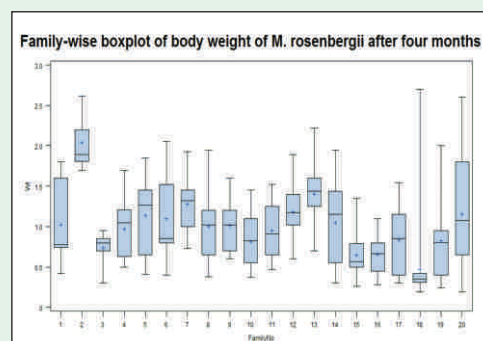
**Project Duration:** - 2009-2012

**Personnel:** PI- Shrinivas Jahageerdar Co-PI- Somdutt, Gopal Krishna, Pawan Kumar, Suresh Babu, Kundan Kumar

##### Achievements

The project aims at evaluating the performance of the *Macrobrachium rosenbergii* population in various production environments and to develop

appropriate breeding plan for the dissemination of the improved genetic material. To achieve this the twenty full-sib families produced were reared family wise at Powarkheda center of CIFE. The sampling was done periodically and the information was collected on economic traits. The data were standardized and analysed for the genetic and non genetic parameters. The heritability for the body weight and body length was  $0.73 \pm 0.04$  and  $0.71 \pm 0.02$ , respectively. The breeding values for each family were also estimated. The study of muscle fiber dynamics is also being studied to study and compare the



development of muscle tissue in various morphotypes of *rosenbergii* and know the genetic mechanism involved in them.

#### 5. Fish Nutrition, Biochemistry and Physiology Division

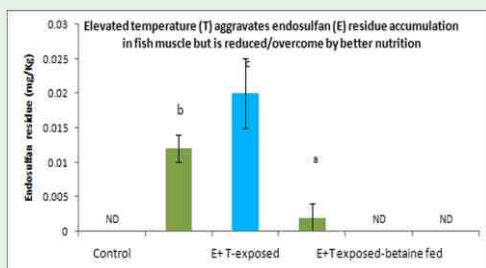
**1. Project Title:** Nutritional strategies to mitigate physio-pathological effects of endosulfan in fish

**Project Duration:-** 2008-2011

**Personnel:** PI-Sanjay Jadhao Co-PIs-Subodh Gupta, S. Munilkumar, S Dasgupta

Concurrent exposure of fish to temperature aggravates endosulfan





accumulation in fish muscle. Whereas extra 0.1% choline significantly ( $P < 0.05$ ) reduced residue in muscle when fish is exposed to endosulfan alone or concurrently with higher temperature, no residue was detected in fish fed supplemental 0.5% betaine and 2% lecithin. Endosulfan exposure reduced ( $P < 0.05$ ) 11- ketotestosterone (11-KT), and induced vitellogenin in males, with further aggravation of this effect due to concurrent exposure on vitellogenin level, but not 11-KT. Endosulfan decreased estradiol and increased  $17\alpha$ -OH progesterone and concurrent exposure to temperature aggravated these effects. Methyl donors especially betaine and lecithin reversed many of these effects. The effects of endosulphan with elevated temperature have been checked with or without methyl donors. The biochemical and histo-pathological investigations of different organs for experimental fish have been done and it was found that methyl donors may be exploited for mitigation of the stresses due to endosulfan (pesticides) with and or without elevated temperature in fish.

**2. Project Title: Molecular analysis of growth/peptide hormones from food fishes (Mullet/ seabass)**

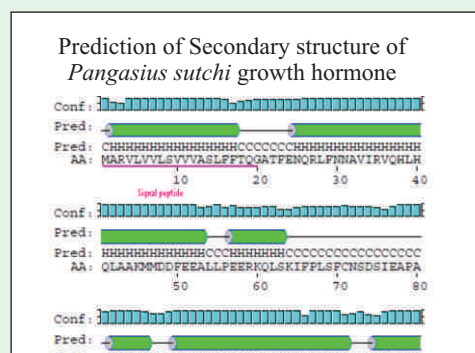
**Project Duration: - 2008-2011**

**Personnel: PI. Subodh Gupta, Co PI: R.S. Rana**

#### Achievements:

Asian Seabass, *Lates calcarifer* (about 500g live weight) were procured from Kharland Research Station, Panvel, Navi Mumbai and tissues - fin, liver and pituitary

glands were dissected out and preserved in cell lysis buffer at 40 C for further use in molecular characterization of peptide hormone genes. Oligonucleotide primers were designed from online available nucleotide data base for leptin (Obese) gene of NCBI gene bank and PCR reactions were set up. cDNA gene of about 350 base pair for IGF 1 was amplified using RT-PCR and utilized for molecular cloning into E. coli /pTZ plasmid vector. Total RNA was isolated from liver of Asian Seabass, *Lates calcarifer*. The leptin (Obese) encoded gene of Asian seabass by was amplified RT-PCR and cloned in plasmid vector pTZ57R/T in and further characterized by restriction enzyme analysis and colony PCR. After confirmation, leptin (obese) gene has been sequenced commercially and submitted for NCBI gene bank for getting accession number. The full length gene encoding growth hormone of Pangasianodon hypophthalmus was synthesized using modified Homology based rapid amplification of cDNA ends (H-RACE) strategy. The full length gene has



1066 bp that encodes 200 amino acids long polypeptide chain of Pangasianodon hypophthalmus 's growth hormone. The primary, secondary and tertiary structure of P. hypophthalmus growth hormone were predicted with help of NCBI cd3N and Swiss Prot ExPasyProtparam online proteomics tools. Data, received from all research personnel were compiled and analysis was done. Final report of project is in progress.

## 6. Fisheries Resource Harvest and Post Harvest Management Division

**1. Project Title:** Impact of juvenile fishery on fish production along the west coast of India.

**Project Duration:** 2009-2012

**Personal:** PI- S.K. Chakraborty, Co-PIs- Latha Shenoy, G. Deshmukhe, A. K. Jaiswar, Asha T. Landage, Zeba Jaffer Abidi, S.K. Patil

### Achievements:

A total of 36 species of fish have been collected from the landing centres which includes Porbander and Veraval from Gujarat, union territory of Diu and Sessoon Docks, New Ferry Wharf, Versova, Bhyander and Mirkarwada from Maharashtra. For bigger species like



*Protonibea diacanthus*, *Otolithoides biauritus*, *Muraenosox telabonoides* and *Pomadasys hasta* all the specimens were juveniles. The young ones of *Pampus argenteus* were also collected in huge quantities, similarly another bigger species of rock cod, *E. diacanthus* was landed with juveniles contributing about 70-80%. In case of other bigger species like the seer fish - *Scomberomorus guttatus*, *S. commersoni*, *S. lineolatus* were also recorded with large number of juveniles.

The market rates of the juveniles and adults have been worked out. The loss to the fishery because of larger quantities of juveniles being landed is being worked and assuming that about 50% of the medium sized specimens are dying due to natural causes, the loss to the adult population is being worked out.

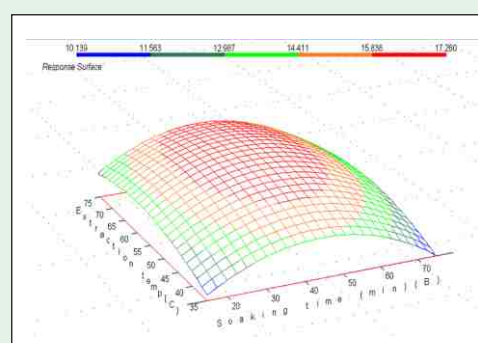
**2. Project title:** Studies on improvement of rheological and functional properties of fish gelatin

**Project Duration:** - 2010-2013

**Personnel:** PI- G.Venkateshwarlu, Co-PIs- B.B. Nayak, Nagalakshmi. K

### Achievements:

The skins of three fishes namely Tiger toothed croaker (*Otolithes ruber*), Pink



perch (*Nemipterus japonicus*) and Ghol (*Protonibea dicanthus*) were selected for extraction of gelatin which yielded (%)  $6.35 \pm 0.12$ ,  $3.5 \pm 0.22$  and  $14.65 \pm 1.21$  respectively. To optimize the extraction conditions for gelatin production from skin of Ghol (*Protonibea dicanthus*), response surface methodology (RSM) was adopted by following central composite design to determine the optimal conditions of four independent variables (concentration of NaOH - X1, soaking time - X2, and extraction temperature - X3 and extraction time - X4). The model obtained by RSM produced a satisfactory fit to the data with regard to the gelatin extraction (for gelatin yield,  $R^2 = 0.867$ ,  $p = 0.0003$ ; for Bloom strength,  $R^2 = 0.837$ ,  $p = 0.007$ ; for melting point,  $R^2 = 0.765$ ,  $p = 0.01$ ). Based on the model obtained by RSM, the gelatin yield was improved in Dhoma (from 6.35 to 7.56%) and in Pink Perch (from 3.5 to 5.57%) by following optimal extraction conditions.

## CIFE Centres

### Kakinada

**1. Project Title: Studies on Viability of *Litopenaeus vannamei* Culture in India**

**Project Duration: - 2009-2012**

**Personnel:** PI- S.S.H. Razvi, Co-PIs- Suresh Babu, P. V. K. Sharma, V. Hari Krishna, K. V. Rajendran, M. Makesh, P.S. Ananthan

#### Achievements:

In 2010 -11, two crops were successfully carried out. For first crop varying stocking densities such as 10, 20, 30 /  $m^2$  were adopted and for the second crop a stocking density of 20 /  $m^2$  was adopted.

For both the crops same management practices were adopted. Ponds were filled up to 1.25 m depth, treated with 30 ppm chlorine to kill predators, weed fishes, crabs and insects. Pond fertilization was done using inorganic fertilizers and organic manures, *Litopenaeus vannamei* PL (8-10 mm) were procured from CP Hatchery at Gudur and after thorough acclimatization released in the culture ponds. Regular monitoring of water quality such as pH, temperature, transparency and DO was done and recorded and soil quality was also tested regularly. In all the ponds aeration was given using long arm aerators. The soil quality parameters were analysed once in a fortnightly.

The plankton samples have been collected once in fortnightly and analysed qualitatively. The post larvae have been screened for WSSV and MBV at the molecular biology laboratory of the centre.

The samples have also been screened for WSSV and MBV at the Pathology and Microbiology laboratory of CIFE, Mumbai. All the tests showed that the PL is free from these viruses. Microscopic





examination of the PL revealed that no ecto-parasites are present and the PL are healthy. The same samples were screened for different viruses such as WSSV, MBV, TSV and LSNV at the Pathology and Microbiology Laboratory of CIFE, Mumbai and found that the post larvae were free from all the viruses except a positive result of LSNV was observed even though no predominant observations of slow growth observed in the shrimps. Screening of the shrimp samples for WSSV and MBV at the molecular biology Laboratory of the centre fortnightly and found that the shrimps are free from the pathogens.

The samples have also been screened for WSSV, MBV, TSV and LSNV using PCR at the Pathology and Microbiology Laboratory of CIFE, Mumbai monthly. The shrimps were found to be free from WSSV, MBV, and TSV. But the presence of the virus LSNV was observed from some of the samples screened even though no predominant observations of slow growth observed in the shrimps.

No epicomensals or ecto-parasites were observed. The shrimps were free from harmful vibrios as indicated by bacteriological analysis. TPC and *Vibrio* sp load analysis of soil and water were done at pre stocking and post stocking at every fortnight intervals. In the first crop shrimps at 10 / m<sup>2</sup> showed maximum growth than at 20 / m<sup>2</sup>. After the total culture period of 72 days shrimps were harvested by complete draining of the pond. An average survival ranging from 80 to 84 % was obtained from the ponds. A total production of 1.4 tonnes/ ha, 2.8 tonnes/ ha, and 4.2 tonnes/ ha were obtained respectively for 10, 20, 30 / m<sup>2</sup>



*Transgenic experiments by induced spawning method*

stocking densities. In the second crop a production ranging from 3 to 3.8 tonnes/ ha has been obtained with survival ranging from 90 to 96 % and with an FCR ranging from 1:1.2 to 1:1.6

## **2.Project Title: Genetic evaluation of Stock of Indian catfish *Clarias batrachus***

**Project Duration: - 2008-2012**

**Personnel: PI- S.S.H. Razvi Co-PIs- Gopal Krishna, G. Venugopal**

### **Achievements:**

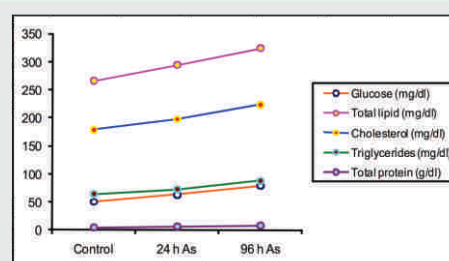
Five breeding trials were taken with different stocks of magur during August - September 2010. Almost all the fishes were stripped successfully and shifted the fertilized eggs to hatching tubs. The spawn has survived only till 8-10 days. Severe seed mortality was observed in the hatchery tubs due to unknown etiology. In order to prevent the spreading of the disease the hatchery was disinfected and shut down till the next season. The brood stock gonads were also in the resorption stage. Similar results were also found in the externally funded project on magur where early fry



### Achievements:

Three *Polygonum spp* were collected from the wild and a working nursery of 425 sq. ft. (25 x 17 ft) was established behind the wet lab of CIFE, Kolkata Centre. Voucher specimens of three *Polygonum spp* were deposited to BSI Headquarter, Kolkata for identification. Bed preparation and maintenance of nursery of *Polygonum spp* (e.g. weeding, spraying of insecticide) were done in the line of organic farming so that chemical compositions of plants don't change. To meet up the deficit of plant from the wild source during lean period, propagation through stem cutting of the existing stock was also tried and successful propagation of *Polygonum glabrum* was achieved by this method. This method of propagation is not yet reported in literature for this plant. Aerial part of *Polygonum glabrum* (total fresh wt. 14.5 kg) and *Polygonum hydropiper* (total fresh wt. 9.0 kg.) was collected from the wild. They were washed thoroughly and dried under shade in ambient temperature for three weeks. The dried plant materials were then chopped and ground to fine powdered form with the help of a mixer-grinder. The powder was then stored at room temperature in an air-tight glass bottle for future use and kept in dry airy

place away from sunlight. Both cold and hot extraction of air dried powder was done for different purposes. Cold extraction of 50 g. *P. hydropiper* powder was done at room temperature in 500 ml conical flask and was extracted sequentially by 250 ml of petroleum ether, methanol and distilled water. The flask was swirled/shaken for half an hour to mix and left to stand on the laboratory platform for 24 hours with occasional shaking/swirling. Next day the mixture was filtered to obtain clear solution of extract. The plant material was washed 2 to 3 times with solvent (50 ml each time) and the washings were collected as filtrate. The filtrate was evaporated to dryness under water bath regulated within 50-60°C. For antimicrobial activity study, crude extracts obtained from cold extraction were sent to CIFE, Mumbai. Three kg fresh aerial part of *Polygonum glabrum* was macerated in mixer-grinder by distilled water. Fibrous part was sieved with a cotton cloth. Then the liquid was filtered under reduced pressure. 6L extract so obtained was stored in refrigerator for toxicity study on common carp. Hot extraction of *P. hydropiper* and *Polygonum glabrum* were done in soxhlet apparatus. The powdered plant material was extracted sequentially with different solvents in order of increasing polarity i.e.



Effects on Plasma Biochemical Constituents in Magur







Granular feed was prepared by using the spheronizer.

The experimental feeding trial has been conducted in rosy barb using the prepared experimental feeds. Rosy barb of uniform length (3.55 cm) and weight (0.66 g) were purchased from a commercial aquarium fish farm and were acclimatized to laboratory conditions for two weeks before the start of the experiment. The experiment was conducted for a period of 35 days. Fish fed with marigold diets showed higher absolute growth rate (AGR), specific growth rate (SGR) and relative growth rate (RGR) than fish fed with control and rose petal diet however, variation among the group was not significant. The biochemical composition of fish muscle in terms of moisture, lipid, crude protein and ash content was similar in all the experimental groups. Total carotenoids concentration in the muscle and skin of rosy barb after 5 weeks of experimental feeding trial clearly showed that the total carotenoids concentration increased with the supplementation of marigold meal in the diet. Marigold petal meal was found to be an effective colour enhancer at a cheaper price without any adverse effect on growth and body composition of fish.

### Externally Funded Projects

**Project title 1:- Assessment of Status of Riverine Fisheries and Linking with the Water Quality Restoration Programme - River Godavari in Maharashtra**

**Funding Agency:- Central Pollution**

**Control Board (New Delhi)**

**Project Duration: 2009-2011**

**Project Personnel:** PI- C. S. Purushotaman, Co-PIs- P. K. Pandey, S.P. Shukla, A. Venilla, A.T. Landge, A. K. Jaiswar

#### Achievements:

Samples were collected from Gnagapur dam, Tapovan, Nandur, Madhyaeshwar, Pravara Sangam, Jayakwadi Dam. Paithan upstream, Pathegaon, Dhalegaon and Raheer during pre-monsoon and post-monsoon seasons. Fish sample were collected from all stations other than Tapovan, where the water was found to be polluted with sewage and industrial effluents. Kppergaon was polluted with organic water. Four species were identified, viz., *Scrotherodon mossambicus*, *S.niloticus*, *Cyprius carpio* and *Poecilia reticulata*. Though more than 125 species of fish have been reported from River Godavari, Fishbase database lists 64 species out of which 34 have been identified in this study with 30 additional species, it appears that the fish diversity has not been affected much though habitat destruction is reported.

**Project title 2:- Niche Area Project on Utilization of Inland Saline Areas for Aquaculture.**

**Funding Agency:- Education Division (ICAR), New Delhi**

**Project Duration:- 2006-2012**

**Project Personnel:** PI- C. S. Purushotaman, Co-PIs- V. K. Sharma, G. Venugopal, Mr. S. S. Razvi, V. Harikrishna, A. P. Murlidhar.

#### Achievements:

Harvesting of *Penaeus monodon* in both the 0.25-ha ponds was completed. The preliminary estimates showed the production at 1.6 t/ha in about three months. *Fenneropenaeus indicus* seed was stocked on 28 June 2010 in the high-saline ponds of Banyani at 20‰ salinity. The seed was obtained from a private hatchery in Taimil Nadu and air-lifted to Delhi. The mortality during transportation was around 2%. After harvesting *P. monodon*, ponds have been prepared and stocked on 10 August 2010. The second crop of tiger shrimp was harvested during 13 - 17 November 2010. The three ponds (2 of 0.25 ha and one of 0.18 ha) yielded 500 - 617 kg/ha in 90 - 94 days at 40 - 60% survival. The food conversion efficiency varied between 1.72 and 1.90. The ponds under the projects have been stocked with *Chanos chanos* on 23 September 2010 with the seed procured at Mandapam.

**Project title 3:- Development of Bacterial Consortia for Bio-processing Agricultural Wastes and Bioremediation of Aquaculture Effluents.**

**Funding Agency:** Application of Micro Organism in Agriculture and Allied Sector (AMAAS), ICAR

**Project Duration:** - 2006 - 2012

**Project Personnel:** PI- C. S. Purushotaman, Co-PIs- P. K. Pandey, A. Venilla,

#### Achievements:

Amplification of 16S r DNA was

performed (27F & 1492 R) using DNA extracted from isolates obtained from Surat samples. Only one sample gave amplification. It was identified as *Lysobacter concretionis*. No significant enzyme activity was detected indicating loss of enzyme, probably because of the dialysis membrane which is made of cellulose. Therefore, other options for the removal of salts after precipitation were evaluated. Knockout experiment for the evaluation of consortium C<sub>b</sub> was attempted.

Amplification 16S rDNA (27F and 1492 R) was performed using the gDNA extracted from Surat isolates. Two samples gave amplification. The Surat isolates have been identified as: *Bacillus subtilis*, *Pseudomonas fulva*, *Exiguobacterium indicum*, uncultured *Acinetobacter* and an uncultured bacterium. PCR with archaea primers (Arch amo F & R) was done. The results of knockout experiment with consortium C<sub>b</sub> were not conclusive. Because of the ambiguity observed in the activities of the individual isolates, a possible contamination was suspected. Glycerol stocks of the isolates have been revived.

Since the results are not conclusive, alternative ways to identify the isolates were explored. Revival of the glycerol stocks of the cellulolytic isolates has been done. To confirm the identity of individual isolates using RFLP and sequencing, DNA extraction has been done which will be further used for 16S amplification. The isolate O5 was found to be inhibitory and has been replaced with the isolate M6.

**Project title 4:- Studies on the Likely**



**Impact of the Proposed Kalpasar Project on the Ecology, Fishery and Socio-economic Aspects of the Coastal Community of the Gulf of Khambat.**

**Funding Agency:** - Ministry of Earth Sciences, Govt. of India (New Delhi)

**Project Duration:-** 2009-12

**Project Personnel:** PI- C. S. Purushotaman, Co-PIs- R. S. Biradar, S. K. Chakroborty, Geetanjali Deshmukhe, Arpita Sharma, Dr.A.K.Jaiswar

#### **Achivements:**

Metals in the samples collected by Gujarat Ecology Society (GES) have been analyzed. The future course of work was



*Marine Sponge collected from Mumbai coast*

worked out along with GES. Water, plankton and benthos samples were collected from River Narmada at Bharuch (Golden Bridge), Bhadbhut, Dahej and Lakhigam on 02 August 2010. The socio-economic survey of the fishermen population was conducted at Bharuch, Maktampur, Bhadbhut, Megham, Suva, Luvara, Lakhigam, Shuklathirth, Mangleshwar, Angareshwar, Jhanor, Hansot and Aliabet. Data collected from Dabka, Mohamedpura, Sultanpura, Kavi, Zamdi, Malpur, Vadgam, Tadatadav, Vainaj, Navagam, Junia Khol, Wasna, Ralaj and

Badalpur during 03 - 04 December 2010 are being analysed.

**Project Title 5: Potential Drugs from Selected Marine Invertebrates and Plants from Indian Waters**

**Funded Agency:** Ministry of Earth Science, Government of India, New Delhi

**Duration:** 2007 -2012

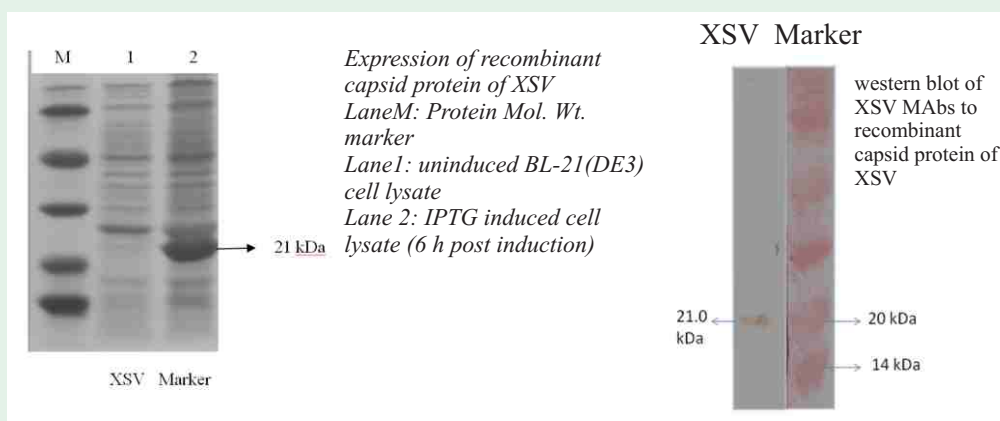
**Project Personnel:** PI-Subodh Gupta, Co-PIs- Geetanjali Deshmukhe, S.G.H. Zaidi

#### **Achievement:**

The project is aimed at investigating the potential bioactive compounds from Marine invertebrates and plants from Indian waters. In this project we collected samples of sponges (22 Nos), sea anemones (02 Nos) and seaweeds and sea grasses (04 Nos) from Ratnagiri and Mumbai Coast (Colaba, Khardanda) of Maharashtra. Methanolic extracts of the samples were prepared and sent to CDRI, Lucknow for assessing their pharmacological activity. Results of these extracts are still awaited. Further, the chemical fingerprinting (TLC and HPLC profiling) and toxicity assay in mice for the collected samples has been also initiated at CIFE.

