

## BREEDING OF *CLARIAS BATRACHUS* IN LOW-SALINE WATER UNDER CONTROLLED CONDITION IN ROHTAK (HARYANA)

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**ABSTRACT** – Induced breeding experiments on Indian magur, *Clarias batrachus* were carried out at Research Centre of CIFE, Rohtak (Haryana). Six breeding trials were conducted with 78.10% fertilization and 89.65% hatching success. Hatching of eggs were observed in both fresh- as well as low-saline water flow-through system, however, the hatching period was 1-2 hours longer in saline ground water in comparison to freshwater. The present study demonstrates that the Indian magur seed may be produced in low-saline (5 ppt) ground water for culture and domestication of this species in salt-affected areas.

**Key words** : Induced spawning, seed production, low saline water, *Clarias batrachus*.

### INTRODUCTION

The Asian catfish, *Clarias batrachus*, popularly known as 'Magur' in India and Bangladesh, inhabits shallow swamps, marshy and derelict waters containing silt, decaying vegetations and organic load with poor nutrient release (Thakur and Das, 1988; Talwar and Jhingran, 1991; Jayaram, 2010). This species can withstand adverse water conditions like deficient in dissolved oxygen owing to its capacity to aerial mode of respiration utilizing atmospheric oxygen (Singh and Hughes, 1971). It can be stocked as seed at high densities i.e. 50,000-1,00,000 number/ha with production potential to be around 4-6 ton/ha/crop of 6 months (Dehadrai *et al*, 1985; Thakur 1991, Dehadrai and Kamal, 1993). The Asian catfish has good taste, flavour and therapeutic value and fetches a high price of around Rs.160-180/- per kg in the domestic markets. The breeding technique of catfishes is not well popularized because induced spawning of *C. batrachus* has been difficult as compared to carps (Ramaswami and Sundararaj, 1957; Sahu and Rao, 1981; Thakur, 1991). Though attempts have made to breed *C. batrachus* through hypophysation and GnRH-based drugs (Devaraj *et al*, 1972; Khan, 1972; Khan and Mukhopadhyay, 1975; Sahu and Rao, 1981; Zonneveld *et al*, 1988; Kohli, 1989; Rao and Janakiram, 1991; Goswami and Sharma, 1997; Yadav *et al*, 2011), the success achieved was restricted to experimental level only (Tripathi, 1990; Thakur, 1991). Recently, Chaturvedi *et al* (2001, 2002) made efforts to extend the technology for commercial seed production of the species at Central

Institute of Fisheries Education Research Centre, Lucknow (Uttar Pradesh). Since the economic returns from major carp culture is declining during the recent years and water availability for year-long culture has become constraint, the farmers are looking for Indian magur because of its hardy nature, fast growth and ability to readily accept artificial feeds (Thakur, 1991). For adoption of magur as an alternate species for aquaculture (Kutty, 2001), there exist acute shortage of natural and hatchery-produced seed of the catfish in this country. Therefore, an attempt has been made to standardize the induced breeding and larval rearing technique of *C. batrachus* in fresh - as well as low saline water of Rohtak (Haryana).

### MATERIALS AND METHODS

Research Centre of Central Institute of Fisheries Education, Rohtak (Haryana), located at a distance of about 80 km from New Delhi, covers an area of about 35 acres which includes 10 acres of freshwater farm and 25 acres area with saline water of 23-25 ppt. The breeding experiments of *Clarias batrachus* (Linnaeus) was undertaken during August 2004 in freshwater as well as saline-flow through water system (Fig. 1). Six pairs of female (weight between 90-120 gm) and males (weight 120-140 gm) were selected (Fig. 2) and injected with sGnRH-based hormonal drug, ovaprim @ male 0.02 ml and female 0.05-0.08 ml/ 100 gm body weight. After administering the drug, catfishes were released into cement cistern for breeding with sufficient number of sprays and showers. All the males were sacrificed for the collection of milt which was preserved in 0.9% saline solution used for fertilization of eggs (van der Waal, 1985).



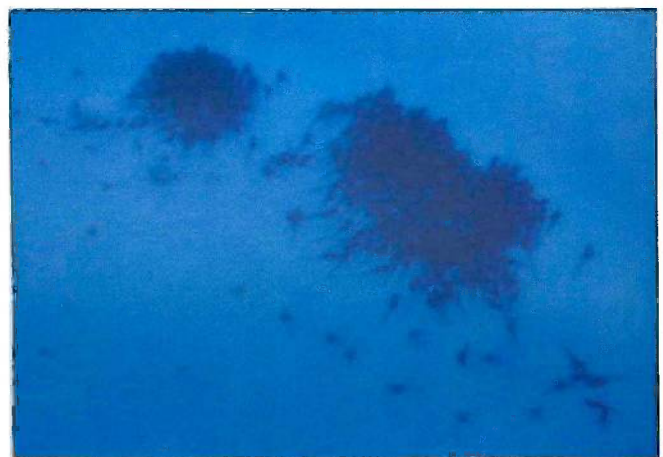
**Fig. 1 :** Flow-through hatchery for larval rearing.



