# Habitat breeding and seed rearing of a near threatened featherback, *Chitala chitala*

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*Broodstock.*

Globally, the Chinese carps and Indian major carps dominate world freshwater aquaculture production, with about twenty species collectively accounting for around 80 per cent of total freshwater fish production. China, India, Bangladesh and Indonesia account for most of the carp production in Asia at 80%, 12%, 3%, and 1%, respectively.

Low-income people favour carps because of their low price and good taste. In many areas in Asia, carps are the major source of animal protein for the poor. In southeast Asia, carps and other indigenous fish species usually fetch a good market price. Today, due to over exploitation of these species or habitat destruction, the availability of most of the indigenous fish species are diminishing in the wild.

Little work is done on indigenous finfish breeding for diversification of aquaculture in India, with negligible replication of mass seed production technology and grow out culture practices on a large scale at the farm level. The reason for this is not clear but may be due to a lack of easily replicable artificial breeding technology. Knowledge of artificial breeding is a key aspect as it permits intensive production of a given species under controlled conditions and allows for continuous production of juveniles for restocking natural or artificial water bodies.

Artificial breeding of threatened species for restocking in their natural habitat or to establish gene banks aids conservation through captive breeding programs and has the potential to generate new employment opportunities for rural people. The north-eastern states of India, including Assam, have rich and varied fisheries resources. However, there has been a drastic reduction in the abundance and range of many species due to habitat modification, anthropogenic factors and overexploitation.


*Adhesive eggs of Chitala chitala.*

To promote the sustainable use of a new candidate species including enhancement of wild stocks and systematic conservation, a good scientific understanding of their biological attributes and culture potential is necessary. Here we present the biological aspects of breeding and larval rearing protocols of the humped featherback *Chitala chitala*, which has been prioritised as a new candidate species for freshwater aquaculture in India.

## *Chitala chitala* - a new candidate species

The humped featherback, *C. chitala* is considered to be one of the most commercially important food, sport, aquarium and highly priced cultivable fish. It is known as the 'king' among all cultivable fishes in Assam. It is commonly known as 'feather-back' due to the presence of a very long anal fin originating from opposite to mid pectoral and confluent with caudal fin giving the appearance of a feather. Chital is highly prized among the fish-eating population of Assam. The market price of this fish is almost double than that of the Indian major carps and exotic carps. Chital is a highly priced cultivable fish due to its rarity and delicacy having very rich nutritive value.

However, over exploitation, habitat degradation, pollution and related anthropogenic pressure on their natural habitats has considerably reduced the population of this species by 50-60% during the last decades. The Indian biodiversity portal and IUCN Red List has categorised *C. chitala* as a Near Threatened species. Regarding conservation of this species, the first attempt at captive breeding and seed production of this highly priced fish in India was made by U.K Sarkar in 2006. A few attempts have been made by farmers to develop *C. chitala* culture based on wild-caught juveniles and a maximum growth up to 1-2 kg/year has been obtained under polyculture systems. As per the package of practice developed by Assam Agricultural University, *C. chitala* can undergo polyculture with carp species to make aquaculture more remunerative to the fish farmers. Chital can be stocked at an inclusion level of 5% in polyculture pond when carp species attain a weight of 200 -250 g during culture. With the success of the captive breeding and seed production of *C. chitala*, young can be released into the natural waters for rehabilitation and restoration of the species in wild aquatic ecosystems.

*Incubation of Chital eggs in Cement cistern.*

*15 days old larvae of Chital chitala.*

**Reproductive Biology of *Chitala chitala***

| Age at maturity | 3rd year of life |
|---|---|
| Sexual dimorphism | Females bigger in length than male; abdomen bulged externally in females; males possess pointed genital papillae |
| Breeding periodicity | Peak time in mid-May to June |
| Gonadosomatic index | 2.8-5% in fully matured fish |
| Fecundity | 10,000-13,000 of egg per kg body weight. |
| Parental care | Male and female take active part and is very prominent |

## Feeding biology

Feeding is one of the most important aspects of fish biology. A sufficient number of reports are available regarding the food and feeding habit of *C. chitala* from India. The fish is carnivorous, with adults feeding on carp fry and aquatic insects. The larvae of chital can be fed on a wide variety of materials including boiled egg yolk, chironomids and tubifex worms. The fingerlings prefer carp spawn and dry feeds comprising formulated feed mixture of 40-50% fish meal along with mustard oil cake and rice polish. The adult fishes weigh 1-2 kg in polyculture ponds and comfortably accept farm made feeds given to the Indian major carps and exotic carps.

## Habitat breeding of *Chitala chitala*

Captive breeding of *C. chitala* was performed in farm ponds of one hectare area at the College of Fisheries, Assam Agricultural University, Raha under the Live Gene Bank Project of Department of Fisheries, Government. of Assam. In ponds, its spawning commences immediately after the early monsoon rains following dilution of pond water to some extent. The peak season for habitat breeding of *C.chitala* has been reported to be in the first quarter of May to June. However, the extended breeding season lasts up to the month of July-August. Captive spawning of chital was observed at the fishponds of College of Fisheries, Raha, where spawning pairs of male and female fishes move together near the artificial spawning grounds. Chital generally spawns on hard substrates such as wooden planks, old car tyres, tree trunks, bamboo poles and so on. At the fish farm of the College of Fisheries, Raha, most of the egg deposition was recorded in old car and bus tyres. A few eggs were laid on the bamboo poles and the wooden trunks of trees. Chital eggs are of 6.0-6.5 mm diameter and are adhesive in nature.

The brood fish were initially procured from Pabhoi Fish Farm in Biswanath District of Assam and were transported to the College of Fisheries. The brooders were raised for one year and were fed daily with a mixture of fish meal, mustard oil cake and rice bran @ 3% of body weight. During the broodstock culture, small carp fingerlings were released into the fish ponds which became an additional source of live food for the brooders. The brooders were not induced by hormone injection, instead natural breeding was performed by providing artificial substrates and fertilised eggs were collected. Natural breeding was triggered by pumping freshwater into the broodstock pond. The ,aximum number of eggs were collected during the months of May-June, with 500-600 eggs recovered from spawning substrates during the peak breeding season.

## Incubation and hatching

During the months of May-June, the breeding substrates were periodically checked for deposition of fertilised eggs to confirm the ovulatory response of fishes. Swollen eggs of 6.0-6.5 mm diameter were found attached to the substrates with maximum deposition on the tyres of old cars. Specialised wooden boards of size 135 cm × 60 cm × 45 cm were also used as egg collectors in the brood stock ponds but no deposition of eggs was observed on these. The tyres loaded with fertilised eggs were transferred to three cemented tanks containing nylon hapa with continuous water supply throughout the incubation phase. The unfertilised eggs were opaque, spherical and whitish in colour measuring 2.0-2.5 mm in diameter, while fertilised eggs were yellowish, transparent, spherical and adhesive in nature. The incubation period of eggs in the hatching hapa was 10-15 days during the experiment. The newly hatched fry of 1-3 days tend to attach to hard substrates and possess a bulky yolk sac with a conspicuous network of blood capillaries. Absorption of the yolk sac was completed by most of larvae 12-14 days after hatching. During the breeding season extending from May to July, 1,000-1,200 of chital fingerlings were successfully reared under captive conditions.