CIFRI NEWSLETTER

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WORKSHOP ON COMPOSITE FISH CULTURE

CONSOLIDATE THE GAINS OF 70s

The sixth workshop of All India Coordinated Research Project on Composite Fish Culture and Fish Seed Production was held at FARTC, Dhauli during Ist and 2nd July 1982. The sixth workshop recommended that having achieved its objectives of demonstrating the viability of composite fish culture technology and maximising fish productoin from fish ponds under different agroclimatic conditions, the efforts now should be reoriented to consolidate the gains obtained under the research project in 1970s.

The Workshop assessed the progress of work being pursued at seven different centres of the project. The impact and implications of the results so far achieved were discussed at length.

Systems approach

Inaugurating the workshop Dr. R. M. Acharya, Deputy Director General, ICAR stressed the need for well designed experiments involving different subsystems. He opined that combinations of these subsystems were required to be done. Dr. Acharya hoped, it would be possible to tackle these problems at FARTC now that the centre was provided with trained scientists and adequate facilities. Many of the centres would be transferred to the respective states. Induced breeding of Chinese carps, he pointed out, should be properly tested under different agroclimatic conditions so that necessary modifications in brood stock maintenance and hatchery management could be effected.

Dr. B. Mishra, Vice Chancellor, Orissa University for Agricultural Technology was the chief guest on the occasion. He rightly

pointed out that fish culture being more profitable than any other form of agriculture it should be popularised with joint efforts from FARTC and OUTA.

Dr. V. R. P. Sinha, Head FARTC also addressed the distinguished gathering. He read out a message from Dr. A. V. Natarajan, Director, CIFRI. Dr. Natarajan desired that the workshop consider :—

(i) Whether the project has accomplished its objectives,

(ii) If not, its causes and a new orientation in its programme and

(iii) Whether there was a need to close some ot the Institute based centres.

He also desired the workshop to examine the reasons for marked fluctuations in fish production from year to year with special reference to genetic variability of the seed, ecological variations of pond eco-system and changes in species combination ratios and stocking densities.

Shri S. D. Tripathi, Project Coordinator who moved a vote of thanks to the chair assured that the project programme would be reoriented in the light of suggestions made by Dr. Acharya and Dr. Natarajan.

Technical sessions

The workshop was held in five sessions. First four sessions were devoted to the progress of work in (i) Southern India (ii) Eastern and North Eastern India (iii) Northern and Central India and (iv) backward and tribal areas in Eastern and Western India under the Chairmanship of Shri G. N. Mitra, Dr. V. G. Jhingran, Shri S. C. Hota and Dr. S. N. Dwivedi respectively. Thirty five scientists took part in the deliberations. The discussions centred round feed and fertilisers, development of hybrid varieties and improvement of seed production and fish culture through scientific methods. The fifth session under the chairmanship of Shri K. H. Alikunhi was devoted to the finalisation of technical programme and recommendations.

Recommendations

The workshop recommended that having achieved its objectives of maximising fish prodution in different agroclimatic conditions and demonstrating the technology to extension officers and farmers the programme could be reoriented and consolidated at a few selected regional centres with adequate field facilities in major agroecological zones. Adequate attention should be paid to the selection and maintenance of pedigree brood stock and seed production at each of the new centres. The workshop also felt that the results of researches at FARTC be given field trials and a two way traffic between basic and applied research be established.

A technical session in progress. From left : Dr. V. G. Jhingran, Dr. V. R. P. Sinha, Shri G. N. Mitra, Shri S. D. Tripathi and Shri H. A. Khan.

Success in Mahseer Breeding

A few specimens of the mahseer *Tor putitora* collected from Bhimtal Reservoir were bred in captivity by stripping. More than one lakh eggs stripped out of the breeders hatched out giving 66.3% survival. These hatchlings when reared in plastic pools resulted in 77.5% survival. The trials with hypophysation coupled with stripping also met with success. About 6,250 and 600 eggs were stripped out in two attempts. However, percentage of fertilisation was poor compared to the eggs stripped without hypophysation.

An artificial feed acceptable to the mahseer fry was also formulated with soyabean, barley flour, wheat middlings and mustard oil cake. This successful attempt in breeding mahseer will go a long way in rehabilitating their population in Indian rivers and lakes.

