Nationally-recognised ornamental fish breeder Kripan Sarkar - a man to remember

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Commercial-scale ornamental fish production and its marketing have already gained popularity and wider attention in India. A good population of freshwater ornamental fish varieties inhabit the wild freshwater resources in the northern part of West Bengal and north-eastern states. Many of us know that at an interval of every fifteen years, white durable bathtubs in passenger cruise ships, made out of fibreglass reinforced plastic are removed and renewed. Knowing that these old ones are no more used and meant for sale, a person involved in ornamental fish business made up his mind to buy such bathtubs in good condition from Visakhapatnam Port, India. He brought those to his home in north Bengal, realising that these can be fruitfully used in the long run for rearing guppies and other small-sized ornamental fishes. Indeed, he was correct.

This person was Kripan Sarkar, who is with us no more. An enterprising ornamental fish breeder-cum-farmer par excellence, exporter and supplier of the same from northern part of West Bengal, passed away on 2 August, 2023 at his home near Jalpaiguri town, West Bengal after a brief illness. He was 58 years of age. As proprietor of Rainbow Ornamental Fish Farm, at Bakshipara Village in Jalpaiguri District, Sri Sarkar was an expert and authority in scientific breeding, larval rearing, propagation, research and experimentation on economically important freshwater ornamental fishes, both exotic and indigenous, familiar and less-familiar. There was a time when Sri Sarkar was the only commercial ornamental fish breeder in north Bengal. His ornamental fish farm, set up in 1998, is located about 2.5 km from Raninagar-Jalpaiguri Junction Railway Station, which is about 28 km from Siliguri town towards Jalpaiguri.

Near to Teesta irrigation canal, Sri Sarkar's farm occupies 1.2 ha with twelve zooplankton-rich earthen ornamental fish culture ponds, in addition to several well-maintained rectangular cement cisterns and large-sized glass aquaria in tiers, for rearing. Four permanent labourers take care of the farm. He had supplied different kinds of ornamental fishes in oxygen-packed condition to many places in the eastern and north-eastern states of India; and exported the same to USA, parts of Europe, Bangladesh, Nepal, and parts of south-east Asia. His fishes include goldfish, black molly, ornamental carps, tiger barb, rainbow shark, angelfish, guppies, many species of tetra, platy, koi carp, sucker mouth, gourami, red tail and others. Sri Kripan Sarkar was also widely known as an advisor, consultant, eloquent speaker and trainer to ornamental fish farmers and beneficiaries. This dynamic person deserves special importance, as he was the force behind improved management practices, technologies and entrepreneurship development for both men and women in connection with farming of different ornamental fishes of commercial importance.

Sri Kripan Sarkar wil remain in hearts of ornamental fish growers.

Glass aquaria for ornamental fishes at Rainbow Ornamentals.

Koi carp at Sri Sarkar's fish farm.

Jaldhaka River in Jalpaiguri District, north Bengal.

The beginning

In 1988, at 23 years of age, Sri Sarkar brought his first aquarium while teaching at a school in Nepal and became fascinated with ornamental fishes. As the only person producing ornamentals in the entire north Bengal and Nepal, he began by breeding exotic fishes such as molly, guppy, tiger barb, and finally angelfish in 1992, attaining success in breeding under the climatic conditions of north Bengal. After returning to India in 1993, he obtained financial support from the West Bengal Fisheries Department under the 'Pradhan Mantri Rozgar Yojana' scheme from the then Assistant Director of Fisheries, Jalpaiguri in 1995. This support enabled him to start a small aquarium fish breeding unit in Jalpaiguri District. He mastered the art and gained success in breeding all of the available ornamental fish varieties found in the local market at that time. He continued with breeding several varieties of ornamental fishes following 'home protocols.' Besides this, he used to buy local fishes such as mahseer, zebra danio and others from fishermen (who caught from local rivers) and sold those again to dealers in Kolkata, Kalimpong, Darjeeling, and Siliguri within West Bengal, as well as to international dealers. He frequently visited riverbanks and sought for correct identification and names of these riverine cold-water fishes caught in nets.

