The Bioscan 15(3): 323-326, 2020
AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES
www.thebioscan.com

EFFICIENCY OF OVATIDE ON MASS SEED PRODUCTION OF CLIMBING PERCH *(Anabas testudineus*, BLOCH, 1972) IN NALBARI DISTRICT, ASSAM

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KEYWORDS
Ovatide
Spawning Fertilization Hatching
Anabas testudineus

Received on :
03.05.2020

Accepted on :
30.07.2020

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ABSTRACT
A study was carried out to evaluate the efficiency of synthetic hormone (ovatide) on induce spawning of the climbing perch, Anabas testudineus under agro-climatic conditions of Assam. The breeding programme was conducted with 3 Ovatide doses of 0.1, 0.2 and 0.3 ml/kg body weight on performance of egg quality. After spawning, the fecundity of each cycle was calculated through relative fecundity and percentage of ovulation, fertilization, hatching and survival. All the three hatcheries (H-1, H-2, H-3) differed significantly ($p<0.01$) in performance of induced breeding while H-3 performed comparatively better ($p<0.05$) than the other two hatcheries. The brooder fishes injected with higher dose of Ovatide (0.3 ml/kg body weight) resulted in highest percentage of fertilization, hatching and survival rate as 98.03 ± 0.74, 87.98 ± 0.82, 80.92 ± 0.94 in H-3 hatchery respectively while the lowest performance was observed in H-2 hatchery. The results showed that the synthetic hormone (Ovatide) is more effective for mass seed production of A. testudineus when injected with 0.3 ml/kg body weight.

INTRODUCTION

Kawoi is an air breathing catfish and they are most preferred fish species for its taste and nutritive value in Assam. This species is endemic to Assam and is hardy in nature and can withstand adverse ecological condition. However the natural aquatic ecosystem of Assam is the main prefered habitat of these fishes. But due to heavy pressure on capture fisheries in the natural water bodies these air breathing species are declining drastically in the daily market (Mahapatra *et al*., 2010; Baruah *et al*., 2013)

North East India is considered as one of the hot spots of aquatic fish biodiversity in the world. Studies of Sarkar and Ponniah (2000) revealed that out of 186 fish species 62 (33.16%) are considered as only food fish. As far as economic value is concerned, it is evaluated that out of 186 species 34 fish species have market demand better than Indian major carps whereas 19 species have similar economic value. Thus, it may play a significant role in improving the state's economy as well as generate employment opportunities to the rural population and unemployed youths. Therefore, mass seed culture technology of indigenous species mainly Climbing perch A. testudineus locally called as 'Kawoi' is considered as a potential species for aquaculture diversification which is need of hour. However, the species of A. testudineus has high demand in the market of North-Eastern India among small fin fish species. It fetches nearly INR 500-700 per kg. Therefore, the demand of seeds of catfish has been increasing day by day for last two years. However, due to lack of quality seeds of catfish of Kawoi were unable to flourish in proper way. Many scientists are claiming the successful breeding of few of the indigenous species but the region specific scenario is still hovering cloudy. Hence, the importance of artificially propagated seeds is of utmost need for the cultivation of these important species. In Assam, reports on artificial breeding of indigenous fish species are not encouraging although Das (2002) reported successful low cost breeding technique of Magur. The successful breeding of climbing perch A. testudineus is being reported by Khan (1972), Banerjee and Prasad (1974) and Khan and Mukhopadhyay (1975). According to Lin and Peter (1996) they used several inducing agents such as salmon gonadotropin releasing hormone (sGnRH) or luteinising hormone releasing hormone (LHRH) analogues in combination with dopamine antagonists were found to be effective in fish breeding. The successful spawning through synthetic inducing agents is a widespread practice and it was studied by many scientists (Sahoo et al. 2003). The main drawback of these hormones are their preparation and storage. Therefore, the commercially available synthetic inducing hormones such as Ovaprim, Ovopel, Dagin and Aquaspawn are becoming very popular and are capable to induce successful spawning of fishes (Peter *et al*., 1988; Nandeesha *et al*., 1990; Cheah and Brzuska, 2001). The Ovatide consists of GnRH analogue in combination with dopamine antagonist is also efficient in inducing spawning (Gupta *et al*., 2002; Sahoo *et al*., 2004b). Therefore, the

objective is to study the efficiency of different doses of Ovatide on spawning response and standardize the dose for mass seed production of A. testudineus.

MATERIALS AND METHODS

The study was conducted in Nalbari district located in Central Western part of Assam State between 910 07/ E 910 47/ E latitudes and 260 N and 580 5/ N longitude. The total geographical area of the district is 1052 sq km, which is 2.6% of the total area of the state of Assam. The 3 different hatcheries selected for study was located at Nalbari district and was designated as H-1, H-2 and H-3.

Portable FRP hatchery for seed production developed by ICAR-CIFA

Witnessing the keen interest of some farmers of the Nalbari district for seed production of Kawoi, the KVK Nalbari, Assam collaborated with ICAR-CIFA, Bhubaneswar for procurement of portable FRP hatcheries for those farmers and the same were established in 3 locations of Nalbari district, Assam. The portable hatcheries are fabricated by fiberglass reinforced plastic (FRP) and consist of a circular tank of 2 m diameter with 5-6 inlets at the intersection of the tank wall and bottom surface. The inlets supply turbulent water flow and it was fitted at an angle of 45º. It had a capacity of about 30,000 fertilized eggs in a single cycle. This turbulent water flow is provided to maintain dissolved oxygen for fertilized eggs. The main advantages of FRP hatcheries are light in weight, easy to transport and it could be assembled and dismantled easily.