**Project title 6:- Development of monoclonal antibody-based rapid diagnostic test for the detection of *Macro brachium rosenbergii* Nodavirus (MrNV) and Extra Small Virus (XSV) of *Macro brachium rosenbergii*.**

**Funding agency:** - Department of Biotechnology, Government of India



**Project Duration: - 2007-2010**

**Project Personnel: PI- M. Makesh Co-PI- K.V. Rajendran**

#### **Achievements:**

White tail disease infected (WTD) *Macrobrachium rosenbergii* samples were collected from a natural outbreak from Kakinada. The disease was confirmed by RT-PCR for *Macrobrachium rosenbergii* nodavirus (MrNV) and extra small virus (XSV), the causative agents of WTD. The genes coding the capsid protein of MrNV and XSV were amplified and cloned into expression vector (pRSETA). The genes were sequenced and were submitted to genbank (Accession No:HQ637179.1 and HQ637180.1). The recombinant capsid protein of XSV was expressed in BL-21(DE3)pLysS cells and the protein were purified by affinity chromatography. Female Balb/C mice were immunized with the recombinant capsid protein of XSV emulsified in Freund's complete adjuvant followed by two boosters in Freund's incomplete adjuvant and a final intravenous booster. The sensitized B lymphocytes from the immunized mice were fused with myeloma cells and the hybridoma clones were selected on HAT

medium. The hybridoma clones were screened by ELISA for the secretion of antibodies against recombinant XSV capsid protein. Twelve positive clones were selected, expanded and cloned twice by limiting dilution. The positive clones were cryopreserved. Out of the twelve positive clones, clone X8D4 which was showing high affinity to the recombinant protein of XSV was selected and bulk antibody was produced. The monoclonal antibody isotype was found to be IgG1 for heavy chain and kappa for light chain. The reactivity of MAb to the viral protein was confirmed by western blot with infected tissue homogenate and by immunoperoxidase test. The monoclonal antibodies thus produced were used to develop immunodiagnostic techniques like ELISA, immuno-dot and reverse passive latex agglutination test (RPLA). Diagnostic sensitivity of these tests were found to be 96.66%, 90%, and 80% respectively. The diagnostic specificity of immunodot and ELISA were found to be 100% and that of RPLA was 92%. Immunodot test is simple and do not require any sophisticated equipment for detection of WTD infected PLs and juveniles at farm level and ELISA can be used to screen PLs and broodstock for the presence of the

virus before using them for stocking or breeding.

**Project title 7:- Development of DNA based vaccine against *Aeromonas spp.* employing conserved outer membrane porin gene.**

**Funding agency:** Department of Biotechnology, Government of India

**Project Duration:** - 2008-2011

**Project Personnel:** - PI- M. Makesh

#### **Achievements:**

Vaccine constructs using the *lamB* porin gene of *Aeromonas hydrophila* were designed. The plasmids construct with and without the insert were purified and were used in the vaccine trials. Rohu (*Labeo rohita*) weighing 40-50 g were procured from commercial farms and were maintained in FRP tanks with continuous aeration. The fish were fed with commercial pellet feed and 20% water exchange was done daily. The fish were divided into groups and were vaccinated with vectors alone or with vector containing the insert by intramuscular injection. One of the groups was also administered with protein booster emulsified in Freund's complete adjuvant intraperitoneally. One group of fish was administered with protein alone. One group was maintained as unhandled control. The fish were bled before administration of vaccines and also at 27, 60 and 90 days post vaccination. The serum was separated for titration of serum antibodies against *A. hydrophila*. LD<sub>50</sub> of *A. hydrophila* was estimated to challenge the fish with LD<sub>50</sub> dose. Before hand the *A. hydrophila*

culture was characterized by biochemical tests. Overnight broth culture was washed thrice in PBS and serial ten fold dilution was made. The bacteria were counted by spread plate method and each dilution was administered to six fishes. The mortality was recorded and the LD<sub>50</sub> dose was calculated by Reed and Muench method. The vaccinated fish were challenged with LD<sub>50</sub> dose of *A. hydrophila* by intraperitoneal administration and the mortality was recorded. The groups administered with vaccine construct and protein booster survived better than other groups. The vaccine trial is being repeated with other constructs.

**Project title 8:- Development and use of fluorescent transgenic zebrafish biosensors for monitoring genotoxic pollutant**

**Funding Agency:** Department of Biotechnology (DBT), Govt. of India

**Project Duration:** - 2007-2010

**Project Personnel:** PI-Aparna Chaudhari  
**Co-PIs-** Gireesh Babu, S.G. S. Zaidi, Sridhar Sivasubbu, Scientist C, IGIB(Institute of Genomics & Integrative Biology), New Delhi

#### **Achievements**

The project aims at developing four transgenic zebra fish biosensors for testing genotoxicity and heavy metal toxicity in aquatic environment. Selected promoters responsive to genotoxicity, broad spectrum of heavy metals and specifically Zn/Cd and Cu have been cloned in mini Tol2 vector so as to control the expression of Ds-Red



DsRed expression from MT4-F2R2 promoter on induction with copper

reporter gene. All the constructs were tested in transient zebrafish embryo assays and shown to fluoresce on induction by respective analytes. Large scale microinjections into one/two celled zebrafish embryos were carried out with these constructs along with mRNA of Tol2 transposase to enhance events of genomic integration. The microinjected fishes have been grown to maturity for which an indigenous recirculatory zebrafish rearing facility has been developed. These are being screened to identify transgenic individuals. The screening process involves mating of an injected fish with a wild type and confirming the presence of the promoter- reporter transgene in the offspring. Out of 83 individuals screened for all the biosensors only seven were found to be positive making the integration 8.4%.

**Project title 9:- Gene Silencing - A strategy for Management of white spot syndrome virus (WSSV)**

**Funding agency: National Agricultural Innovation Project, NAIP, ICAR**

**Project Duration: - 2008-2012**

**Project Personnel: - PI- K. V. Rajendran  
Co-PI- M. Makesh**

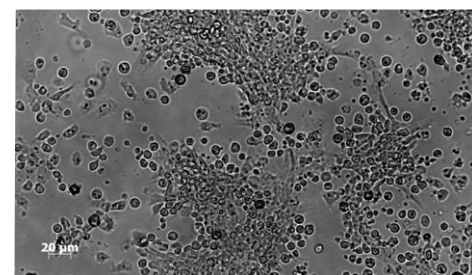
## Achievements:

The medium for the culture of cells derived from various organs of mud crab *Scylla serrata* were optimized. Leibovitz L-15 media (3X) with antibiotics, 10% fetal bovine serum 1% lipid concentrate and 1X non essential amino acids mixture were used for culturing the cells.

Osmolality was adjusted with crab saline. Of the different tissues of crab used, hemocytes showed better attachment and spreading than other tissues and could be maintained for 3 days in 3X L-15 medium supplemented with FBS. Cells from testes showed adherence and were also viable as suspension cultures when cultured in 3X L-15+1X non essential amino acids mixture and 1% lipid concentrate (osmolality adjusted with 2.5X crab saline). Cell proliferation was observed as indicated by increase in the number of cells. Cell viability decreased after subsequent subcultures.

Hemocytes were infected with WSSV inoculum to evaluate the replication of virus. Hemocytes cultured in 3X L-15+1X non essential amino acids mixture and 10% FBS (osmolality adjusted with 2.5X crab saline), exposed to WSSV, showed likely cytopathic effects produced by the virus like, pigmentation, clumping and detachment from substrate. WSSV replication was observed in hemocytes harvested 24 h, 48 h and 72 h post-

*Hemocytes (24 h) maintained as control cultured in 3X L-15+1X NEAA+10%FBS with osmolality adjusted to 1035mosM with 18%2X crab saline*



infection as observed by conventional and Real time PCR.

**Project title 10:- Strengthening of digital library and information management under NARS (e-grant)**

**Funding Agency: - National Agricultural Innovation Project, NAIP, ICAR**

**Project Duration: - 2009-2012**

**Project Personnel: - PI- N. P. Sahu**

#### **Achievements:**

The major objective of e-Granth project was to facilitate more and more no of users to the library. In this context digitization of the books is the best option to increase the numbers of end users. At CIFE following activities were done to march ahead with the digitization and sharing of information's, viz., classification of Books, Cataloguing, Data Export and Uploading Records. About 1200 nos. of Dissertations/Thesis were classified by using DDC-22 (Dewey decimal classification) beside other books as and when arrived at library. About 1200 Dissertations/Thesis and 222 books catalogued in Connexion in MARC 21 format. Exported 19,000 records from Libsys in MARC 21 format. Prepare Data file and Label File for data to be

uploaded.

**Project Title 11: Bioprospecting of genes and allele mining for a biotic stress tolerance**

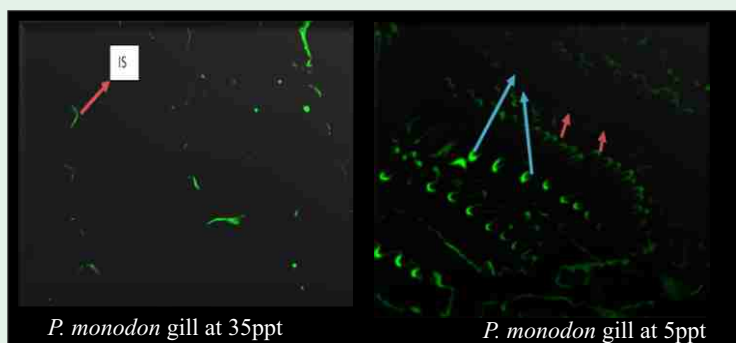
**Funding Agency: National Agricultural Innovation Project, NAIP, ICAR**

**Project Duration: - 2009-2012**

**Project Personnel: - PI- Aparna Chaudhari Co-PIs: Gireesh Babu P, and Gayatri Tripathi**

#### **Achievements**

The major goal of the project is to characterize the four novel partial gene sequences (FM, SM1, SM2 and SM3) found to be involved in salt homeostasis of *P. monodon*, in an earlier study. 3' and 5' RACE was performed to find out the ends of the partial gene sequences. The result confirmed that SM1 is arginine kinase and SM2 is 16s rRNA gene. SM3 could not be amplified at all and RACE for FM1 is being done. Real Time PCR results showed that Na<sup>+</sup>K<sup>+</sup>ATPase (NaK), arginine kinase (AK), carbonic anhydrase (CA) and FM are differentially regulated both above and below iso-osmotic salinity (i.e. 25 ppt). In gill and muscle, NaK expression was high at 35 ppt, but though gill showed down-regulation at lower salinities this was not the case in muscle. CA expression was down-regulated on both sides of the iso-osmotic salinity (25 ppt) in muscle tissues however in gill it was upregulated at 35 ppt. AK expression was significantly up-regulated in gill at 5, and 35 ppt, while in muscle it was down-regulated at 35 ppt. Unexpectedly,  $\beta$ -actin showed a striking ~50 fold up-regulation in gills at 35 ppt. Hence, EF1a





was used for normalization. Salinity related variation in FM gene was determined by semi quantitative RT-PCR. It is observed that FM increases on both sides of isoosmotic salinity (25 ppt) in gill only. However, it is yet to be confirmed by Real Time RT-PCR. Immuno-fluorescence studies of NaK-ATPase expression in *P. monodon* gill shows that the recruitment of the enzyme to the gill membrane increases markedly in dilute environments when the animal is hyper-regulating and not when it is hypo-regulating at 35 ppt. It indicates that in *P. monodon* this pump is actively involved in uptake of ions at dilute salinities as in zebrafish.

**Project title 12: - A Value Chain on Fish Production in Fragile Agricultural Lands and Unutilized Aquatic Resources in Maharashtra**

**Funding Agency: National Agricultural Innovation Project, NAIP, ICAR**

**Project Duration: - 2008-2012**

**Project Personnel: - PI- A.K. Reddy Co-PIs- S. R. Kovale (college of fisheries, Ratnagiri), Chhaya Jadhav (Vatslya Mandir, Lanja, Ratnagiri)**

#### **Achievements**

Two aquaculture demonstration units



were established on the common property of the farmers having salt affected sugarcane fields which are fallow for the last 40-50 years. Carp seed production was successfully demonstrated at three stages i.e., spawn to fry, fry to fingerling and fingerling to yearlings. Net income obtained from seed production i.e. spawn to fry, fry to fingerling and fingerling to yearlings was Rs. 11,300/- per 0.10 ha per month; Rs. 10,800/- per 0.10 ha per 45 days and Rs. 15, 900/- per 0.1 ha per 8-10 months respectively. Carp culture was successfully demonstrated to the farmers and achieved a production of 3560 kg / ha / year and obtained a net income of Rs. 69,500/-. Carp hatchery and *Spirulina* culture units are established on common property of farmers. A village resource centre (VRC) was established on government allotted land at Shere village and equipped with audio-visual aids. In addition to the proposed sub-project objectives, an innovative integrated approach for reclamation of low productive salt affected sugarcane fields through aquaculture and sub-surface drainage (SSD) system was implemented in two units of each 4.25 ha. Successfully produced carp Fingerlings in the rearing ponds constructed in the vicinity of selected reservoirs. 34,655 Nos. of advanced fingerlings (10-12 cm) were stocked in two reservoirs.

**Project title 13:- Strengthening the Statistical Computing for NARS**

**Funding Agency: National Agricultural Innovation Project, NAIP, ICAR**

**Project Duration: - 2009-2012**



**Project Personnel:** - PI- S. Jahageerdar  
Co-PI- Biradar, R.S.

#### **Achievements:**

Conducted one 'SAS Installation' Workshop on 16-17 June 2010 at CIFE, Mumbai. A total number of 24 scientists/faculty from 18 institutes attended the workshop. Organized one Trainer's Training Program on 'SAS: A Comprehensive Overview' from 12<sup>th</sup> July to 13 August 2010 at CIFE, Mumbai. A total number of 23 scientists/faculty members from various universities/institutes attended the training program. Organized five Researcher's Training Program on 'SAS: An Overview' during 2010-11. A total number of 102 scientists/faculty members and 20 masters, doctoral and research scholars from various universities/institutes were trained during these training programs.

**14 .Project title: IMPACT OF PRAWN POLY-CULTURE TECHNOLOGY IN TRIPURA**

**Funding Agency: National Agricultural Innovation Project, NAIP, ICAR**

**Project Duration: 2007-2012**

**Personnel: PI- Swadesh Praksh , Co-PI- R.S.Biradar**



#### **Research Achievements**

The impact assessment study of prawn-carp poly-culture technology (PCP) was conducted with the adopters as well as non-adopters of technology in the Tripura state. The data on socio-economic aspects, perception of adopters about prawn carp poly-culture technology, constraint of technology, comparative economics, adoption rate, willingness to continue the prawn poly-culture technology were collected from 35 adopters and 45 non-adopters. Major source of income was fisheries plus agriculture (65%) in the selected area. High rate of adoption was among the income distribution range (up to 1 lakh/annum). Technology has positive impact with respect to their profitability, income, forward & backward linkages, skill & knowledge, resource enhancement and social relation. Increase in gross return over the total cost is by 31.23 per cent in PCP over Indian Major Carps (IMC). Overall high profit with introduction of PCP technology over IMC is mainly because prawn is high valued species. It was found that the availability of cash/credit, availability of quality seed, and risk of revenue loss / low yield due to disease are the major constraints with 71.43%, 71.43% 42.86% and 71% respectively in PCP practices. It was interesting to know that 100 per cent of the adopters indicated that marketing is not at all a constraint due to high price and very quick marketability of prawn in the adoption area. The overall positive impact of the PCP technology reflected in the increasing rate (19% per annum) of adoption (number of beneficiaries) over the last eight years. The overall impact

assessment of technology for the study area revealed an additional return of Rs. 2.12 per additional rupee invested. Among the adopters of the PCP technology, prawn consumption which was almost negligible rose to 12 Kg/person/annum and women employment increased by 13% per annum. Efforts should be made to remove constraints to encourage increased adoption of PCP technology, which will lead to increased production and improved socio-economic conditions of fish farmers.

**Project title 15:- Development of auto-transgenic Asian catfish, *C.batrachus***

**Funding Agency:** - National fund for Basic and strategic Research in Agriculture National Agricultural Innovation Project (ICAR-NAIP)

**Project Duration:-**2007-2012

**Project Personnel:** - PI- K.C. Majumdar  
Co-PI: K. Ravinder, (CCMB, Hyderabad)

**PI-** Sh.S.S.H. Razvi of cooperating Institute, (CIFE, Kakinada)

**Achievements**

The transgenic seed produced during 2009-10 from four different stocks viz., Andhra, Haryana, Orissa and Madhya Pradesh comprised of cGH and gGH were reared from hatchlings stage to fingerlings stage in cement nursery ponds in isolation. Further, these stocks after salvaging from cement nurseries were shifted to earthen ponds for raising up to brood stock stage. All the four stocks could be successfully developed as brood stock in isolation and in containment conditions. All the biotic

and abiotic factors were conducive for the growth and survival of the fishes. Growth analysis conducted at regular intervals has revealed the following in relation to the performance of different location stocks and also comparison between cGH and gGH fishes. Specific growth rates per day were not differing significantly among the transgenic cGH and gGH of various stocks but were lower than that of the control in all the stocks. M.P and A.P stocks were showing maximum specific growth rates per day. The Project personnel of CCMB, & CIFE have conducted induced spawning experiments during August 2010 at CIFE farm. A new autotransgene constructs BcGH was transferred through sperm electroporation into fish from different locations like Haryana, Orissa, Madhya Pradesh and Andhra Pradesh. But the BgGH construct was transferred through sperm electroporation in to fish from only one location (Andhra Pradesh). Samples of early fry produced from all four stocks were shifted to CCMB for rearing separately at the pisciculture facility. However, bulk of the stocks was reared in CIFE hatcheries and fry rearing units. But the fry rearing could not be completed successful due to the sporadic occurrence of mortality of fishes due to unknown etiology. In order to check the mortality antifungal treatment measures were resorted by application of malachite green, potassium permanganate etc by bath treatment method. But it could not arrest so samples were drawn for bacterial cultures. It was diagnosed as severe *Aeromonas* infection (may be a secondary pathogen). Immediately antibiotics treatment was commenced through feed application, but it was in



ponds. We observed that the average percentage weight gain was found to be greater in the optimal temperature, as compared to ambient temperature, at 15<sup>th</sup> and 30<sup>th</sup> day of sampling. The observation confirms our earlier finding of laboratory experiment conducted in *L. rohita*. Prepared a video documentary in English and 11 Indian languages on thermal ecological studies in India entitled “and quiet merges the warmth”. The project has been completed.

**Project title 17:- Electron radiations from Microtron for enhancement of shelf life and nutritional quality of aqua-feed**

**Funding Agency:** - Board of Research in Nuclear Sciences (BRNS), Department of Atomic energy, Govt. of India.

**Project Duration:** - 2007-2011

**Project Personnel:** - PI- A. K. Pal Co- PI - N.P. Sahu

#### **Achievements:**

The effect of electron beam irradiation on the level of anti-nutritional factors of three commonly used aquafeed ingredients such as cotton seed cake, rubber seed cake and soybean meal was investigated. All three ingredients were subjected to electron beam irradiation



at 0 (control), 5, 10, 15 and 50 kGy. The anti-nutritional factors studied were phytic acid, tannin and hydrocyanic acid. The effect of electron beam irradiation on total free amino acids was also studied. The results revealed that electron beam irradiation significantly reduces ( $P < 0.05$ ) the levels of phytic acid and hydrocyanic acid in all the three ingredients. A negative correlation was found between the dose of electron irradiation (kGy) and hydrocyanic acid content of rubber seed cake ( $y = -0.5078x + 3.80$ ,  $R^2 = 0.96$ ), cotton seed cake ( $y = -0.3566x + 2.93$ ,  $R^2 = 0.94$ ) and soybean meal ( $y = -0.3252x + 3.09$ ,  $R^2 = 0.69$ ). Similarly, phytic acid content also followed a negative correlation with electron irradiated rubber seed cake ( $y = -76.89x + 445.71$ ,  $R^2 = 0.80$ ), cotton seed cake ( $y = -44.413x + 398.83$ ,  $R^2 = 0.99$ ) and soybean meal ( $y = -203.27x + 1111$ ,  $R^2 = 0.95$ ). No defined trend was observed for tannin and total free amino acid of the ingredients. At 10 kGy level of irradiation the percentage reduction of hydrocyanic acid, phytic acid and tannin was 34, 63, and 22 respectively. However when total reduction (%) of hydrocyanic acid, phytic acid and tannin were pooled together an optimum level of 9.33 kGy found to reduce all the antinutritional factors to the maximum level. The results revealed that electron beam irradiation could be successfully employed to reduce the antinutritional factors present in plant ingredients. A feeding trial was conducted to study the effect of electron beam irradiated feed exposed at 10 kGy on growth of *Labeo rohita* fingerlings. During 45 days feeding trial treatment groups (irradiated feed) registered 18% more weight gain



compare to the control group. Hence it appears that electron beam radiation is an ideal strategy for utilization of low cost plant based ingredients in aquafeed.

**Project title 18:- Studies on the degradation product of both nutrients and anti-nutrients of aqua-feed and their effect on immune physiology of *Labeo rohita* fingerling”**

**Funding Agency:** - Board of Research in Nuclear Sciences(BRNS), Department of Atomic energy , Govt. of India.

**Project Duration:** - 2010-2013

**Project Personnel:** - PI- N.P. Sahu Co-PI- A.K.Pal

#### **Achievements:**

Five types of samples (pure phytic acid, pure tannin, egg albumin, casein, soybean meal) were selected for electron beam radiation. Mangalore University Microtron centre was used for the sample irradiation. Samples were irradiated at 5, 10, 15 kGy radiation. The irradiated samples were subjected to NMR study for the identification and isolation of degraded product from the different ingredients.

**Project title 19:- Genetic Conservation and Live Gene Banking of Mahseer Fish in Indrayani River**

**Funding Agency:** National Fisheries Development Board, NFDB, Govt. of India

**Project Duration:** - 2010-2013

**Programme Leader:** Dr. W.S. Lakra

**Project Personnel:** PI- Gopal Krishna, Co-PIs- N K Chadha, V K Tiwari, Rupam Sharma, Ogale Mahesh Mahajan (FONA, Talegaon)

#### **Achievements**

The project on live gene banking of Mahseer in Indryani River was undertaken in collaboration with NGO (FONA), Talegaon. The work done during the period reported include signing of Memorandum of Understanding with FONA, Talegaon for technical cooperation. During this period the project field staffs were selected to take up field activities. Initially, the survey was conducted for the water quality parameters, flow and sediments of the river and fish fauna of the stretch of the river from Dehu Road to down town to ascertain the suitability of area and availability of the fish. Further, based on the survey and availability of water level, the site was finalised where the cages could be installed. The permission of the Gram Panchayat was also sought to install the cages. The orders were placed for procurement of cages and other necessary equipments. Glassware, chemicals, feed and other materials has been procured. The ponds were renovated; nursery constructed and seed is being reared. Mass awareness material has been procured and forthcoming activities are planned to be conducted as per schedule.

**Project Title 20:-Development of community participated model for chaur (Flood plains) and maun (Ox-bow lakes)**

**Funding Agency:** - National Fisheries Development Board (NFDB),



## Hyderabad

**Project Duration:-**2010-2013

**Programme Leader:** Dr. W.S. Lakra

**Project Personnel:** PI- V.K. Tiwari Co-  
PIs- N. Kumar, A.K. Verma

### Achievements:

Self help groups were made 3 at Balua Chaur and 13 at Manika Maun. 4 and 6 nursery ponds have been constructed at Balua and Manka Maun respectively for



rearing of fish seed. Trainers (18 participants) training was conducted at College of Fisheries; Dholi in Aug 2010. Growth of the fishes in nursery ponds is being assessed.

**Project Title 21:-Community based reservoir fisheries management Achievements**

**Funding Agency:** National Fisheries Development Board (NFDB), Hyderabad

**Project Duration:** - January 2010- December 2011

**Project Personnel:** - PI- Kiran Dube Rawat Co-PIs-Neelam Saharan, V.K. Tiwari, Chandra Prakash, K. D. Raju, Babitha Rani A.M,

### Achivements:

The launching workshop of the NFDB project entitled "Community based reservoir fisheries management" was held on 27<sup>th</sup> Jan, 2010 at the Siddheshwar temple, Vachape village in Dimbhe reservoir. During the year 8, 56, 000 fingerlings were stocked in the reservoir. In 26 ha area 14 quintals of Dhencha, *Sesbania aculeate* seed has been planted in 35 villages, which got submerged in water during monsoon contributing to the productivity of the reservoir. Three pens measuring 0.8 ha, 0.66ha and 0.48 ha were constructed at three different locations of the reservoir i.e. Savarli - I Savarli II and Digad respectively in the month of October during 27 to 30<sup>th</sup> 2010. The construction material included Ballies, Bamboo poles, HDPE knotless webbing, and chicken mesh etc. When the sufficient water entered in the pens (2 - 3 m depth), fry of Indian major carps (Catla, Rohu, Mirgal 60:35:5) measuring 45 to 60 mm, (5.7g) were stocked in the pens with a stocking density of 1,30,000, 77000 and 60,000 in Savarli - I, Savarli II and Digad pen respectively. Pens were regularly checked for any damage or clogging and cleaned. Fish were fed daily twice (Rice bran, GOC, vitamin mix, mineral mix) in morning and evening. Their growth was



checked at monthly interval and also at the end of the culture period. After rearing the fry in the pens for a period of 54 days, when the water was released from the reservoir, the fingerlings were harvested and stocked in the reservoir, during their culture of 54 days harvested during 23<sup>rd</sup> and 24<sup>th</sup> December 2010, fingerlings attained an average length of 100.32 mm (14.37g), 101.40mm, (16.62g), 104.63mm (15.80g), 103.57 mm (15.43g). Overall 108000, 64,000 and 56000 fingerlings were harvested from Savarli - I, Savarli II and Digad pens respectively and stocked in the same reservoir. Thirty two new floating net cages (3m x 3m x 3m) have been installed in the reservoir. The cages are made of HDPE knotless webbing. For walking platform saal wood is used. For floating the cages sealed HDPE barrels were used.