Slowly and steadily, he learnt the breeding behaviour and captive breeding technique of indigenous ornamental fishes and food fishes including mahseer and medium carps of the Teesta River. Koi carp of different colours and a hybrid variety were produced in the hatchery unit of Rainbow Ornamental Fish Farm by crossing Kohaku and Showa, two exotic ornamental koi carp types of high demand. In the initial years, Sri Sarkar used to sell thousands of angelfish per month to an exporter from China, who used to on sell them to Israel. He was successful in artificial seed production of some important exotic ornamental fish species in glass tanks before 2005 and continued with it on a large scale. In 2004, he obtained a subsidy from MPEDA after completion of construction of his angelfish breeding and farming unit.

His thoughts based on experience

In his speeches more than once, Sri Sarkar had expressed about his inability to produce and supply enough ornamental fishes, indicating that he was unable to fulfil the demand (orders) he received. He expressed the need for an adequate transport system for ornamental fishes from farm site to markets so that producers get a good price and good amount of profit, that fish farmers should get access to government subsidies, and expressed concern over a percentage of fishes that die during long-distance transportation on buses and four-wheelers. He was interested in cluster develop-

ment, eager to form a co-operative society in north Bengal comprising about a hundred ornamental fish farmers. To become progressive enough and prosper in this business, Sri Sarkar expressed the need of proper training for ornamental fish farmers, catfish, and major carp cultivators, and for modern methods of disease prevention, cure, bagging and transportation, and other aspects.

Sri Sarkar emphasised that the practice of the Green Certification Board is a must and can provide a new dimension to ornamental fish business, and that Government including NFDB may financially support some newcomers and established ornamental fish breeders and farmers in West Bengal to develop infrastructure facilities with more space and brood banks for ornamental fishes. He opined that it would be good if ornamental fish cultivators in this state were able to get loans from the West Bengal State Co-operative Bank in a smooth manner. He desired to introduce some small to medium-sized indigenous fish species in good numbers into the Karala River in Jalpaiguri District of north Bengal to restore natural balance of the river and have its water inhabited by fishes. He strongly wished for empowerment and employment of rural women self-help groups in ornamental fish farming utilising their backyard ponds and small homestead land, imparting need-based training to them.

As an invitee

In a training programme for ornamental fish farmers in north Bengal organised under the initiative of NABARD and West Bengal Fisheries Department on 7 October 2002, Sri Sarkar mentioned that farmers and entrepreneurs would be able to rear ornamental cichlids, all species of tetra, catfish and angelfish easily with a little know-how. At the invitation of West Bengal Fisheries Department and BENFISH, he lectured in over seven training programmes until 2011 on topics such as ornamental fish feed preparation, identification of brooders, larval rearing, and live food production. In 'Indaquaria 2010', organised by MPEDA at Chennai during 8-10 January 2010, he spoke elaborately on advances in ornamental fish farm management. Sri Sarkar was invited as resource person in the training programme on 'Ornamental fish breeding and culture for fish farmers', organised at Zoology Department of Gauhati University, Assam on 14 February 2010. He participated as a resource person in the NFDB Workshop on 'Integrated development of ornamental fish production and marketing' in October 2011 at Hyderabad.

MPEDA, Government of India had organised an 'Advanced training programme on ornamental fish farm management' on 21-22 September 2012 at the MPEDA Ornamental Fish Training Centre at Integrated Rural Technology Centre,

Rectangular cement cisterns under good quality tin shed.

Palakkad, Kerala. In this programme, Sri Sarkar took classes as an experienced ornamental fish breeder from West Bengal. In 'Aqua Aquaria India 2015', an aquaculture - aquariculture show organised by MPEDA during 20-22 February 2015 at Vijayawada, Sri Sarkar made a presentation on live food culture with videos and photographs in the session 'Technological advances in ornamental fish sector'. He lectured and demonstrated on breeding and culture of some commercially important exotic and native ornamental fishes as well as live food culture in front of prospective fish farmers and researchers in the 'Training programme on ornamental fish breeding and culture', organised at Gauhati University during 11-12 February 2017. In the Training programme on 'Ornamental fish farming' at the Department of Life Sciences, Dibrugarh University on 16-17 March, 2017, Sri Sarkar shared his experiences with farmers on live food culture and on-farm production of freshwater aquarium fishes.

