

From scarcity to supply: The Nalbari magur (*Clarias batrachus*) seed hub in north-eastern India

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ICAR-CIFA provides training to farmers for magur breeding and seed production.

Why magur seed matters in North-eastern India

Access to quality seed remains one of the biggest constraints limiting the expansion of freshwater aquaculture across Asia. For indigenous species such as magur (*Clarias batrachus*), farmers' dependence on declining wild stocks has long limited adoption of culture despite strong consumer demand. The experience from Nalbari district of Assam, India, shows how a farmer-led seed production system can transform this. With targeted institutional support, local scarcity has become a sustainable supply base for an entire region.

C. batrachus is a high-value indigenous catfish. Consumers in eastern and north-eastern India prefer it for its taste, high nutritive value, and low intramuscular spines. Traditionally, markets have depended largely on capture fisheries from natural water bodies. However, overexploitation, habitat

degradation, and contamination of aquatic ecosystems with agricultural chemicals have led to a steady decline in wild catches. As a result, demand for magur has consistently outpaced supply.

Despite strong consumer preference, the unavailability of quality seed has primarily constrained expansion of magur aquaculture. Assam, a leading state in freshwater aquaculture and carp seed production, has a strong farmer knowledge base and infrastructure. Farmers can use this to diversify into indigenous catfish culture. Recognising this potential, scientists from ICAR-Central Institute of Freshwater Aquaculture (ICAR-CIFA) started systematic efforts to promote captive breeding and seed production of magur. They provided farmer training, on-farm demonstrations, and sustained technical support.

The Nalbari context

Assam occupies a central position in the north-eastern region of India and has extensive inland water resources. Nalbari district, located on the north bank of the river Brahmaputra, is surrounded by aquaculture-intensive districts such as Baksa, Kamrup, and Barpeta. Fish farming is a major livelihood activity in the area. Farmers have long-standing experience in carp seed production and grow-out culture.

Consumers in the region strongly prefer indigenous catfishes such as *C. batrachus*, *Heteropneustes fossilis*, *Ompok bimaculatus*, and *O. pabda*. These species command premium prices due to limited availability and high demand. Although the region is well suited for catfish culture, farmers have been reluctant to adopt these species because of breeding difficulties, high seed mortality, and lack of locally available seed. These constraints, coupled with farmer interest, prompted ICAR-CIFA to start focused interventions in Nalbari district.

Putting farmers at the centre

ICAR-CIFA conducted a baseline survey in Nalbari and adjoining areas in collaboration with Krishi Vigyan Kendra (KVK), Nalbari, and the Department of Fisheries, Assam. Because of the regular engagement of these agencies with local farmers, mobilisation was smooth and effective. Initially, they selected a group of 30-40 motivated farmers for capacity building in magur seed production over a two-year period.

ICAR-CIFA, in partnership with KVK Nalbari and the Department of Fisheries, Assam, helped establish magur hatcheries through hands-on training, demonstrations, and cluster-based technical support. A key technological intervention was the development of a fibreglass-reinforced plastic (FRP) magur hatchery by the ICAR-CIFA team. Farmers in Nalbari and surrounding areas have since commercialised and adopted this design. The lightweight, durable, and modular FRP design is easy to install and move. It also offers greater resilience under flood-prone conditions. This makes it particularly suitable for smallholder hatchery operations in the Brahmaputra valley. These sustained efforts led to the emergence of Nalbari as a major magur seed production hub in north-eastern India. At present, more than 25 functional magur hatcheries operate in the district, in addition to several units in neighbouring Barpeta district.

Making captive magur seed production work

Magur is an omnivorous catfish that typically reaches a marketable size of 150-200 g and breeds naturally during the monsoon season. Scientists have successfully standardised captive breeding using healthy broodstock. Farmers rear broodstock in cement cisterns or ponds at a density of 2-3 fish per m² with intermittent water exchange. They feed broodfish compound diets containing 32-35% crude protein.

Farmers can identify sexually mature brooders weighing 100-150 g during the breeding season by the pointed genital papilla in males and rounded papilla in females. Hatchery



Demonstration of breeding at farmer's hatchery.

operators inject only females with synthetic hormones such as Ovaprim, Ovotide, Wova-FH, or Gonopro at a dose of 1.0-1.5 ml per kg body weight to induce ovulation.

Operators strip eggs 16-17 hours after injection. They achieve fertilisation using sperm suspension prepared from dissected testes of males in normal saline. They incubate fertilised eggs in flow-through hatcheries. Magur is a low-fecund species, producing approximately 4,000-5,000 eggs per 100 g female.