Pesticide Residue in Fishes and Sediments

Fishes and prawns and the sediments from the Hooghly estuary were examined for pesticide residue as a part of the Institute's studies on the aquatic environment. Pesticide residues were recorded in sediment samples collected between Namkhana and Barrackpore. Among the samples, DDT was found to be maximum in Belur (42 ppb) and BHC-Y in Dakshineswar (70 ppb) sampling zones. Among suspensoids collected from brick fields near Barrackpore, DDT was detected upto 87 ppb and BHC-Y upto 112 ppb.

A hilsa measuring 350 mm contained 31 ppb of DDT in its flesh and in smaller specimens it was upto 270 ppb. Small hilsa specimens contained BHC-Y upto 146 ppb. Among prawns, highest DDT recorded was 122 ppb and BHC-Y 210 ppb.

Bioaccumulation of Heavy Metals

Preliminary studies suggested the bioaccumulation of heavy metals like zinc, chromium and copper in the fishes of the Hoogly waters. The fishes *Eleotris macrodon, Rita rita, Sillago panijus, Ailia coila* etc. and shrimps *Macrobrachium villosimanus, M. rude* and *M. malcolmsonii* were found to be affected. In *Rita rita* gills, kidneys, liver, flesh, intestine and gonads contained zinc. Chromium was restricted to gills only.

A novel method for breeding of magur

A technique for mass breeding of magur *Clarias batrachus* has been evolved by the CIFRI scientists at its Gauhati Centre in collaboration with the Directorate of Fisheries, Assam. This novel breeding technique involves special preparation of Paddy fields for releasing the breeders.

The experiment was initiated on 10. 6. 82 in five plots of 0.25 ha each. Special earthen dykes were provided across the plots. These dykes were traversed by burrows at one meter interval. A fortnight after the implantation of paddy saplings, 50 sets of pituitary injected magur in the ratio of 1 male : 2 females were released in each plot. Water level was maintained at 15 cm. A week later, magur fry could be observed in the experimental plot. The fry when reared attained an average size of 55 mm in one month time.

Higher yield from cage culture

Cage culture of common carps in peninsular tanks yielded better results in repeated trials this year. Four hundred common carps reared for six months yielded 140 kg in a 10.5 sq. m. cage. This is equivalent to 133 tonnes/ha/6 month. Last year, a production @ 92 t/ha/6 months was attained at a stocking density of 300 common carps/cage.

ON THF ANVIL—8

WASTE UTILIZATION IN AQUACULTURE

The utility of wastes arising from industrial, agricultural and other community activities in aquaculture was well known to us since very early times. However, as the horizons of human activities kept widening, the variety and quantum of these wastes assumed staggering dimensions. CIFRI has probed into the possibilities of utilising municipal, agricultural, domestic and industrial wastes in aquaculture. Animal excreta such as dung, urine and bird droppings ; sewage, biogas slurry, city garbage and domestic refuse are already identified as manure and supplementary feed.

The Institute has recently added a new dimension to the concept for waste utilisation by exploring the possibilities of using the industrial effluents as fish toxicants, algicides and fertilisers in fish pond. Wastes from distillaries, rayon industries and cotton seed processing centres are under investigation.

These organic and inorganic wastes are studied to ascertain their biodegradability, nutrient value, biochemical impact on recipient water, toxicity to fishes and fish food organisms and other relevant factors. The rate of mineralisation of these wastes are studied under different environmental conditions and in combination with microbes.

Apart from wastes, waste waters are also given adequate attention by the Institute. Utilisation of jute retted waters for fish production is an example. These waters were hitherto considered unsuitable for fish culture and domestic purposes. A farmer at village Patulia, West Bengal, has already harvested 412 kg of fish in 10 months from a 0.07 ha jute retting pond under the technical guidance of CIFRI. Efforts are under way to enhance the yield further.

CIFRI investigations are aimed at evolving technologies to utilise these wastes. Aquaculture is one of the ideal media for recycling wastes.

