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Successful breeding of an endemic murrel, *Channa aurantimaculata* Musikasinthorn, 2000 with a habitat manipulation practice

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ABSTRACT

Endemic murrel Channa aurantimaculata, of North-eastern India, were acclimatized in the controlled cemented cistern after 120 days and breeding has been getting done without any stimulation. Acclimatization response was excellent and their growth and survival rate was found to be very encouraging. The observations will help for explaining the culture potentiality and conservation of this data deficient near threatened murrel species and grown for their ornamental importance can be cultured successfully and hence imports of a wide range of popular wild-caught tropical fish could be restricted

Key words: Channa aurantimaculata, rearing and breeding.

INTRODUCTION

The genus Channa is characterized by a super aphyryangial accessory respiratory organ facilitates a air breathing mode of life and the genus is distinguished from other genera of the family in having long, soft dorsal and anal fins, scales on the head mostly cycloid and that on the body, mostly ctenoid, caudal fin rounded, curved lateral line[1]. The Chanidae are represented by 26, species, of which 23 occurs in Asia and the rest in Africa[2]. North-eastern India is rich in swamps and lakes, and in Chanid fauna [1]. The fairly large species, *Channa aurantimaculata*, is endemic to the forest streams, ponds, and swamps adjacent to the Brahmaputra River in the subtropical rainforest of northern Assam [2]. The species is remarkably striking, with a vibrant pattern of purple and orange adorning the length of its body and can be regarded as a potential aquarium fish. Discovered in 2000 from Dibrugarh Assam, and measuring up to 40cm in length, the fish is also known as the 'orange-spotted snakehead', as its head looks like that of a snake. It is carnivorous and predatory, enjoying a diet of smaller fish and invertebrates. IUCN has listed this species of murrel in the data deficient category.

Majority of the indigenous ornamental fish trade in India is from the North Eastern states and the rest is from Southern states which are the hot spots of fish diversity in India. Ninety five per cent of our ornamental fish export is based on wild collection. This capture based export is not sustainable and it is a matter of concern for the industry and sustainability of native species. Most of the fish species grown for their ornamental importance can be cultured successfully.

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Dehaldari, 1976 [3] was made extensive studies on the cage culture of some of the species of this region under All India Coordinated Project on air breathing fishes. But no study on the culture potentiality of this species has been trialed till date. Considering the paucity of knowledge, an attempt has been made on acclimatization response, growth and survival rate of *Channa aurantimaculata* and breeding in controlled condition to study the feasibility of commercial rearing of this potential aquarium fish as well as for long-term conservation of this endemic fauna.

MATERIALS AND METHODS

To explore the culture potentiality and breeding of *Channa aurantimaculata* in artificial condition through habitat manipulation technique, a total no. of 10 individuals of the species (within the size group of length 3.22. 18.3cmand weight 0.65. 88.22 gm) were reared in cemented cistern (LxDxB: 2.0m x 0.80m x 1.0m) at Lakhimpur, Assam in open air to receive adequate monsoon rains between April and July 2009. The specimens were collected from the wetlands and transported to the experimental site. The specimens were given a dip treatment in 1ppm KMnO₄ solution before being released into the cemented cistern as a prophylactic measure against possible infections [4]. The cistern was filled up with 30cm de-chlorinated water, followed by liming with appropriate dose and manuring (with 3kg of cow dung). The bottom of the tank was filled with soil (15 cm.) because they usually dig into the substrate to try and burrow. Some obligatory hydrophytes such as *Pistia stratiotes* Linn. (A free-floating perennial plant), *Nymphoides indicum* Roxb.(free-floating aquatic fern), *Aponogaton undulates Koehne, Hydrilla verticillata* (L.f.) Royle (a submersed perennial), *Ceratophyllum demersum* L (annual submersed aquatic plant) plant were provided for sheltering of fishes in the cistern because floating cover is must for this species as they like to hang out under it . During the rearing period, the fish specimens were fed with live earth worm, silk worm pupae, cockroach and grasshopper mosquito larvae and mosquito@10% body weight once daily. Growth and survival rate were calculated by the formula [5].

Body weight gain SGR=

Time (days)

Certain physico-chemical properties like temperature, pH, and dissolve oxygen of the tank were recorded fortnightly according to [7] for 12 months.

Fifty percent (100 Nos.) of the fry was reared in the glass aquarium to study their food and feeding behaviour.

Morphometry of the species was carried out according to the methods of [8-10].

RESULTS AND DISCUSSION

Findings of the acclimatization response, growth, percentage and specific growth rate of *Channa aurantimaculata* in controlled condition in 270 days of culture trial are given in Table 1 and 2. In the present study, the high rate of survival (100%) recorded on acclimatization of wild stock of *Channa aurantimaculata* under cemented cistern condition indicated a favourable response of the fish to the ecological transition from the wild habitat to the cistern environment. The appreciable growth rate (i.e., 0.695) exhibited by the fish during rearing period indicated that the

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prevailing environmental conditions in the cement cistern were within the tolerance range for the species. Further, growth is considered as a specific, adaptive property ensured by the unity of the species with its environment [11].