Hatching occurs within 24-26 hours. Operators collect larvae weighing 2-3 mg for indoor rearing at a density of 1,000-1,500 larvae per m² for at least two weeks. Given their delicate nature, careful tank bottom cleaning and partial water exchange are essential. Farmers initially feed larvae live feed, followed by gradual introduction of formulated diets, including the ICAR-CIFA-developed and commercialised magur larval feed 'Starter-M'. This results in survival rates of ≥80%.

The larvae develop into advanced fry (25-30 mg). Farmers stock these in cement tanks at 150-200 individuals per m² for fingerling production. After 1-2 months, periodic grading and thinning are required. Further rearing for 4-6 months at lower densities produces stockable fingerlings (>4-5 g) suitable for grow-out systems.

Farmers can stock well-prepared ponds with fingerlings (>5 g) at 50,000 per hectare and feed them compound feed at 3% of body weight. These ponds can produce 2-3 tonnes per hectare per year. Occasional disease problems such as fin rot, aeromoniasis, or epizootic ulcerative syndrome may occur, particularly under high organic load. Farmers can reduce these through timely water exchange and pond management.



Haul of magur fingerlings.

Farmers' voices from the ground

Mr Amal Medhi (Nalbari)

Mr Medhi, a graduate from Sondha village, actively produces seed and grows out indigenous fishes including *C. batrachus*, *Anabas testudineus*, *H. fossilis*, and carps. With a total water area of six hectares, he produces and sells catfish seed at Rs 3-5 per piece (US\$0.04-0.06), earning Rs 300,000-500,000 (US\$3,600-6,000) per season. He has also diversified into fish feed distribution. The National Fish Development Board recognised him as a progressive farmer in 2020.

Mr Hemanta Das (Nalbari)

An Industrial Training Institute graduate, Mr Das operates a magur hatchery spread over 0.13 ha and produces 300,000-500,000 fry and fingerlings per season. His integrated approach of combining carp and catfish culture allows efficient use of broodstock and pond resources.

Mr Bapan Talukdar (Nalbari)

Mr Talukdar, a graduate in Arts, adopted magur seed production alongside carp farming following training and technical support from ICAR-CIFA. He has consistently produced 200,000-300,000 magur seed annually since 2016-17.

Mr Makibuddin Ahmed (Barkura village)

Initially dependent solely on carp seed production, Mr Ahmed diversified into magur hatchery operations after being trained. With continuous technical guidance, he now produces more than 300,000 magur fry and fingerlings per season.

Mr Ratul Das (Barazara village)

Mr Das expanded his seed production capacity after installing a commercialised FRP magur hatchery developed by ICAR-CIFA. With regular technical guidance, he scaled

"Floods used to cause heavy losses. The FRP magur hatchery and proper larval feed made seed production safer and easier. Today, magur is no longer a risk for me."

"Magur seed production gave me steady income beyond carp farming. Buyers come directly to my farm, and the demand never drops. Now I am confident to expand and guide other farmers."

up production despite limited resources. He innovatively established fingerling rearing units using bamboo pens and hapas. Regional media have featured his success, and he received the Best Fish Farmer Award from the Department of Fisheries, Assam, in 2015.

Marketing and demand dynamics

Farmers in Nalbari sell magur seed at Rs 2-5 per fry (US\$0.02-0.06) and Rs 5-10 per fingerling (US\$0.06-0.12). Farmers market seed directly from their farms, often receiving advance orders by telephone. They use oxygen-packed transport for long-distance supply, while traditional silver hundi containers work for short-distance distribution. Farmers supply seed across Nalbari and neighbouring districts, contributing to improved local availability.

What did not work as expected

Excessive rainfall and seasonal flooding during the breeding period remain major challenges for farmers in Nalbari. Flood events frequently damage hatchery infrastructure and result in loss of broodstock and seed. In addition, farmers report constraints related to timely availability of quality feed ingredients and hatchery inputs.

Lessons for replication

Trained farmers in Nalbari no longer see magur seed production as a complex activity. Exposure visits to functional hatcheries, peer learning, and recognition through awards and public acknowledgement have encouraged wider adoption. The willingness of experienced farmers to support newcomers has further strengthened horizontal technology transfer. This makes the model suitable for replication in similar agro-climatic regions.

Conclusion

With sustained technical support from ICAR-CIFA and logistical help from KVK Nalbari and the Department of Fisheries, Assam, farmers have established more than 25 magur hatcheries in Nalbari district. Approximately 70 farmers now actively produce magur seed, supplying quality seed to multiple districts within Assam and adjoining states. The Nalbari magur seed hub shows how targeted capacity building and farmer-centred interventions can address seed scarcity and promote diversification in inland aquaculture. The experience shows that combining farmer capacity with appropriate hatchery hardware and species-specific feeds can convert indigenous fish seed production from a constraint into a scalable enterprise.