EXTENSION SCENE

Highlights

- ☐ A group of 18 trainees from Vivekananda Institute for community service, Mandra :
- ☐ Twenty three trainees from Netaji Subhas Cooperative Training College, Kalyani :
- ☐ Nineteen trainees from Loksiksha Parishad, Ram Krishna Mission, Narendrapur :
- ☐ Twenty two trainees from Association for Food Production (AFPRO) and
- ☐ Thirty nine trainees of CIFE Bombay were at CIFRI. They were taken to the laboratories and briefed by the extension scientists about the activities and achievements of the Institute. The trainees evinced keen interest in the activities both in the field demonostrations and in the laboratories.
- ☐ As a part of CIFRI's built in arrangement to disseminate the know-how to the farmers, 10 talks were delivered by the scientists of Extension Section, S/Shri U. Bhowmick, P. K. Pandit and B. K. Banerjee. The subject of talks varied from fish seed production, fish farming, fish diseases and their control to magur culture.

The extension scientists visited five farmers' ponds to offer necessary scientific tips. The beneficiaries included, Air Force Society, Jaffarpur, Shri Ajoy Chatterjee of Machlandapur and M/s Dutta Fisheries, Alamgunj, Burdwan.

- ☐ Shri P. Das, S_3, met Lt. General

R. S. Dayal and other senior officers of the Indian Army Headquarters. He discussed with them different fish production technologies developed at CIFRI with special reference to composite fish culture and its economics on 24.8.82.

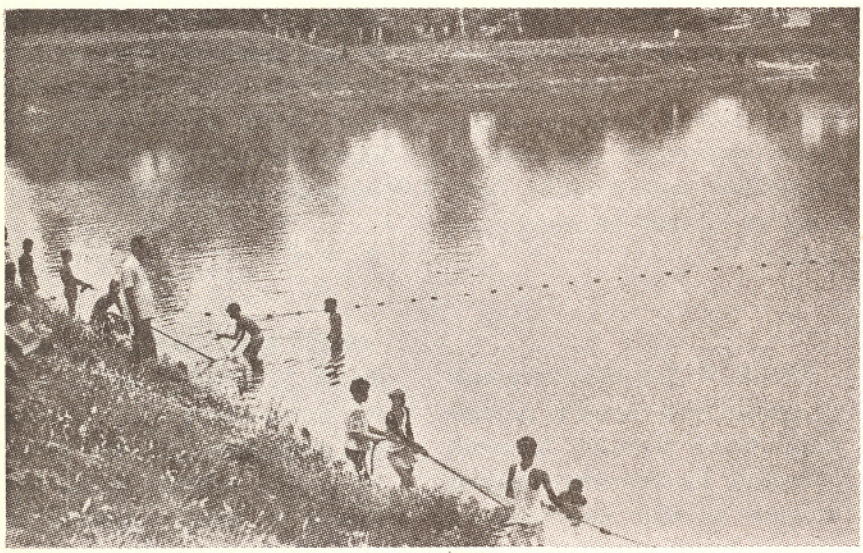
Lab to Land Programme

As the second phase of the Lab to Land Programme, work under 7 centres embracing 300 farm families in the state of West Bengal and Orissa was initiated in June, 1982. Harvesting at Chaanditala Centre was done in June. Production of fish in composite fish culture ranged from 1,700 kg-4,764 kg/ha/8 months. Magur Production was 2,102 kg-2445 kg/ha 6 months. 2nd phase of LLP was initiated in 10 villages under Chanditala, Kamarpukur and Bally-Dewangunj Centres. A total of 100 families were benefited by this.

CIFRI SHOWS THE WAY

Twenty fifth May, 1981. Shri S. K. Roy a progressive fish culturist approaches the Director, CIFRI for technical guidance. His ponds by and large derelict, produce very little. They would not yield more than 60 kg/ha. CIFRI steps in. A scientist is sent to study the ponds. Water and soils are tested. What is wrong with these ponds ? Ponds are acidic (pH 5.2-6.3). The total alkalinity is very low. Moreover, a thick layer of muck blankets the pond's bottom interfering seriously with the production process.

