

EX-SITU EXPERIMENTATION ON BREEDING PHYSIOLOGY OF *OMPOK BIMACULATUS* (BLOCH, 1794) IN TRIPURA

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During September 2009 to August 2011 brood stock of *Ompok bimaculatus* was collected from different water bodies of Tripura such as Rivers Feni, Muhuri, Gomoti, and also from Rudrsagar and Hurijala wetlands. To maintain certain water quality characteristics in the breeding program water samples from different locations were collected. The brood stock was provided specific feed during acclimatization. With certain characteristics of the gonad the maturity cycle of *Ompok bimaculatus* was examined during June-July. With some specific biological conditions the induced spawning was done. Developments of embryonic and larval developmental stages of *O. bimaculatus* were marked with some specific characteristics features.

Key words : *Ompok bimaculatus*, breeding physiology, culture technology, Tripura.

INTRODUCTION

Ompok bimaculatus (Bloch, 1794) belonging to the family Siluridae under the order Siluriformes is a freshwater and lotic catfish native to India, Bangladesh, Pakistan, and Myanmar. The fish has a wide geographical distribution covering the North Eastern States of India, Bihar and West Bengal, the Indus plain and some areas of Pakistan as well. Rivers connected to the beels, wetlands are usually considered as common habitat for them. This species is well preferred because of its lipo-protein texture with soft bones, and high nutritional value. This species has been listed as endangered fish species in India (IUCN 1990) due to its continuous decline in abundance and limitations of distribution. Reasons of the decline are due to indiscriminate fishing during the breeding season, wide use of pesticide and insecticides in agricultural fields resulting flowing of pollutional water from agricultural field into water. Further, siltation in the lotic habitat may also be considered another reason. It did not receive much attention in aquaculture probably due to lack of knowledge regarding its breeding physiology, larval rearing and culture technologies (Parameswaran *et al.*, 1970; CAMP, 1998; (Banik & Malla, 2010; Banik *et al.*, 2011).

RESULTS AND DISCUSSION

Brood Stock : collection and management

Brood stock fishes of 1-2 years old (40 male and 80 female) of *O. bimaculatus* were collected from river Feni, Muhuri, Gomati, and Hurijala wetland of Tripura and procured by fisherman during the month September 2009 to August 2011. The brood stocks were acclimatized in a local fish farm in a stocking carp pond (0.32 ha, depth- 2.5 ± 0.78 m). They were maintained in a polyculture system. Aquatic macrophytes like *Hydrilla verticillata* and *Eichhornia crassipes* were introduced into the pond for providing suitable ecological niche for them. Prior to captive breeding programme the fish individuals were nourished for some period (Banik *et al.*, 2002 & 2011). For gonad

maturation of this species, sGu RH based analogue and Dempridone injection was administered as stimulator (Banik *et al.*, 2011)

Water quality management :

Different physico-chemical parameters of river water was analysed adopting the methodology of APHA (2002) which was maintained in the brood stock pond (Table I).

Table I : Physico-chemical parameters maintained in brood stock pond.

S. No.	Parameter	Range
1	Water Temperature	29± 2.2°C
2.	pH	7.5±0.92
3.	Dissolved Oxygen	7.0± 2.32 ppm
4.	Free CO ₂	4.3±2.12 ppm
5.	Turbidity	2.5±1.1 cm
6.	Carbonate	60±5.70 ppm
7.	Bicarbonate	120±27.10 ppm
8.	Ammonia	> 0.1 ppm
9.	Nitrate	> 0.01 ppm
10.	Phosphate	>10-20 ppm
11.	Suspended Solids	> 2-5 ppm

Feed Management

The brood forms of *Ompak bimaculatus* (Bloch) were fed with mass cultured Rotifers, small live prawns, trash fishes, boiled chicken viscera, mustered oil cake etc. Adult *O. bimaculatus* were reared in farm ponds. Spawners were fed mass cultured Rotifers and small live prawns.

Breeding Season and Maturation

Maturity cycle of the species was studied by examination of gonads through various months of the year. During November-January the fishes were in stage I and II of maturity. Most of them attained stages III of maturity in March. Majority of the males were matured in late April, while the bulk of females were only in stage IV. Fully ripe females were observed from late May to the end of July. Breeding season extends from early June to late July.

Selection of breeders

Fully ripe females and males are selected during breeding season (June - August). With the secondary sexual characters developed during breeding season the male as well as female are being identified. This are comb-like and swollen with milt but does not normally yield the contents with slight pressure on abdomen near the vent. Males have usually elongated and pointed genital papilla. Females have soft bulged abdomen for enlargement of the balloon shaped hard roes, reddish vent and rounded genital papilla. The pectoral fin spine, which is relatively longer and thicker in male rather than female, becomes prominent.