**Project Title 22:-Ornamental fish culture in cages for livelihood of fisherwomen**

**Funding Agency: National Fisheries Development Board (NFDB), Hyderabad**

**Project Duration: - January 2010- December 2011**

**Project Personnel: PI- Kiran Dube Rawat, Co-PIs- Neelam Saharan, V. K. Tiwari, Chandra Prakash, Babitha Rani A.M., K. D. Raju**

#### **Achivements:**

The launching workshop of the NFDB project entitled was held on 27<sup>th</sup> Jan, 2010 at the Siddheshwar temple, Vachape village in Dimbhe reservoir. Women were selected and acquainted

with the cages maintenance and biology and behavior of common ornamental fishes. After the training of fisherwomen, first on trial basis they are given four cages for hands on experience and learning of all activities. For training and practice these cages were stocked with the seed (800 gold fish fry, 25 mm 1.0 g, in each cage) provided by CIFE and were fed and maintained by these women. Initially the fish was grown for three and half months and the first lot of fish was harvested (750 nos, 92 mm 86 g).



About 250 no of fish were left for growing brood stock, which were reared for another two months and were harvested (121mm, 270.5g) and brought to CIFE's Ornamental fish seed production unit. They are being bred for seed production, for rearing in cages again. For raising ornamental fishes in cages, sixteen new floating net cages (3m x 3m x 3m) have been installed in the reservoir. The cages are made of HDPE knotless webbing. For walking platform saal wood is used. For floating the cages sealed HDPE barrels were used.

**Project title 23:- Network project on Capacity building of coastal fisherwomen through post-harvest technologies**

**Funding Agency: - National Fisheries**

Development Board, ICAR-NFDB through Directorate of Research on Women in Agriculture, DRWA

**Project Duration:** - 2009-2012

**Project Personnel:** PI: B.B. Nayak, Co-PI: Arpita Sharma

#### **Achievement:**

Qualities of dryfish samples from Maharashtra were analyzed. Qualities of Bombay duck dried in hygienic way were compared with the dry fishes from the market. In order to develop methods to make alternate use of the fishes through low capital technologies, fishes were fermented by unconventional process. Products were prepared from Bombay duck skin that had good shelf life and good acceptability. Fisherwomen taking part in Koli festival were given guidance on hygienic handling of fish.

**Project title 25:** - Algal Cultivation and Processing for Livelihood Generation in Coastal Areas along Thane and Sindhudurg Districts along the Maharashtra Coast

**Funding Agency:** - Department of Science and Technology (DST), Govt of India

**Project Duration:** - 2009-11



**Project Personnel:-** PI-Geetanjali Deshmukhe

#### **Achivements:**

Standardization of *Kappaphycus* culture and enhancement of growth by regulating nutrients under laboratory condition were studied to understand optimized conditions for *Kappaphycus* growth and carrageenan yield and gel strength. In the growth enhancement studies, light intensity at 1500 lux was found to be most suitable at DGR of 2.86%. Maximum yield of carrageenan obtained in the plant treated with light intensity of 1500 lux of all the three experiment and the yield is of about 42.39% on dry weight basis. The better yields are obtained in the plant treated with nitrate-nitrogen enrichment level of 2.5 mg/l and the yield is of about 42.38 % and the plant treated with normal PES medium (in the phosphate-phosphorus experiment) respectively. Regarding the quality of the carrageenan, the gel strength, melting temperature and gelling temperature were calculated with different treatment levels of light intensity, nitrate and phosphate levels - the results were non-significant.

*Gracilaria folifera* collected from Colaba, Mumbai was grown in different salinity gradient to optimize the salinity quotient. This experiment was carried out to test the algal growth at Dahanu; where the estuarine condition prevails. Optimum growth for the vegetative fronds ( $3.5 \text{ g day}^{-1}$ ) was observed at 25 ppt salinity

Awareness programme was arranged at Malvan and about 45 participants took

keen interest in knowing the nutritional value of the sea-vegetables (seaweed) and species available at Malvan coast. They seem to be aware of value of seaweed as a fertilizer as traditionally, they use *Sargassum* species at Malvan. Demonstration of cultivation of seaweeds were given by laying the netbags at Malvan.

1. Awareness programme
2. Information on nutritional value of seaweeds
3. Collection of seaweeds by locals
4. *Gracilaria* culture under laboratory condition

**Project title 26: - Validation of Geo-physical products over western coastal region**

**Funding Agency: - Space Application Centre (SAC), Ahmedabad**

**Project Duration: - 2008-2012**

**Project Personnel: - PI- Latha Shenoy  
Co-PIs: S. K. Chakraborty, Geetanjali Deshmukhe, and S. P. Shukla**

#### **Achievements**

The Project titled Validation of OCM II Geo-physical products over western coastal region is a component of the National Program on Oceansat-2 Utilization funded by the Space Applications Centre, Ahmedabad. The objectives of the project are (1) validation of Geo-physical products derived from OCM II over Mumbai coast (2) Estimation of errors for operational geo-physical products using in-situ observations and (3) Data base

generation of in-situ parameters acquired through validation.

Study sites consisted of eight transects along the Mumbai coast comprising Colaba, Malabar Hill, Worli, Mahim, Santa Cruz, Versova, Madh and Manori. The sampling dates were selected in accordance with the pass of satellite over the Arabian Sea with respect to the Mumbai coast. Surface water samples were collected from five stations in each transect with one in the centre and remaining four stations around 750 m away from it in each of the four directions. GPS was used to get accurate location of sampling stations. The parameters computed and analyzed are chlorophyll a and Total Suspended Matter (TSM). A new portable Fluorometer was procured and calibrated for the purpose of in-situ analysis in conformity with the standard protocol followed by the funding Agency. The Match-up analysis was carried out at SAC, Ahmedabad after making the comparison of the in-situ and OCM II chlorophyll a and TSM values. One day National Meeting of Oceansat II Utilization Program was organized by SAC, Ahmedabad that was attended by the Project Personnel. The Project will continue up to March 2012.

**Project title 27:- Validation of Potential Fishing Zone (PFZ) Advisories along the Mumbai Coast, Maharashtra State**

**Funding Agency: - Indian National Centre for Ocean Information Centre (INCOIS), (Hyderabad)**

**Project Duration:-2009-2012**

**Project Personnel: - PI- Latha Shenoy  
Co-PIs- S. K. Chakraborty, S.P.Shukla, Ashok Jaiswar**



### Achievements:

The Project titled Validation of PFZ advisories along the Mumbai coast, Maharashtra state is a component of National program on validation of PFZ advisories funded by Indian National Centre for Ocean Information Centre (INCOIS), Hyderabad. The objectives of the project are a) To validate PFZ advisories along the Mumbai coast b) To disseminate PFZ advisories to fisher community to indicate availability of fish c) To educate the fisher community and conduct awareness campaigns about usefulness of information available through PFZ advisories d) To collect feedback on the PFZ advisories and availability of fish and e) To collect biological, oceanographic and environmental data. Versova landing centre was selected for the purpose of study.

An Electronic Display Board (EDB) has been installed at Versova fishing village to transmit information on the availability of fish along with weather forecast and warning to the fisher community. With the installation of EDB, fishers are now able to gather required information prior to setting out for fishing and directly go to the fishing ground. It is a unique service to the fishing Community that provides reliable, timely and short-term potential fishing zone Advisories using satellite data. This information is relayed with reference to latitude and longitude in four languages i.e. English, Hindi, Marathi and Gujarat on an LCD screen for the benefit of the local fishers.

The PFZ advisories are regularly

disseminated to the more than 100 fishermen of Versova and Mahim village through the mobile SMS service in the local language as soon as it is received. Regular visits are made to the landing centers for interaction with the fishing community and to motivate them to use the modern technologies for their benefit. After the initiation of the project, so far, two awareness campaigns were conducted one each at Versova and Mahim. Water samples were collected from PFZ and Non-PFZ areas and analysis was done for chlorophyll-a, Dissolved Oxygen, pH, Salinity and available phosphorous. Feed back data was collected from fishers with regard to details such as craft and gear used, fishing operation, actual location of fishing, catch, PFZ forecast, fishing period etc.

**Project Title 28:- Rural Livelihood Development through Aquaculture in Ponds Constructed under NREGA in Gumla District of Jharkhand.**

**Funding Agency: - United Nation Development Programme, UNDP**

**Project Duration: - 2010-2011**

**Project Personnel: PI-N. Kumar Co-PI-V.K. Tiwari, A.K. Verma**

### Achievements:

Beneficiary led result demonstration of aquaculture technologies was jointly organized by Central Institute of Fisheries Education (CIFE), Mumbai and Department of Fisheries (DoF), Government of Jharkhand in two selected blocks namely Gumla and Ghaghra of Gumla district. Based on the



advice of DFO, Gumla and field visit, a total of 10-villages namely Tangersikwar, Chapka, Dhindholi, Shivrajpur and Badkadih from Ghaghra block and Basua, Puggu, Jhargaon, Pokma and Tonto from Gumla blocks were selected purposively.

Mapping of all the ponds in the selected villages was carried out through the conduct of Rapid Rural Appraisal (RRA). One RDF from each of the selected village was selected through a participatory exercise on the basis of personal characteristics of farmer and also the type of ponds in consultation with villagers. Awareness cum pre-demonstration farmers' training was organized during the month of March, 2010 in both the blocks in which all the RDFs as well as fellow fish farmers (FFFs) were invited. Capacity of selected RDF was enhanced in aquaculture through organizing 4 farmers' training, 2 in each of the selected blocks in the presence of officials of DoF, Gumla in which plan of action for the project was finalized including pond preparation and mobilization of inputs.

A project launching workshop of the project was organized in Gumla. The programme was attended by a large number of stakeholders. A five days trainers' training was also organized by CIFE scientists on the aspect of social mobilization and aquaculture related skills. On-site trainings were organized in each of the selected ponds for method demonstration at an interval of every 2 months. The method demonstration was conducted by the trained RDFs to fellow farmers in the presence of Scientists of CIFE, Mumbai and officials of DoF, Govt. of Jharkhand. During the course of entire project period, 4 numbers of such on-site

trainings were conducted on each of the selected ponds. Initially, low input/low risk and high profit base technology was introduced that can be up scaled to input intensive technology gradually with increase in confidence of farmers, only after the completion of one cycle. It is expected that farmers will be able to harvest about 1.5-2.0 ton of fish /acre that will result into an earnings of about Rs.1.0 lakh per acre. With CIFE intervention, farmers have got exposure and learned the package of practices for aquaculture in such ponds.

**Project Title 29: Development of Quantitative Real-time PCR for Four DNA Viruses Infecting Indian penaeid shrimp**

**Funding Agency: Department of Biotechnology, Govt. of India**

PI: K.V. Rajendran, Co-PIs: M. Makesh and Aparna Chaudhari

#### **Achievements**

- A sensitive and specific SYBR Green-based quantitative real-time PCR was developed for the detection and quantification of WSSV. The assay was successfully applied to quantify progression of WSSV in experimentally infected *P. monodon*.
- A sensitive and specific SYBR Green-based quantitative real-time PCR was developed for the detection and quantification of IHNV. The assay was applied to quantify the IHNV level in *P. monodon*. The assay was found to be more sensitive than the conventional test to detect IHNV sequences in shrimp.



## External Funded Projects (Newly initiated):

**Coordinated Research Projects on “Aquatic Radioecology”** In collaboration with BRNS, Mumbai, BARC, Mumbai and NPCIL, Mumbai

**Funded Agency:** Board of research in Nuclear Science/Department of Atomic Energy (GOI)

**Period:** 2010-2013

**Programme Leader:** Dr. W. S. Lakra, Director/Vice chancellor

**Project Co-ordinator:** Dr. A.K.Pal, Head FNBP Division

Total Budget: Rs. 647 lakh

**Titles of the projects:**

**1. Studies on baseline marine radio-ecology and biodiversity around nuclear power plant site in Jaitapur, Maharashtra.**

PI : Dr. S.K. Chakraborty, Head, FRH&PHM, CIFE, Mumbai , Co-PI: Dr. A. K. Jaiswar, FRH&PHM, CIFE, Mumbai  
PC : Dr. P. M. Ravi, BARC; Co-PC: Dr. B. N. Dilip, ESL, Kaiga

Budget: Rs. 68.25 lakh

**2. Studies on present status of marine radioecology and biodiversity at Kalpakkam coastal site**

PI : Dr. A. K. Pal, Head, FNBP, CIFE, Mumbai

Co PI : Dr. Munil Kumar, FNBP, CIFE, Mumbai

PC : Dr. S. Rajaram, OIC, Kalpakkam & Dr. S. Krishnan, ESL, Kalpakkam

Budget: Rs. 208.35 lakh

**3. Studies on present status of marine radioecology and biodiversity at Tarapore coastal site**

PI : Dr. S. Dam Roy, Head, Aquaculture, CIFE, Mumbai

Co PI : Dr. Chandra Prakash, & Mrs. Paramita Banerjee Sawant, Aquaculture, CIFE

PC : Dr. A. Baburajan, OIC, ESL, Tarapore  
Co-PC: P. Sudhindran

Budget: Rs. 168.5 lakh

**4. Base line riverine radioecology and biodiversity studies around the proposed NPP site in Madhya Pradesh**

PI: Dr. S. Dasgupta, FNBP, CIFE

Co-PI: Dr. S. P. Shukla, AEHM, CIFE

PC: Dr. P. M. Ravi, BARC Co - P C : Mr. Manish K. Mishra, SOD, BARC

Budget: Rs. 202.35 lakh

### Achievements:

The recruitment of staffs has been completed. The plan for survey and sampling of different sites under the project has been discussed thoroughly with the respective Co-PC of the individual project.

## Contract Research Project

**Project Title 1:-Formulation and development fish inducing hormone for fish breeding (Gonopro-FH injection)**

**Funding Agency:** APC Nutrients Pvt. Ltd., 106, S.V. Road, Santacruz, (w),

**Project Duration:** - June, 2009 - Sep, 2010

**Project Personnel:** - P.I.: A. K. Pal Co-PI: S. Dasgupta

### Achievements:

Gonopro-FH was formulated in combination of synthetic GnRH and domeperidone and validated through



field trials. The Gonopro-FH produced better quality of the eggs in terms of fertilization and hatching success than those produced by Ovaprim. The changes of steroid hormones such as estradiol, 17-OH progesterone (17-OH) and testosterone were assessed during the final oocyte maturation (FOM) in both the group and found that although level of the maturation inducing steroid i.e., 17-OH-P in the blood increased early in the fish induced with ovaprim, the surge required for FOM was recorded higher in

the blood of fish injected with Gonopro-FH. The better quality of eggs may be attributed to the proper synchronization of the FOM process and surge of blood 17-OH-P level. Moreover, the less viscosity of the product enhanced the penetrability without causing post-injection injury.

**Project Title 2:- Establishment of giant freshwater prawn hatcheries in Assam.**

**Funding Agency:-** Department of Fisheries , ( Govt of Assam)

**Project Duration:-** June, 2019- Sep, 2010

**Project Personnel:** A. K. Reddy

### Achievements

Established 1.0 million capacity hatchery at Meen Bhawan, Guwahati and trial operation was conducted during August-September, 2010. Construction



of other two hatcheries is in final stage at Cilchar and Dubri. Trained 8 Officials of Dept. of Fisheries, Govt. of Assam in "Management of Giant Freshwater Prawn Hatchery" at CIFE, Mumbai during 27 September, 2010 to 18 October, 2010 to operate 3 prawn hatcheries in Assam.

## *Matsyagandha Matsya Mahotsav*

Bandra-Kurla Complex , Mumbai



Dr. W.S. Lakra, Director & Vice-Chancellor showing the activities of CIFE to Shri Sharad Pawar, Hon'ble Union Minister of Agriculture, Shri Prithviraj Chavan, Hon'ble Chief Minister, Govt. of Maharashtra and Shri Madhukar Deorao Chavan, Hon'ble Minister of Animal Husbandry, Dairy Development and Fisheries



Shri Sharad Pawar, Hon'ble Union Minister of Agriculture, Shri Prithviraj Chavan, Hon'ble Chief Minister, Govt. of Maharashtra and Shri Madhukar Deorao Chavan, Hon'ble Minister of Animal Husbandry, Dairy Development and Fisheries at NAIP, CIFE Stall.

# 6 Extension Achievements



## 6.1 Short term Training Programmes/Special Training Programmes

Title	Venue	Period	No. of Trainees
Fish culture	Kakinada	Mar 16-22, 2011	22
Ornamental fish breeding and culture, Carp culture and Fish harvesting	KVK, Banswara, Rajasthan	Mar 8-10, 2011	57
Fish Culture	Kolkata	Mar 5- 14, 2011	30
Fish farming	Kakinada	Feb 28- Mar 9, 2011	5
Basic aspects of aquaculture and fisheries	Powarkheda	Feb 22- 28, 2011	10
Management of Pond & Reservoir Fisheries	Powarkheda	Feb 22-28, 2011	09
Methodologies for study of plankton and benthos	Mumbai	Feb 22-28, 2011	4
Machli avum Jhinga Palan	Kakinada	Feb 17- 26, 2011	37
Fish Culture Practices in the Water logged Area and Flood Plains	Kolkata	Feb 17-23, 2011	18
Machli avum Jhinga Palan	Kakinada	Feb 2 - 11, 2011	35
Machli avum Jhinga Palan	Kakinada	Jan 21-30, 2011	39
Freshwater Aquaculture	Kolkata	Jan 5-14, 2011	21
Fish Breeding & Culture and Fish Processing	Kolkata	Jan 14-24, 2011	13
Fish Disease & Fish processing	Kolkata	Jan 14 - 24, 2011	16
Machli avum Jhinga Palan	Kakinada	Jan 6 - 15, 2011	40
Fish Breeding	Kolkata	Dec 23- 30, 2010	11
Machli avum Jhinga Palan	Kakinada	Dec 22-31, 2010	38
Brackishwater Aquaculture	Kakinada	Dec 9-18, 2010	5
Ornamental Fish Breeding Technology	Kolkata	Nov 25-26, 2010	20
Carp Breeding & Hatchery Management	Kolkata	Nov 24-Dec 9, 2010	13
Livelihood and nutritional security of tribal dominated areas through integrated farming system and technology models	Banswara(Dist), Rajasthan	Nov 24-25, 2010	14





Ornamental fish breeding and culture, Carp culture	KVK, Banswara, Rajasthan	23-25 Nov, 2010	27
Machli palan	Kakinada	Nov 22-25, 2010	25
MPEDA sponsored Ornamental Fish Breeding Technology	Kolkata	Nov 22 - 23, 2010	20
Ornamental fish breeding and culture	Mumbai	Oct 19-21, 2010	16
Management & Maintenance of Pisciculture (Carp & prawn culture)	Powarkheda	Oct 8-14, 2010	16
Fish culture	Kakinada	Sep 28 -Oct 2, 2010	20
Management of Giant Freshwater Prawn Hatchery	Mumbai	Sep 27 - Oct 18, 2010	8
Freshwater fish culture	Kakinada	Sep 23-30, 2010.	15
Freshwater Aquaculture	Kolkata	Sep 15- 24, 2010	30
Machli palan	Kakinada	Sept 13-19, 2010	24
Freshwater Fish culture	Kakinada	Sep13-17, 2010	21
Water Quality management techniques in ponds and Hatcheries	Mumbai	Sep 6-12. 2010	10
Fish & Prawn culture (in Hindi)	Powarkheda	Sep 9-18, 2010	20
Mass Scale Seed Production and Culture of Magur (MTC)	Kakinada	Sep 2-9, 2010	9
Ornamental Fish Breeding & Culture	Kolkata	Aug 16-25, 2010	18
Carp culture	Rangapara, Assam	Aug 12-13, 2010	20
Fish farming	Kolkata	Aug 11-20, 2010	31
Carp and Prawn Culture	Rangapara, Assam	Aug 11-15, 2010	25
Carp & Prawn breeding and farm Management	Powarkheda	Aug 5-11, 2010	22
Trainers training	Fisheries College, Dholi, Bihar	Aug 2-5, 10	18



Machli Palan	Kakinada	Jun 29 - Jul 5, 2010	10
Breeding & Rearing of magur	Kolkata	Jun 23- Jul 2, 2010	29
Third Regional Training course on Code of Conduct for responsible fisheries	Mumbai & BOBP-IGO Chennai	Jun 20-July 3, 2010	20
Trainers training	Gumla, Jharkhand	Jun 10-14 , 2010	20
Machli avum Jhinga Palan	Kakinada	Jul 7 - 16, 2010	33
Freshwater Aquaculture	Kolkata	Jul 6 - 15, 2010	29
Machli avum Jhinga Palan	Kakinada	May 27- Jun 5, 2010	37
Freshwater Aquaculture	Kolkata	May 22-31, 2010	27
NGO Workers (PACT)	Sulatanpur (U.P.)	May 10-19, 2011	86
Machli palan	Kakinada	May 5-11, 2010	26
Cage and Pen culture for raising fingerlings	Mumbai	Apr 19-23, 2010	18.
Machli avum Jhinga palan	Kakinada	Apr 15 - 21, 2010.	30
Machli palan	Kakinada	Apr 3 - 9, 2010	27
Fish and Prawn Farming	Powarkheda.	Mar 30- Apr 8, 2010.	21
Freshwater Aquaculture	Kolkata	Mar 30-Apr 8, 2010	21
Fish & Prawn culture (in Hindi)	Powarkheda	Mar 30 - Apr 8, 2010	21
Livelihood and nutritional security of tribal dominated areas through integrated farming system and technology models	Banswara District, Rajasthan	Mar 29-31, 2010	15

## 6.2 Participation in Exhibitions



Programm/Workshop	Venue	Period	Participating Centre/HQ
Mini Kisan Mela and Farmers Meet	Village Bainsi, District Rohtak	Mar 12, 2011	Rohtak
Xth Agricultural Science Congress on Soil, Plant and Animal Health for Enhanced and Sustained Agricultural Productivity	NBFGR, Lucknow	Feb 10- 12, 2011	Mumbai, Rohtak
Agricultural Exhibition -cum- Technology Week	Ramkrishna Ashram KVK, Nimpith, West Bengal	Feb 9-13, 2011	Kolkata
Regional Agriculture Fair	ICAR, RCER, Patna	Mar 7-10, 2011	Kolkata
Bharat Nirman - Jan Suchana Abhiyan	Nehru Stadium, Madhya Pradesh	Feb 4-6, 2011	Powarkheda
Pusa Krishi Vigyan mela	IARI Campus, Pusa, New- Delhi	Mar 3 - 5, 2011	Rohtak
Jayant Agro Exhibition, 2011	Walwa, Sangli Dist., Maharashtra.	Feb 16-19, 2011	Mumbai
Bigyan O Shilpa - Projukti Mela	B.R. Ambedkar Park Kankinara, West Bengal	Jan 20-26, 2011	Kolkata
Matsyagandha 2010 Mahamatsya Mahotshav	Bandra Kurla Complex, Mumbai	Dec 26-28, 2010	Mumbai
05 <sup>th</sup> National Conference on KVK 2010 and National Exhibition	Udaipur, Rajasthan	Dec 22-24, 2010	Mumbai
Agri-Koli festival	Dombivli, Maharashtra	Nov 23-30, 2010	Mumbai

Yashavantrao Chavan Agro-Industrial and Veterinary Exhibition, 2010	Karad, Satara district, Maharashtra	Nov 23-26, 2010	Mumbai
“PONFISH 2010”	Yanam, Puducherry	Nov 21-22, 2010	Kakinada
India International Trade Fare	Pragati Maidan, Delhi	Nov 14 - 27, 2010	Rohtak
“Infish Expo 2010”	NFDB, Hyderabad	July 9-11, 2010	Kakinada
Annual Agriculture Fair 2010	Itarsi, M.P.	Jun 9-11, 2010	Powarkheda
Horti Expo 2010	University of Horticultural Sciences, Bangalore	May 28-31, 2010	Kakinada
14 <sup>th</sup> National Expo	Amrabati Maidan, Sodepur, Kolkata	Sep3-7, 2010	Kolkata
Baramati Agri-Expo Haritkranti & Kisan Mela, 2010	Baramati, Maharashtra Mumbai	Nov 1-4, 2010	Mumbai
BENAQUA 2010 National Fish Festival	Nalban Fisheries Food Park Complex, Kolkata	Oct 1-4, 2010	Kolkata

#### Farmers' Meets/Special Training programmes organized in the NE states/other states

Name of programme	Period	State
State level review workshop on technological and HRD requirements for fisheries development in Tripura	Aug 9, 2010	Tripura
Freshwater prawn hatchery	Aug 11, 2010	Assam
Trainers training at Fisheries College, Dholi, Samastipur, and Bihar under the project of Development of community participated enhanced fisheries management model for the Chaur (flood plains) and Maun (oxbow lakes).	Aug 4-8, 2010	Bihar
Fish Farmers Day	Jul 9 -10, 2010.	Jharkhand, Bihar, North Eastern State, Maharastra
Trainers training at Gumla, Jharkhand under the NREGA project of Rural Livelihood Development through Aquaculture	Jun 13-21, 2010	Jharkhand
Launching Workshop of the UNDP project	Jun 9, 2010	Jharkhand



### 6.3 Media

#### Head Quarter, Mumbai

Dr. V. K. Tiwari, Senior Scientist, recorded a documentary on fish culture at CIFE, Powarkheda Center on 29<sup>th</sup> June, 2010, for Bhopal Door Darshan. Dr. Kiran Dube Rawat, Principal Scientist, recorded a 15 minute documentary for Pune Doordarshan which was telecast during December 2010 and January 2011. Dr. M. P. Singh Kohli, Principal Scientist and Dr. Kiran Dube Rawat documented reports on “Pen culture: Aadivasina rojgarachi navi sandhi”, for Lokmat, Pune Ravivar, dated 20 February 2011, “Cage cultivation madhun yetet aadivasint samridhi” for Agrovani, Agro special, dated 3<sup>rd</sup> June 2010, and “Fishing with flood-struck locals in Maharashtra” for Indian Express, dated 15<sup>th</sup> May 2010.

