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INDUCED SPAWNING OF CAPTIVE STOCK OF THREATENED BRONZE FEATHERBACK, *NOTOPTERUS NOTOPTERUS*, FOR STOCK IMPROVEMENT AND CONSERVATION

S.M. SRIVASTAVA¹, P.P. SRIVASTAVA¹, R. DAYAL¹, A.K. PANDEY¹ and S.P. SINGH²

¹National Bureau of Fish Genetic Resources, Canal Ring Road, Lucknow-226 002, India

²Department of Zoology, Government Post-Graduate College, Satna-485001, India

ABSTRACT

Notopterus notopterus, a commercially important food and ornamental fish, is showing declining trends in natural habitat. Since artificial fecundation and ranching are the envisaged strategies for conservation and rehabilitation of endangered species, *N. notopterus*, collected from Gomti river, was successfully bred by intramuscular (i.m.) administration of GnRH-based drug, ovaprim @ 0.5 and 1.0 ml/kg body weight to male and female, respectively. There was 100% breeding, fertilization rate varied from 85-94% and survival from 80-85% at water temperature 26±2°C. Fecundity of the female fish was found to be 2570±198 kg⁻¹ body weight. Captive breeding will aid in stock improvement and conservation, ensuring species survival as well as sustainable fishery.

KEY WORDS: Induced spawning, Stock improvement, Conservation, *Notopterus notopterus*

INTRODUCTION

The oviparous bronze featherback (knife fish), *Notopterus notopterus* belongs to the Family Notopteridae. It is a popular food fish having ornamental value as well and thrives well in freshwater rivers, ponds and lakes. This fish is distributed in south and south-east Asia including Bangladesh, Malaysia, Thailand, Myanmar, Java, Sumatra and Borneo (Rahman, 1989). In India, it has been recorded from Ganges, Brahmaputra, Mahanadi, Godavari, Krishna, and Cauvery (Talwar & Jhingran, 1991; Sugunan & Sinha, 2001; Jayaram, 2010). The wild population of bronze featherback has declined in the past few years due to over-exploitation, pollution and habitat degradation (Palaniswami & Manoharan, 2010). The profound effect of over-exploitation in the forthcoming years may lead to further reduction in the population and availability of this teleost. The fish has a standard length of 60 cm under natural conditions (Talwar & Jhingran, 1991). It is a very hardy fish and can be easily reared in the aquarium, stagnant water and aquaculture system on a variety of feeds. Bronze featherback breeds naturally during June to August in rivers and ponds in India and there is a report on natural breeding of this fish under

captive conditions too (Haniffa *et al.*, 2004). Due to reduced abundance of *N. notopterus* in the wild, the fish has been categorically kept in the list of the threatened species of the country (CAMP, 1998; Mukherjee *et al.*, 2002). Sarkar *et al.* (2010) have also confirmed the threatened status of the fish in Gomti river. Though there is some information on breeding, fecundity, induced spawning and egg incubation of *Notopterus chitala* (Singh *et al.*, 1980; Hossain, 1999; Radheyshyam & Sarangi, 2005; Sarkar *et al.*, 2006), such reports on *N. notopterus* are lacking. Since artificial fecundation and ranching are the envisaged strategies for conservation and rehabilitation of endangered species (Minkley & Deacon, 1991; Maitland, 1993; Jensen, 1994; Pandey & Das, 2002; Das *et al.*, 2006; Archdencom & Bonar, 2009; Shei *et al.*, 2010), the present work was carried out to induce breeding in bronze featherback by using synthetic gonadotropin release hormone (sGnRH), ovaprim.

MATERIALS AND METHODS

Wild bronze featherback fish, *Notopterus notopterus* (Pallas, 1769) were collected from Daligunj and Khadra sampling stations of river Gomti at Lucknow, India. Both

*Corresponding author ; email: akpandey_cifa@yahoo.co.in

male and female were kept separately and acclimatized for two months (Fig. 1). The fishes were fed *ad libitum*, natural live as well as laboratory-made supplementary feed (paste containing egg caster). After acclimation, the brood fishes were subjected to pairing in rectangular FRP tank with 2:1 ratio of male and female and an artificial shower for recirculation of water was arranged round-the-clock for 4 days (Fig. 2). The fishes were administered ovaprim (Syndel Laboratory, Vancouver, Canada) intramuscularly (i.m.) @ 0.5 and 1.0 ml/kg body weight to male and female, respectively. Hiding were made by using cement rough surfaced tiles and placing rock stones inside each breeding tank, as artificial substratum for mating, spawning and adherence and protection to the eggs (Fig. 3). Fertilization rate was estimated by counting randomly deposited eggs on per unit surface area of the tiles (Fig. 4). Hatching rate was estimated on 7th-8th day after spawning by randomly counting eggs in which complete hatching process was