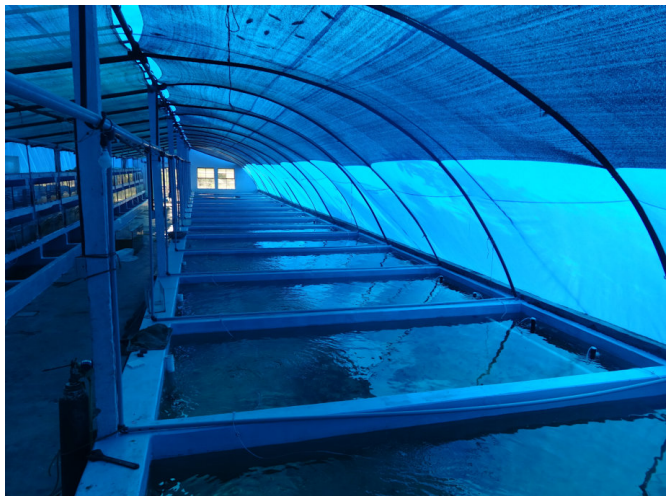
He was invited to the 'Workshop on ornamental fisheries entrepreneurship development', organised by National Co-operative Development Corporation, NFDB and Government of West Bengal on 25 January 2020. Sri Sarkar was invited as a panellist in the National Fish Farmers' Day programme, organised by ICAR-CIFA, Bhubaneswar on 10 July 2020. He was invited in the National Stakeholder Consultation on 'Indian Ornamental Fisheries 2.0 - The way forward', organised by NFDB, Hyderabad; ICAR-CIFA, Bhubaneswar and Department of Fisheries, Animal Husbandry and Dairying, Govt of India during 22-24 April 2021. Here he spoke in the Technical Session on 'Enhancing ornamental fish production and addressing the constraints in marketing'. Recently he was invited as an expert in the stakeholder consultation-cum-mass awareness and ornamental fish farming live demonstration programme, organised by ICAR-CIFRI, Barrackpore at Sukhia Block, Mirik Sub-division and Sittong-Khasmahal in Kurseong Sub-division in Darjeeling district during 5-6 February 2023.

Sri Sarkar's publications

Sri Kripan Sarkar's collaborative research paper on growth of the ornamental carp, *Cyprinus carpio* var. *koi* in concrete tanks using different dosages of organic manures was published in the Turkish Journal of Fisheries and Aquatic Sciences in 2004 as second author; it was inferred that an application rate of 0.26kg/m³, every 10 days, is most suitable for koi carp tanks manured with both cow dung and poultry excreta[1]. Another paper (as co-author) on fish biodiversity studies of seven rivers in the Jalpaiguri, Coochbehar and Alipurduar districts of the eastern Himalayas for conservation strategies (in search of new indigenous riverine fish having ornamental importance) was published in the International Journal of Applied Research in 2015. Along with the eminent Indian fishery scientists Late Dr E. G. Silas, Dr A. Gopalakrishnan, Dr Alappat Ramachandran, Dr T. V. Anna Mercy, Dr K. R. Pushpangadan, Dr P. Anil Kumar, Dr M.K. Ram Mohan and K. K. Anikuttan, Sri Kripan Sarkar contributed as co-author in the compendium 'Guidelines for green certification of freshwater ornamental fishes', published by MPEDA, Government of India, Kochi in 2011.

Scientists-cum-authors from UK, Sweden and Germany acknowledged Sri Sarkar for help with field work in their research paper on colour processing ability of zebrafish, published in Current Biology (Cell Press) in 2018. In the paper on observation of wild zebrafish in India, published

Cruise ship bath tubs recycled for rearing ornamental fishes.



Series of cement cisterns for aquarium fishes under greenhouse net shed.