#### Kakinada Centre

Dr. S.S.H. Razvi, Scientist-In Charge, delivered a T.V talk on Pengba breeding and seed production to Eenadu TV during October, 2010. Mr. Murali Mohan Technical Officer T-6, attended to an All India Radio - Interview, Visakhapatnam on 30.04.2010 topic on “PASUPUPEETHALA PEMPAKAMLO MELAKUVALU”, broadcasted on 02.05.2010 AIR, Visakhapatnam. Mr. K. Radha Krishna Reddy, Tech. Officer, T-5 attended to an All India Radio talk at Visakhapatnam on 06.05.2010 on the topic “Deseya Marpu Chapala Pempakamlo Melukuvalu” Pallesseemalu Farmers Programme. Mr. K.R.K. Reddy delivered a short audiovisual documentary on “Carpus Chapala Pempakamulo Melukuvalu” telecast in ETV2 Telugu channel Annadata farmers

program on 21-6-10 at 06.30 hrs. The centre arranged for a video documentary on culture practices of *L.vannamei*, *Chanos chanos*, *Mugil cephalus* and *Lates calcarifer* on 8 & 9<sup>th</sup> of August 2010.

#### Powarkheda Centre

Dr. R. K. Upadhyay, Technical Officer, participated in the live T. V. Panel discussion telecast by the Bhopal Doordarshan on 26 May 2010. Under the 'Gram Mangal' program of Bhopal Doordarshan and the activities of the centre were recorded on 29 June, 2010 and. Dr. R. K. Upadhyay, Technical Officer and Mr. Hasan Javed, Technical Officer explained about the pre-monsoon pond preparation methods and prawn farming system. The Hoshangabad correspondent of 'India TV' visited the centre on 30-31 July, 2010 and recorded the activities of the centre. Dr. S. K. Mishra, Senior Scientist & OIC, Mr. Pavan Kumar, Scientist and Dr. R. K. Upadhyay, Technical Officer explained the activities of the centre and breeding of fishes. A video production unit from New Delhi deputed by CIFE, Mumbai, visited the centre during 5-7 August, 2010 and recorded the activities of the centre. Dr. S. K. Mishra, Senior Scientist & OIC, Mr. Pavan Kumar, Scientist and Dr. R. K. Upadhyay, Technical Officer explained culture activities of the centre.

#### Rohtak Centre

Dr. V. K. Sharma, OIC of the Centre delivered a TV - talk on 12.02.10 to Doordarshan Krishi Darshan programming unit (CPC Doordarshan) on inland saline aquaculture practices. A Television talk was delivered by Shri. Vangurula Harikrishna to Doordarshan Krishi Darshan programming unit (CPC



Doordarshan) on the culture of Tiger shrimp using inland saline waters. Scientists and Officer In-charge of the center visited the Aquaculture Research and Training Institute (ARTI) Hissar, Haryana regularly to deliver lectures to the Fisheries Officers of Haryana and gave necessary inputs on various technologies of the fish and prawn culture and breeding. Neighborhood fish farms were also regularly visited and necessary technical guidance was provided.

#### 6.4 Visit Coordination

Among distinguished visitors, Shri. Trivendra Singh Rawat, Minister of Agriculture, Dairy, Fisheries, Ministry of Agriculture, Dairy, Fisheries, Uttarakhand, and Shri Rajiv Maharshi, Additional Secretary, Department Of Agriculture, Research, Education, Ministry of Agriculture (DARE), Govt. of India visited the Headquarters, Mumbai on 21<sup>st</sup> December, 2010 and 17<sup>th</sup> July, 2010 respectively. 367 visitors from various Colleges and Universities and from different parts of the country visited the Institute and its Centres and different times of the year.

#### 6.5 Technical guidance and Demonstration

##### 6.51 Headquarters

Inputs were given with regard to the innovative technology developed from Aquaculture Division. A plan was prepared for installation of pens at Manika maun, Muzzafarpur, under the project entitled “Development of community participated enhanced fisheries management model for the Chaur (flood plains) and Maun (oxbow

lakes)’ and installed. During the visit of Chainpur, Gumla and Ghagra blocks in Gumla district, Jharkhand areas, ponds constructed under NAREGA scheme. Technical guidance on pond construction was given to the farmers and District Fisheries Officers. Discussion held with Dy. Commissioner, Gumla, Irrigation And Fisheries State Officers of Gumla District for exploring the possibility of aquaculture in the Gumla district, in which, possible technologies were suggested. Farmers and entrepreneurs were given suggestions about farm and hatchery construction, soil and water management. The scientists of the Aquaculture Division of the Institute demonstrated raising carp fingerlings in cages and pens at Dimbhe reservoir. Cages and pens were installed and rural communities were trained for *in situ* rearing of fingerlings of IMC in Dimbhe reservoir with community participation.

Giant Freshwater Prawn Hatchery established at Meen Bhawan, Directorate of Fisheries, Govt. of Assam during August, 2010. Demonstration of an innovative integrated approach for reclamation of low productive salt affected sugarcane fields through sub-surface Drainage System and Aquaculture. In this system, soyabean and sugarcane production were increased by 73 and 114 percent respectively. Carps have grown from 50 g to 450 g in 4 months in sub-surface drainage water. Bengal gram and wheat as inter crops with sugarcane are in progress. This was demonstrated at Malkhed Village, Karad Taluka, Satara District. Carp seed production and carp culture were demonstrated in salt affected sugarcane fields at Shere and



# 7 Honours and Awards



**Dr. W. S. Lakra,**  
Director/Vice-  
Chancellor



- Chair, Working Group for Fisheries Development in Haryana, constituted by Haryana Kisan Ayog, Government of Haryana.
- Chair, Sub-Group on Fisheries constituted by Planning Commission, Government of India for Department of Agricultural Research and Education for the Twelfth Five Year Plan.
- Chair, Sub-Group on Fishery Policies and HRD of Planning Commission for the Twelfth Five Year Plan

**Dr. R.P.Raman,**  
Senior Scientist of  
Aquatic Environment  
& Health  
Management  
Division, CIFE



Mumbai was awarded Congress of Zoology Gold Medal by the Zoological Society of India (ZSI) for his outstanding research and academic contributions in Fisheries Science (Fish Diseases) during the “21<sup>st</sup> All India Congress of Zoology” held at CIFRI Barrackpore on 21<sup>st</sup> December, 2010.

**Dr. K.Pani Prasad,**  
Senior Scientist of  
Aquatic Environment  
& Health  
Management  
Division, CIFE,



Mumbai was awarded Fellowship by the Zoological Society of India (ZSI) for his outstanding research and academic contributions in Fisheries Science (Fish Diseases) during the “21<sup>st</sup> All India Congress of Zoology” held at CIFRI Barrackpore on 21<sup>st</sup> December, 2010.

**Dr. Archana Sinha,**  
Principal Scientist  
and OIC Kolkata  
Center, CIFE was  
awarded Congress of  
Zoology Gold Medal  
by the Zoological  
Society of India (ZSI)



for her outstanding research and academic contributions in Fisheries Science (Aquaculture) during the “21<sup>st</sup> All India Congress of Zoology” held at CIFRI Barrackpore on 21<sup>st</sup> December, 2010.

**Dr. V.K. Tiwari,**  
Senior Scientist,  
Aquaculture Division,  
CIFE, Mumbai of was  
conferred with  
Fellow of Association  
for the advancement  
of Zoology Allahabad  
(F.A.A.Z.) on 15th January 2011.



**Dasari Bhoomaiah,** Technical officer, Documentation Cell, CIFE Mumbai received Certificate of appreciation from National Bureau of Fish Genetic Resources, Lucknow for designing new NBFGRL Logo in January 2011.

**Dasari Bhoomaiah,** Technical officer, Documentation Cell, CIFE Mumbai received Letter of appreciation from Central Agricultural Research Institute,

**Dr. Archana Sinha**, Principal Scientist and OIC Kolkata Center, CIFE was conferred with fellowship of BIOVED Research Society, Allahabad in recognition of her outstanding scientific contributions in the field of Human Resource Development, Aquaculture and Ornamental Fisheries.



NBFG, Lucknow during 10-12, February, 2011.



**Dr.K.Pani Prasad**, Senior Scientist of Aquatic Environment & Health Management Division, CIFE, Mumbai was elected as Vice President, Zoological Society of India from 1 April 2010



## CIFE Institutional Awards

### Best Division



Fish Nutrition, Biochemistry,  
& Physiology Division

### Best Teacher



Dr. N.K.Chadha

### Excellence in Team Work

Dr. C. S. Purushothaman,  
Dr. V. K. Sharma,  
Dr. G.Venugopal,  
Mr. V. Harikrishna  
& Mr. Ashok Kumar

### Institution Building



Dr. N.K.Chadha

### Best innovative Idea



Mr. Dasari Bhoomaiah

### Best Young Scientist



Dr.Girish Babu

### Best Administrative Staff



Mr.Vijay Kuveskar

### Best Extension Worker



Dr.R.K.Upadhyay

### Best Technical Staff



Mrs.S.S.Gajbhiye

### Best School Children



Miss Sohini Dasgupta, Xth Std

### Best Hindi Work



Mr. K.B. Sreeramamurty

### Best Supporting Staff



Mr.Lavesh Kumar



Master Syed Nazish Zaidi, XIIth Std



## ICAR sports tournament

The institute participated in the ICAR inter institutional sports meet held at IGRI, Jhansi during 15-19 February 2011 and won the following medals

### Men

800 metre  
Second



Mr. Kantaram Shinde

High Jump  
Second



Mr. Kishore Bose

Relay 4X100 mt  
First



Mr. Deepak Bhokshe



Mr. Sambhaji S. Shelke



Kabaddi - Runner up



Mr. Kishore Bose



Mr. Ninad Kandalgaonkar

### Women

Table Tennis (Singles)  
Winner



Mrs. Francisca Fernandes

Table Tennis (Doubles)  
Runner up



Ms. Chanda Khundol and  
Mrs. Francisca Fernandes

Badminton (Singles)  
Runner up



Mrs. Pragati Gadre

# 8 Linkages and Collaborations



## Government of India Organizations

- Integrated Fisheries Project, Kochi
- Central Institute for Coastal Engineering for Fishery, Bangalore
- Central Institute of Fisheries Nautical and Engineering Training, Kochi
- Fishery Survey of India, Mumbai
- Marine Products Export Development Authority, Kochi
- National Institute of Nutrition, Hyderabad
- Zoological Survey of India, Kolkata
- Indian Institute of Technology, Kharagpur
- Department of Earth Sciences, Government of India
- Department of Science and Technology, Government of India
- Department of Biotechnology, Government of India
- Indian National Center for Ocean Information Services (INCOIS), Hyderabad
- Satellite Application Centre, Ahmedabad in the utilization of OCEANSAT II
- Bhaba Atomic Research Centre, Mumbai
- Tata Cancer Research Center, Mumbai
- Indian Institute of Foreign Trade, Kolkata

## ICAR Institutes

- Central Marine Fisheries Research Institute, Kochi
- Central Institute of Brackishwater Aquaculture, Chennai
- Central Institute of Freshwater Aquaculture, Bhubaneswar
- Central Inland Fisheries Research Institute, Barrackpore
- Central Institute of Fisheries Technology, Kochi
- National Bureau of Fish Genetic Resources, Lucknow
- Directorate of Coldwater Fisheries Research, Bhimtal
- ICAR Research Complex for Goa, Goa
- ICAR Research Complex for Eastern Region, Patna
- Indian Agricultural Research Institute, New Delhi

## CSIR Institutes

- Industrial Toxicology Research Centre, Lucknow
- Central Drug Research Institute, Lucknow
- Central Institute of Medicinal and Aromatic Plants, Lucknow
- Central Food Technological Research Institute, Mysore
- National Institute of Oceanography, Goa
- Centre for Cellular and Molecular Biology, Hyderabad
- National Botanical Research Institute, Lucknow
- Institute of Genomics and Integrative Biology, Delhi



## Universities

- Cochin University of Science and Technology, Kochi
- Annamalai University, Chidambaram
- Adikavi Nannaya University, Rajahmundry
- University of Goa, Goa
- Acharya N.G. Ranga University, Guntur
- B.S. Konkan Krishi Vidyapeeth, Dapoli
- Maharana Pratap University of Agriculture and Technology, Udaipur
- Jawaharlal Nehru University, New Delhi
- Microtron Centre, Mangalore University, Mangalore
- Bhartiya University, Coimbatore
- West Bengal University of Animal & Fishery Sciences, Kolkata
- Mumbai University, Mumbai
- Bidhan Chandra Krishi Viswa Vidyalaya, Nadia, West Bengal
- Kalyani University, Kalyani West Bengal

## State Governments

Department of Fisheries of the following states:

- Haryana
- Uttar Pradesh
- Bihar
- Tamil Nadu
- Andhra Pradesh
- Tripura
- Arunachal Pradesh
- Meghalaya
- Nagaland
- Assam
- Manipur
- Mizoram
- Sikkim
- State Institute of Fisheries Technology, Kakinada

## Other Organizations

- Tata Power Company, Lonavala & Mumbai
- Action Aid International, Port Blair
- M. S. Swaminathan Research Foundation, Chennai
- The Seafood Exporters Association of India, Kolkata
- Nezami Rekha Sea Foods Pvt. Ltd., Kolkata
- IFB Agro Industries Ltd., Aquatic & Marine Products Div., Kolkata
- Shrimo Exports, Kolkata

- Coreline Exports, Kolkata
- Digha Sea Food Exports, Kolkata
- NSZA Sea Food Pvt. Ltd, Kolkata
- Central Calcutta Science and Culture Organization for Youth

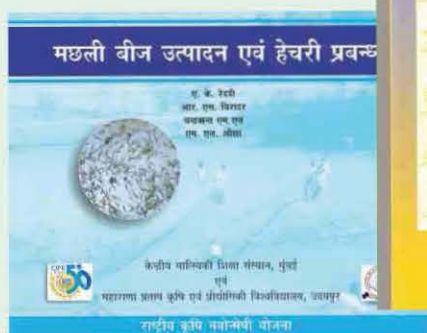
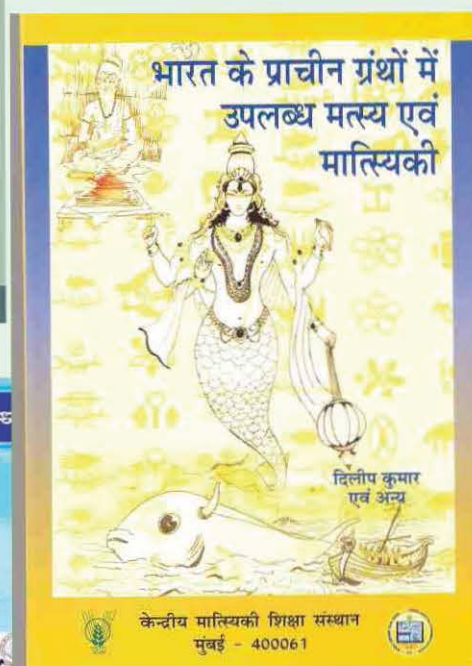
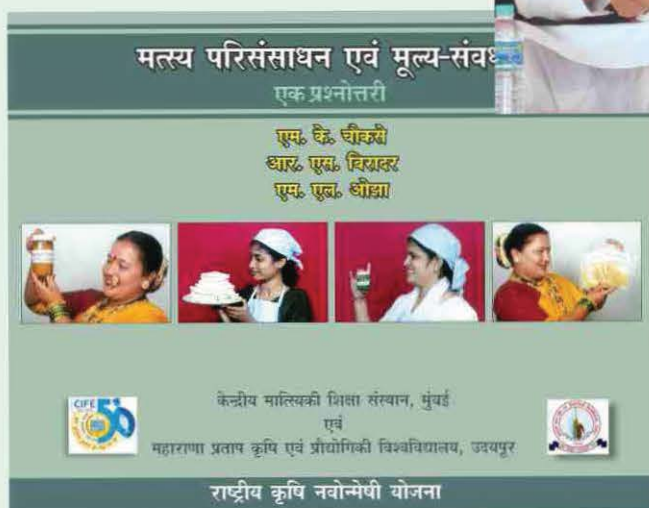
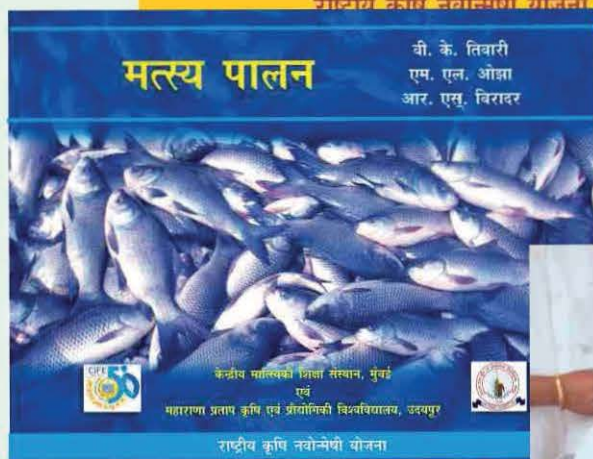
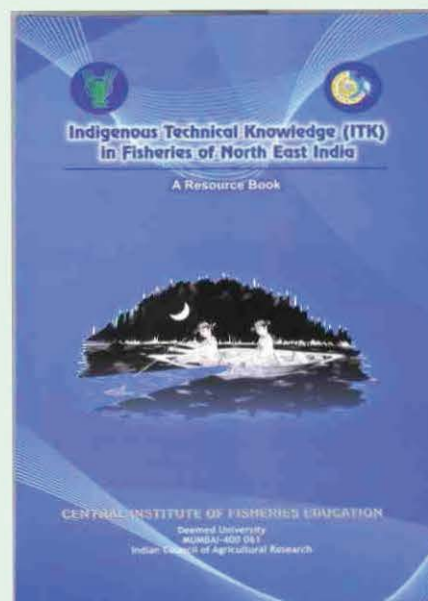
#### NGOs:

- Interactive Research School in Health Affairs, Pune
- SHASHWAT, Manchar, District Pune
- Yusuf Meherally Centre, Kutch, Gujarat
- United Artists' Association, Ganjam, Orissa
- FONA , Talegaon , Maharastra

#### 8.2. Collaborations

- ☒ **MoU with Ramkrishna Mission KVK, Nimpith, West Bengal and CIFE**  
CIFE inked a pact with Ramkrishna Mission KVK, Nimpith, West Bengal from 22 July, 2008 on educational and research collaborations specially related to ornamental fish culture and other types of aquaculture practices.
- ☒ Indian National Center for Ocean Information Services (INCOIS), Hyderabad for installation of electronic display board for dissemination of information on potential fishing zones (PFZ) and weather warnings to fishermen of Versova.
- ☒ Indian Institute of Technology, (B), Mumbai through implementation of a course on “Entrepreneurial Opportunities in Fisheries” for students of IIT, Mumbai through a series of 15 lectures by CIFE faculty.
- ☒ Satellite Application Centre, Ahmedabad in the utilization of OCEANSAT II.
- ☒ Co-ordinated Project WITH BARC, NPCIL on Aquatic Radio-ecology, Mapping of Radio-isotopes in the Aquatic environments both marine and riverine ecosystem.







# Chapter 9 Publications

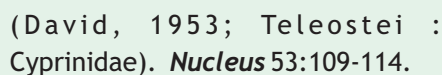


## 9.1: Research Publications in Refereed Journals

- Aanand, S., Purushothaman, C. S., Pal, A. K. and Rajendran, K. V., 2010. Toxicological studies on the effect of copper lead and zinc on selected enzymes in the adductor muscle and intestinal diverticula of the green mussel *Perna viridis*. *Indian J. Mar. Sci.*, 39(20): 299-302.
- Akhtar, M. S., Pal, A. K., Sahu, N. P., Alexander, C., Gupta, S. K., Choudhary, A. K., Jha, A. K. and Rajan, M. G., 2010. Stress mitigating and immunomodulatory effect of dietary pyridoxine in *Labeo rohita* (Hamilton) fingerlings. *Aquaculture Research*, 41: 991-1002.
- Akhtar, M.S., Pal A.K., Sahu N.P., Alexander C., and Meena, D. K., 2011. Dietary pyridoxine enhances thermal tolerance of *Labeo rohita* (Hamilton) fingerlings reared under endosulfan stress, *Journal of Thermal Biology*, 36:84-88.
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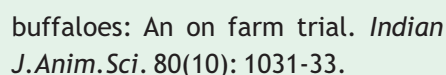


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# 10 Participation in Workshops/ Conferences/Symposia/ Meetings/Farmers meet etc.