During the trial it was unable to observe the matting behaviour devotedly but in the first week May more than two hundreds fries were noticed in the tank. Fries were well guarded by both male and female but male was found to be more active than the female one. By taking this opportunity, remaining eight specimens in the cistern were captured and transferred to elsewhere for safeguard of offspring. Extra plankton supplement was made for 20 days.

After fifteen days when young fishes were transferred to a glass aquarium with about 2.2 cm in length, they were fed with mosquito larvae. Observation reveals that, a single fry can consume as many as 50 to 80 mosquito larvae within an hour. After attaining the stage of fingerling, they were fed with chopped earth worm only. In the aquarium the fingerlings were reared up to the size of about 10 to 12 cm and weight about 15 to 20 gms. Young fishes are closely similar with *C. punctatus* and *C. striatus*, but approx. after two month of age, appearance of black spots followed by yellowish vertical stripes in the ventro-lateral side was noticeable followed by a black and yellow colouration in the caudal, dorsal, pectoral and anal fins. Appearance of round blush blemish at the base of both pectoral fins indicates their adulthood (gonadial maturation). The male one is slightly slender, colouration is more dazzling and yellow reticulation on head scale is more vivid in comparison to female one are some prominent features of sexual dimorphism(Fig.1&2). Upper half of body dark brown to black with 7-8 large irregular orange blotches; pectoral fins with a black blotch at the base and 5 vertical vivid black bands [1].

Fish morphometry (average value of five species) is depicted in the Table: 2.

Table 1: Certain physico-chemical properties of water environment of cement tank.

Month	Tempr	pН	DO ₂	Free CO ₂
March	18-18.6	8.2-8.4	5.8-6	2.3-2.8
April	22-22.8	7.6-7.7	4.8-5.1	1.6-1.7
Jun	25-26.1	6.8-6.9	5.1-5.6	1.4-1.5

1	Total Length	31.2
2	Standard Length	24.5
3	Pre Dorsal Length	7
4	Head Length	7.35
5	Eye Diameter	1
6	Head Depth	2.7
7	Head Width	3.4
8	Pre Orbital Length	1.33
9	Post Orbital Length	4.9
10	Inter Orbital Width	2.35
11	Gape width	3.3
12	Dorsal Fin Height	1.8
13	Dorsal fin Base	15.3
14	Pectoral Fin Length	4.85
15	Pectoral Fin Base	1.4
16	Ventral Fin Length	2.2
17	Ventral fin Base	.55
18	Caudal fin Height	2.8
19	Anal fin Length	1.7
20	Anal Fin Base	9.3
21	Least Height Caudal Peduncle	2.5
22	Caudal Peduncle Length	1.6
23	Anal Length	12.1
24	Pre Pectoral Length	8.1
25	Pre Ventral Length	10.2
26	Pre Anal Length	14.3

Majority of the indigenous ornamental fish trade in India is from the North Eastern states are based on wild collection including *Channa aurantimaculata*[11] (Hazarika et al., 2009). Capture based export is a matter of

concern for the sustainability of native species. Hence, it is absolutely necessary to shift the focus from capture to culture based development to reduce the pressure on their natural habitats, facilitate the conservation of threatened and endemic fish species besides being creating substantial job opportunities for the locals through development of low cost enterprise.

The findings of the present study support that *Channa aurantimaculata* acclimatizes well to the environmental conditions of the cement cistern which indicates its potentiality for culture and suggests that *Channa aurantimaculata*, a prominent endemic murrel species having ornamental value thrive well in the controlled condition like cemented cistern, earthen pits etc. and can be considered for short-term culture in various seasonal water bodies available in the state. This will not only help in augmentation of natural population but also provide an additional avenue of income for marginal fish farmers in rural areas as well as helps in long-term conservation of this endemic fish specie.

Age of the Fish	Avg. Length	Avg. Wight	Type of food	Mortality if any
15 Days old	2.2 cm	1.4gms	Mosquito larvae and plankton	2%
30 days old	3.4cm	2.2 gms	Mosquito larvae	1.5%
60 days old	6.2cm	4.5 gms	Chopped earth worm	1%



Channa aurantimaculata



1. Channa aurantimaculata (female)



3. Fish pairing



2. Channa aurantimaculata (male)



4.Parental care of male fis



5. Parental care of male fish



6.Captured fry and mother

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Fig.7: Food supplied to the fingerlings



Fig.8: Rearing fingerling in aquarium



Fig.9: Fingerlings (60 days old)



Fig.10: Adult female



Fig.11: Channa aurantimaculata in the aquarium.

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