The ailment having diagnosed, corrective measures begin. A rather heavy dose of lime (500 kg/ha) is administered to correct the acidity and to accelerate the process of decomposition of muck. CIFRI suggests a comprehensive fertilisation schedule, a combination of organic and inorganic manures. Stocking is regulated at a density of 5,000 to 6,000 per ha with Indian major carps fry. Cow dung 5,000 kg/ha, urea 100 kg/ha and super phosphate 120 kg/ha. And a low level of artificial feeding of fry at the rate of 1% body weight. Fish yield goes up, say about 1,500 kg to 2000 kg per hatcare. CIFRI advises the farmer that the production could be further enhanced if exotic carps are introduced.



The above anecdote narrates CIFRI'S extension activities at a fish farmer's pond at Harischandrapur. This is only one of the several instances where CIFRI steps in to offer a helping hand to fish farmers.

A net operation in Shri S. K. Roy's pond at Harischandrapur

'Be in tune with nature'

CIFRI too joined the environment-conscious World Community to observe 5th June World Environment Day. The highlight of the Day's events was an enlightening talk at CIFRI auditorium by Dr. B. I. Sundararaj, Professor of Zoology, Delhi University. This was followed by an animated discussion by the participating scientists.

Dr. Sundararaj spoke at length on the adverse environmental impact of todays reckless resources exploitation. He warned that the human community was steadily heading for a calamity for not being in tune with the environmental rhythms. Nature was always unkind to those animals and plants who failed to be in harmony with the rhythms of nature. Dr. Sundararaj pointed out several instances of environmental degredation.

Two vital phenomena, i.e. the uncontrolled exploitation of natural resources and the environmental pollution have already started boomeranging on the prosperity of mankind, Dr. Sundararaj observed. He also cited examples of vested interests which operated against the long-term environmental interests. He was happy to note the widespread environmental awareness among policy makers and public.

Earlier Mr. P. Das, Senior Scientist of the Instiute detailed the significance of World Environment Day and the evolution of World Environment movement.

The talk was followed by a discussion by the scientists on various environmental issues. Dr. V. K. Unnithan, on the basis of his experiences in environmental movement pleaded for sound planning of awareness programmes. The key point he discussed was how to involve masses in conservation programmes. He preferred constructive demonstration activities to indoor seminars and talks.

Shri R. K. Das, sounded a note of caution with regard to occupational health hazards in various industries. Environment prevailing at these working sites interfered seriously with physiological functions. He cited examples from plastic industries. pencil factories, cotton ginneries etc.

Dr. H. C. Joshi keenly felt the need for imparting the right type of instructional guidance to users of pesticides so as to obviate the possibility of their deleterious effect on humans.

Shri S. Paul, Scientist was of the view that all round environmental degradation was the price for economic development and reckless urbanisation. According to him legislative measures aiming at improvement of the environment would be of limited avail, unless accompanied by mass participation at all levels.

While concluding the discussion Shri K. K. Ghosh, Scientist wanted 'Environment Day' observed in a more meanigful way by taking up field oriented social work aiming at mass education on environmental aspects.

Visitors

C. S. Singh, M. P. at FARTC.

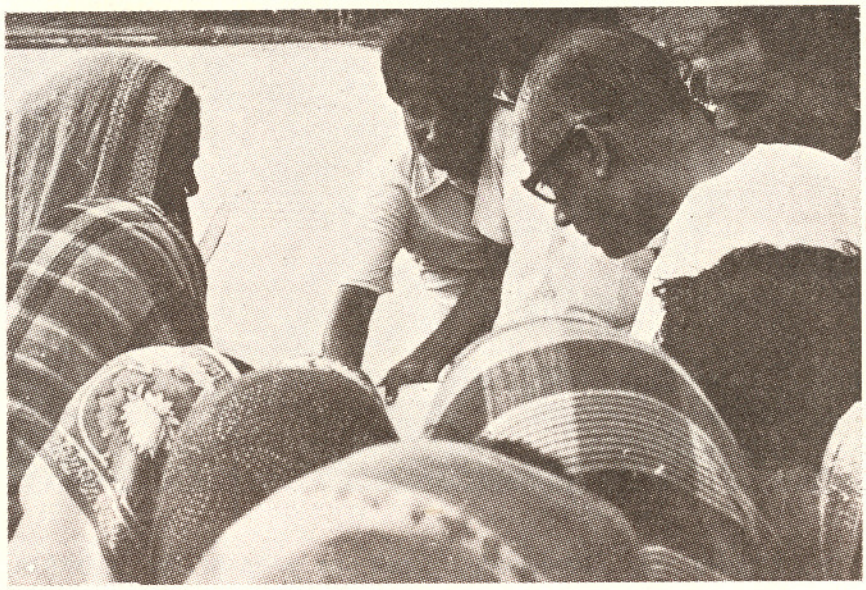
Shri Chandra Sekhar Singh, Member of Parliament and Member, Governing Body of the ICAR paid a visit to the laboratories and farms of the FARTC, Dhauli on 26th July, 1982. Shri Singh also visited the villages adopted by the Centre under its 'Lab to Land' programme.

