

# QUALITY SEED PRODUCTION USING CRYOPRESERVED SPERM IN FISH HATCHERIES BECOMES A REALITY IN BANGLADESH

By Md. Rafiqul Islam Sarder and Mohammad Matiur Rahman

Md. Anwar Hossain has been the senior assistant general manager of Biswas Agro Fisheries and Hatchery in the Mymensingh district of Bangladesh for over 20 years. Recently, poor breeding performance and production of quality fish seeds (fertilized eggs) have resulted in lower-than-expected profits for his company. Like many fish hatchery operators in the country, Hossain is eager to find a solution to improve the quality of his product. That is why he is working with a Feed the Future Innovation Lab for Fish project to establish a cryogenic sperm bank of key carp species for aquaculture production.

Aquaculture production in Bangladesh has increased significantly over the past two decades and now accounts for more than 57% of total fish production. Indian major carps (IMCs), some exotic carps, and catfishes are the main cultured species, and their production depends on timely and adequate supply of quality fish seed. Until 1978, the country was completely dependent on natural sources for fish seed, but wild seed production has decreased at an alarming rate due to factors such as over-fishing, destruction of breeding and feeding grounds, water pollution, and siltation of riverbeds.

Therefore, an artificial breeding system evolved to fulfill farmers' demand, and many fish hatcheries (at present 103 public and 935 privately owned units) have been established. However, the quality of seeds has deteriorated over the years, mostly in private hatcheries, for many reasons such as inbreeding, inter-specific hybridization, negative trait selection, and improper broodstock management. These factors result in problems including low growth, high mortality, disease susceptibility, deformities, and low fertility of fish. Thus, fish farmers have not been achieving expected production, and many farmers have become frustrated and are changing their professions. Production and supply of good quality seeds is the prerequisite for maximum aquaculture production.

Led by the Department of Fisheries Biology and Genetics at Bangladesh Agricultural University (BAU) in Mymensingh, the Fish Innovation Lab's cryogenic sperm banking project is developing a cryogenic sperm bank of rohu, catla, and mrigal (IMCs) as well as silver carp, bighead carp, and grass carp (exotic carps) for commercial seed production and brood banking.

As a part of first-year project activities, breeding trials of rohu, mrigal, silver carp, and bighead carp were successfully completed in nine selected hatcheries (two government and seven private) in four regions from June to August 2021. After successful breeding in each hatchery, cryopreserved sperm and fresh sperm-originated seeds are being reared separately in the nursery ponds of the respective hatcheries.



Here, a stakeholders' training workshop is taking place on sperm cryopreservation at the Faculty of Fisheries, BAU, Mymensingh. (Photo by Md. Rafiqul Islam Sarder, BAU)

## PROJECT TEAM

### Lead PI and Bangladesh PI

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### Bangladesh Co-PI

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This is the first ever successful fish seed production in Bangladesh at the hatchery level using cryopreserved sperm. All the hatchery operators welcomed this new technology and are excited to see the result of producing seeds using cryopreserved sperm.

Hossain, who was interested in trying this new technology for improving the quality of broodstocks as well as seeds at his hatchery, was invited to attend a day-long training workshop on sperm cryopreservation technology organized by the project at BAU.

Hossain said, "I am delighted with the successful breeding of mrigal and bighead carp with cryopreserved sperm, which was done for the first time in my hatchery."

After one month of rearing, average weight measurements of mrigal and bighead carp fingerlings from cryopreserved sperm indicate that cryopreserved sperm-originated seeds performed better than controls.

"I am hopeful to develop quality broodstocks of mrigal and bighead carp by rearing these cryopreserved sperm-originated seeds," says Hossain. "If I become successful for producing quality seeds from these good quality broods after two to three years, the reputation of my hatchery will be stronger, and the business of our hatchery will be expanded."

Rohu and mrigal were also successfully bred in a government fish seed multiplication farm.

Md. Shafiqul Islam, the farm manager, said, "We always have to receive new technology to go forward, and this is a new experience for me. If fertilization and hatching rates of eggs can increase, then this technology could be used commercially throughout the country to produce quality seeds and broods. Moreover, during early and late breeding season when the males may not be ready, then cryopreserved sperm can be used for breeding. This breeding practice will be profitable for hatcheries because during early and late breeding season, seed prices remain high."

Mr. Jahidur Rahman, owner of Matri Fish Hatchery in Jashore, said, "A new fish breeding technology with cryopreserved sperm was implemented in my hatchery for rohu, mrigal, and silver carp. Both cryopreserved and fresh sperm-originated seeds are produced and being reared separately in ponds. The cryopreserved sperm-originated seeds are showing higher growth than controls. I am very hopeful about the success of this technology."

Preliminary sampling data demonstrate higher growth performance of cryopreserved sperm-originated seeds of rohu, mrigal, silver carp, and bighead carp, and it is expected that after two to three years the broods will generate quality seeds and have a higher growth rate. The project team expects these results to lead to increased production and improved livelihoods for the fish farmers as well as benefits to consumers.

## ABOUT THE FISH INNOVATION LAB

The Fish Innovation Lab supports the United States Agency for International Development's agricultural research and capacity building work under Feed the Future, the U.S. Government's global hunger and food security initiative.

Mississippi State University is the program's management entity. The University of Rhode Island, Texas State University, Washington University in St. Louis, and RTI International serve as management partners.

[www.feedthefuture.gov](http://www.feedthefuture.gov)  
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