**Fig. 2 :** Selection of brooders of *C. batrachus*.



**Fig. 3 :** Hatchlings of *C. batrachus*



**Fig. 4 :** Advanced hatchling of *C. batrachus*.



**Fig. 5 :** Seed of *C. batrachus*.

Subsequently, the females were stripped and the eggs were fertilized with pre-collected milt. Of 7,640 fertilized eggs obtained, 1,100 eggs were shifted to freshwater hatching tubs and later to "Magur-Flow-Through-Hatchery-System" and remaining 6,540 were shifted in saline water hatchery (5 ppt). For the hatching experiments, separate units for flow of freshwater and ground saline water (4-5 ppt) were used. The physico-chemical characteristics of water were - air temperature 18.5-42.0°C, water temperature 8.0-37.0°C, pH 8.16-8.41, DO 6.8-7.2 mg/L, free CO<sub>2</sub> 0-5 mg/L salinity 4-5 ppt, total alkalinity 190-248 mg/L, total hardness 1010-1260 mg/L and chlorides 1190-1710 mg/L which were within the optimal range (Dwivedi and Ravindranathan, 1982).

#### RESULTS AND DISCUSSION

Each aquatic species has an optimum range of salinity tolerance for reproduction and growth and outside the range, performance is diminished and survival may be poor. Results of the breeding experiments conducted at

Table 1: Details of breeding experiments on *Clarias batrachus*.

Sl. No.	Female weight (gm)	Male weight (gm)	Number of eggs	Number of good eggs	Water used	Number of hatchlings	Number of 15 days old fry	Seed produced
1.	90	120	1,170	1,100	FW	990	690	690
2.	100	140	1,500	1,050	SW	940	650	650
3.	120		1,900	1,330	SW	1,190	830	830
4.	120	120	1,800	1,440	SW	1,290	900	900
5.	120		1,600	1,280	SW	1,150	890	890
6.	100	140	1,800	1,440	SW	1,290	900	900
Total			9,770	7,640		6,850	4,860	4,860

Abbreviations: FW- Freshwater; SW.-Saline water.

CIFE Research Centre at Rohtak have been summarized in Table 1. Six breeding trials on *C. batrachus* were carried out with 71% fertilization and 89.65% hatching success. Hatching of eggs were observed in both fresh as well as low-saline water flow-through system, however, the hatching period was 1-2 hours longer in saline ground water in comparison to freshwater. In freshwater flow-through system, 990 hatchlings and in saline flow-through system, 5,860 hatchlings were obtained. Though oxygen level in both the flow-through hatching systems was maintained at 6.8-7.2 mg/L, hatching took place 1-2 hours earlier in freshwater flow-through system than the low-saline water. Hatchlings were reared for 15 days to fry stage and with survival success of 71%, 4,860 seed were produced. They were stocked in a ground saline water pond with 5 ppt for further rearing. This study demonstrates that seed of *C. batrachus* may be produced in low-saline ground water which is available in western Uttar Pradesh, Haryana, Rajasthan and part of Punjab.

Though *C. batrachus* is not categorized as threatened taxa but population of this species has been declining day-by-day in the northern India while its availability is very poor in many parts of the country (Chaturvedi *et al*, 2009; Binoy, 2011). This has been attributed to over-fishing, reduction in habitat areas due to reclamation of wetlands, extensive use of pesticides, weedicides and fertilizers in the catchment area as well as illegal entry of the Thai magur, *Clarias gariepinus* and lack of breeding as well as rearing technology for conservation aquaculture (True *et al*, 1996; Anders, 1998; Mondal and Mondal, 2000; Pandey and Das, 2006; Chaturvedi *et al*, 2009; Binoy, 2011). Aquaculture of *C. batrachus* is gaining importance in India and Thailand

because the species is highly esteemed for its nourishing properties and quick recovery from prolonged illness (Wainchakorn, 1957; Sidthimunka *et al*, 1966; Thakur, 1991; Talwar and Jhingran, 1991; Chondar, 1999). Owing to its hardy nature, fast growth and ability to accept artificial feeds, this species is adjudged as an ideal catfish for aquaculture but the technology for mass-scale seed production needs perfection under different agro-climatic conditions of this country before being transferred on commercial scale (Thakur, 1991; Singh and Pandey, 2009). Successful induced breeding and larval rearing of *C. batrachus* will pave the way for its culture and domestication in low-saline ground water of salt affected land with an area of 0.52 million ha in Haryana State. There exists record that the species inhabits in fresh- and brackish-water of plains (Talwar and Jhingran, 1991).

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