Shri Singh met the members of the Mahila Industrial Cooperative Society for net fabrication at Nakhurupatna. He was greatly impressed by the Composite Fish Culture Programme undertaken by the scheduled castes and landless farmers of the village. He discussed the cost benefit ratio of fish farming and net making with the farmers and farm women. He was informed that a farm woman earned about Rs. 5.50/day on an average by net weaving. The Society had already sold nets worth Rs. 3,500/-.

Shri Singh was very happy to see fish farming activities in a Harijan Basti at Uttar Shasan where the womenfolk were engaged in controlled breeding of common carp, egg care and nursing the spawn. Shri Singh also met the farmers of Malisahi village who produced about 17 lakhs spawn under the guidance of the scientists of FARTC. These villagers have earned about Rs. 1000/- from the sale of spawn and are expecting about Rs. 5000/- from the sale of fry.

When Shri Singh met the KVK/TTC trainees he showed keen interest in their activities. He discussed the mode of selection of KVK trainees with the Head, FARTC. Shri Singh was informed of the impact of such training in the economic development of the rural areas.

Shri Singh was keenly interested in the on going research activities of the FARTC and discussed the problems with individual scientists. He appreciated the speed with which the Freshwater Aquaculture Research and Training Centre has been established and made the Lead Centre on Carp Farming for ali Asian Countries.



Shri C. S. Singh at Uttar Shasan

Mr. B. O. Ifesanya, FAO fellow from the Federal Department of Fisheries, Victoria Island Lagos, Nigeria visited the Institute on 29.5.82.

Dr. Roger Doyle, Professor, Biology Department, Delhousie University, Halifax Nova Scotia, Canada visited the Institute on 11.6.82.

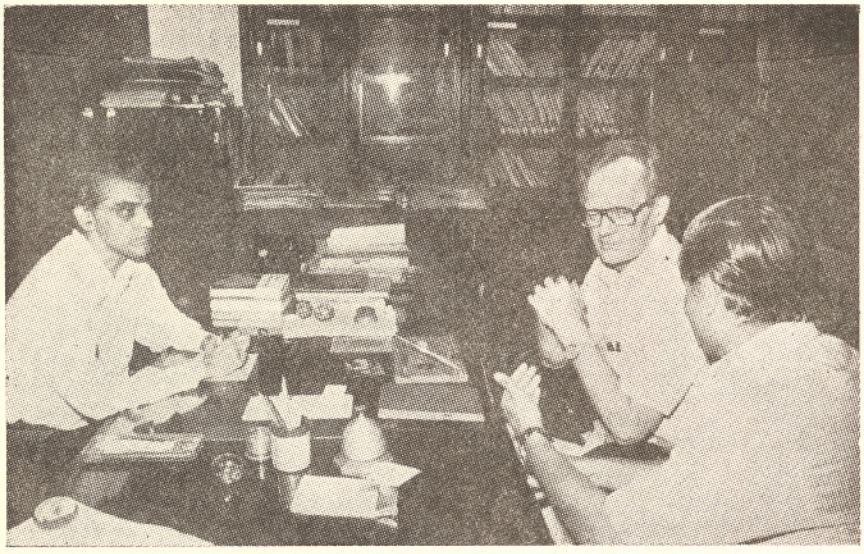
Dr. D. J. Roy, Zonal Coordinator, Zone-II, Lab to Land Programme visited the demonstration centres at Chanditala and Kalyanbati on 25.5.82.

Dr. P. B. Panda, Deputy Director, Animal Husbandry, Government of West Bengal visited the Institute on 1.5.82.

