



Successful Induced Breeding and Larval Rearing of *Pangasianodon hypophthalmus* under Controlled Conditions of Raipur (Chhattisgarh)

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Introduction

Pangasianodon hypophthalmus, commonly known as striped (sutchi, iridescent shark) catfish, fetches high price in markets. Culture of this species is growing day-by-day in Bangladesh (Rahman *et al.*, 2006; Ahmed and Hasan, 2007; Ahmed *et al.*, 2013), Indonesia (Griffith *et al.*, 2010), India (Lakra and Singh, 2010; Singh and Lakra, 2012; Kumar *et al.*, 2013) and Vietnam (Phan *et al.*, 2009; Bui *et al.*, 2010). Vietnam is the top producer and exporter of *P. hypophthalmus* (Phan *et al.*, 2009; Bui *et al.*, 2010). Contribution of the Indian major carps in Indian aquaculture is more as compared to those of catfishes and in Andhra Pradesh itself, major carps contribute about 85% of the total freshwater fish production while catfishes and murels show the next to them (Laxmappa, 2004). *P. hypophthalmus* is native of Mekong Basin and Chao Phraya river in Thailand, Cambodia and Vietnam. It has been introduced in Singapore, Philippines, Taiwan, Malaysia, China, Myanmar, Bangladesh, Nepal and India. In India, it was brought in West Bengal through Bangladesh during 1997 (Mukai, 2011). Initially, its culture was carried out in Andhra Pradesh and West Bengal in private sector but the Government of India permitted aquaculture of *P. hypophthalmus* in year 2010-11. Recently, cage culture of this species has also been initiated in Govind Sagar (Rihand) reservoir, Sonbhadra district (Uttar Pradesh) and the results are encouraging. Young ones of the species are bottom feeder and carnivores while the fingerlings feed on snail, worm, insects, gastropods etc. Females of this species attain maturity at the end of third year while male mature

in two years (Phuong and Oanh, 2009; Griffith *et al.*, 2010; Vidthayanon and Hogan, 2013; Anon, 2014).

P. hypophthalmus is a promising candidate species for freshwater catfish culture (young ones also possess ornamental values) and has captured all markets of India in shorter period (Lakra and Singh, 2010; Singh and Lakra, 2012). There exist reports that this species is being sold in more than 100 countries, mainly in European Union, Russia, South-east Asia and USA in the form of white fillets (Nguyen, 2007; Phuong and Onah, 2009; Phan *et al.*, 2009). For culture of this species in West Bengal, the seed were initially procured through Bangladesh. Though the species has been induced bred in West Bengal, Andhra Pradesh and Chhattisgarh and some hatcheries established in these states, the survival of offspring has been very poor. *P. hypophthalmus* is highly fecund fish, seasonal spawner and breeds once in a year in flooded river. Recently, the striped catfish has been bred successfully in Mekong Delta region of Vietnam by using high doses of human chorionic gonadotropin (HCG) (Bui *et al.*, 2010). An attempt was made to induce breed *P. hypophthalmus* by employing GnRH-based drug and dopamine antagonist (ovaprim) in order to standardize the breeding protocol and development of hatchery for mass seed production of the species under agro-climatic conditions of Raipur (Chhattisgarh) for sustainable aquaculture.

Materials and Methods

Breeding and hatching experiments were carried out at Lucky Fish Farm, Kurud, Dhamtari (Chhattisgarh)



State). Male and female brooders of *Pangasianodon hypophthalmus* (Family Pangasiidae) were reared at M/S Hemant Chaudrakar Fish Farm at Dhamtari. At this farm, glass jar model of hatchery with 15 cemented vertical jars, were developed in the year 2010-11. Physico-chemical parameters of the water during the breeding experiments were analyzed (APHA, 1998). For induced breeding, mature and gravid brooders of both the sexes of age group 3 (+)

years were collected (Fig. 1, 2) and ovaprim was administered @ 0.5 ml/kg to female and 0.3 ml/kg male brooders (Fig. 3). Injected brooders were kept in cemented breeding tanks of size (3 × 2 × 1 m) with flowing water. After 10-12 hours of the drug injection, the females were ready for spawning and the stripping was done in the early morning (6 a.m.) (Fig. 4).



Fig. 1: Collection of brooders of *P. hypophthalmus*.



Fig. 2: Breeding set of *P. hypophthalmus*



Fig. 3: Intramuscular injection of ovaprim.



