

EVALUATION OF BREEDING PERFORMANCE OF ASIAN CATFISH, *Clarias batrachus* IN CAPTIVITY

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ABSTRACT

In the present study attempts were made to evaluate the breeding performance of Magur, *Clarias batrachus* at different doses of ovaprim in laboratory condition. Different doses of ovaprim were tried on male and female fish, the optimum response was showed at dose 1 ml/kg body weight of female and 0.5 ml/kg body weight of male. The brooders weight range was 250-450 g. Breeding response studied under different parameters and showed latency period (h), fecundity, fertilization and hatching (%), 12 ± 1.2 , 4500 ± 150 , 80 ± 2.1 and 75 ± 2.5 respectively. The present findings indicated that ovaprim @ 1ml/kg and 0.5 ml/kg body weight of female and male respectively showed maximum spawning response in *Clarias batrachus*. This is the ideal method to increase the population of this fish in nature to conserve.

KEYWORDS : Induced Breeding, Marathwada, Ovaprim, *Clarias batrachus*.

The Asian catfish, *Clarias batrachus* popularly known as Magur is highly popular in India as an expensive table fish. This species of fish is an excellent diet source in case of patients because of easily digestible high grade protein, high concentration iron and beneficial lipid content. Marathwada region comprising the eight districts. In Marathwada region various dams like, Nathsagar, Majalgoan, Yeldari, Vishnupuri, Siddheshwar, etc are present. The population of *Clarias batrachus* species is declining day by day due to drying up of wetlands, use of pesticides in the paddy field, loss of habitat and overfishing particularly in Marathwada region (Jagtap and Kulkarni, 2013). Due to non-availability of quantity and quality seeds from wild and natural source and also scarcity of matured brood fish which is the major constraint in the culture of this species in a large scale level in this region. To overcome this problem seed production and culture as well in pond environment through induced breeding. The use of synthetic inducing agents for successful ovulation followed by stripping in catfish is a common practice and has been studied at several occasions (Manickam and Joy, 1989; Tan-Fermin et al., 1997).

However, the commercially available synthetic inducing hormones in readymade form containing GnRH and dopamine blocker receptor (ovaprim, ovopel, dagin and aquaspawn) are becoming very popular and found to be efficient in successful spawning of fishes (Brzuska and Adamek, 1999 and Cheah and Lee, 2000). The aim of the present study was to test the potential effects of different

doses of ovaprim in induced spawning of *Clarias batrachus* in captivity to conserve wild population of this species.

MATERIALS AND METHODS

The induced breeding experiments were carried out in the department laboratory. Brooders were collected from local fish market, prior to the breeding season or during the breeding season. The brooders were acclimatized in the laboratory condition. They were fed at 2% body weight daily in the evening hour with chicken, meat and artificially made pellets. The males were selected on the basis of pointed and reddish genital papilla, while females by a round and reddish papilla, softness of abdomen and uniform size of intra-ovarian oocytes (Sharma, et al., 2010).

The female brooders of 250-400 g weight range were selected for induced breeding. Ovaprim (Manufactured Syndel Laboratories, Canada) was used as hormone for induced breeding of fish. Different doses of ovaprim viz. 0.4, 0.5 and 1 ml for female and male 0.1, 0.2 and 0.5 ml per kg body weight were tried. Dose was administered intramuscularly. Injected brooders were released in spawning tank one female and one male in each tank. For each dose three replicates were used. The water parameters were monitored following the standard methods (APHA, 2000).

Before injection, individual female and male body weight was recorded. The testes were removed from male fish, incised and squeezed to get sperm. The sperms were pooled and diluted with physiological saline to prepare a

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sperm suspension. Before stripping, individual weight of females was recorded. At the end of the desired latency period the females were stripped individually into dry enamel tray. The male fishes were dissected and the testes were collected and cut into several pieces with a sharp blade and pressed gently by a cloth to collect the milt. Then the eggs and milt solution were mixed thoroughly with birds feather in a plastic bowl with gentle shake for five minutes. Sperms were then allowed to remain with eggs for another five minutes and excess sperms were removed by several times washing with water.

The translucent eggs containing embryonic eyes were considered fertilised. Unfertilized eggs were removed immediately from the tray to avoid the fouling of water. Student's t test were used for statistical analysis.

Flow-through system for incubation of eggs

The flow-through system, developed in this laboratory comprises a stand on which is placed a row of plastic tubs (12 cm dia, 6 cm high). Water supply is provided from an overhead tank through a common pipe to all the tubs with individual control taps. Each tub is provided with an outlet at a height of about 4 cm which drains into a common conduit to drain off the water. Aeration was supplied to each hatching tub. The fertilized eggs are uniformly distributed in the plastic tubs and a feeble current of water is provided to maintain good water quality. The hatchlings are transferred to plastic containers (capacity 200 L) for rearing.

RESULTS AND DISCUSSION

The spawning response of *Clarias batrachus* at different ovaprim doses is presented in Table 1. The stripping response at 1 ml/kg body weight dose was

significant, followed by 0.5 and 0.4 ml/kg body weight ovaprim dose. The latency period was 14.2 ± 1.2 h. Fecundity 3000 ± 150 , fertilization rate ($75 \pm 2.5\%$) and hatching ($70 \pm 3.5\%$) ($p < 0.05$) were recorded during this study. The eggs hatched out within 12 to 18 h and yolk sac was absorbed in 4 days. Table 1 about here.