Mr. Mohammad M. Ahmed Director of Fisheries, Mr. P. K. Duara, Jt. Director of Fisheries and Dr. Bora, Director of Veterinary services Assam visited the Institute on 19.6.82. They also visited the Krishnanagar Research Centre.

Dr. C. Nascimento, Director and Dr. J.F. Junior, Tech. Director, Agricultural Research Centre for Humid Tropics, Belen, Brazil visited the Institute on 17.8.82.

DR. GUNNERSON AT CIFRI



Dr. Gunnerson (middle) with Dr. A. V. Natarajan (left), Director and Shri Apurba Ghosh, Scientist.

Dr. Charles G. Gunnerson, Project Officer, UNDP Recovery Project (World Bank) visited CIFRI on 20th September, 1982. Dr. G. Gunnerson discussed the salient features of the UNDP Project on research and development in integrated resource recovery (waste recycling). He explained the goals of the project in terms of environmental employment and financial benefits that may accrue through implementation of integrated resource recovery projects in developing countries. Dr. A. V. Natarajan, Director, CIFRI explained the distinguished visitor the various waste recycling research projects under implementation by the Institute. The projects incorporate cattle dung, pig waste, duck droppings, biogas slurry and sewage effluents in aquaculture. Dr. Gunnerson evinced keen interest in these programmes.

Dr. Gunnerson was taken round the laboratories of the Institute, the recirculation-cum-filtering system of aquaculture at Barrackpore as well as sewage-fed fish culture centre of CIFRI at Khardah.

STAFF NEWS

Transfers

Name	Designation	From	To
Shri K. N. Krishnamurthy	S-2	Bhavanisagar	Madras
Shri D. V. Pahwa	S-2	Karnal	Dhauli
Shri K. Gopinathan	S-1	Madras	Pollachi
Dr A. Mathew	S-1	Bhavanisagar	Pollachi
Shri Y. S. Yadava	S-1	Gauhati	Bongaigaon
Shri A. K. Datta	S-1	Barrackpore	Rahara
Shri M. Chowdhury	S-1	Gauhati	Bongaigaon
Shri M. Kachup	Jr. Clerk	Ranchi	Barrackpore
Shri H. C. Banik	Jr. Clerk	Muzaffarpur	Barrackpore
Shri S. K. Maranappan	Jr. Clerk	Bhavanisagar	Pollachi
Shri Kunja Behari	Jr. Clerk	Dhauli	Allahabad
Shri A. K. Srivastava	Jr. Clerk	Rihand	Dhauli
Shri K. Kaliyannan	Fisherman	Bhavanisagar	Pollachi
Shri S. K Venkatachalam	Fisherman		,,
Shri M. V Krishnan	Fisherman	,,	,,
Shri Subrahamanyan	Fisherman	,,	,,
Shri H. C. Haldar	Fisherman	Dhiga	Barrackpore
Shri N. K. Das	Watchman	Barrackpore	Dhiga

Shri P. K. Karuppannan resigned from services on 15.8.82.

Appointment

Shri Lakshmi Ram was appointed watchman at Karnal on 17.5.82.

Promotions

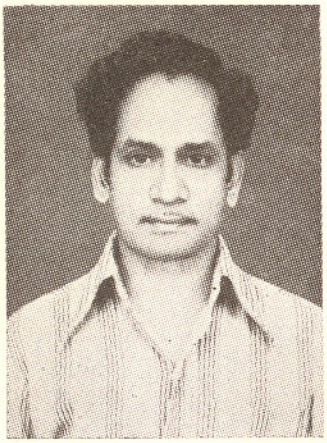
The following promotions were made during the period May to August 1982.

Name	From	To	w.e.f.
Shri R. M. Bhowmick	S-1	S-2	1.7.79
Dr. Peer Mohammed	S-1	S-2	,,
Shri S. K. Sarkar	S	S-1	,,
Shri M. J. Bhagat	S	S-1	,,
Shri P. V. G. K. Reddy	S	S-1	,,
Shri H. S. Mazumder	S	S-1	,,
Shri P. K. Ghosh	S	S-1	,,
Shri N. M. Chakraborti	S	S-1	,,
Shri S. K. Mazumder	S	S-1	,,
Shri P. K. Sukumaran	S	S-1	,,
Shri B. R. Dutta	T-4	T-II·3	1.7.76
Shri H. Das	T-1	T-2	14.4.82

Advance Increments

Shri A. K. Ghosh	S-1	Three increments.
Shri N. P. Srivastava	S	Three increments.

