FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

GENETICALLY IMPROVED ROHU CARP IS NOW IN THE HANDS OF BANGLADESHI FARMERS

By Matthew Hamilton and Mohammed Yeasin

Most farmers of livestock and crops have long had access to genetically improved breeds and varieties, but that has not been the case for carp farmers such as Shafiujjaman Momin from Bagatipara upazila of Natore district in northwest Bangladesh. At least, not until now.

In Shafiujjaman Momin's pond, the group is sampling fish for an on-farm trail for the WorldFish Carp Genetic Improvement Program generation three rohu. (Photo by Md. Fakhruddin)

Momin is taking part in a trial of third-generation (G3) WorldFish genetically improved rohu. WorldFish G3 rohu (*Labeo rohita* or rui) is expected to grow 30% more rapidly than river-sourced fish. The purpose of the trial, in which Momin is taking part, is to validate these predicted growth rates under real-world, on-farm conditions.

"When I received the G3 rohu from WorldFish, I was told that this fish would grow 30% faster than the conventional strain. I did not believe it then," said Momin. "However, I see it is growing even faster than 30%, so now, I have confidence in G3 and believe it can help fish farmers produce more with less."

Last year, hatchlings from rapidly growing WorldFish G3 families were made available to hatcheries to be grown into breeding parents (i.e., broodstock). It is the performance of these same G3 families that Momin is trialing on his farm, along with rohu from a well-regarded commercial strain and rohu from an unimproved control line (equivalent to river-sourced rohu).

Under a Feed the Future Innovation Lab for Fish project – led by WorldFish, Bangladesh Agricultural University, and the Louisiana State University Agricultural Center – Momin and 18 other semi-commercial farmers were provided with trial fish in May 2021. He is now growing them with multiple other species (i.e., under polyculture), according to his usual farming practices. This trial is being undertaken with additional support from the CGIAR Research Program on Fish Agrifood Systems (FISH), the Bill and Melinda Gates Foundation, and Feed the Future Bangladesh Aquaculture Activity. Preliminary measurements taken in September revealed that the growth of G3 fish, relative to the control line fish, was in line with expectations. Final results will be available before the G3 broodstock supplied to hatcheries become reproductively mature and their offspring are made available for sale to nurseries and farmers.

Rohu hatcheries, nurseries, farmers, and researchers are waiting expectantly for these results. It is anticipated that around 20 hatcheries will sell approximately 3,500 kg of hatchlings to over 35,000 nurseries and farmers in 2022 and 2023.

"I collected G3 rohu from WorldFish in 2020," said Ekramul Kabir, the proprietor of Madhumoty Fish Hatchery situated in Jashore, Bangladesh. "Since then, I have been rearing the fish at my hatchery facility to prepare them for spawning in 2022. Currently, each fish weighs one kilogram on average, which is much better than any conventional rohu strain.

USAID FROM THE AMERICAN PEOPLE
MISSISSIPPI STATE UNIVERSITY
GLOBAL CENTER FOR AQUATIC FOOD SECURITY

PROJECT TEAM

Lead PI	Matthew Hamilton, PhD WorldFish
Lead Co-PI	John Benzie, PhD WorldFish
Bangladesh PI	Mohammed Yeasin WorldFish
Bangladesh Co-PI	Mostafa Hossain, PhD Bangladesh Agricultural University
U.S. PI	Terrence Tiersch, PhD Louisiana State University Agricultural Center

"I learned that a field trial is underway to evaluate the performance of G3 rohu at the farmer level. If the trial result is similarly encouraging, it will be useful for us to help farmers understand the advantages of this improved rohu strain."

In addition to rohu, WorldFish manages catla (*Catla catl*a) and silver carp (*Hypophthalmichthys molitrix*) genetic improvement programs. Although not as advanced as rohu, G1 catla families were produced in 2021, and G2 silver carp will be spawned in 2022 with support from the Fish Innovation Lab project.

Fish accounts for 60% of animal protein consumed in Bangladesh. This is predominantly sourced from domestic aquaculture, and rohu is a culturally and economically important species in the country. It has a wholesale market value of around one billion USD each year. In this context, on-farm trials and adoption of WorldFish G3 rohu is an exciting step forward for Bangladeshi aquaculture, but it is just the beginning.

Thanks to the support from the Fish Innovation Lab, WorldFish produced additional G3 families in 2021, and in 2022, it will produce its first fourth-generation (G4) families. WorldFish G4 is expected to grow at least 40% more rapidly than river-sourced rohu.

Such rapid genetic gains are unheard of in terrestrial animal and crop breeding. When it comes to genetic improvement, the sky is the limit for aquaculture species with their short generation intervals (2-3 years for carp) and no history of domestication.

Once in the hands of hatcheries, nurseries, and farmers, genetically improved rohu, catla, and silver carp will further enhance the productivity of carp polyculture systems in Bangladesh. Accordingly, it will contribute to increased food security, nutrition, and livelihoods for the farmers and consumers that rely on these carp polyculture systems.

The project team would like to thank partner hatcheries, participating farmers, and Department of Fisheries in Bangladesh for their ongoing engagement, participation, and interest in these trials.

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
www.fishinnovationlab.msstate.edu

This story was made possible by the generous support of the American people through the U.S. Agency for International Development (USAID) under the Feed the Future initiative. The contents are the responsibility of the Feed the Future Innovation Lab for Fish and do not necessarily reflect the views of USAID or the United States Government.