

Captive breeding of *Ompok bimaculatus* (pabda): An indigenous catfish of North East India

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Assam stands out as the most abundant state of India in terms of fisheries resources. Among the 315 diverse fish species found in the North East region, Assam hosts the highest count, ranging from 197 to 217 species. These species serve various purposes, including food, ornamental, or sport fishing, with some showing promising potential for aquaculture. Approximately 40 species in the region are deemed suitable for commercial aquaculture, yet only a handful are presently cultivated.

While Indian major carps dominate aquaculture, constituting 90-95% of India's total freshwater fish production, Assam also features numerous indigenous medium and minor carp species, small indigenous fishes, chital, catfish, among others, commanding higher market prices and demand

compared to major and exotic carps. Thus, there is an opportunity to enhance aquaculture profitability by integrating high-value and nutritious species into farming systems.

However, there has been a notable decline in the abundance of indigenous fish species such as *Ompok bimaculatus*, attributed to habitat modification, climate shifts, altered weather patterns, and overexploitation. To address this, promoting scientific methods such as controlled breeding, scientific rearing, and releasing fish seed through ranching in open waters can aid in restoring the population of *O. bimaculatus*, which is classified as a near-threatened species per the IUCN report.

Ompok bimaculatus (pabda) broodstock.





Pabda broodstock tanks.

***Ompok bimaculatus* - a new candidate species**

O. bimaculatus, locally known as pabda catfish, is widely distributed in the natural water resources of Assam and other northeastern states of India. It is a preferred indigenous non-airbreathing catfish with high market demand compared to Indian major carps and exotic carps. Due to its soft body structure, high protein, and low fat content, it is highly sought after by people in West Bengal, Assam, and the Northeast.

According to the IUCN report, the species is classified as threatened due to alterations in breeding habitats, changes in weather patterns, and overexploitation, leading to a decline in its abundance. Given its economic importance and potential for aquaculture, conserving this fish species is crucial. Therefore, efforts have been made to breed the species in captivity at a renowned fish farm called Pabhoi Fish Farm located in Biswanath Chariali, Assam, India.

A Brief profile of Pabhoi Fish Farm

Pabhoi Fish Farm is a meticulously managed facility dedicated to fish breeding, seed production, and carp culture management. Established in 1996, a Chinese Eco Hatchery was introduced at the farm for induced breeding of carps.

This hatchery includes nursery, rearing, and grow-out ponds spanning 14 hectares of water area. With the implementation of the breeding and seed production unit, the farm has earned recognition for its high-quality seed production not only in Assam but also across the northeastern region.

The farm primarily focuses on Indian major carp seed production, as well as fry, fingerling, and yearling rearing, and grow-out culture. Annually, the farm produces over 150 million fish spawn, along with 10-15 tons of fry, fingerlings, and yearlings collectively, and 8-10 tons of grow-out fish. Additionally, murrel (*Channa striatus*), chital (*Chitala chitala*), and ari (*Sperata seenghala*) seed are produced using traditional methods due to the self-recruiting nature of these fish.

As a registered Network Hatchery of NFDB, Hyderabad, Pabhoi Fish Farm engages in breeding Indian major carps, exotic carps, and has recently initiated breeding programs for amur common carp, Jayanti rohu, and improved catla. To promote the farming of indigenous fish species, the farm has set up a hatchery unit for locally important fish such as magur, pabda, and singhi with financial backing from NFDB, Hyderabad.

Moreover, the farm conducts numerous training programs for fish farmers, supported by Krishi Vigyan Kendras of Assam and Arunachal Pradesh, as well as farmers backed by the Department of Fisheries, Government of Assam and

Arunachal Pradesh. Additionally, students from the College of Fisheries, Assam Agricultural University, Raha, visit the farm annually for practical hands-on training in fish breeding and hatchery management.

Breeding season and maturity of *Ompok bimaculatus*

At Pabhoi Fish Farm, breeding of pabda was conducted in June, coinciding with the onset of the monsoon season. The peak breeding period for pabda catfish in northeastern India typically spans from May to June. The fish were reared for one year in fish ponds, each measuring 0.15 hectares. Brooders reached maturity after one year of rearing under pond conditions.

Pabda brooders exhibited distinct sexual dimorphism, with females generally longer and heavier than males of the same age group. Female brooders typically displayed a bulging abdomen with a fleshy, round, and reddish genital opening. The male-to-female sex ratio was maintained at 1:1. During the study, fish reached a size of 20–23 cm and weighed 20–40 g at first maturity in captivity.

Variation in fecundity was observed during captive-induced spawning, with reported differences among research groups. During breeding operations at the fish farm, a relative fecundity ranging between 20,000–22,000 eggs per 100 g of fish body weight was recorded.