Doctorate to Rao

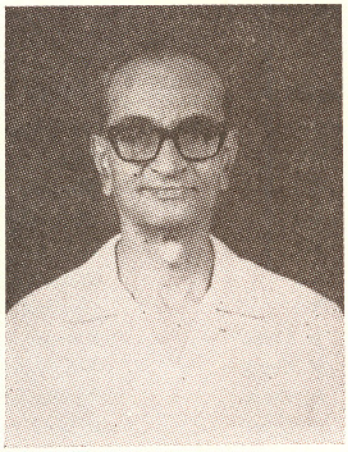


Shri G. Ramamohana Rao, Scientist at Madras centre has been awarded Ph.D. by the Andhra University for his work on 'Biology and culture of catfishes of Pulicat Lake, India'. His work throws new light on the food and feeding habits, age and growth, maturity and breeding, length-weight relationship and other biological aspects of certain catfishes especially *Mystus gulio*. The catfish was cultured in brackishwater ponds for three years where it had bred. Other species covered include *Tachysurus arius* and *Plotosus canius*.

Training

Smt. A. Dey and Smt. S. Das, Librarians attended a week long "Management course in conservation of Documents" conducted by Indian Association of Special Libraries & Information Centres, Calcutta from 15-20 February, 1982.

Dr. Seshappa retires

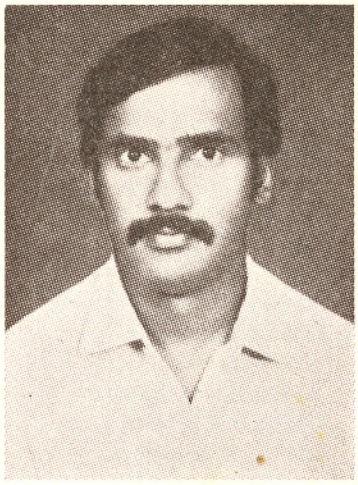


Dr. G. Seshappa, Emeritus scientist at Bangalore Research Centre has completed his project at CIFRI. Dr. Seshappa is a renowned scientist and he was in the active services of ICAR in Central Marine Fisheries Research Institute. After retirement he has been working on project on 'raciation studies in Malabar sole *Cyanoglossus semifasciatus* collected from Calicut, Cannanore, Mangalore and Malpe areas of west coast', as emeritus scientist at CIFRI Bangalore. He has completed the project on 31st August, 1982. CIFRI wishes him happy retired life.

Radio Talk

Shri D. N. Singh, Scientist delivered a talk on *'machli palan keliye thaiyari'* which was broadcast on 15.6.82 by AIR Allahabad.

Suresh joins IAS



Shri K. Suresh, Scientist at FARTC, Dhauli was selected to the Indian Administrative Services. He was releved from the service of Council to join the Lalbahadur Sastri National Academy, at Moussouri in the 1st week of September, 1982.

Karamchandani retires

Shri S. J. Karamchandani, JFS at Allahabad centre retired from the services of ICAR on 31.3.1982. Shri Karamchandani is one of the pioneering investigators in CIFRI. In his thirtyfive years of service at CIFRI, he made notable contributions in the fields of fish biology, reverine fisheries management, water pollution etc.

Seminar/Symposium

First National Fisheries Cooperative Congress

The First National Fisheries Cooperative Congress was held at Nagpur on 26th June, 1982. Shri S. Paul, Scientist represented the Institute. On this occasion, a souvenir was brought out that contained a contribution, 'Revitalisation of Cooperatives For Efficient Fish Marketing in Inland Sector' by Dr. A. V. Natarajan and S. Paul. The Congress was well attended by a cross section of delegates and invitees belonging to departments of cooperation, fisheries, banks, and various co-operative federations. □

Shri U. Bhowmick, Scientist attended the National Workshop on LLP on 14-15 May, 1982 held at Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur.