Fig. 4: Stripping eggs of *P. hypophthalmus*





Table 1: Physico-chemical parameters during the breeding experiments at Kurud, Dhamtari (Chhattisgarh).

Sl. No.	Parameters	I	II	III	IV	V	Remarks
		12.8.2010	14.8.2010	16.8.2010	17.8.2010	18.8.2010	
1	Dissolved oxygen (mg/l)	4.2	4.0	4.8	4.8	4.0	Hatchery water
2	Free carbon dioxide (mg/l)	--	--	--	--	--	--
3	Iron (mg/l)	0.1	0.2	0.2	0.2	0.2	
4	Water temperature (Hatchery)	27.5 °C	27.8 °C	28.2 °C	28.4 °C	28.6 °C	Hatchery water
5	pH	7.4	7.4	7.8	7.4	7.4	
6	Salinity (ppt)	--	--	--	--	--	--
7	Total alkalinity (mg/l)	110	110	120	120	110	
8	Weather temperature (°C)	34.6	34.2	34.2	34.0	34.6	
9	Weather	Sunny	Sunny	Sunny	Sunny	Sunny	
10	Fertilization % (after removal of stickiness) stripping and washing of eggs	70%	60%	70%	80%	80%	After

Results

Physico-chemical parameters of the water during the breeding experiments have been summarized in Table 1. Results of the breeding trails on *P. hypothalamus* conducted at Dhantari, Raipur (Chhattisgarh) have been summarized in Table 2. In present study, successful induced breeding was observed in the striped catfish after ovaprim administration. The eggs of *P. hypophthalmus* were very small (diameter 1.4-1.8 mm), adhesive in nature while fertilized eggs were light creamy or brown in colour. Rearing of hatchling were carried out in circular incubation pool, hapa (20 × 5 × 1 m) and nursery ponds. Survival of the seed varied from 40-60% in all the three conditions. For fertilization of one million eggs of *P. hypothalamus*, one ml milt was used. After fertilization, three type of solutions such as cow milk (Fig. 5), multani soil (mitti) (Fig. 6) and black soil (Fig. 7) were used for removal of stickiness of eggs. Separated eggs were transferred to vertical jar cemented Pangas Hatchery for incubation (Fig. 8, 10) where they hatched out in 26 hours at 28±1°C. Hatching in each set varied from

40-80% depending up on the maturity status of the brooders, stripping technique, hatchery management etc. After absorption of yolk, spawn started feeding on day 3 and live feed (zooplankton, *Artemia naupli*) and eggs along with custard powder were provided thrice daily as feed and shifted to prepared nursery ponds. Rearing of fry was done in the cemented cistern (3 × 2 × 1 m), happa (20 × 5 × 1 m) (Fig. 9) and three nursery ponds of different sizes (30 × 60 m, 40 × 60 m and 50 × 50 m, water depth 2-3 feet) @ 200-300 fry/meter². The fry attained 4-5 cm size in 25-30 days and 7-9 cm in 40 days of rearing in nursery ponds. For culture of *P. hypothalamus*, fingerlings were stocked @ 25,000-30,000/ha.

Discussion

Induced breeding of the Indian major carps has been achieved successfully by administration of pituitary gland extract (PGE) and different preparation of synthetic GnRH-based drugs and dopamine antagonists (Chaudhuri and Alikunhi, 1957; Chaudhuri *et al.*, 1966; Dwivedi and





Fig. 5: Washing of eggs with cow milk.



Fig. 6: Washing of eggs with multani soil.



Fig. 7: Washing of eggs with black soil.



Fig. 8: Transfer of fertilized eggs of *P. hypothalamus*

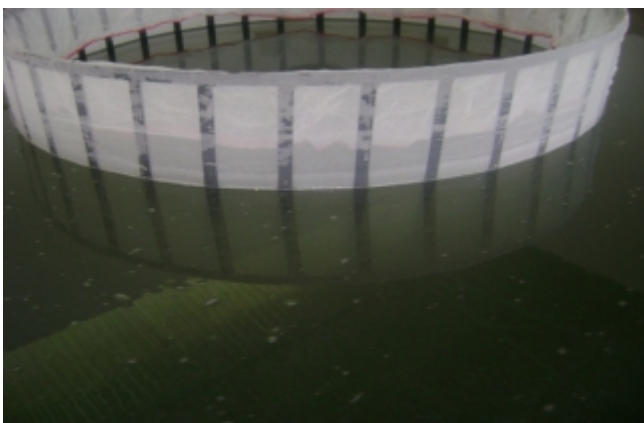


Fig. 9: Rearing of spawn of *P. hypothalamus*.