## Participation of Dr. W. S. Lakra, Director and Vice-Chancellor

Date	Programme
<b>Abroad :</b>	
23-25 Sept., 2010	International Barcode of Life (iBOL), Scientific Steering Committee Meeting at University of Guelph, Canada
<b>India :</b>	
15-16 July 2010	Directors' Conference at NASC Complex, New Delhi
22 <sup>nd</sup> July 2010	Selection Committee meeting at Punjab University, Chandigarh
27 <sup>th</sup> July 2010	Review Meeting of ICAR-Biodiversity Workplan at NASC Complex, New Delhi Reviewed the research programmes and infrastructure development Kochi Unit of NBFGR, Kochi
9 Aug, 2010	21 <sup>st</sup> meeting of ICAR Regional Committee No.VII held at CIAE, Bhopal
15-17 Sept., 2010	Meeting of the Sectional Committee/Executive Committee of NAAS, India
3 <sup>rd</sup> - 4 <sup>th</sup> Oct., 2010	Vice Chancellors of Agricultural Universities, NASC, New Delhi
21 Oct., 2010	Meeting with regard to X Agricultural Science Congress at NAAS Secretariat, New Delhi
14 <sup>th</sup> Dec. 2010	Coordination Committee Meeting of ICAR Deemed Universities at ICAR, New Delhi
22 <sup>nd</sup> Dec. 2010	Inaugural function of National Conference on KVK-2010 at Maharana Pratap University of Agriculture & Technology, Udaipur
1 <sup>st</sup> & 2 <sup>nd</sup> Feb., 2011	Inaugural session of National Initiative on Climate Resilient Agriculture and Pre-Launch Technical Workshop at NAAS
10-12 Feb., 2011	Meeting with the President, NAAS, New Delhi and Meeting with Organizing Committee at NBFGR, Lucknow
21-22 Feb., 2011	Vice Chancellors Conference on Agricultural Universities at New Delhi
23 <sup>rd</sup> February 2011	Interface of VC of Agricultural Universities with Directors of ICAR Institutes
9-10 March 2011	International Conference on Higher Education in India at IMC, New Delhi
17 <sup>th</sup> March 2011	Meeting with DG, ICAR and RAC interaction on at New Delhi
23.03.2011	Participated in the DBT Task Force meeting at Delhi
28 <sup>th</sup> to 30 <sup>th</sup> Jan 2011	Inaugurated Versova Koli Sea Food Festival Versova, Mumbai



#### 10.1: Participation in Workshops/Conferences/Symposia/meetings/farmers meet, etc.

Date	Programme	Organized by	Participants
8 April 2010	Symposium on Applications of flow cytometry in Marine biology	NIO, Goa	Dr. Pani Prasad
15-16 April, 2010	2nd Annual Workshop of NAIP Component-2	TNAU, Coimbatore	Dr. A.K. Reddy
22-23 April, 2010	Experts Consultation on Marine Biotechnology and Biodiversity Conservation	Goa University, Goa by NBFGR, Lucknow and NIO, Goa	Dr. Gireesh Babu
26 Apr, 2010	Meeting of Review of PF projects of INCOIS	Centre for Studies on BOB, Vizag	Dr. Latha Shenoy
29 April 10	Meeting of Fish pathologists and veterinarians working in fisheries institutes for Empanelment of pathologists to prescribe medicines to treat fish diseases	Coastal Aquaculture Authority, Chennai	Dr. Pani Prasad
6-7 May, 2010	National Inception workshop of the FAO-FSI sponsored project of Bay of Bengal Large Marine Ecosystem	Hotel Green Park, Vishakapatnam	Sh. S.S.H Razvi, Dr. Suresh Babu, P. and Mr.R.R.S. Patnaik
21-22 May, 2010	National Meet on Technological Innovations in Agriculture	NASC Complex, New Delhi	Dr. A.K. Reddy
9 June, 2010	Launching Workshop of the UNDP project	Jharkhand	Dr. V.K. Tiwari
9 June, 2010	Scientific Advisory Committee (SAC) meeting of the Krishi Vigyan Kendra (KVK), Powarkheda	Zonal Agricultural Research Station of JNKVV at Powarkheda	Dr. S. K. Mishra & Dr. R.K. Upadhyay
27-28 June 2010	Consultation workshop for drafting Orissa Inland Fishery Act 2010	State Deptt. of Fisheries, Orissa	Dr. R. S. Biradar
16 June 2010	Meeting with Director General, ICAR about the personal policies of Scientist	Krishi Bhawan, New Delhi	Dr. V. K. Sharma
26 June, 2010.	Board of studies meeting of the Zoology department of PR Government College, Kakinada	Kakinada	Dr. P. Rami Reddy
18 July, 2010	Aqu-Agris Workshop on Environment Management Strategies in Aquaculture	Institute of Science Mumbai	Dr. C. S. Purushothaman
19 July, 2010	Fisheries development in Vidarbha region	Secretariat, Mumbai	Dr. V.K. Tiwari
7 <sup>th</sup> August 2010	National workshop on Augmenting outreach programmes in Animal Husbandry & Fisheries	KVAFS University Bidar	Dr. R.S. Biradar
9 Aug, 2010	Impact Assessment Workshop	Agartala, Tripura	Dr. V.K. Tiwari

9 Aug, 2010	State Level Review workshop on technological and HRD requirements for fisheries development in Tripura	Tripura	Dr. V.K. Tiwari
11-15 Aug, 2010	Carp and prawn culture	Rangapara, Assam	Dr. A.K. Reddy
13 <sup>th</sup> August, 2010	Workshop of projects related to MGNREGA at Unnati, Krishi Bhawan	Ministry of Rural Development, Govt. of India, New Delhi	Dr. Nalini Ranjan Kumar
27-28 <sup>th</sup> Oct., 2010	Experiential Learning: Monitoring and Evaluation	UAS, Dharwad	Dr. Nalini Ranjan Kumar
31 Aug, 2010	State level Work shop on Strategies for sustainable Aquaculture.	S.V.K.P.& K.S.Raju Arts and science College.Penugonda, WGDt.,AP	Dr. P. Rami Reddy, and Dr. J. Krishna Prasad
2 - 3 Sept, 2010	Workshop on fermented foods of North East India.	Institute for Bio-resources development with DBT sponsorship	Dr. B.B. Nayak
8 Sept, 2010	Innovation 4 Industry Meet	CIFT and NFDB, Vishakhapatnam	Dr. G.Venkateshwarlu
10 Sept, 2010	Scientific Advisory Committee Meeting of RKAKVK, Nimpith	RKAVK, Nimpith	Dr. Archana Sinha
14-16 Sept, 2010	Regional Committee Meeting- II, ICAR	CARI, Port Blair	Dr. Archana Sinha
24 Sept, 2010	DBT Task Force Meeting	New Delhi	Dr. Archana Sinha
27 Sept, 2010	Programme on Culture of Giant Freshwater prawn with Indian Major carps	Patna, Bihar	Dr. V.K. Tiwari
28 Sept, 2010.	Workshop on Impact assessment of Fisheries Development programmes	Jharkhand, Ranchi	Dr. K.K Jain
29-30 Sept, 2010	Workshop on Sustainable Development of Inland capture and culture fisheries in Tamil Nadu	Fisheries Technocrats Forum and CIBA Chennai	Dr. S. Dam Roy
21 Oct, 2010	Scientific Advisory Committee (SAC) meeting of the Krishi Vigyan Kendra (KVK), Powarkheda	Zonal Agricultural Research Station of J NKVV at Powarkheda	Dr. R.K. Upadhyay
25 Oct, 2010	Discussion on Research Needs due to Abiotic Stress in Agriculture Management in India under Global Climate Change Scenario	New Delhi, ICAR	Dr. C. S. Purushothaman
27 Oct, 2010	Expert Committee for setting up of Aquatic Animal Quarantine Lab at Palghar	Palghar	Dr. Pani Prasad



1-4 Nov, 2010	Baramati Agri-Expo Haritkranti 2010	Baramati, Pune District, Maharashtra	Dr. A.K. Reddy
6 - 7 Nov, 2010	International consultation on DNA Bar-coding	New Delhi	Dr. Gopal Krishna Dr. S. Jahageerdar Dr. Pani Prasad Dr. Rupam Sharma Dr. Gireesh Babu Mr. Pavan Kumar
10 Nov 2010	Annual progress monitoring meeting for the NAIP project on Bioprospecting of genes and allele mining for abiotic stress.	New Delhi	Dr. Aparna Chaudhari
11 - 13 Nov, 2010	International Symposium organized by Society of Animal Physiologists	IVRI, Bareilly	Dr. Aparna Chaudhari
13 - 15 Nov 2010	4th steering committee meeting of SAARC Nations on Food Security	Kathmandu, Nepal	Dr. V. K. Sharma
20 Nov, 2010	Enhancing Food Security, Safety and International trade through Radiation Technology	Indian Nuclear Society at Vashi, Navi Mumbai	Dr. G.Venkateshwarlu Dr. M.K. Chouksey
22 Nov, 2010	Brackish water Aqua-farmers Meet	CIBA, Kakdwip	Dr. Archana Sinha
23-26 Nov, 2010	Yashwantrao Chavan Agro-Industrial and Veterinary Exhibition, 2010	Karad, Satara Maharashtra	Dr. A.K. Reddy
25-27 Nov, 2010	Akhil Bhartiya Rajbhasha Sammelan	Goa	Dr. K.K Jain
29 Nov 2010	Institute Managerial Committee meeting	CIFRI, Barrackpore	Dr. V. K. Sharma
29-30 Nov, 2010	State level Seminar on Research methodologies in animal sciences	P.R Govt. College, Kakinada	Dr. S.S.H. Razvi, Dr. P. P. Suresh Babu
29-30 Nov, 2010	National seminar on Abuse of Antibiotics in shrimp farms.	MPEDA, SIFT, Govt. of A.P. Kakinada	Mr. S.S.H Razvi, Dr. P. Rami Reddy Dr. P. Srinivasa Rao
30 <sup>th</sup> November 2010	Review workshop	Ministry of Rural Development Government of India and UNDP India	Dr. Nalini Ranjan Kumar
1 Dec, 2010	Institute Management Committee meeting	CIFT, Kochi	Dr. C. S. Purushothaman
2 - 4 Dec, 2010.	ICAR RC-7 meeting	CIAE, Bhopal	Dr. Somdutt
15-16 Dec, 2010	NFDB funded Project Review Meeting	Hyderabad, A.P.	Dr. V.K. Tiwari,
13-16 Dec 2010	Steering Committee meeting of INCANA	Cairo, Egypt	Dr. V. K. Sharma
21-23 Dec 2010	21st All India Congress of Zoology and National Seminar on Biodiversity Conservation with special reference to fisheries and its management for food, livelihood and	CIFRI, Barrackpore, Kokata	Dr. Pani Prasad

	nutritional security and 2nd Helminthological Congress		
22-24 Dec 2010	5th National Conference on KVK 2010 and National Exhibition	Udaipur, Rajasthan	Dr. V.K. Tiwari
26-28 Dec, 2010	<i>Matsyagandha Mahamatsya Mahotsav</i>	Mumbai	Dr. A.K. Reddy
27-28 Dec., 2010	Sensitization cum Training Workshops for the Nodal Officers of NISAGENET	IASRI, New Delhi	Dr. Pani Prasad
10 - 11 Jan, 2011	Regional Committee meeting, V of ICAR	CSSRI, Karnal	Dr. V. K. Sharma
17-20 Jan, 2011	Asian Pacific Aquaculture and Giant Prawn 2011	Kochi	Dr. Neelam Saharan Dr. K.V. Rajendran Dr. S. Jahageerdar Dr. M. Makesh Dr. A.K. Reddy Dr. Munil Kumar Dr. Rupam Sharma Dr. P.P. Suresh Babu Dr. P. Srinivasa Rao Dr. B.K. Mahapatra Dr. Parimal Sardar
21-23, Jan, 2011	International Conference on "Managing Sustainable Development of Rural Economy and Agri Business"	Banaras Hindu University, Varanasi	Dr. R.S. Biradar Dr. Nalini Ranjan Kumar
28 Jan, 2011	5th meeting of Food and Agriculture group 12, ICAR	Bureau of Indian Standards	Dr. B.B. Nayak
28 Jan, 2011	ICAR Zonal Technology Management & Business Planning and Development meeting-cum-workshop (Zone-East)	NIRJAFT, Kolkata	Dr. Archana Sinha
24-29 Jan, 2011	Bioinformatics Resources and Tools for Agricultural Research	IASRI, New Delhi	Dr. Subodh Gupta
25-27 Jan, 2011	Large Marine Ecosystem, Bay of Bengal Programme	Chennai	Dr. S. K. Chakraborty
29 Jan, 2011	Scientific Advisory Committee (SAC) meeting of the KVK of CIAE (ICAR), Bhopal.	CIAE, Bhopal	Dr. S.K. Mishra
2 Feb, 2011	Inaugural Programme of Training on Application of remote sensing and GIS in soil resources studies towards land use planning	NBSS&LUP (ICAR) Regional Centre, Kolkata	Dr. Archana Sinha
5-6 Feb, 2011	National Seminar on Impact on emerging areas of science and technology on the development of society	Science City, Kolkata	Dr. Archana Sinha
10 Feb, 2011	National Seminar on Integrated farming system - a sustainable approach towards rural development	Ramkrishna Mission Ashram, Krishi Vigyan Kendra, Nimpith	Dr. Archana Sinha





10-11 Feb, 2011	National Conference on Frontiers in Technologies for Conservation of Environment.	Dhempe College of Art and Science, Goa University, Goa	Dr. Gopal Krishna
10-12 Feb, 2011	10th Agricultural Science Congress on Soil, Plant and Animal Health for Enhanced and Sustained Agricultural Productivity	NBFGR, Lucknow	Dr. Neelam Saharan Dr. V.K. Tiwari, Dr. A.K. Verma, Dr. Aparna Chaudhari, Dr. Somdutt, Mr. Munilkumar. S Dr. K. Pani Prasad, Dr. Gayatri Tripathi, Dr. Makesh, Dr. A.K. Reddy, Dr. B.K. Mahapatra Dr. S. Datta Dr. Parimal Sardar, Dr. R.K. Upadhyay
17 Feb, 2011	Training cum Workshop on Development of Technology Module for Farm Women	Zonal Project Directorate, Zone-II, Salt Lake, Kolkata	Dr. Archana Sinha
18 Feb, 2011	1st Meeting of the Expert Group to suggest both long term and short term measures for creating an appropriate and effective legal and institutional framework for management and control of aquatic animal diseases	ICAR, Fisheries Division, New Delhi	Dr. Pani Prasad
16-19 Feb, 2011	Jayant Agro Exhibition, 2011	Walwa, Asta Taluka, Sangli District, Maharashtra	Dr. A.K. Reddy
18-20 Feb, 2011	Krishi Expo 2011	Jaipur (Rajasthan)	Dr. R.S. Rana
21 Feb 2011	Workshop on RFD	Cabinet Secretariat, Performance Evaluation Cell, Govt of India, New Delhi	Dr. Neelam Saharan, Dr. S. Munilkumar
21 Feb 2011	Scientific Advisory committee, meeting of KVK, Bhiwani	KVK, Rohtak	Dr. V. K. Sharma
20-22 Feb, 2011	Workshop on Climate Resilient Agriculture	Zonal Project Directorate, Zone-II, Salt Lake, Kolkata	Dr. Archana Sinha
March 2011	Sensitization workshop on RFD, ICAR	ICAR, New Delhi	Dr. Neelam Saharan and Dr. S. Munilkumar
4-6 March, 2011	Inaugural function of Farmers' Training & Visit programme' organized by IFFCO.	Indian Farmers Fertilizer Co-operative Limited, Hoshangabad	Dr. R. K. Upadhyay
11-12 March, 2011	ICAR- Zonal Technology Management &	CIRCOT, Mumbai	Dr. G. Venkateshwarlu,

	Business Planning and Development Unit (West Zone) meeting cum workshop		Nagalakshmi K., Dr. Sanjay Jadhao, Dr. Subodh Gupta
12 March 2011	Mini Krishi Vigyan Mela	Bainsi, Rohtak	Dr. V. K. Sharma
15 March 2011	Selection of subject matter specialist Fisheries of Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, (M.P).	JNKV, Jabalpur, (M.P.)	Dr. V. K. Sharma

## 10.2: Training Programmes\Summer schools/Winter schools attended

Period	Programme	Organized by	Name of Participants
22 March-11 April, 2010	CAFT (Centre for Advanced Faculty Training Programme) on Fisheries Resource Management	CIFE, Mumbai	Paramita B. Sawant
27-28 March , 2010	Brainstorming Workshop on Nanotechnology and its application in Agricultural Sciences	CIFE and Indian Institute of Spices Research, Calicut	Paramita B. Sawant
19 - 23 April, 2010	Packaging material for fish and fishery products	Indian Institute of Packaging, Mumbai	Dr. M.K. Chouksey
27 Apr, 2010	Training program on Logical Frame Analysis	INCOIS, Vishakhapatnam	Dr. Latha Shenoy
13-21 June, 2010	Trainers training at Gumla, Jharkhand under the project of Rural Livelihood Development through Aquaculture in ponds constructed under NREGA	Jharkhand	Dr. A. K. Verma
2 July- 3 Aug, 2010	SAS- An overview	CIFE, Mumbai	Dr. A. K. Jaiswar



4-8 Aug, 2010	Trainers training under the project of Development of community enhanced fisheries management model for the Chaur (flood plains) and Maun (oxbow lakes).	Fisheries College, Dholi, Samastipur, Bihar	Dr. A. K. Verma
04-08 Aug , 2010	SAS Genetics/JMP Genomics	IASRI, New Delhi	Dr. S. Jahageerdar
13 Aug, 2010	Training course on Culture of Major Carps, Pungasius and Air breathing fishes.	Sponsored by NFDB and SIFT, Kakinada	Dr. J. Krishna Prasad
28 Aug, 2010	Winter school on Molecular Techniques in Gene Isolation and Characterization	National Research Centre on Plant Biotechnology, Pusa Campus, New Delhi	Dr. R.S. Rana
6 to 12 Sept, 2010	Water quality management techniques in Ponds and hatcheries	CIFE, Mumbai	Mr. V. N. Acharyulu Mr. Hasan Javed Mr. Anil Kulsanghe
14-18 Sept, 2010	Refresher Course on Advances in Scientific Aquaculture in the North East	COF, CAU, Lembucherra, Tripura	Mr. Prakash Kumar Behera
22 Sept -12 Oct, 2010	Winter school on Basic techniques IVRI, Bareilly in solid phase peptide synthesis and applications of Synthetic peptides in animal disease diagnosis and research		Dr. Gireesh Babu and Mr. Pavan Kumar
5 - 26 Oct, 2010	Vistas in Marine Biotechnology	CMFRI, Cochin	Dr. Suresh babu, P. P
15 - 20 Nov, 2010	SAS- An overview	CIFE, Mumbai	Dr. Geetanjali Deshmukhe
18-23 Dec, 2010	Researcher's Training Program on "SAS: An overview	BA College of Agriculture, Anand Agricultural University, Anand, Gujrat	Dr. Subhendu Datta





### 10.3 Foreign deputations

Programme	Date	Venue	Participants
Nutraceuticals (Fisheries Science)	7 May - 4 Aug, 2010	Nova Scotia, CANADA	N. P. Sahu

### 10.4 Lectures delivered by faculty at other institutes

Date	Name of the lecture	Venue	delivered by
23 April, 2010	Latest development in fish culture in the refresher course of Fisheries officials	ARTI, Hissar	Dr. V. K. Sharma
21 May 2010	CATAT for Entrepreneurs in Fisheries section in their ongoing training for farmers and officers of U.P, Uttara Khand, &. Rajasthan	CATAT, Rajasthan	Dr. V. K. Sharma
12-13 Jun, 2010	Digital imaging n designing of publications	FSI, Mumbai	Mr. Dasari Bhoomaiah
24 July, 2010	Workshop for college lecturers on new syllabus on fisheries	Jhunjhunwala college	Dr. B.B Nayak
26-27 July, 10	Potential of Fish Transgenesis in enhancing fish production ICAR	NASC, New Delhi	Dr. Aparna Chaudhari
05 Aug, 2010	SAS Proc inbreeding and SAS Proc Allele	IASRI, New Delhi	Dr S Jahageerdar
13 Aug, 2010	Training course on Culture of Major Carps, Pangasius and Air breathing fishes	SIFT, Kakinada,	Dr. J. Krishna Prasad
Sept -Oct., 2010	Fisheries of the World	Lal Bahadur Sashtri Academy of Nautical Sciences	Dr. S.K. Chakraborty
21 Sept, 2010	Integrated Fish Farming	CIFRI (ICAR), Salt Lake Centre, Kolkata	Dr. B.K. Mahapatra
22 Sept, 2010	Integrated Fish Culture	CIFRI (ICAR), Salt Lake Centre, Kolkata	Dr. Asok Biswas



1 Oct, 2010	Carp hatchery management and Poly-culture of fish with prawn for DOF Officers and farmers	Patna, organized by state fisheries department.	Dr. V.K. Tiwari
2 Oct, 2010	Innovative Technologies towards sustainability (ITTS-2010)	National Seminar by CIFE in collaboration with Deptt. of Fisheries, Govt. of West Bengal	Dr. Archana Sinha and Dr. B.K. Mahapatra
13 Dec, 2010	SAS: An Overview Lecture on 'SAS DATA Steps and Report Generating from SAS	Dept. Agricultural Statistics, Applied Mathematics and Computer Science, College of Agriculture, University of Agricultural Sciences GKV, Bangalore	Dr S Jahageerdar
7,9 & 14 Dec, 2010	1.Coastal Aquaculture, 2.Mariculture, 3.EIA studies related to coastal aquaculture & guidelines suggested by Coastal Aquaculture Authority of India-Extra Masters	L.B.S. College of Advance Maritime Studies and Research, (Maritime University, Ministry of Surface Transport, Govt. of India, Chennai), Mumbai	Dr. A. K. Reddy
5 Jan, 2011	Ornamental Fish Trade	FISHCOPFED, New Delhi	Dr. Archana Sinha
10 Feb, 2011	Role of fisheries towards rural development as a component of integrated farming system	Ram Krishna Mission Krishi Vigyan Kendra, Nimpith	Dr. Archana Sinha
10 March, 2011	Location specific curriculum on Fishery Sciences	Sushil Kar College & WBUAF&SC	Dr. B.K. Mahapatra
16 March, 2011	Culture of Food Fish	Bose Institute at Falta Experimental Farm, 24 Parganas	Dr. B.K. Mahapatra
22 March, 2011	Integrated Fish Farming for Livelihood Security for Sunderban region	CIFRI (ICAR), Salt Lake Centre, Kolkata	Dr. P.K. Roy
23 March, 2011	Integrated Fish Farming on Livelihood Security	CIFRI (ICAR), Salt Lake Centre, Kolkata	Dr. Ashok Biswas
24 March, 2011	Integrated Fish Farming for Livelihood Security	CIFRI (ICAR), Salt Lake Centre, Kolkata	Dr. B.K. Mahapatra



# Meetings, Workshops, Seminars, Summer/Winter Schools etc. organized



## 11.1 Workshops/Conferences/Symposia etc. organized

Date	Programme	Venue
8 - 9 April, 2010	Workshop on Personality Development	CIFE, Mumbai The Leadership Watch, Gurgaon
28-29 April, 2010	Vice Chancellor's Conference on Novel strength sharing among agricultural universities	CIFE, Mumbai
6 May, 2010	Technological, HRD & Extension Requirements for Fisheries and Aquaculture Development in Assam	CIFRI Regional Centre, Guwahati, Assam
11 May, 2010	Technological, HRD & Extension Requirements for Fisheries and Aquaculture Development in Manipur	Directorate of Fisheries, Imphal, Manipur
13 May, 2010	Technological, HRD & Extension Requirements for Fisheries and Aquaculture Development in Mizoram	Tourist Guest House, Aizwal, Mizoram
26-28 May, 2010	Indian Aqua-Invest Congress Expo-2010, Special symposia on Diversification of Aquaculture and policy framework for fisheries and aquaculture sector in India	CIFE, Mumbai
22 June, 2010	User Awareness Programme for Web of Science Web Ex Training CeRA (Consortium for e-Resources in Agriculture)	CIFE, Mumbai
9 July, 2010	Farmers- Scientists interactive workshop	CIFE, Mumbai
10 July, 2010	National Fish Farmers Day	CIFE, Mumbai
5 Aug, 2010	Result demonstration workshop on Demonstration of Asian Seabass <i>Lates calcarifer</i> in pond culture system under NFDB funded project	Saphale (Maharashtra)
09 Aug, 2010	Technological, HRD & Extension Requirements for Fisheries and Aquaculture Development in Tripura	College Tilla, Agartala, Tripura
24 Aug, 2010	HRD initiatives for improving quality of outputs of CIFE	Lonavala
27-28 Aug, 2010	Golden Jubilee National Seminar on Diversification of Aquaculture through locally available fish species (DALAF-2010)	CIFE, Kolkata Centre
31 Aug, 2010	Hindi Seminar on <i>Swatantryotter Bhartiya Matsiyiky ka Vikas</i>	CIFE, Mumbai



29 Sept, 2010	Workshop on Aquaculture in Salt Affected Sugarcane Fields and Farm Ponds” under NAIP Sub-project	Karad, Satara District, Maharashtra
1-4 Oct, 2010	National Seminar on Innovative Technologies towards sustainability (ITTTS-2010). Fisheries, Govt. of W.B.	CIFE, Kolkata Centre and Directorate of CIFE, Kolkata Centre
5-6 Feb, 2011	National Seminar on Impact on emerging areas of science and technology on the development of society as Joint Convener, organized by Central Calcutta Science & Culture Organization for Youth in collaboration with University of Calcutta and Ministry of Science & Technology, Earth Sciences, Environment & Forests, Govt. of India, New Delhi	Science City, Kolkata