seen on the surface of cemented tiles and rock stone. Hatchlings with yolk sac were transferred to other glass aquaria for further rearing up to next 15 days. The survival of hatchling was calculated randomly by taking samples from aquarium at 3 days interval up to 15 days. Survival was recorded at the end of the spawning and complete resorption of yolk sac. Fecundity was calculated prior to spawning. After 4 days, spent fishes were removed from the breeding FRP tank, given KMnO₄ bath (5 ppm) for 30 minutes and released back into the stocking pond.

RESULTS AND DISCUSSION

There was 100% breeding in the experimental fishes. The brooders showed aggressive and chasing behaviour after 10-12 h of intra-muscular injection of ovaprim. The female released eggs in the night which stuck on the rough surface of the cement tiles and rock stones. The male released milt and eggs were fertilized externally. The

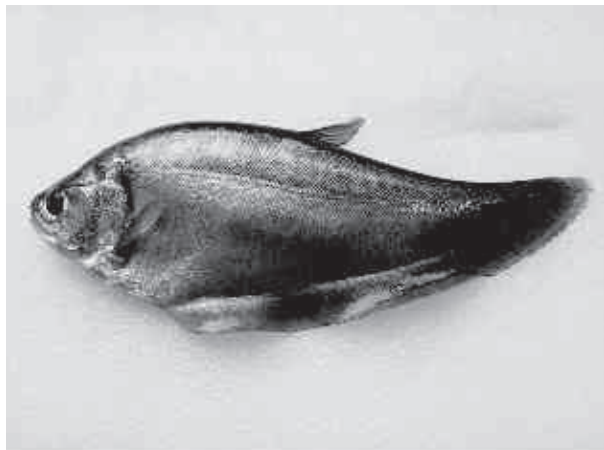


Fig. 1. Brooder of bronze featherback, *Notopterus notopterus*



Fig. 2. FRP tank for conditioning and breeding



Fig. 3. FRP tank ready for breeding



Fig. 4. Eggs adhered on the rough surface of rock stone

parental care behaviour was observed particularly in females. The fertilized eggs were bright milky white with a red streak, spherical in shape with visible yolk material. The unfertilized ones were dull and yolk material was not visible. The fertilization rate in experimental sets varied from 85-94%, fertilized eggs were larger (3.5 ± 0.5 mm) in size and the hatching period varied between 5th-6th day at water temperature 26 ± 2 °C. The percentage survival ranged from 80-85% and fecundity 2570 ± 198 kg⁻¹ body weight of female fish.

Ovaprim contains salmon gonadotropin-releasing hormone analogue and a dopamine antagonist, domperidone. It is a commercial product employed successfully for induced spawning in a number of commercially important food as well as ornamental and threatened fishes (Lakra *et al.*, 1996; Pandey *et al.*, 1998, 1999; Sridhar *et al.*, 1998; Singh *et al.*, 2000, 2002; Nayak *et al.*, 2001; Sarkar *et al.*, 2006; Rath *et al.*, 2007; Hill *et al.*, 2009). Artificial fecundation of the endangered species- *Tenualosa ilisha* (Sen *et al.*, 1990), *Tor khudree* (Kulkarni & Ogale, 1986; Nandeeshha *et al.*, 1993), *Tor putitora* (Joshi, 1981; Shrestha *et al.*, 1990; Sehgal, 1991; Ogale, 1997; Pandey *et al.*, 1998), *Ompok bimaculatus* (Sridhar *et al.*, 1998), *Labeo dussumieri* (Kurup & Kuriakose, 1991), *Ompok pabda* (Bhowmik *et al.*, 2000), *Osteobrama belangeri* (Reddy, 2000), *Horabragrus brachysoma* (Ponniah *et al.*, 2000) and *Notopterus chitala* (Radheyshyam & Sarangi, 2005; Sarkar *et al.*, 2006) has been reported earlier. In the present study, successful induction of spawning has been achieved in threatened *N. notopterus* through ovaprim administration which released adhesive eggs similar to *N. chitala* (Singh *et al.*, 1980; Hossain, 1999; Radheyshyam & Sarangi, 2005; Sarkar *et al.*, 2006). The fertilized eggs of bronze featherback were slightly smaller and fecundity was also less as compared to *N. chitala*. However, hatching period of both the species was almost similar. Captive breeding of this species will aid in stock improvement and native fish conservation, ensuring species survival as well as sustainable fishery.

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