Fig. 10: *Pangasius* Hatchery at Raipur.



Table 2: Induced breeding experiment conducted on *P. hypothalamus* at Kurud, Dhamtari (Chhattisgarh).

Sl. No.	Date	Weight of female (kg)	Wight of male (kg)	Ovaprim dose (ml)	Total number of eggs stipped	Average number of fertilized eggs	Ferti-lization %	Number of hatchlings	Number of spawn	Number of fry (nursery)
1	12.8.2010	3.200 2.800	3.500	1.5- 3.0	10,00,000	8,00,000	70	5,60,000	2,30,000	
2	14.8.2010	3.500 3.700	4.00	2.0-3.5	8,00,000	7,00,000	60	4,20,000	3,36,000	
3	16.8.2010	4.100 3.400	3.200	1.6-3.8	12,00,000	10,00,000	70	7,00,000	3,40,000	
4	17.8.2010	4.000 3.800	3.700	1.7-3.9	11,00,000	8,00,000	80	6,40,000	3,84,000	
5	18.8.2010	3.900 4.100	4.200	1.1-2.0	10,00,000	7,00,000	80	5,60,000	2,24,000	
Total						40,00,000		28,80,000	15,14,000	

Ravindranathhan 1982; Chaudhuri and Singh, 1984; Nandeeshan *et al.*, 1990; Lakra *et al.*, 1996; Mahanta *et al.*, 1998; Pandey *et al.*, 2001, 2002a, b, 2009; Singh *et al.*, 2000). Even catfishes have also been induced bred through the similar preparations/ drugs (Ramaswamy and Sundararaj, 1956, 1957; Khan, 1972; Devaraj *et al.*, 1972; Khan and Mukhopadhyay, 1975; Pathak *et al.*, 1982; Zonneveld *et al.*, 1988; Rao and Janakiram, 1991; Alok *et al.*, 1993, 1995; Tharaknan and Joy, 1996; Goswami and Sarma, 1997; Kanungo *et al.*, 1999; Nayak *et al.*, 2000; 2001; Singh *et al.*, 2002; Pandey and Koteeswaran, 2004; Sahoo *et al.*, 2005; Mishra *et al.*, 2011; Yadav *et al.*, 2011; Taslim and Ahemd, 2012; Chaturvedi *et al.*, 2012a, b, c, 2013). There exist report that the striped catfish has been bred successfully in Mekong Delta region of Vietnam by using high doses of human chorionic gonadotropin (HCG) (Bui *et al.*, 2010). In the present study, *P. hypothalamus* has been induced bred successfully through ovaprim administration under agro-climatic conditions of Raipur (Chhattisgarh) with better survival of fry and fingerlings (Table 2).

There exists a lot of scope for freshwater catfish farming in India for diversification of aquaculture and sustainable production (Dehadrai, 1978; Thakur, 1991; Nayak *et al.*, 2000). Since the culture of *P. hypothalamus* is profitable among the catfishes,

there exist more demand of this species for aquaculture in India and tropical regions of the America for sustainable aquaculture (Rahman *et al.*, 2006; Lakra and Singh, 2010; Mukai, 2011; Singh and Lakra, 2012; Hekimoglu *et al.*, 2014; McGee, 2014). Vietnam has already shown the record production (1.0-1.5 million tonne per annum) of this species (Nguyen, 2007; Phuong and Onah, 2009; Phan *et al.*, 2009). Though the striped catfish is widely cultured in China, Vietnam, Thailand, Taiwan, Philippines, Cambodia, Indonesia, Lao People's Democratic Republic, Bangladesh, Nepal and India (Griffith *et al.*, 2010), this species has been declared Endangered in Vietnam due to over-exploitation, habitat degradation, changes in flow and water quality as well as over-harvesting of eggs, fry and juveniles for aquarium trade (Vidhthayanon and Hogan, 2013; Anon, 2014). The success achieved in induced spawning and seed (10,50,000 fry and 6,30,000 fingerlings) production of *P. hypothalamus* through ovaprim administration and hatchery development in Raipur (Chhattisgarh) will pave the way for mass seed production of this species for conservation aquaculture (True *et al.*, 1996; Anders, 1998) which will reduce the pressure on collection of fry and juveniles from the wild natural habitats (Nguyen, 2009).



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