News roundup

Bundh breeding in Karnataka

The Karnataka State Fisheries Department's very first attempt to breed major carps in dry bundhs of Bidar District met with success. A pond (*Gokatte*) at Kabirbadi, about 30 km from Bidar was provided with a bundh, waste-weir and an outlet. During rainy season this tank swells to about 1 hectare with a depth of 1-1.5 m. In the first week of July, 1982 the tank received water and 30 breeders of rohu and mrigal were released in the pond. The first breeding was noticed on 11th July. About one lakh fertilised eggs were collected from the tank and were hatched out in the departmental nurseries in Bidar District.

The State, having 4 lakhs ha available for inland fisheries development, is striving to bring closer the gap between seed production and seed requirements which is now to the tune of 29 crores. The success in bundh breeding is certainly a big step in this direction.

—Karnataka State
Fisheries Department

Killer fish

A killer fish, locally known as *Katkati* claimed the lives of seven fishermen who ate it. A dog and a hen who shared the meal with their masters also met with instant death. Three deaths were cofirmed by the police while villagers asserted four more deaths a few months ago. The fish was caught from river Bhagirathi.

—Amrita Bazar Patrika.

—'Katkati', the alleged killer is the tocal name for Tetrodon cutcutia. Members of the genus Tetrodon or 'sea frogs' are known for their poisonous flesh—Ed.

Tilapia in Aquaculture.

An international symposium on 'Tilapia in aquaculture' will be held in Tiberias, Israel from 8-13 May, 1983. Preliminary registration forms are available from the organising committee ISTA, P.O. Box 3054, Tel Aviv 61030. Participants will also have the opportunity to visit Israeli hatcheries and fish farms practicing conventional to hyperintensive cultivation methods and using labour saving equipments.

—ICLARM Newsletter.

Paper out of shellfish

The Shikoku Institute of the Industrial Science and Techology Agency has developed a method for making paper out of crustacean carapaces. Chemically, chitin is similar to cellulose, the raw material for paper. Chitin is extracted from the carapaces cooled to —20°C and dissolved in water and formic acid. Thin yarn can be spun from the fluid chitin and made into paper.

LIBRARY

BOOKS :

Ed. Gerking Shelby D. *ed.*
Ecology of freshwater fish production

Moss, Brain
Ecology of freshwaters

Rosenbetg, Seymour L.
Self-analysis of your organization

Stewart, Nathaniel
Help your Boss & help yourself

Agarwal, S. N *et al. ed.*

Perspectives in library and information science, Vol. I & II : Viswanathan Festschrsit.

Chaudri, S.L S. & Satya Chaudri

Chaudri's compilation of the fundamental rules and the supplementary rules :
Including orders issued by the Government of India Vol. I & II : Main rules. 8th *ed.* (Corrected upto the 31st December, 1980)—First, Second & third & fourth lists of corrections & additions.

Boyd, Claude E.
Water quality management for pond fish cultue (Development in aquaculture & fisheries science series, No. 9)

Halver, John E. & Klaus Tiews *ed.*
Finfish nutrition & Fishfeed technology, Vol. I : Proceedings of a world symposium sponsored & supported by European Inland Fisheries Advisory Commission of FAO (EIFAC), International Council for the Exploration of the Sea (ICES) and International Union of Nutritional Sciences (IUNS) : Hamburg, 20-23 June, 1978.

Kirpichnikov, V. S. *ed.*
Selective breeding of carp & intensification of fish breeding in ponds : Bulletin of the State Scientific Research Institute of Lake and River Fisheries, USA, Vol. 61.

Lockwood, A P. M *ed.*
Effects of pollutants on aquatic organisms.

Toshiaki J. Hara *ed.*

Chemoreception in fishes (Development in aquaculture and fisheries scienee series. No. 8).

Taneko Suzuki

Fish and Krill protein : Processing technology

Love, R. Malcolm

The Chemical biology of fishes ; With a key to the chemical literature.

Love, R. Malcolm

The Chemical biology of fishes, Vol. 2 : Advances 1968-1977 : With a supplementary key to the chemical literature

Connell, J. J. *ed.*

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3. ASPAC Newsletter, Nos. 54, 1981 & 55, 1982.
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5. Australian Journal of Biological Sciences, **35** (1). 1982.
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