Male fighter feather fish at Sri Sarkar's farm.

in the journal Zebrafish in 2019, Sri Sarkar was included as one of six co-authors, which included four foreign scientists-authors. In another paper published in Conservation Physiology (Oxford University Press) on testing of thermal tolerance in wild and laboratory zebrafish populations, Sri Sarkar was in the team of seven authors, which included five Norwegian scientists-authors. In such research studies, Sri Sarkar led in the collection of zebrafish from twelve sites in the foothills of the Himalayas, close to India-Bhutan border. Ph.D. researchers in Zoology (specialisation in fisheries/ aquaculture/fish biology) of North Bengal University and Gauhati University did a part of their research studies and field experiments at Sri Sarkar's ornamental fish farm - Sri Sarkar gave them advice and technical expertise.

About his accomplishments and contributions

Speaking about Sri Sarkar, the Late Dr P. Jha, Former Principal of Raiganj Surendranath Mahavidyalaya, Uttar Dinajpur District had mentioned in 2006 that Kripan Sarkar was a scientist without degrees. Dr Jha had educative discussions on some aspects of his research with Sri Sarkar. Even not having any formal higher education, Sri Sarkar had a command of any aspect related to live food culture and proper water quality management for ornamental fish farming. With around three decades of experience in ornamental fish culture and trade, coupled with his extensive reading habit and frank way of speaking, Sri Sarkar was an exemplary teacher and an extraordinarily affectionate friend. In the words of teachers of the Eastern Institute for Integrated Learning in Management - Jalpaiguri Campus (students had an excursion to Sri Sarkar's Rainbow Ornamental Fish Farm), Sri Sarkar was a man of immense power, energy, enthusiasm to create and motivate all – and had remarkable entrepreneurial skills.

In 2012, Dr S. Barat, Retd. Professor of Zoology, North Bengal University had mentioned: 'Kripan Sarkar has developed an expertise in captive breeding, and he has widely researched fish species. He is an amateur expert, has been working for the past three decades and for the last eight years, or so, he has been working as a guide for our researchers'. Sri Sarkar was Research Advisory Committee member of ICAR-CIFA, Bhubaneswar as a progressive fish farmer. Considered as an eminent entrepreneur of West Bengal and intellectually sound person, Sri Sarkar had obtained success in captive breeding and rearing programmes of some indigenous riverine ornamental fishes of north Bengal, viz., *Puntius jelius* and other species, *Colisa* sp., *Chela* sp., *Botia dario* ('rani machh'), *Badis assamensis*, *Mastacembelus* sp., two species of boroli *Barilius* sp. - the prized small indigenous fish of north Bengal, and a species similar to *Heteropneustes fossilis*, i.e., 'gangsinghi'. He was successful in acclimatising the cyprinid *Neolissochilus hexagonolepis* at his farm from sub-adult to brooder stage, did its breeding and seed rearing, and thereafter supplied seed to interested fish farmers in hilly areas.

Sri Sarkar was associated with the ornamental fish business for many years, served as motivator and role model for young entrepreneurs, helped others to grow. He disseminated the technology of ornamental fish breeding and rearing among local fishermen in different districts of north Bengal, and spread the concept of ornamental fish industry. He rightly understood that the vocation of breeding and propagation of different kinds of ornamental fishes and both domestic and international trade of the same could become a profitable and sustainable source of income and entrepreneurship opportunity for unemployed youths in suburban areas and villages in West Bengal, and other eastern and north-eastern states in India. He set up a training centre on ornamental fish breeding and rearing for unemployed youths and a farm in the Babubasa area near Champasari in Darjeeling district. Four women's self-help groups with ten members each working in the ornamental fishery sector were formed in Raiganj Block of Uttar Dinajpur District under his initiative, the same also in Gazoldoba Village in Jalpaiguri District.

Boroli fish Barilius barila 7.5cm.

Sri Sarkar gave importance to simple and easily adoptable indigenous technologies, or home protocols. He himself used to prepare the right kind of formulated feed for the larvae of his ornamental fishes and gave special attention to culture of live fish food organisms. For instance, he believed that culture of mosquito larvae can be done in ornamental fish breeding-cum-farming units to feed growing ornamental fishes.