Induced Spawning

Gravid females were induced bred during July to August in 2009 and 2010. A total of 52 females (weighing 4.05 kg; average wt 77.88g) are being considered. They are being fertilized with whitish-milt (sperm) suspension collected from males. Ovaprim was used at different dosages. Hatching time has been recorded at about 22-26 hours after fertilization at 26-30°C. Absorption of yolk sack has been noticed within 3-4 days of hatching. Altogether 52 females of *O. bimaculatus* are being considered for the purpose. Of which about 87.38% of the individuals responded to the breeding technology (Chakrabarty *et al.* 2006 & 2007). Average fertilization rate has been 72%. Of this, a total of 0.09 lakh viable spawns are being developed in 2010 (Table II).

During experimentation the acclimatised brood fishes were taken from the post-stocking carp pond through repeated netting as well as segregation and then were transferred into breeding hapa for acclimatization further for about 7 to 8 hrs. For promoting gamete production in both female and male as well as for influencing fertilization, Ovaprim (Syndel Lab. Ltd., Vancouver, Canada) was used (Chaudhary 1976). Ovaprim was applied at 0.5-1.5 ml/kg body weight for females and 0.5 ml/kg body weight for males, applied in a single injection. Females were stripped for spawning 5-9 hours after hormone injection and the fertilized eggs were collected in a tray, counted and the percentage of fertilization was determined. The no of eggs varied from 1068-5892 during the experiment. The eggs were transparent, adhesive and were found attached to the sand bed of the tank. The fertilization rate varied 62-80%. Milt was obtained from males by surgically removing the testes, which were macerated to produce a suspension to be mixed with the eggs for fertilisation. Eggs were subsequently washed thoroughly with clean water and transferred to a cement tank for hatching, with constant aeration. After spawning Hatching was proceeded by intensive agitation of the larvae inside the egg shell. Hatching occurred 23-25 hr after spawning and the hatchlings were light yellow in colour (Bhowmick *et al.*, 2000; Mukherjee & Das, 2001; Chakrabarty *et al.*, 2006 & 2007. The survival potential of the hatchling varied from 51-72% ($r = 0.97$, $P < 0.01$).

Egg Collection and Incubation

The fertilized eggs are found to be distributed uniformly in the plastic tubs and a feeble current of water is provided in order to maintain standard water quality characteristics (Chakrabarty *et al.*, 2008). Water temperature between 27 to 30°C is maintained for hatching. The newly hatched larvae are cylindrical, transparent and devoid of mouth, pectoral fin and body pigments. Yolk sack is pale greenish and got absorbed within three days. Rudiment of paired maxillary and mandibular barbels appeared initially. Larval phase lasts for about 8th- 15th days. The caudal, dorsal and ventral fins are developed during 12th-17th day.

Embryonic Development

Observations of embryonic as well as larval stages of *O. bimaculatus* was made with some particular characteristic features, such as - Ovary : Ovary & Eggs - Uniform size ; Diameter of ripe eggs : 0.858-1.365 mm , Colour : Brown. Fertilized Eggs : Diameter of zona radiata, vitelline membrane and egg proper are 1.712-1.921 mm, 1.225-1.429 mm and 1.190-1.360 mm respectively. Colour : Radish brown. Embryo : Size - Comparatively

Table II : Results of captive breeding experiments using different doses of ovaprim.

No. of Experiment	Average weight of female (g)	Ovaprim dosage (ml/kg of body weight)	Average weight male (g)	Ovaprim dosage (ml/kg body weight)	Latency period (hr)	Number of eggs spawned	Fertilization (%)	Hatching (%)	No of hatchlings produced
1.	287	1.5	210	0.5	5-6	3254	62%	51%	1028
2.	217	1.0	175	0.5	7-8	5892	75%	66%	2916
3.	224	0.5	190	0.5	8-9	3054	78%	55%	1310
4.	233	1.5	180	0.5	5-6	2544	66%	65%	1091
5.	212	1.0	160	0.5	7-8	4756	80%	72%	2739

large, Colour of yolk - brown Just hatched larvae : Size - 3.701mm, Colour of yolk sac - brown, Pre-anal myotomes - 11. and Post-anal myotomes - 37-40.

Post-larvae

Yolk just absorbed - Length : 4.268 mm Colour - Less translucent; brownish melanophores minute and numerous and almost uniformly distributed. Maxillary barbules : Reach beyond commencement of anal fin - 67-68 rays. Colour : Dark brown; lack of longitudinal bands, yellow bands; melanophores more numerous and concentrated on the back. Shoulder spot - conspicuous, Caudal spot - fully formed, Maxillary barbules - covering 4/5th length of the body, anal fin - narrow with 67-68 rays (Mukherjee *et al.*, 2002; Hussain 2006; Chakrabarty *et al.*, 2008).

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