## 11.2 Meetings conducted

Date	Programme	Venue
5, April, 2010	Syllabus revision exercise for M.F.Sc. course	CIFE, Mumbai
29 April, 2010	A meeting with Consultants from Fan Li marine and Consultancy, Malaysia to Zoological Survey of India	CIFE, Kolkata Centre
30 April, 2010	A meeting of faculty members, students and trainees was organized with Dr. Dilip Kumar, Director, CIFE and Dr. Davide Fezzardi, ECTAD Programme and Operations Officer, FAO Representative in Vietnam	CIFE, Kolkata Centre
28 May, 2010	Consortium Implementation Committee (CIC) Meeting and Consortium Advisory Committee (CAC) of NAIP Sub-project	CIFE, Mumbai
31 May-2 Jun, 2010	Annual SRC	CIFE, Mumbai
15 June, 2010	Staff General Body Meeting of CIFE Powarkheda Centre	Powarkheda Centre
18 June, 2010	An Interface meeting with BARC-CIFE Scientists and presentation of proposal for Aquatic Radio-Ecology Centre at CIFE	CIFE, Mumbai
18 June, 2010	NFDB meeting for “Pilot project on capacity building skill development programme for fishermen of Sunderban in West Bengal” as a collaborative programme of WBUA&FS, Sunderban Development Board, CIFE & CIFA.	CIFE, Kolkata Centre
13-14 July, 2010	Institute Joint Staff Council (IJSC) meeting	CIFE, Powarkheda Centre

30 July, 2010	Academic Council Meeting	CIFE, Mumbai
4 Aug, 2010	Extension Council Meeting	CIFE, Mumbai
19 Aug, 2010	Board of Management meeting	CIFE, Rohtak Centre
30 Aug, 2010	RAC meeting	
31 Aug, 2010	Consortium Implementation Committee (CIC) Meeting of NAIP Sub-project	CIFE, Mumbai
27 Nov, 2010	High Power Review Committee	CIFE, Mumbai
7 Dec, 2010	2 <sup>nd</sup> meeting for formulation of Project on Ornamental Fish Farming for Sunderban	CIFE, Kolkata Centre
18 Dec, 2010	Academic Council meeting	CIFE, Mumbai
31 Dec, 2010	Institutional Biosafety Committee meeting	CIFE, Mumbai
24 Jan, 2011	Half yearly SRC	CIFE, Mumbai
28-30 Jan, 2011	e-course development meeting	CIFE, Mumbai
07 Feb, 2011	Core Committee meeting	CIFE, Mumbai
17 Feb, 2011	Fifth meeting of the Board of Examinations to finalise the results of M.F.Sc. (2010-12 batch)	CIFE, Mumbai
23 Feb, 2011	Board of Examinations meeting to moderate Ph.D. (I Semester) question papers	CIFE, Mumbai
1 March, 2011	XII Plan EFC proposal for CIFE under chairmanship of DDG, Fisheries	CIFE, Mumbai
4 March, 2011	Theme meeting on Thermal ecology, organized jointly by Board of Research on Nuclear Sciences, Mumbai and CIFE	CIFE, Mumbai
22 March, 2011	Meeting of scientists and technical officers with Mrs Ajita Bajpai Pandey, Principal Secretary (Fisheries), Govt of MP and Mr U.K. Purohit, Director (Fisheries), Govt of MP	CIFE, Powarkheda Centre
26 March, 2011	RAC meeting	CIFE, Mumbai
28 March, 2011	Consortium Advisory Committee (CAC) Meeting of NAIP Sub-project	CIFE, Mumbai





### 11.3 Summer school/winter school/CAFT training etc. conducted

Date	Programme	Venue
22 March - 11 April 2010	CAFT Programme on Fisheries Resource management	CIFE, Mumbai
24 Feb 2011-16 Mar 2011	CAFT Programme on Advanced Techniques in Aquatic Environmental Analysis	CIFE, Mumbai

### 11.4 Invited lectures delivered by guest faculty at CIFE

Programme	Date	Venue	Delivered by
Mystery of our origins	2 April, 2010	CIFE, Mumbai	Dr. Lalji Singh, Director, CCMB, Hyderabad
Sex education and its ethics	3 May, 2010 for society	CIFE, Mumbai	Dr. Saroj Gumaste, M. D.
Recent Status of Academics and Aquaculture productivity	29 May, 2010.	CIFE, Mumbai Aquaculture,	Dr. D.P. Thakur, Professor of at Asian Institute of Technology, Bangkok,
Fisheries and Aquaculture in Malaysia	1 June, 2010	CIFE, Mumbai	Dr. Gopinath Nagaraj, Adjunct Professor from Fan Li Marine and Consultancy, Sdn. Bhd, Malaysia
User Awareness Program for Web of Science Web Ex Training "CeRA", conducted by ICAR.	21 June, 2010	CIFE, Mumbai	Mr. Chandrashekar N. S., Principal Scientist, NAIP and M/S Thomson Reuters for NAIP
"DNA barcoding and International Barcode of Life Project"	10 Nov, 2010	CIFE, ICAR	Dr. Robert Hanner, Professor at Dept. of Integrative Biology, University of Guelph and Associate Director of the Canadian Network on DNA Barcoding, Biodiversity Institute of Ontario

### National conference on 'Sharing of Novel Strength in Agricultural Universities'

Central Institute of Fisheries Education, Mumbai and Indian Agricultural Universities Association (I.A.U.A.) jointly organized a two days conference on the topic 'Novel Strength Sharing in Agricultural Universities' on 28-29 April, 2010 at CIFE, Mumbai. The objectives of the conference were:



- Identification and sharing of the novel strengths available in CAU's, SAU's and Deemed Universities
- Development of a road map for sharing of novel strengths and replication of success stories

The conference was attended by participants from state and central agricultural universities and deemed universities and total number of the participants was 44 including 20 Vice-Chancellors.

The presentations in the conference were spread in five technical sessions followed by a special session on open discussion on sharing of novel strengths and success Stories for overcoming the constraints and arriving at recommendations. The open discussion session was followed by plenary session.

The conference was inaugurated by the Chief Guest Padmabhushan Dr. R. S. Paroda, former Secretary DARE and Director-General of Indian Council of Agricultural Research and Dr. Arvind Kumar, Deputy Director General (Education and Fisheries , ICAR, New Delhi ) graced the occasion as guest of Honour.

Dr. R.S. Paroda in his inaugural address advocated for the establishment of a global consortium for agricultural education, He stressed that such an initiative will strengthen the agricultural education in developing countries. He emphasized that for achieving the optimum benefits of collaboration, priority should be given to establish a platform for productive collaboration with the universities of our neighboring countries because the agro-climatic conditions and socio-economic status of these countries are similar to ours. Dr. Paroda stated that looking at our own weaknesses from time to time is best way to move forward and he expressed the hope that this conference will facilitate the process of identifying our own weaknesses as well as strengths so that a strategy can be developed not only for overcoming the weaknesses but also for further enhancement of strength of the AU's and DU's by pursuing a complimentary approach.

The inaugural session was followed by a special lecture on the topic 'Reorienting agricultural research for development in Asia-Pacific: The way ahead, delivered by Padmabhushan Dr.R.S.Paroda, Former Director General and Secretary (DARE).



## Recommendations

Based on the presentation and open discussion during the sessions, following recommendations were approved by the house:

(1) A consortium of different SAU/DU in the area of veterinary and fishery science should be established to address the issues of mutual interest

(2) A collaborative program on the effect of climate change on epidemiology of animal diseases should be developed and executed in a participatory mode

(3) Collaborative programme for harnessing the potential of cold deserts for fruits, vegetables and seed production should be chalked out

(4) National core faculty in certain disciplines from ICAR-DU and SAU should be identified and the modalities for exchange of faculty and resources should be decided

(5) A six year integrated course with minimum qualification of 10th Standard should be introduced in CAU/SAU/DU for attracting rural youth towards agricultural education

(6) An active participation of entrepreneurs in integration of production and processing technologies should be ensured by developing an appropriate framework

## Indian Aqua-Invest Congress and Expo-2010

Indian Aqua-Invest Congress and Expo- was organized during 26-28 May 2010 at Central Institute of Fisheries Education (CIFE), Mumbai, in collaboration with the

Pillay Aquaculture Foundation (PAF), Mangalore, and Indian Fisheries



Association (IFA), Mumbai. The event started with the welcome address by Dr. Dilip Kumar, Chief Organizing Secretary, and was inaugurated by His Excellency Shri. B. P. Singh, Governor of Sikkim. The vision and mission of Pillay Aquaculture Foundation was highlighted by Prof. H.P.C. Shetty, President, PAF, Indian Chapter. More than 200 delegates, representing State Department of Fisheries, ICAR Research Institutes, Universities, Commercial and subsistence farmers' community, Fisher's organizations, NGOs, Business houses, etc. participated in the event. There were five technical sessions and in the first session, seven papers were presented dealing with overview of global status, potentiality and constraints of aquaculture development, various technologies available in mariculture, freshwater and brackishwater aquaculture and the scope for their commercialization and employment generation. Second session had four presentations dealing with the support from major funding and development agencies both in terms of financial and technical support. The third session on aquaculture and related enterprises saw five presentations



discussing strategies for culture-based fisheries, entrepreneurs' perspectives on the opportunities and constraints in hatchery operation and need to attract investments in aquaponics for efficient utilization of space, water conservation and economic efficiency. A successful model of self-help group-led mariculture development, NGOs role in aquaculture development, strategies and approaches in gender mainstreaming in aquaculture and livelihoods struggle among the fisher women were highlighted in the fourth session on NGOs and aquaculture. The fifth session dealt with the various issues related to human resource planning and development. Besides these technical sessions, there were two parallel special symposia- The symposium on Diversification of Aquaculture had eleven oral presentations and twenty poster presentations highlighting potential and various constraints in the diversification of aquaculture. The symposium on Policy Framework for Fisheries and Aquaculture Development was conducted in an open discussion format with Shri L. Rynjah, Principal Advisor, Planning Commission, Govt. of India, as the Chair. The draft policy framework, which is formulated by CIFE through a series of consultative meetings held in different parts of the country during the last three years, was presented before the panel for a comprehensive discussion. Another highlight of the Congress was an exposition organised for various stakeholders of the aquaculture and fisheries industry.

The final session was an open discussion guided by a Panel led by Prof. H.P.C. Shetty. The session focussed on issues

highlighted by various presentations and open discussions made during the two days. After the deliberation, the panel prioritised various recommendations made in all the technical sessions. Dr. Dilip Kumar, Chief Organizing Secretary, informed the house that major recommendations that emerged from the Congress would be made available to all the participants and various stakeholders.

The Congress was sponsored by ICAR Fisheries Institutes, Planning Commission, National Bank for Agriculture and Rural Development, Coastal Aquaculture Authority, National Fisheries Development Board, Ministry of Earth Science, Department of Science and Technology, National Academy of Agricultural Research Management, The Karnataka Fisheries development Corporation.

#### **Indigenous Technical Knowledge (ITK) in fisheries sector for Central region of India**

A write shop on “Documentation of indigenous technical knowledge in fisheries sector of central region of India” was organized by Central Institute of Fisheries Education, Mumbai during 10-14th August, 2010 at New Zealand Hostel, Aarey Colony, Goregaon, Mumbai. This write shop was a part of the series of the write shops organized for the documentation of ITK's of various regions of India. The documentation of the ITK of East and west coast and north eastern region has already been accomplished. The objective of the write shop was to prepare an authentic document on the existing knowledge of the indigenous communities of central



region about the various aspects of fisheries and aquaculture. The contributions were classified into five broad thematic areas viz. Harvesting, Processing, Aquaculture, Therapeutics and Biodiversity. Dr.R.S. Biradar , Joint Director , CIFE inaugurated the write shop and, in his inaugural address, he apprised the participants about the importance of such write shops in safeguarding the rights of the tribal communities of India. Dr. S. Dam Roy, Head, Aquaculture Division, CIFE also



highlighted the significance of traditional knowledge in modern day life and emphasized that documentation of ITK in fisheries is of utmost importance as it has a direct impact on the livelihood of fishing communities.

The write shop was attended by fourteen resource persons belonging to the indigenous communities who not only possess the first hand information about the ITK but are also practicing it till present days. Prof. Rani Dhanze, Fisheries Department, Chowdhary Shrawan Kumar Himanchal Pradesh Krishi Vishwavidyalaya, Palampur attended the write shop as an expert and Dr.Arup Kumar Chowdhary, DFO , Ranchi was the facilitator of the write shop. During the first three days, the first, second and third drafts of the contributions with

illustrations were displayed and edited simultaneously by incorporating the inputs received from the participants and experts. On the last day of the write shop, a resource book consisting of the descriptions and illustrations of 79 contributions was displayed to the participants in the presence of the Director and Joint Director, CIFE. Dr. Dilip Kumar, Director, CIFE provided his input and suggestions for further improvement of the illustrations and descriptions of the ITK.

Dr.S.P.Shukla (Senior Scientist & Coordinator of the write shop), Dr.Rupam Sharma (Senior Scientist), Dr. Paramita Bannerjee Sawant (Scientist and Co-ordinator of the write shop), Mrs.S.S.Gajbhiye, Mr.D.Bhoomaiah, Ms.Veena Desouza, Mr.S.K.Sharma and Mr.Deepak Khogre contributed in organizing the write shop.

### **Interactive Workshop: Farmers-Scientist-Interface and Farmers Day, 9-10 July, 2010**

The institute had invited the nominations of best two fish farmers from Commissioners and Directors of States and Union Territories of Government of India. In addition to that



CIFE Centers and entrepreneurs known to CIFE were also requested to nominate







Ministries/Departments of fisheries and related agencies of the BOBP-IGO Member countries. Dr. Latha Shenoy, Senior Scientist was the Co-ordinator of the training program held at Mumbai.

The training program at CIFE, Mumbai included classroom lectures on the topics such as CIFE, its mandate and programs, Indicators for sustainability of marine capture fisheries, Impact of changing climate on fisheries, Increasing the contribution of small-scale fisheries to poverty alleviation and food security, Ensuring safety in fishing operations and Approaches and strategies for fisheries extension. A field visit was organized at the Versova fishing village, co-operative society, Ice plant and landing centre for interaction with the stakeholders for understanding the constraints faced by the community in adaptation of CCRF to the local situation. The field visit provided an opportunity for the participants to observe and comprehend functioning of fishers and their organizations besides interaction with the fisher community.

The participants made presentations on case studies with regard to problems of fisheries management relevant to their respective countries that were followed by discussion. Group work was assigned to the trainees to prepare Report on important issues of CCRF. Four Groups were made, each comprising representatives from all the participating countries. The issues included Taking CCRF to the grass roots, Role of stakeholders and mechanism of their participation in implementation of the code, Alignment of policies and programs to meet the requirements of

implementation of CCRF and Adaptation of the CCRF to meet local requirements. Group Leaders of all the groups made inter-country presentations which were discussed at length. Assessment of their understanding of the code, various management issues and possible approaches to address them was facilitated by making them solve a crossword puzzle in fisheries.

The training program has been instrumental in building rapport among the fisheries personnel of the BOBP-IGO member countries and exchanging their ideas and experiences regarding fisheries management.

### Golden Jubilee National Seminar on Diversification of aquaculture through locally available fish species

The Golden Jubilee national Seminar on “Diversification of aquaculture through locally available fish species” was organized during 27-28 August 2010. The Chief Guest Dr. S.N. Dwivedi, Former



Additional Secretary to Govt. of India inaugurated the Seminar in Mini Theater Hall of Science City, Kolkata at 10.30 AM on 27th August, 2010. Dr. P.C. Chowdhuri, Dr. P.V. Dehadrai, Former DDG (Fy.); Dr. Dilip Kumar, Director, CIFE, Mumbai; Prof. M. Yusuf Kamal, Former

Vice Chacellor, J&K; Prof. C.S. Chakrabarti, VC, WBUAFS, Kolkata; Dr. A.P. Sharma, Director, CIFRI, Barrackpore and Dr. R.S. Biradar, Joint Director, CIFE, Mumbai, Dr. M. Sinha, Advisor, department of Fisheries, Govt. of Tripura, Dr. K.K. Vass, Former Director, CIFRI, Barrackpore, Dr. C.S. Singh, Former Dean, College of Fisheries, Pantnagar, Dr. S.C. Mukherjee, Former Joint Director, CIFE, Mumbai, Dr. P. Das, Former Director, NBFGR, Lucknow, Prof. N.C. Datta, Ex-Professor, Calcutta University, Dr. B.B. Jana, Ex. Professor, Kalyani University, Prof. Kuldeep Singh, Former Officer-in-Charge, CIFE, Kolkata Centre and others grace the occasion. A total of 200 delegates and experts participated in the Seminar.

On this Occasion an Exhibition cum Aqua Fair was organized in the Campus of CIFE Kolkata Centre. Twelve public concerns displayed their activities in the fair namely CIFRI, CIFT, CIFE, CIBA, MPEDA, NABARD, Godrej-Agrovet, Bluetech Dynamics, FISHCOPFED, Tara Maa Hatchery, Rajlakshmi Aquarium, IB Group Indian Solvent Industries and RKAKVA, Nimpith.

A separate session was organized in the morning of 28th August 2010 at 10.30AM in the Committee Room of CIFE Kolkata Centre for State Director's, Department of Fisheries. This session was chaired by Dr. (Mrs.) B. Meenakumari, deputy Director General (FY), ICAR, New Delhi. Presentations were made by Directors, Department of Fisheries from the States of West Bengal, Manipur, Tripura, Arunachal Pradesh, Punjab & Chandigarh and Chhatishgarh. Mr. P. Selvaraj, AGM, NABARD, Mumbai also made a presentation regarding schemes of

NABARD relevant to aquaculture development in the country.

### Theme meeting on Thermal Ecology



A theme meeting on "Thermal Ecology" was organized at CIFE on 4<sup>th</sup> March, 2011 in collaboration with BRNS and DAE to discuss the future programmes on thermal ecological studies in the country. Padmashree Dr. S.K. Banerjee, Chairman Atomic Energy Commission, was the Chief guest and Dr. R. K. Sinha, Director, BARC, Mumbai was the Guest of Honour of this programme. A comprehensive report on thermal ecological studies conducted in India and a video documentary on thermal ecology entitled "*and quiet merges the warmth*" in 11 languages were released in the innuragual function. Dr W.S Lakra, Vice-Chancellor ,CIFE gave emphasized on strong collaborative basic research with BARC during his welcome address . Dr. Banerjee also explained possible research collaboration on thermal ecology and radio-ecology with CIFE. The round table discussion regarding the future directions on thermal ecological studies was presided by Dr. K.V.K. Nair, former Director NIOT, Chennai. Several experts working on the area of thermal ecology were participated in this meeting. The programme was coordinated by Dr A.K.Pal.



Dr. W.S. Lakra, Director & Vice-Chancellor, CIFE in discussion with Padmashri Dr. S. K. Banerjee, Chaiman, Atomic Energy Commission and Dr. R. K. Sinha, Director, BARC.



Hon'ble Shri Trivendra Singh Rawat, Minister of Agriculture, Dairy and Fisheries, Govt. of Uttarakhand being felicitated by Dr. W.S. Lakra, Director & Vice-Chancellor, CIFE.



# Chapter 12 Distinguished Visitors



## CIFE, Mumbai

Date of Visit	Visitor	Designation and place
2 April, 2010	Dr. Lalji Singh	Director CCMB, Hyderabad
28-29 April, 2010	Dr. R. S. Paroda	Former DG ICAR
27-30 April, 2010	Dr. Gopinath Nagraj Ms. Puvanes SS Dr. James	Fan Li Marine Consultancy, Malayasia
27-30 April, 2010	Dr. Davide Fezzardi	ECTAD Programme and Operations Officer, FAO, Vietnam
26-28 May, 2010	Mr. B.P. Singh	Governor of Sikkim
26-28 May, 2010	Mr. H.P.C. Shetty	President, PAF, Chennai
29 May, 2010	Dr. D.P. Thakur	Professor of Aquaculture, Asian Institute of Technology, Bangkok
June, 2010	Dr. Gopinath Nagaraj	Adjunct Professor from Fan Li Marine and Consultancy, Sdn. Bhd, Malaysia
6 June, 2010	Dr. Ajay Kumar Ghosh	Former Director, CIFRI, Barrackpore
6 June, 2010	Prof. N.C. Datta	Ex. Professor, Calcutta University
6 June, 2010	Mr. Taj Mohammed	President, Sea Food Association of India, eastern Region, Kolkata
6 June, 2010	Dr. S.N. Biswas	Deputy Project Director, Directorate of Fisheries, Govt. of West Bengal
6 June, 2010	Dr. K.R. Naskar	Ex. Officer-in-Charge, CIFRI Sub Centre, Salt Lake, Kolkata
6 June, 2010	Dr. S.G. Markandeya	Scientific Secretary, BRNS, BARC
17-18 June, 2010	Dr. A.K. Roy	Ex. Principal Scientist, CIFA, Bhubaneshwar
17-18 June, 2010	Mr. Raheem Ahmed	CEO, Nezami Rekha Sea Food Pvt. Ltd., Kolkata
17-18 June, 2010	Dr. K.C. Dora	Dean, WBUAF&SC, Chakgaria





21 June, 2010	Mr. Chandrashekar N. S	Principal Scientist, NAIP and M/S Thomson Reuters for NAIP
10 July, 2010	Dr. Madhumita Mukherjee	Director, Deptt. of Fisheries, Govt. of West Bengal
10 July, 2010	Dr. A.K. Singh	Zonal Project Director, Zone-II
10 July, 2010	Sri S. Sahu	Area Manager, BSNL. Kolkata
10 July 2010	Dr. Madhumita Mukherjee	Director, Dept. of Fisheries, Govt. of West Bengal
10 July 2010	Dr. A.k. Singh	Zonal Project Director, Zone-II
17 July 2010	Shri Rajiv Maharshi	Additional Secretary, DARE, Govt. of India
21 July 2010	Dr. Gopinath Nagaraj,	Fanli Marine and consultancy Sdn. Bhd. Co., Malaysia
23 July 2010	Dr. Gopinath Nagaraj	Fan Li Marine and Consultancy Services, Malaysia
14 Aug, 2010	Dr. Arun Kumar Chaudhari	DFO, Ranchi
19 Aug, 2010	Dr. (Mrs.) B. Meena Kumari	DDG (Fy.), ICAR, Pusa, New Delhi
19 Aug, 2010	Dr. Nagendra Sharma	Ex. Vice Chancellor, Sher-E- Kashmir University of Agriculture & Technology, Jammu, J&K
19 Aug, 2010	Dr. A.P. Sharma	Director, CIFRI, Barackpore, Kolkata
27-28 Aug, 2010	Dr. S.N. Dwivedi	Former Secretary, Department of Ocean Development and Former Director, CIFE, Mumbai
27-28 Aug, 2010	Dr. P.C. Chowdhuri	FAO
27-28 Aug, 2010	Dr. P.V. Dehadrai	Ex. DDG IFisheries)
27-28 Aug, 2010	Prof. M. Yusuf Kamal	Former Vice-Chancellor, J&K
27-28 Aug, 2010	Prof. C.S. Chakrabarti	Vice-Chancellor, WBUAF&S, Kolkata



27-28 Aug, 2010	Dr. A.P. Sharma	Director, CIFRI, Barrackpore
27-28 Aug, 2010	Dr. M.R. Sinha	Advisor, Department of Fisheries, Govt. of Tripura
27-28 Aug, 2010	Dr. K.K. Vass	Former Director, CIFRI, Barrackpore
27-28 Aug, 2010	Dr. C.S. Singh	Former Dean, College of Fisheries, Pantnagar
27-28 Aug, 2010	Dr. P. Das	Former Director, NBFGR, Lucknow
27-28 Aug, 2010	Prof. N.C. Datta	Ex. Professor, Calcutta University
27-28 Aug, 2010	Dr. B.B. Jana	Ex. Professor, Kalyani University
27-28 Aug, 2010	Dr. (Mrs.) B. Meenakumari	DDG (Fisheries), ICAR, New Delhi
<b>7 Sept, 2010</b>	Dr Mangala Rai	Former Secretary, DARE and DG, ICAR
20 Sept, 2010	Shri Ram Narayan Saroj	Deputy Director (Rajbhasha), Govt. of India, Kolkata
2 Oct, 2010	Dr. P. Das	Former Director, NBFGR, Lucknow
2 Oct, 2010	Dr, Madhumita Mukherjee	Director, Dept. of Fisheries, Govt. of West Bengal
2 Oct, 2010	Dr. A.P. Sharma	Director, CIFRI, Barrackpore
2 Oct, 2010	Dr. A.K. Ghosh	Former Director, CIFRI, Barrackpore
2 Oct, 2010	Dr. K.C. Dora	Dean, WBUAF&SC, Chakgaria
2 Oct, 2010	Dr. Utpal Sar	DDF, Govt of West Bengal
2 Oct, 2010	Dr. C. Saha	Former Director, CIFA, Bhubaneshwar
2 Oct, 2010	Dr. T.K. Ghoshal	Officer-in-Charge, CIBA, Kakdwip
2 Oct, 2010	Dr. S.N. Dwivedi	Former Secretary, Department of Ocean Development and Former Director, CIFE, Mumbai
2 Oct, 2010	Dr. B.N. Pandey	Head, Department of Zoology, Magadh University, Bodh Gaya, Bihar



10 Nov, 2010	Dr. Robert Hanner	Professor at Dept. of Integrative Biology, University of Guelph and Associate Director of the Canadian Network on DNA Barcoding, Biodiversity Institute of Ontario
15 Nov, 2010	Dr. C.S. Chakrabarty	Vice-Chancellor, WBUAF&S, Belgachia
15 Nov, 2010	Dr. P. Das	Former Director, NBFGR, Lucknow
15 Nov, 2010	Dr. K.C. Dora	Dean, WBUAF&SC, Chakgaria
15 Nov, 2010	Dr. B.K. Chand	Professor, WBUAF&SC, WBUA&FS, Mohanpur
21 Dec, 2010	Shri Trivendra Singh Rawat	Minister of Agriculture, Dairy and Fisheries, Uttarakhand
22 Jan 2011	Shri. Giriraj Singh	Honorable Minister, Animal and Fisheries resources, Govt. of Bihar
13 Feb, 2011	Dr. S. N. Dwivedi	Ex-Director, CIFE, Mumbai
4 March 2011	Dr. S. K. Banerjee	Chairman, Atomic Energy Commission
4 March 2011	Dr. R.K. Sinha	Director, BARC, Mumbai
22 March. 2011	Mrs Ajita Bajpai Pandey	Principal Secretary (Fisheries), Govt. of Madhya Pradesh, Bhopal
22 March. 2011	Mr U.K. Purohit	Director(Fisheries), Govt. of Madhya Pradesh, Bhopal



### Infrastructural Development

#### CIFE, Mumbai

Phase- III work is under progress. Construction of slab of third floor and fourth floor of the main academic building has been completed. The first and second floor slabs of Director's residence completed. Construction of the Type IV quarters has been completed. International hostel, Boys and Girls hostel and Type V quarters are in progress.