Similar findings were also reported by (Sahoo et al., 2005) in the same species while using sGnRHa in combination with domperidone (14 to 23 hours). However according to Sahoo et al., (2005), the suitable latency period for final maturation of ova is also dose dependent when using sGnRHa and domperidone combinations on spawning performances and deduced that latency period of 14-17 hours and dose of 20 µg sGnRHa along with 10 mg domperidone and 30 µg of sGnRHa & 15 mg domperidone per kg of female was found to be suitable for best spawning and larval production. Thus our findings are in connivance to the reporting of (Sahoo et al., 2005) in case of *C. batrachus*.

Dose 0.4 and 0.5 ml of ovaprim per kg body weight resulted in lowest stripped egg yield. Which might be due to insufficient release of gonadotropin (Billard et al., 1984). Zonneveld et al., (1988) has the opinion that the stripping response decreased at lower dose of pituitary in *Clarias batrachus*. The lowest fertilization at 0.4 ml dose might be due to asynchrony between maturation and ovulation, lead to low hatching and this was in agreement with the report of (Rowland, 1988). The good quality eggs were obtained when 1ml ovaprim per kg body weight of fish was injected to this species. More deformity in larvae at lower or higher dose may be attributed to the fertilization of unripe or over ripe ova. Lam et al., (1978) noted that over ripe eggs did not

Table 1 : Breeding Response of *Clarias batrachus* to Ovaprim at Different Doses

Sr. No.	Weight of female (g)	Weight of male (g)	Dose of female (ml/kg)	Dose of male (ml/kg)	Latency period (h)	Fecundity	Fertilization (%)	Hatching (%)
1	200-275	160-200	Control	Control	Nil	Nil	Nil	Nil
2	175-250	150-200	0.4	0.1	16 ± 1.0	2000 ± 200	70 ± 2.6	65 ± 4.7
3	375-400	350-400	0.5	0.2	14 ± 1.4	2500 ± 100	75 ± 2.8	70 ± 3.3
4	350-450	250-300	1.0	0.5	12 ± 1.2	4500 ± 150	80 ± 2.1	75 ± 2.5

Values are Mean±S.E. of three replicates significant at ($p < 0.05$).

form a perivitelline space when placed into fresh water, suggesting that there had been a change in the permeability of the chorion. Water parameters like temperature, pH, dissolved oxygen and total alkalinity were in the ranges of 26-29°C, 7-9, 6.5-7.5 mg/l and 310-340 mg/l respectively during this study.

CONCLUSION

The present investigation concluded that the highest production of good larvae was obtained when injecting 1ml ovaprim per kg body weight of female which could be due to higher numbers of good eggs, higher fertilization and hatching, and less mortality.

ACKNOWLEDGEMENTS

Authors thanks to UGC, New Delhi, for providing financial assistance for this work. Authors also thankful to Principal, Shri Shivaji College, Parbhani for providing facility for this work.

REFERENCES

- APHA, 2000. Standard Methods for Examination of Water and Waste Water, 21th edn. American Public Health Association, Washington, DC, USA, 1268.
- Billard R., Reinaud P., Hollebecq M. G. and Breton B., 1984. Advancement and Synchronization of spawning in *Salmo gairdneri* and *Sital trutta* following administration of LHRHa Combined or not with pimozide. *Aquaculture*, **43**: 57-66.
- Brzuska E. and Adamek J., 1999. Artificial spawning of European catfish, *Silurus glanis* : Stimulation of ovulation using LHRHa, ovaprim and carp pituitary extract. *Aquaculture Research*, **3** (1): 59.
- Cheah M. S. H. and Lee C. L., 2000. Induced ovulation of the Australian eel-tailed catfish, *Neosilurus ater*, Perugia) with Ovaprim. *Asian Fisheries Science* **13**:87-96.
- Jagtap H. S. and Kulkarni S. S., 2013. Present Status of the Catfish Diversity in Marathwada Region, Maharashtra, India. *Indian Streams Res. J.*, 1-6.
- Lam T. J., Nagahama Y., Chan, K. and Hoar W. S., 1978. Overripe and post-ovulatory corpora lutea in the three spine stickle back, *Gasterosteus aculeatus* L., form Trachurus. *Canadian Journal of Zoology*, **56** : 2029-2036.
- Manickam P. and Joy K. P., 1989. Induction of maturation and ovulation by pimozide LHRH analogue treatment and resulting high quality egg production in the Asian catfish, *Clarias batrachus* (Linn.). *Aquaculture*, **83**:193-199.
- Rowland S. J., 1988. Hormone-induced spawning of the Australian freshwater fish Murray Cod, *Maccullochella peelii*, Mitchell), Percichthyidae). *Aquaculture* **70** : 371-389.
- Sahoo S. K., Giri S. S. and A. K. Sahu, 2005. Induced spawning of Asian catfish, *Clarias batrachus*, Linn.): effect of various latency periods and SGnRHa and domperidone doses on spawning performance and egg quality. *Aquac Res.*, **36**: 1273- 1278.
- Sharma K., Yadava N. K. and Jindal M., 2010. Effect of different doses of ovatide on the breeding performance of *Clarias batrachus*. *Livestock Res. for Rural Development*, **22** (4):1-7.
- Tan-Fermin J. D., Pagador, R. R. and Chavez R. C., 1997. LHRHa and pimozide-induced spawning of Asian catfish *Clarias macrocephalus*, Gunther) at different times during an annual reproductive cycle. *Aquaculture*, **148** : 323-31.
- Zonneveld N., Rustidja W. J., Viveen A. R. and Maduna W., 1988. Induced spawning and egg incubation of the Asian catfish, *Clarias batrachus*. *Aquaculture*, **74** : 41-47.