The organisms may be sieved from culture medium using fine-mesh silk/cotton cloth, kept in normal water and added to brooder fish tanks (concrete or large glass tanks) later on. Sri Sarkar cultured *Brachionus* sp., *Moina* sp. and *Daphnia* sp. in small segregated earthen chambers, also *Paramecium* sp. using boiled hay and *Artemia salina*, which were meant to be fed both to larvae of *Clarias magur* and ornamental fishes. He demonstrated that mixing and applying poultry manure, mustard oil cake and crumbs from a nearby cake factory into ornamental fishponds could encourage zooplankton *Daphnia* sp. growth in water.

Sri Sarkar even trained some farmers hands-on in north Bengal and Assam on induced breeding and seed production of air-breathing catfish *Clarias magur* and on novel recirculatory aquaculture system project. In a self-taken video, he captured and studied remarkable moments during the spawning process of *C. magur* in captivity and behaviour of the male brooder. He had an innovative mindset, came up with new ideas, and was ahead of others during his time. He could prepare glass aquarium tanks of different sizes, repair filters, blowers, and other associated machineries on his own when required. In his visit to Shanghai, China in 2019 and Bangkok, he selected and bought aerators, pumps, and other accessories for his fishes in glass tanks and rectangular concrete cisterns. In 2021, he was eager to establish an ornamental fish farm at Darrang District, Assam. He supplied fishes here and to Arunachal Pradesh regularly from his farm at Jalpaiguri on the roadway, and fishes that will be produced and transported from this new farm will help to minimise the distance and time required during transportation. It may lead to increased survivability of fishes, he believed.

In addition to captive breeding, Sri Sarkar collected early stages and sub-adults of indigenous (wild) ornamental fishes from hilly rivers of north Bengal, Assam, and Meghalaya, nurtured and domesticated those in simulated natural environment in his farm up to marketable size. Fishes retained their normal and appealing wild body colour in confinement. In an Ornamental Fish Exhibition organised at Eco Park at Papum Pare, Arunachal Pradesh under the initiative of ICAR-CIFA, Sri Sarkar spoke about breeding technologies and the ornamental potential of some small-sized indigenous fish species found in hill streams of Arunachal Pradesh. Ornamental murrels *Channa stewartii*, *C. aurantimaculata*, *C. orientalis*, loach *B. dario*, *Mystus bleekeri*, *Macrognathus aculeatus*, etc are found in border areas of Assam and Arunachal Pradesh. Sri Sarkar attempted to breed *Botia rostrata* - the rare endemic fish of Arunachal Pradesh. The early stages of golden mahaseer *Tor putitora* was reared at his farm to adult stage in 2003 on the initiative of the West Bengal Fisheries Department. He helped in fabricating the large aquarium house at the Integrated Ornamental Fish Farming Unit within the Gauhati University premises, supplied exotic and indigenous ornamental fishes to this place.

End note

In India, some eminent fishery entrepreneurs have shown their reflection in the society, like the Late Nilu Ghosh near Kolkata, Ashis Sarkar, Dipak Roy and Kripan Sarkar of north Bengal[2]. For the first time, I saw the photograph of Sri Sarkar and his farm in a Bengali publication of West Bengal Fisheries Department, published in October 2005, and made a visit there on 9 April 2017 for the first time. Sri Sarkar was a consultant to progressive ornamental fish farmers in Meghalaya, Arunachal Pradesh, Assam, Mizoram; used to visit these places quite often enthusiastically, shared his technologies with ornamental fish farmers in these states with great efforts and had so much involvement. He was known to many scientists working in fishery and aquaculture institutes under ICAR in different parts of India, had considerable depth of knowledge.

About ornamental fish broodstock maintenance and other aspects, Sri Sarkar did not hesitate to extend and share his expertise and technical knowledge to farmers and entrepreneurs who came forward, in his best possible capacity. With problem-solving abilities, he kept on conducting research on anything new, which helped in developing his skills. We have lost a pioneer in ornamental fishery sector in eastern and north-eastern India, namely Kripan Sarkar, who used to remain mentally and physically engrossed in breeding and rearing ornamental fishes. The ideas and legacy, which he left behind, will remain immortal.

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