#### CIFE Kakinada centre

Video-conferencing facility was inaugurated by Dr. Dilip Kumar, Director, CIFE, Mumbai, on 6 June 2010. The hostel foundation stone laying was inaugurated by local MLA Sh. D. Chandrasekara Reddy on 21.8.2010 in the presence of CIFE Director and Joint Director.

#### CIFE Powerkhedha centre

Major infrastructure development at CIFE Powerkhedha centre includes the laying of 33 KV High Tension (HT) line connection to the centre by MP Electricity Supply Board (MPESB), Hoshangabad, installation of 100KVA transformer from one point HT connection and laying of internal connection to office and laboratory by CPWD, Bhopal concrete approach road inside trainees hostel premises, repairing and maintenance of office shed, false roofing and laying of marbonite tiles in office floor etc., installation of two 7.5 HP submersible pump sets in the farm, purchase of HDPE pipe line (1000 mtrs) and providing connectivity between pump sets and brooder/ stocking ponds and Installation

of cooling towers in the D-85 Hatchery and various other repairs

#### CIFE, Rohtak centre

The center has undertaken the construction of two over head Sintex tanks of 5000 L capacity (2010), poly house of size 450 sq. mts for the winter rearing in Baniyani Area (2010), covering of roofs of Type-II and Type-I Quarters with acryl sheets (2011), covering of shade net over the filtration and settling tanks and polylining of a grow out pond of size 0.1 ha in the Baniyani farm

#### Students welfare Activities

During the reporting period 2010-11, various student welfare activities were conducted. Our students participated in various literary, cultural and sports meets and won prizes. Mr. Mujahid Khan Pathan (MFSc 2009-11) participated in the South Zone Level Elocution competition conducted by Tamilnadu Agricultural University (TNAU), Coimbatore and won the first prize. Mr. Firose won the second prize in the All India level elocution competition held at NBFGR, Lucknow organized by All India Agricultural Science Congress. Our students also actively participated in different events in the sports meet held at Kerala Agricultural University (KAU).

For the better placement of students, campus interviews of few companies like Triton and IFB have been organized in our campus. To acquaint and guide the students about opportunities of higher education in overseas, a guidance programme was organized and there was a detailed interaction with the students regarding availing loans, procedures,



finding out universities, GRE, TOEFL exams etc.

### Science club

A new initiative on the behest of Director General ICAR was the formation of a Science club at CIFE during Jan. 2011. The club aims to organize scientific lectures, debates and discussion on emerging and popular thematic/ research areas.

Dr.A.K.Pal, HOD, Fish Nutrition and Biochemistry delivered a lecture on 'Climate impacts in fish : Prediction from physiological responses in simulation models of micro-environment', on 10<sup>th</sup> Jan, 2010 and Dr. M.P.Singh Kohli, Principal Scientist, Aquaculture Division Inland Aquaculture delivered a lecture on 'Challenges and Milestones' on 19 Feb, 2011 as part of series of lectures organized by Science Club .

### Other Celebrations

#### Annual Day Celebration

Annual Day was celebrated on 6 June 2010 at CIFE Mumbai and its centres with great pomp and grandeur. Various competitions were held in all the centres and prizes were distributed and cultural programme was also organized. The Annual Day at CIFE, Mumbai was

inaugurated by Dr. S.G. Markandeya, outstanding Scientist & Scientific Secretary, BRNS, BARC, Mumbai, in the presence of Dr. Dilip Kumar, Director/Vice-Chancellor and Dr. R.S Biradar, Joint Director of CIFE, Mumbai. Various Annual Awards under different categories for the meritorious staff and children of staff members were distributed. A cultural evening, showcasing a spectrum of talents of the members of the Institute, was the key event of the day.

#### National Integration week

Vigilance awareness week was observed at CIFE, Mumbai and its centres from 25 October to 1 November 2010. A pledge was taken to work with honesty and sincerity.





# Chapter 14 Personalia



## Details of Present Staff Members

### Director and Vice-Chancellor

Dr. W. S. Lakra

### Joint Director

Dr. R. S. Biradar

### Head Of Division

Dr. C. S. Purushothaman

Dr. A. K. Pal

Dr. Gopal Krishna

Dr. S. K. Chakraborty

Dr. S. Dam Roy

Dr. M. Krishnan

### Principal Scientist

Dr. M. P. Singh Kohli

Dr. K. K. Jain

Dr. (Mrs.) Neelam Saharan

Dr. Somdutt

Dr. (Mrs.) Kiran Dube Rawat

Dr. S. N. Ojha

Dr. K. V. Rajendran

Dr. G. Venkateshwarlu

Dr. N. K. Chadha

Dr. (Ms.) Sheela Immanuel

Dr. Nalini Ranjan Kumar

Dr. B. B. Nayak

### Senior Scientist

Dr. (Mrs.) Latha Shenoy

Dr. (Ms.) Geetanjali Deshmukhe

Dr. (Mrs.) Aparna Choudhari

Dr. P. K. Pandey

Dr. N. P. Sahu

Dr. V. K. Tiwari

Dr. S. Jahageerdar

Dr. (Mrs.) Arpita Sharma

Dr. K. Pani Prasad

Dr. R. P. Raman

Dr. A. K. Reddy

Dr. Chandra Prakash

Dr. Ashok Kumar Jaiswar

Dr. R. S. Rana

Dr. S. Munil Kumar

Dr. Rupam Sharma

Dr. Gayatri Tripathi

Dr. Satya Prakash Shukla

Dr. Swadesh Prakash

Dr. Zeba Jaffer Abidi

Dr. Asha T. Landge

Dr. A. Vennila

Dr. Makesh M.

Dr. Subodh Gupta

Dr. S. Dasgupta

Dr. C. S. Chaturvedi

### Scientist (SS)

Dr. Suryakant Patil

Dr. P. S. Ananthan

Dr. S. B. Jadhao

Dr. Ajit Kumar Verma

### Scientist

Mrs. Vidyashree Bharati

Ms. Babita Rani A. M.

Mr. Gireesh Babu Pathakota

Mrs. Paromita Banerjee Sawant

Mr. Kundan Kumar

Ms. Manjusha L.

Mrs. Nagalaxmi K.

Mr. Vinod Kumar Yadav

### T 7-8

Mr. R. D. Tandel

Mr. S. G. S. Zaidi

Dr. (Mrs.) Rama Sharma



Mr. G. K. Rao  
Dr. S. K. Pandey  
Mr. Alkesh Dwivedi  
Mr. S. S. Kamat

#### T-6

Mr. A. K. Padmanabhan  
Mr. D. R. Khogre  
Mr. S. K. Sharma  
Dr. M. K. Chouksey  
Mr. Chandrakant M. H.  
Mr. Dasari Bhoomaiah  
Mr. P. K. Das  
Mrs. Nalini Poojary  
Mr. Ram Singh  
Mr. Subhash Chand

#### T-5

Mrs. Madhavi Pikle  
Mrs. Rajani H. Khandagale  
Mrs. S. M. Bagwe  
Mr. S. M. Shinde  
Mr. R. G. Kudale  
Mr. Bhagat Singh Rawat  
Mr. C. B. Kareer  
Mr. B. G. Mandhare  
Mrs. S. S. Gajbhiye  
Mr. J. M. Koli  
Mrs. S. P. Nalawade  
Ms. Revati B. Dhongde  
Mrs. Rekha Nair

#### T-4

Mrs. Bharati Ghagare  
Mr. N. K. Aglave  
Mr. B. J. Rathod  
Mr. Avinash Sable

#### T-3

Mr. B. T. Phande

Mr. Suryakant L. Koli  
Mr. Baburam Jaiswar  
Mr. Rajarshee Moitra  
Mr. S. R. Bandkar  
Mr. Sagar S. Sawant  
Mr. Yogesh Jadhav  
Mr. V. K. Gupta  
Mr. Pawan Kumar  
Mrs. G. Aruna Devi

#### T-2

Mr. Sikandar Shaikh Hussain  
Mr. Arun Anand Puri Gosavi  
Mr. A. L. Kokane  
Mr. R. D. Deshmukh  
Mr. Dhanpat Singh Rawat  
Mr. V. G. Dhindore  
Mr. V. K. Bhawe  
Mrs. V. D. Misale  
Mr. A. N. Mahadik  
Mr. K. Dhana Raju  
Mr. Mohd. Baqar  
Mrs. Shahila Iftekhar

#### Chief Administrative Officer

Mr. Suresh Kumar

#### Chief Finance and Accounts Officer

Mr. Suresh Chandra

#### Deputy Director (Official Language)

Dr. R. P. Uniyal

#### A.A.O.

Mrs. Valsa Pavithran  
Mrs. Swati S. Parab  
Mr. B. L. Kokkula  
Mrs. N. Y. Raorane

#### Private Secretary

Mr. G. S. Fernandes

#### Assistants

Mrs. Sushma Singh  
Mrs. S. R. Wadhavkar

Mrs. D. N. Behl  
Mrs. A. A. Shukla  
Mrs. D. S. Naik  
Mrs. F. G. Fernandes  
Ms. C. S. Khundol  
Mr. D. S. Ingale  
Mr. R. R. Kadam  
Mrs. S. S. Koli

#### **Personal Assistant**

Mrs. S. R. Arutla  
Mr. P. R. Ninawe

#### **Stenographer (Grade-III)**

Mrs. Pragati R. Gadre

#### **U.D.C.**

Mr. V. S. Kuveskar  
Mr. D. V. Raorane  
Mrs. S. V. Pawar  
Mrs. A. U. Joshi  
Ms. Y. S. Dhatavkar  
Mr. A. G. Kolambkar  
Mrs. S. S. Parab  
Mr. B. P. Chauhan  
Mr. P. G. Angne  
Mr. M. B. Waghela  
Mr. N. L. Ghane

#### **L.D.C.**

Mrs. C. C. Raut  
Mrs. Anu Grover  
Mr. S. H. Bhosle  
Ms. N. A. Sawant  
Mr. Shirish P. Malvankar  
Mr. R. N. Kamble  
Mr. P. P. Sonawane  
Mr. K. A. Shinde  
Mr. Kishore Bose

#### **Skilled Supporting Staff**

Mr. M. R. Wasnik  
Mr. S. R. Jaiswar  
Mr. B. S. Tamankar  
Mr. A. R. More  
Mr. D. B. Gaikwad  
Smt. V. J. Tambe  
Smt. K. R. Ahire  
Smt. Kamla Jai Kishore  
Mr. T. G. Gaikwad  
Mr. J. K. Makwana  
Mr. A. R. Dhore  
Mr. B. R. Chavan  
Mr. M. P. Kotian  
Mr. G. B. Kamble  
Mr. A. R. Shingade  
Mr. J. N. Dhanu  
Mr. V. N. Ondkar  
Mr. Vinod Kumar Yadav  
Mrs. R. H. Chavan  
Mr. A. N. Joyashi  
Mr. G. N. Zendeekar  
Mr. A. D. Sonawane  
Mr. Sambhaji S. Shelke  
Mr. Deepak M. Bhokse  
Mr. Ninad V. Kandalgaonkar  
Mr. Sitaram B. Padyal  
Mrs. Reshma Naik

#### **Vessel Staff**

Mr. Josey Jacob  
Mr. K. Satyanarayana  
Mr. S. K. Chodankar  
Mr. Sidharth Kotian  
Mr. S. Maity  
Mr. K. V. Rajendran  
Mr. A. P. Dhawde  
Mr. Kamaraju S. Sattupalli  
Mr. B. N. Sukur  
Mr. G. G. Zendeekar  
Mr. V. M. Patil  
Mr. Arvind M. Lavande  
Mr. Fakir Miyan Usman Mullaji



## Powerkheda Center

**Sr.Scientist /Officer In-charge**  
Dr. S. K. Mishra

**Scientist**  
Mr. Annam Pavan Kumar

**T 7-8**  
Dr. R. K. Upadhyay

**T-5**  
Mr. L. P. Bamalia  
Mr. Hasan Javed

**T-4**  
Mr. Gurubachan Singh

**T-3**  
Mr. Anil D. Kulsunge

**T-2**  
Mr. Anup Singh  
Mr. Raghuvir Prasad

**Assistant**  
Ms. Asha Durve

**L.D.C.**  
Mr. Hari M. Potpose

**Skilled Supporting Staff**  
Mr. Hari Singh  
Mr. Lallu Prasad  
Mr. Vishnu Lal  
Mr. Mangli Prasad  
Mr. Surendra Kumar  
Mr. Ram Keval Prasad  
Mr. Shambhu Dayal  
Mr. Manoharlal  
Mr. Ram Swaroop  
Mr. S. Prajapati  
Mr. Gyan Chand

## Kokatta Center

**Principal Scientist/Officer In-charge**  
Dr. (Mrs.) Archana Sinha

**Principal Scientist**  
Dr. R. C. Das

**Senior Scientist**  
Dr. B. K. Mahapatra  
Dr. G. H. Pailan  
Dr. Subhendu Datta  
Dr. Parimal Sardar

**Scientist (Selection Grade)**  
Dr. P. K. Roy

**T-9**  
Mr. B. K. Mishra

**T-7/8**  
Dr. Asok Biswas

**T-6**  
Mr. S. K. Sharma

**T-5**  
Mr. R. K. Mondal

**T-4**  
Mr. P. K. Patra

**T-3**  
Mr. P. K. Behera

**T-1-3**  
Mr. S. K. Das

**T-2**  
Mr. T. K. Ghosh

**T-1**  
Mr. Dhiraj Prakash

**Personal Assistant**  
Ms. Kaberi Biswas

**U.D.C.**  
Mr. C. N. Sahani  
Mr. P. K. De

**L.D.C.**  
Mr. Ram Milan Singh

**Skilled Supporting Staff**  
Mr. B. D. Mondal  
Mr. T. C. Balmiki  
Ms. Manju Paul  
Mr. R. N. Prasad  
Mr. R. N. Das  
Mr. R. Cowdhary

## Kakinada Center

### Scientist (SG) Officer In-charge

Sh. S.S.H. Razvi

### LDC

Smt.M.Rama Mani

### Scientist

Dr. Suresh Babu P.P.

### Skilled Supporting Staff

Mr.M.Ch.Apparao

Mr.Shivaram Kale

Mr. S.Nanna Saheb

Mr K.Niranjan

Mr. N.V.Ramana

Mr. V.Shivaji

Mr.O.Veera Raju

Mr.T.Satyanarayana

Mr.K.Prasad

Mr.A.Laxmana Reddy

Mr.S.Vallisha

Mr.P.V.K.Reddy

Mr.P.Dora Reddy

Mr.S.Subba Reddy

Mr.Y.Buchilingam

Mr.M.Govindu

Mr.M.Ananda Rao

Mr.G.V.V.Satyanarayana

### T-7-8

Mr.K.B.S.Murty

Dr.P.Rami Reddy

Dr.J.Krishna Prasad

Dr.P.Srinivasa Rao

### T-6

Mr.K.Murali Mohan

Mr.V.N.Acharyulu

Mr.R.R.S.Patnaik

### T-5

Mr.K.R.K.Reddy

Mr.B.Krishna Rao

### T-2

Mr.. M.Satyanarayana

Mr.K.Mallaiah

Mr.A.Gurraiah

### Assistant

Mr.B.Veera Raju

Mr.B.Laxmana Rao







## Rohtak Center

### Principal Scientist /Officer In-charge

Dr. V. K. Sharma

### Scientist

Mr. Vungarala Hari Krishna

Mr Murlidhar P. Ande

Mrs. Thankam Teresa Paul

### T-6

Mr. Inderjit Singh

### T-5

Mr. Ashok Kumar

### T-4

Mr. Sanjeevan Kumar

Mr. Hasan Javed

### T-3

Mr. Satyendar Singh

Mr. Lokesh Kumar

### T-2

Mr. Krishan Kumar

### Assistant

Mr. V. K. Sinha

### Skilled Supporting Staff

Mr. Gyani Ram

Mr. Lavesh Kumar



## Appointments

Dr. W.S.Lakra joined as Director and Vice-Chancellor, CIFE on 1st September 2010

Sr. No.	Name	Post & Posting	Date of Appointment
1	Mr. Satyendra Singh	T-3 field & farm technician	17-07-2010
2	Mr. Subhash Chand	T-6 library computer technician	09-07-2010
3	Mr. Vijay Kumar Gupta	T-3 field & farm technician	31-07-2010
4	Mr. Lokesh Kumar	T-3 Computer technician	21-07-2010
5	Mr. Pawan Kumar	T-3 laboratory technician	07-08-2010
6	Mrs. Guruaribam Aruna Devi	T-3 laboratory technician	16-08-2010
7	Mr. Prakash kumar Behra	T-3 laboratory technician	26-08-2010
8	Mr. Dhiraj Prakash	T-1 laboratory technician	12-07-2010
9	Mr. Kantaram Shinde	LDC	06-09-2010
10	Mr. Prasanjit Sonavane	LDC	06-09-2010
11	Mr. Kishore bose	LDC	14-09-2010
12	Ms. Manjusha L.	Scientist	18-09-2010
13	Ms. Nagalakshmi	Scientist	23-04-2010

## Promotions:

Name	Designation	Promoted to	Date
Mr. Hasan Javed	T-4	T-5	13-04-2010
Mr. K. Dhana Raju	T-2	T-3	24-04-2010
Mr. Avinash N. Sable	T-3	T-4	16-07-2010
Mr. K. Mallaiah	T-1	T-2	30-10-2010
Mr. P.K. Patra	T-4	T-5	01-01-2010
Mr. Hasan Javed	T-4	T-5	03-04-2010
Mr. R.K. Mondal	T-3	T-4	01-01-2010



## Transfers

Name	Designation	To
Mrs. Padmavathi	AAO	CIFE Centre, Kakinada
Dr. S. K. Mishra	Senior Scientist	CIFE Centre Powarkheda
Mr. Gyan Chand	SSG-II	CIFE, Powarkheda Centre
Dr. Somdutt	Principal Scientist	CIFE, Mumbai

## Retirements:

Name	Designation	Date of retirement
Shri. M. Krishna	Skilled Support Staff	30-04-2010
Shri. K.P. Shetty	Technical officer T-5	30-06-2010
Dr. S. Basu	Principal Scientist	31-07-2010
Dr. Dilip Kumar	Director	31-08-2010
Shri. J.P. Patil	Technical officer T-5	30-09-2010
Shri. S.V. Patil	T-4	30-09-2010
Miss. Arvinder Mehta	Receptionist/ Tel. Operator	30-09-2010
Dr. M. Ali	Technical officer T-7	31-10-2010
Mr. S. R. Vinarkar	T-1-3	31-12-2010
Mr. N. L. Singh	Technical officer T-9	31-01-2011
Mrs. S.V. Kadam	Assistant	31-03-2011

## Death:

Sr.No.	Name	Designation	Date of Death
1	Mr. Kishore Jagtap	LDC	17-09-2010

İBERİ 3/4 DDP μBS %ē ~ NōDBB μBÀ aEBİBeİB  
E 3/4BBŪ 3/4BB 2B μB ADEBäEB à% ~ 3/4BB θ

μΒΑἰε.  $\hat{1}/4$ B. ΒΑ.μΒΒ0āĒΒ  $^2$ Βē 50 ĒΒīΒēĀ %~Β  
 ``āĒΒŃΒΒΒ ĒΒ  $1/4$ ΒΕΔ $^{3/4}$ Β āĒΒ%~ΒΒΒ  $^{3/4}$ ΒΒΥΒΒ  
 ΕΒ;ΒΒ ``ΔΒ ΔΒΡΔ;ΒΒ $^2$ Β %0ē~  $^{3/4}$ Βīē ΒΣΒ $^2$ Β μΒÀ  
 ΔΒΡà ΒμΕΒ μΒΑΕ%~ΒīΒ ĒΒĒΒΒ 0 ``ΔΒ  
 ΔΒΡΔ;ΒΒ $^2$ Β %0ē~ °ΒāΕΒμΒāĒΒĀ ĩΒΥΒ ^ĒΒΡ  
 $1/4$ ΒΕΔ $^{3/4}$ Β f® $1/4$ Βā ĒŃ.  $1/4$ Β $^2$ ΒīēĒΒ %0ā~ $1/4$ ΒΒĀ  $^2$ Βē  
 ĒΒĒΒ%0ē~āīΒ μΒΒĒΒ $^2$ Β āĒΒ%~ΒΔΒ,  
 Ē $^{3/4}$ ΒĒΒΔΒΒ $^{3/4}$ Β,  $^2$ ΒāΔΒΡ±ΒΒ $^2$ Β ^ĒΒΡ  
 ĒΒ $^2$ ΒīΒā—ΕΒ āĒΒ%~ΒΔΒ μΒÀ μΒ $^2$ Βā  
 μΒΑΔΕΒāāĒΕΒ §ā 0 ΔΒΡΔ;ΒΒ $^2$ Β %0ē~  
 °ΒāΕΒμΒāĒΒĀ ā $^2$ Β§ēĒΒ%0~ ĒŃ. ^ΔΒ. $^2$ Β.  
 à°ĒΒē§ā  $^2$ Βē āĒΒīΒēĒΒ Ē $^{3/4}$ ΒΒŪ $^{3/4}$ ΒΒ $^2$ Β  
 μΒΑΔΕΒāΕΒ %0~ΛΕΒē Ńā^ Ē $^{3/4}$ ΒĒΒŃΒāΛ%0~  
 μΒΑāīΒ ΒϢΒ μΒΑΣΒ $^2$ Β %0~Λ $^2$ Βē ΕΒ;ΒΒ  
 $1/4$ Β ΕΔ  $^{3/4}$ Β μΒΒĒΒ%0~īēΡ %0~īē