Broodstock maintenance

Rectangular ponds with an area ranging from 0.20 to 0.50 hectares and an average water depth of 1.0 to 1.2 meters are considered suitable for broodstock raising. Prior to releasing fingerlings for broodstock development, pond management measures are implemented. These measures include liming the ponds at a rate of 250 kilograms per hectare and applying cow dung at a rate of 1,300 kilograms per bigha (equivalent to 0.13 hectares). Broodstock ponds are covered with netting to prevent bird predation.

To prepare the broodstock, fingerlings are reared at a density of 35,000 fingerlings per hectare for 12 months. During broodstock development, fish are fed a supplementary diet with a crude protein content of 30–35% daily, at a rate of 3–5% of their body weight. This diet typically comprises ingredients such as mustard oil cake, boiled chicken viscera/ fish wastes, rice polish, and so on.

Captive breeding

Artificial breeding in captive conditions was conducted without sacrificing male brooders. The breeding took place in rectangular cemented cisterns measuring 50 square meters with a depth of 1.5 meters. To prepare the tanks for breeding, they were cleaned with $KMNO_4$ and salt solution to remove the algal slime layer from the walls and bottom. After cleaning, the tanks were rinsed with clean tap water and dried to eliminate any residues of salt and potassium, making them ready for the induced breeding programme.

Mature female brooders weighing 80–100 grams and male brooders weighing 60–80 grams were kept in a hapa for 6 hours prior to injection. The brooders underwent a dip treatment in potassium permanganate solution as a prophylactic measure to ensure their better health status. Fish handling was conducted carefully to prevent possible injury and secondary infection.



Injecting broodstock with hormones to induce spawning.



Breeding hapa installed in cement cistern.



Fertilised pabda eggs.

A single injection of inducing hormone was administered to all the brood fish. The fish were injected intramuscularly above the lateral line towards the dorsal fin using a 1ml syringe. The needle was inserted horizontally at an angle of approximately 45 degrees from the head. Pabda were injected with the inducing agent Ovatide at a recommended dose of 2.5 ml per kilogram body weight for females and 0.5 ml per kilogram body weight for males.

After a latency period of 9–10 hours, the injected brooders were removed and stocked in the earthen ponds. The fertilised eggs were collected and temporarily placed in an aluminium container. The eggs were washed with clean water and transferred to a flow-through system for hatching.

To facilitate hatching, a framed fine-mesh nylon net screen was spread horizontally in the bottom of the cemented cistern, approximately 5–10 cm above the bottom, and fertilised eggs were evenly distributed over the screen. The eggs were maintained under mild water flow and aeration to ensure better survival. Hatchlings emerged after 18–24 hours of incubation at a water temperature ranging from 27 to 30 degrees Celsius. Once most of the eggs had hatched, the screen and any unfertilised eggs were removed from the breeding tank to prevent water fouling.

Larval rearing

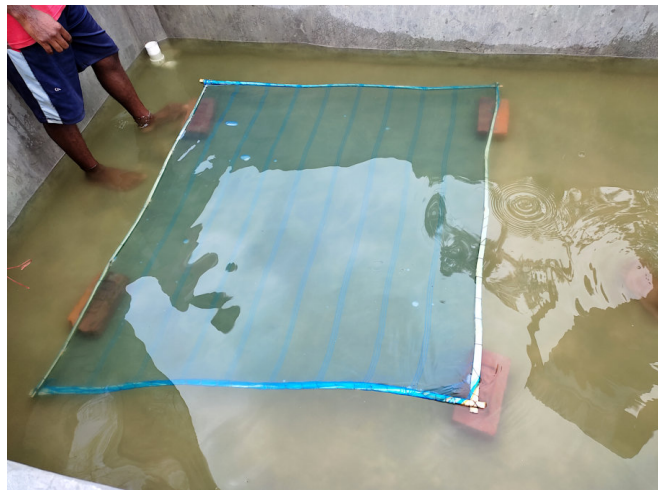
The hatched larvae are transferred to circular hatching chambers after being collected from the cemented tanks. Newly hatched larvae are cylindrical, transparent, and lack a mouth, but they possess pectoral fins and body pigments. They also have a large yolk sac, which is pale greenish in color and is absorbed within 2–3 days. At this stage, the rudiment of one pair of maxillaries and two pairs of mandibular barbells begins to appear.

During the first two days after hatching, the larvae rely on their yolk-sac reserves as a food source. By the second day, their mouths open, allowing them to consume small quantities of feed provided in the rearing system. The amount of feed given depends on the larval density and growth.

After two weeks, the larvae are provided with a nutritious and balanced formulated diet consisting of egg custard and fish meal.

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A framed nylon mesh net for incubation of eggs.



15 day old pabda hatchlings.



Pabda seed ready for sale at Pabhoi Fish Farm.