ΕΒ%~²Βã%~ã ÌΒΒ²Β%~ΒÀã μΒÆΣΒ²Β  
 %~À²Βẽ%~ã ΔΒÉΒΒÑ §ã ø

# हिन्दी पखवाडा 2010

%oë~²§Äã³¼B ¼BBà£D¾B%o~ã àÍB BB  
 ÐBÐ¹BB²B ²Bë à²BBÐ%o~ 14 ÐBë 28

page 128





EBİBÄ 2010-11 %œ~ ŞŋAB²B %œ~²ŞEä³⁄B  
 ¼BBà£Đ³⁄B%~ã äİB BB ĐBĐĐİBB²B,  
 ¼B äP¹B ˆÄ²Bë ¼BBà£Đ³⁄B%~ã  
 ²BaĐBĐ±BB²B %œ~ ĐBBİB Nă äİB BB Bİà  
 àĖĐEĐBÄ %œ~ BëYB ¼BeY %~B¶ ~à  
 ¼BÑ£ĖBµBæBÄ³⁄Bİe BŞB²B àŞ³⁄BB Nİø ĖBİBÄ  
 %~B µBÆBÀP°B %ă~ĖBµBà£Đ³⁄BİeY  
 %œ~ 'İBë àÀB Bİ¶ ~²BİĖĖĖ ĐÖÄë BİİB  
 ²B ˆBÆă%~Ė"BAĖB ³⁄Baă²BĖBàĐBÄÖă'  
 ²BB¼B%~ ĐBĐ BBëİ×ă ĐBë Nă B,  
 àİĐB%B~B fŞ³BBÖ²B ĖB. BÄ. ˆĐB. µBāİŞB  
 İBă %œ~ %~À %~¼BĖBİeY °BÀB  
 à%~³⁄BB B³⁄BB ø ˆĐB ĐBĐ Bİeİ×ă ¼BeY 20  
 %ă~ĖBµBà£Đ³⁄BİeY %œ~ ĐBBİB İİ ²³⁄B  
 µBÆà£B°BBà B³⁄BİeY ²Bë °BB B àĖB³⁄BB ø  
 ˆPaĖ³⁄B²B ˆĖBB-ˆĖBëĐÖ %~BİBÆēĐB  
 ˆĖBİ ˆĐµBİe %œ~ £BİBB àµBĖĖBë  
 ¶ ~Bf²ĖēİB²B, ¼Bİ BĖBİeÀ %œ~  
 ĐBĐ³⁄BăĖB £BĖĖBBĖB±BB²B ¼BeY ³⁄BÑ  
 ĐBĐ Bİeİ×ă B³⁄BİeàİBEB %~ă BˆÄ ø ˆĐB  
 ĐBĐ Bİeİ×ă ¼BeY İBĖB%œ~àİB %~B  
 àĖB%~BĐB ˆĖBİ²Băà£B £Bİ³⁄BBÄ %~à²Bë  
 ¼BeY B²BĖĖBBĖBă àĖBà°B²²B ¹BB±BB BëY  
 ĐBë ĐBĐİBİà±BEB 28 ¼BñàÜB%~ ĖBëÜB  
 Bİà 20 µBİeĐÖÄ µBÆĐEĐBà£B à%~ˆ Bˆø

$$\frac{3}{4}B\tilde{N} \quad \tilde{E}\tilde{I}\tilde{B}\tilde{A} \quad \tilde{D}B \quad \tilde{D}B\tilde{D}|BB^2B \quad \% \sim B \quad \tilde{D}\tilde{E}B\tilde{C}B\tilde{A}$$

$\mathbb{R}^{\frac{3}{4}}\mathbb{B}\mathbb{P}\mathbb{E}\mathbb{B}\tilde{\mathbb{a}}\tilde{\mathbb{E}}\mathbb{I}\mathbb{B}\tilde{\mathbb{A}}\text{ }^{\circ}\mathbb{B}\tilde{\mathbb{a}}\tilde{\mathbb{N}}\mathbb{i}\text{ }\varnothing\mathbb{D}\mathbb{E}\mathbb{B}\mathbb{C}\mathbb{B}\tilde{\mathbb{A}}\mathbb{I}\mathbb{B}^{\frac{3}{4}}\mathbb{B}\mathbb{P}\mathbb{E}\mathbb{B}\tilde{\mathbb{a}}$   
 $\%_{\circ}\sim\mathbb{B}\text{ }\mu\mathbb{B}\mathbb{A}\mathbb{B}\tilde{\mathbb{A}}\mathbb{P}^{\circ}\mathbb{B}\text{ }\%_{\circ}\sim\mathbb{i}\mathbb{e}\mathbb{E}\mathbb{B}\%_{\circ}\sim\mathbb{B}\mathbb{E}\mathbb{B}\mathbb{B}$   
 $\%_{\circ}\mathbb{e}\sim{}^2\mathbb{S}\mathbb{A}\text{ }\frac{1}{4}\mathbb{B}\mathbb{e}\mathbb{Y}\text{ }\mathbb{D}\mathbb{i}\mathbb{B}\mathbb{B}^2\mathbb{B}\tilde{\mathbb{a}}\frac{3}{4}\mathbb{B}\text{ }\mathbb{A}\mu\mathbb{B}\text{ }\mathbb{D}\mathbb{B}\mathbb{e}$   
 $\mathbb{f}\mu\mathbb{B}\mathbb{E}\mathbb{B}^1\pm\mathbb{B}\text{ }\frac{1}{4}\mathbb{B}\mathbb{E}\mathbb{D}\frac{3}{4}\mathbb{B}\text{ }\mu\mathbb{B}\mathbb{A}\mathbb{I}\mathbb{B}\mathbb{B}\tilde{\mathbb{a}}\mathbb{E}\mathbb{B}^{\frac{3}{4}}\mathbb{B}\mathbb{i}\mathbb{e}\mathbb{Y}\text{ }^{\circ}\mathbb{B}\mathbb{A}\mathbb{B}$   
 $\mathbb{I}\mathbb{B}\mathbb{E}\mathbb{B}\%_{\circ}\mathbb{e}\sim\tilde{\mathbb{a}}\mathbb{I}\mathbb{B}\text{ }\frac{1}{4}\mathbb{B}\mathbb{e}\mathbb{Y}\text{ }\tilde{\mathbb{a}}\mathbb{E}\mathbb{B}\tilde{\mathbb{a}}\mathbb{E}\mathbb{B}\pm\mathbb{B}\mathbb{E}\mathbb{B}\mathbb{B}\text{ }\tilde{\mathbb{a}}\mathbb{E}\mathbb{B}\mathbb{B}\frac{3}{4}\mathbb{B}$   
 $\mu\mathbb{B}\tilde{\mathbb{A}}\text{ }\mathbb{B}\frac{3}{4}\mathbb{B}\mathbb{i}\mathbb{e}\tilde{\mathbb{a}}\mathbb{I}\mathbb{B}\mathbb{E}\mathbb{B}\text{ }^{\wedge}\%_{\circ}\sim\mathbb{A}\mathbb{B}\mathbb{I}\mathbb{O}\tilde{\mathbb{A}}\tilde{\mathbb{a}}\frac{3}{4}\mathbb{B}$   
 $\mathbb{D}\mathbb{B}\mathbb{B}\mathbb{B}\mathbb{i}\mathbb{e}\mathbb{I}\times\tilde{\mathbb{a}}\text{ }\%_{\circ}\mathbb{e}\sim\mathbb{D}\mathbb{B}\mathbb{B}\mathbb{i}\mathbb{B}\text{ }\tilde{\mathbb{N}}\tilde{\mathbb{a}}\mathbb{B}\text{ }\varnothing\mathbb{i}\tilde{\mathbb{N}}$   
 $\mathbb{E}\mathbb{B}\%_{\circ}\sim{}^2\mathbb{B}\tilde{\mathbb{a}}\%_{\circ}\sim\tilde{\mathbb{a}}\mathbb{D}\mathbb{B}\mathbb{Y}\mathbb{B}\mathbb{i}\mathbb{e}\mathbb{Y}\text{ }\mathbb{E}\mathbb{B}\mathbb{E}\mathbb{B}\tilde{\mathbb{a}}\text{ }^{\sim}\mathbb{D}\mathbb{B}$   
 $\mathbb{D}\mathbb{B}\mathbb{B}\mathbb{B}\mathbb{i}\mathbb{e}\mathbb{I}\times\tilde{\mathbb{a}}\text{ }\%_{\circ}\mathbb{e}\sim\text{ }^{\wedge}\%_{\circ}\sim\tilde{\mathbb{a}}\mathbb{E}\mathbb{B}\mathbb{I}\mathbb{B}\mathbb{e}\mathbb{I}\mathbb{B}\text{ }\mathbb{D}\mathbb{B}\mathbb{Y}\mathbb{B}$   
 $\%_{\circ}\mathbb{e}\sim\mathbb{P}\mathbb{E}\mathbb{B}\mathbb{B}\tilde{\mathbb{A}}\mathbb{E}\mathbb{B}\text{ }\tilde{\mathbb{a}}\mathbb{E}\mathbb{B}\mathbb{D}\mathbb{B}\tilde{\mathbb{a}}\mathbb{i}\mathbb{B}\tilde{\mathbb{A}}^{\frac{3}{4}}\mathbb{B}\mathbb{B}\mathbb{e}\mathbb{Y}\text{ }\mathbb{E}\mathbb{B}\mathbb{i}\mathbb{B}\mathbb{B}$   
 ${}^2\mathbb{B}\tilde{\mathbb{a}}\mathbb{D}\mathbb{B}\mathbb{B}\pm\mathbb{B}\mathbb{B}^2\mathbb{B}\%_{\circ}\sim\mathbb{E}\mathbb{B}\mathbb{B}\tilde{\mathbb{A}}\text{ }\tilde{\mathbb{a}}\mathbb{E}\mathbb{B}\mathbb{I}\mathbb{B}\mathbb{e}\mathbb{I}\mathbb{B}\mathbb{D}\mathbb{B}\mathbb{i}\mathbb{e}\mathbb{Y}$   
 $\%_{\circ}\sim\mathbb{i}\mathbb{e}\text{ }\mu\mathbb{B}\tilde{\mathbb{a}}\mathbb{A}\mathbb{D}\%_{\circ}\mathbb{e}\sim\mathbb{E}\mathbb{B}\text{ }\tilde{\mathbb{a}}\%_{\circ}\sim\frac{3}{4}\mathbb{B}\mathbb{B}\text{ }\mathbb{B}^{\frac{3}{4}}\mathbb{B}\mathbb{B}\text{ }\varnothing$   
 $\%_{\circ}\mathbb{e}\sim\mathbb{I}\mathbb{B}\%_{\circ}\sim\mathbb{i}\mathbb{e}\mathbb{Y}\text{ }\%_{\circ}\mathbb{e}\sim\mathbb{D}\mathbb{B}\mathbb{B}\mathbb{i}\mathbb{B}$   
 $\mu\mathbb{B}\mathbb{B}\mathbb{A}\mathbb{D}\mu\mathbb{B}\tilde{\mathbb{a}}\tilde{\mathbb{A}}\%_{\circ}\sim\mathbb{D}\mathbb{B}\mathbb{B}^1\mathbb{B}\mathbb{B}\pm\mathbb{B}\text{ }\%_{\circ}\mathbb{e}\sim\tilde{\mathbb{a}}\mathbb{E}\mathbb{B}^{\wedge}$   
 $\tilde{\mathbb{a}}\%_{\circ}\sim\mathbb{D}\mathbb{B}\mathbb{B}^2\mathbb{B}\mathbb{i}\mathbb{e}\mathbb{Y}\text{ }\mathbb{E}\mathbb{B}\mathbb{i}\mathbb{B}\mathbb{B}\text{ }\mathbb{E}\mathbb{B}\mathbb{I}\mathbb{B}\mathbb{B}\tilde{\mathbb{a}}^2\mathbb{B}\%_{\circ}\sim\mathbb{B}\mathbb{e}\mathbb{Y}$   
 $\%_{\circ}\mathbb{e}\sim\mathbb{D}\mathbb{B}\mathbb{B}\mathbb{i}\mathbb{B}\text{ }\mu\mathbb{B}\tilde{\mathbb{a}}\tilde{\mathbb{A}}\frac{1}{2}\mathbb{B}\frac{1}{2}\mathbb{B}\mathbb{B}\tilde{\mathbb{A}}\mathbb{E}\frac{1}{4}\mathbb{B}\%_{\circ}\sim$   
 $\%_{\circ}\sim\mathbb{B}^{\frac{3}{4}}\mathbb{B}\tilde{\mathbb{A}}\%_{\circ}\mathbb{A}\sim\frac{1}{4}\mathbb{B}\text{ }\%_{\circ}\mathbb{e}\sim\mathbb{B}\pm\mathbb{B}\mathbb{B}\tilde{\mathbb{A}}\text{ }\mu\mathbb{B}\tilde{\mathbb{A}}$   
 $\tilde{\mathbb{a}}\%_{\circ}\mathbb{e}\sim\mathbb{D}\mathbb{B}\mathbb{B}^2\mathbb{B}\text{ }\tilde{\mathbb{a}}\mathbb{S}\mathbb{E}\mathbb{B}\mathbb{D}\mathbb{B}\text{ }\%_{\circ}\mathbb{e}\sim\mathbb{f}\mu\mathbb{B}\mathbb{E}\mathbb{B}\mathbb{B}\text{ }\frac{1}{4}\mathbb{B}\mathbb{e}\mathbb{Y}$   
 $^{\wedge}\%_{\circ}\sim\%_{\circ}\sim\mathbb{B}^{\frac{3}{4}}\mathbb{B}\tilde{\mathbb{A}}\mathbb{I}\mathbb{B}\mathbb{E}\mathbb{E}\mathbb{B}\mathbb{B}\text{ }\mathbb{B}^{\frac{3}{4}}\mathbb{B}\mathbb{i}\mathbb{e}\tilde{\mathbb{a}}\mathbb{I}\mathbb{B}\mathbb{E}\mathbb{B}\text{ }\%_{\circ}\sim\tilde{\mathbb{a}}$   
 $\mathbb{B}^{\sim}\mathbb{i}\mathbb{B}\tilde{\mathbb{a}},\text{ }\tilde{\mathbb{a}}\mathbb{I}\mathbb{B}\mathbb{D}\mathbb{B}\frac{1}{4}\mathbb{B}\mathbb{e}\mathbb{Y}\text{ }\mathbb{S}\mathbb{i}\mathbb{e}\text{ }\tilde{\mathbb{a}}\%_{\circ}\sim\mathbb{D}\mathbb{B}\mathbb{B}^2\mathbb{B}\mathbb{i}\mathbb{e}\mathbb{Y}$   
 $\%_{\circ}\sim\mathbb{i}\mathbb{e}\text{ }\mu\mathbb{B}\tilde{\mathbb{a}}\mathbb{A}\mathbb{D}\%_{\circ}\sim\mathbb{B}\tilde{\mathbb{A}}\text{ }\mu\mathbb{B}\mathbb{A}\mathbb{E}\mathbb{S}\mathbb{B}^2\mathbb{B}\text{ }\%_{\circ}\sim\tilde{\mathbb{A}}$   
 $\mathbb{D}\mathbb{B}\frac{1}{4}\frac{1}{4}\mathbb{B}\mathbb{B}\tilde{\mathbb{a}}^2\mathbb{B}\mathbb{E}\mathbb{B}\text{ }\tilde{\mathbb{a}}\%_{\circ}\sim\frac{3}{4}\mathbb{B}\mathbb{B}\text{ }\mathbb{B}^{\frac{3}{4}}\mathbb{B}\mathbb{B}\text{ }\varnothing$   
 $\%_{\circ}\mathbb{e}\sim{}^2\mathbb{S}\mathbb{A}\tilde{\mathbb{a}}\frac{3}{4}\mathbb{B}\text{ }\frac{1}{4}\mathbb{B}\mathbb{B}\tilde{\mathbb{a}}\mathbb{E}\mathbb{D}\frac{3}{4}\mathbb{B}\%_{\circ}\sim\tilde{\mathbb{a}}\text{ }\tilde{\mathbb{a}}\mathbb{I}\mathbb{B}\mathbb{B}\mathbb{B}$   
 $\mathbb{D}\mathbb{B}\mathbb{B}\mathbb{D}\mathbb{i}\mathbb{B}\mathbb{B}^2\mathbb{B}\text{ }\%_{\circ}\sim\tilde{\mathbb{a}}\text{ }\mathbb{B}\tilde{\mathbb{a}}\mathbb{C}\mathbb{B}\mathbb{E}\mathbb{B}\asymp\mathbb{B}\mathbb{B}$   
 $\tilde{\mathbb{a}}\mathbb{E}\mathbb{B}\%_{\circ}\sim\tilde{\mathbb{a}}\mathbb{D}\mathbb{B}\mathbb{E}\mathbb{B}\text{ }\%_{\circ}\sim\tilde{\mathbb{A}}^2\mathbb{B}\mathbb{e}\text{ }^{\wedge}\mathbb{E}\mathbb{B}\mathbb{P}\text{ }\mathbb{I}\mathbb{B}\tilde{\mathbb{a}}\mathbb{B}\%_{\circ}\sim$   
 $\mathbb{f}\mathbb{E}\%_{\circ}\mathbb{e}\sim\mathbb{I}\times\mathbb{E}\mathbb{B}\mathbb{B}\text{ }\mu\mathbb{B}\mathbb{A}\mathbb{B}\mu\mathbb{E}\mathbb{B}\text{ }\%_{\circ}\sim\tilde{\mathbb{A}}^2\mathbb{B}\mathbb{e}\text{ }\mathbb{N}\mathbb{e}\mathbb{E}\mathbb{B}\tilde{\mathbb{a}}$   
 $\mathbb{E}\mathbb{B}\mathbb{B}\mathbb{e}^2\mathbb{B}\mathbb{B}\mathbb{E}\mathbb{E}\mathbb{E}\mathbb{B}\mathbb{B}\text{ }\frac{1}{4}\mathbb{B}\mathbb{e}\mathbb{Y}\text{ }\frac{1}{4}\mathbb{B}\mathbb{B}^2\mathbb{B}\mathbb{E}\mathbb{B}\mathbb{B}\mathbb{D}\mathbb{B}\mathbb{B}\mathbb{B}\pm\mathbb{B}^2\mathbb{B}$





¾BíeİB²BB BēY %~īē ĐBĐ½BBàĒBBB  
à%~¾BB B¾BB 0

ĐBĐĐB²B²Bē ²EBÀĐBĒB¾B ²Bäp¾Bīē Bā  
BēYBīēY İBİĐBē ²B¼B%~ μBÆ°BBĒBā,  
ŞĒBŞĒB¾B, ¹BBñÜ ĐBē μBÆ°BBĒBā BāŞ¹BñĒē  
μBÆŞēİBBēY %~B fμB¾Bīē B %~À²īē  
ÑēĒBā μB²BB ±¾BB²B %~à²ŞÆĒB  
à%~¾BB 0 ²EBÀĐBĒB¾B ÜBBÀē μBB²Bā  
%~ē ēBā²B EBĒĒBB¹BīēY ¼BēY ĐBē  
μB%~ñĒē Bˆ ÖBˆ BÀ àİÇB¼μB,  
μBā¼Bīē²BīēĒ²B %~ā 90-94 àŞ²BīēY ¼BēY  
μBİŞĒĒBBÀ 500-617 à%~ĒBīē/Ñē.Ñīē BˆĀ BİÀ  
f²B%~ā fˆBÀİBāàĒBBB 40-60% ÑāˆĀ 0  
¼BĐμB¼BĐBēĒBBˆÑāˆ½Bī²BīēĐB-½Bī²BīēĐB  
%~ē ¹BāİBīēY ĐBē EBĒĒBB¹BīēY %~īē °BÀ  
àŞ¾BB B¾BB 0  
¼Bē%~Bē¹BĒēà%~¾B¼B āİēİB²B¹B BāĀ  
%~ē ¼BīēĒB ĒBB¾BÀĐB BİÀˆ—ĐÖĀB  
Đ¼BñĒĒ ĒBB¾BÀĐB %~ē àĒBˆ à²ŞB²B  
μBā BÇB EBİ¾BBÀ à%~¾BB B¾BB 0  
fĐB%~ē %~BÀ%~ %~īē İÇīēÇBā¹B«  
à%~¾BB B¾BB BİÀ fĐBē İBā²B¹BīY%~  
¼BēY ĐB¼BBāĒĒİÖ à%~¾BB 0 f²B%~ā  
à²ŞB²B ĐBĒĒBāŞĒBB 96.66% BİÀ 90% EBİBB  
80%ŞēÜBā BˆĀ 0 ĒB-ĒB 83 BĒēĒEB ¼BēY  
ĐBē ĐBˆBā İBĒB ĐBĒĒBŞ%~ %~ē àĒBˆ

8.4% ˆ%~ā%~ÀÇB %~À²Bē ĐBē  
%~ēĒĒB ĐBBB ĐB%~BÀBĒ¼B%~ μBBˆ  
Bˆ 0

àİB²B%~B fμB¾Bīē B ²BÑāY à%~¾BB  
B¾BB Ñīē ˆēĐBē İBĒB¾B ĐBĐBB±B²BīēY  
BİÀ %~ēàİB °Bā¼B ¼BēY ¼BĒĐ¾B  
fμBBŞ²B μBÀˆ%~ ¼BāĒ¾BĒB±BĀ%~  
μBàÀ¾BīēİB²BB EBİ¾BBÀ %~ÀˆĐB  
¾BīēİB²BB %~ē ¼BB±¾B¼B ĐBē  
¼BÑBÀİÖĀ %~ē ĐBBĒBBÀ àİĒBē ¼BēY  
%~ÀĒĒ EBĒĒBæ%~B %~ē ²B¼B%~  
μBÆ°BBĒB BēYB ¼BēY ¼BİĒBā %~ē ēBā²B  
½BÀÇBīēY - ÇĒē ĐBē μBīē²BB ¼BİĒBā, μBīē²BB  
¼BİĒBā Đīē ¹BāàĒB%~B, BİÀ  
¹BāàĒB%~B ĐBēˆ%~ĒBİBā¾B ¼BİĒBā  
μBÀ¹BāİB fμBBŞ²B ÑēĒBā  
ĐB¶Ē~ĒBBBμBāĒB%~ μBÆ¾Bīē B  
μBÆŞāİBĒB à%~¾BB B¾BB 0 ¼BĒĐ¾B  
%~ēİB%~īēY %~ē ĐBB¼BāāÑ%~  
°BāĐBpμBāÇB μBÀ%~BμBĀ Ñİ½Bāā EBİBB  
àĐμBÆĐBāĒB²BB ĐBĒĒB±BĀ²B %~B  
¾Bāà²BÖ ĐBäpBBB à%~¾BB B¾BB 0  
İBēĀē BBĒĒB ¼BēY ĐBÀ%~BÀ °BÀB  
B¹BāÖĒB °Bā¼B μBÀ BÆB¼BāÇB ĐBĒĒB  
%~ē²ŞÆ (VRC) %~āĐBİBB²BB %~āBˆĀ  
BİÀ fĐBē Şēİ¾B-İÇBBĒ¾B fμB%~ÀÇBBēY  
ĐBēĐBāĐBā—İBEB à%~¾BB B¾BB 0







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**Central Institute of Fisheries Education**  
Mumbai - India  
[www.cife.edu.in](http://www.cife.edu.in)



# CIFE network



## ● Headquarters

**Central Institute of Fisheries Education**  
(University under Sec. 3 of UGC Act),  
Indian Council of Agricultural Research  
Panch Marg, Off Yari Road,  
Mumbai - 400061

EPABX Lines : 022 - 6361446/7/8  
Director : 022 - 6363404 (O)  
              : 022 - 6361656 (R)  
Joint Director : 022 - 6302232 (O)  
Fax: : 022 - 6361573 (Director)  
          : 022 - 6310657 (Joint Director)  
          : 022 - 6348223 (Sr.A.O.)  
          : 022 - 6351006 (F.A.O.)  
e-mail : [contact@cife.edu.in](mailto:contact@cife.edu.in)  
Website : <http://www.cife.edu.in>

## ■ Centres

### CIFE Centre

30, G.N. Block Sector -V,  
Salt Lake City, Calcutta- 700 091  
West Bengal  
[kolkatacentre@cife.edu.in](mailto:kolkatacentre@cife.edu.in)  
Tel: (033)2357 3893/2357 5269  
Fax : (033) 2357 5269

### CIFE Centre

Beach Road, Near Old Burmah Shell,  
Kakinada-533 007, Andhra Pradesh  
[kakinadacentre@cife.edu.in](mailto:kakinadacentre@cife.edu.in)  
Tel: (0884)2376746  
Fax : (0884) 2373602

### CIFE Centre

Lahli, Via Anwal  
Rohtak-124 411, Haryana  
[rohtakcentre@cife.edu.in](mailto:rohtakcentre@cife.edu.in)  
Tel: (01258) 253595/253506  
Fax : (01258)253506

### CIFE Centre

Powarkheda,  
Hoshangabad-461 110  
Madhya Pradesh  
[powarkhedacentre@cife.edu.in](mailto:powarkhedacentre@cife.edu.in)  
Tel: (07574) 27280  
Fax : (07574) 227208