Working practices of the selected FRP hatcheries

Study of breeding and larval rearing of indigenous climbing perch (Kawoi), A. testudineus was carried out during the year 2018-2019 and 2019-2020 in the fish farms of Nalbari district. The farmers of Nalbari district started breeding programme of Kawoi during the breeding season from April-August every year. In Assam climbing perch matures during March to June with a peak from April to May, which is similar in most of the fish species of the region (Gogoi *et al*., 2013). The following were the working practice in the study-

Seed production technique of climbing perch (Kawoi), A. testudineus

Farmers collected Kawoi brood fish from own earthen ponds. Brooders were fed twice daily with fish meal based feed containing 30-35% protein @ 3-5% of the body weight. The brood stock of Kawoi having average weight of 80-100 gm each was used during the study. Farmers maintained ideal 2:1 (Male and Female) sex ratio of Kawoi for higher fertilization. Hatchery owners selected male and female Kawoi fishes where males were darker and had a more accentuated knife edged anal fin than females. The pectoral fin of male became rough during the breeding season and the genital papilla is rather pointed and narrow with free-oozing milk when slight pressure was applied on the abdomen. The pectoral fin of females was smooth, the genital papillae were swollen and pinkish, and the abdomen is bulging and soft. The female Kawoi fishes were injected @ 0.5-1.0 μl/g body weight and 0.25-0.5 μl/g body weight was injected to male. After 7-8 hours of injection spawning was observed where the fishes released the eggs. Eggs were incubated in FRP tanks where they hatched out within 7-8 hrs at 26-28ºC. The spawns were reared for 3 weeks in FRP tanks and fed with zooplanktons for first two weeks, till they attained the size of 12-16 mm and subsequently fed on powdered formulated feed containing 35% protein.

After spawning, the fecundity of each cycle was determined (Chondar, 1994; Thomas *et al*., 2003 and Rath, 1999). It was represented by the following formula:

Total number of eggs laid (approx) = Average no. of eggs in each sample beaker X No. of beakers of eggs

$$\text{Relative fecundity} = \frac{\text{Total number of egg}}{\text{Body weight}}$$

$$\text{Percentage of ovulation(\%)} = \frac{\text{Number fish ovulated}}{\text{Total number of fish injected}} \text{X100}$$

$$\text{Percentage of fertilization(\%)} = \frac{\text{Number of fertilized eggs}}{\text{Total number of eggs in sample(fertilized + unfertilized}} \text{X100}$$

$$\text{Hatching rate(\%)} = \frac{\text{Total number of spawn}}{\text{Number of fertilized eggs}} \text{X100}$$

$$\text{Survival rate(\%)} = \frac{\text{Number of hatching alive up to larvae stage}}{\text{Total number of hatching}} \text{X100}$$

$$\text{Normal larvae(\%)} = \frac{\text{Number of normal larvae}}{\text{Total number of larvae counted}} \text{X100}$$

$$\text{Abnormal larvae(\%)} = \frac{\text{Number of abnormal larvae}}{\text{Totla number of larvae counted}} \text{X100}$$

Statistical analysis and economic analysis

Statistical analysis was done by analysis of variance (ANOVA) to determine the significant differences among means at $\acute{a}$ = 0.05 level using statistical tools of Microsoft Office Excel (2007).

RESULTS AND DISCUSSION

Three different doses of Ovatide hormone were used in three different hatcheries for inducing ovulation in female A. testudineus. The performance data of doses on female ovulation are represented in Table-1. The results of ANOVA test showed significant ($p < 0.01$) difference in all three hatcheries while the success rate of hatchery (H-3) was significantly ($p < 0.05$) higher than others. During the breeding programme, three females and six males were selected in the ratio of 2:1 and 10 breeding cycles was carried out in each hatchery. Different doses of Ovatide hormone were injected intramuscularly in three hatcheries. The result of ovulatory performance of A. testudineus in H-3 hatchery showed that the total fecundity, relative fecundity and ovulation were 1349.32 ± 128.87, 6.39 ± 0.55, 98.08 ± 0.78 respectively and it was significantly higher ($p < 0.05$) where body weight of females and male were 70.34 ± 1.59 65.65 ± 2.70 respectively. The success rate of H-3 hatchery was higher compared to the other two hatcheries when the fishes were injected with Ovatide @ 0.30 ± 0.003 ml per kg body. The lowest total fecundity, relative fecundity and ovulation were

Table1: Performance of various doses of Ovatide on spawning fecundity, stripping response, fertilization, hatching and larval production of A. testudineus.

Parameters	H-1	H-2	H-3
Body Weight of Male(gm) NS	64.05 ± 1.44	62.95 ± 0.675	65.65 ± 2.70
Body Weight of Female(gm) NS	69.74 ± 2.42	68.90 ± 1.58	70.34 ± 1.59
Dose of Ovatide (ml/kg body weight) NS	0.20 ± 0.006	0.11 ± 0.01	0.30 ± 0.003
Latency period (Hours)	10.20 ± 0.42a	15.20 ± 0.78b	7.80 ± 0.78c
Fecundity	866.02 ± 9.41a	455.33 ± 23.22b	1349.32 ± 128.87c
Relative Fecundity	4.14 ± 0.12a	2.20 ± 0.13b	6.39 ± 0.55c
Ovulation %	83.26 ± 4.13a	47.81 ± 4.90b	98.08 ± 0.78c
Fertilization%	88.10 ± 0.48a	60.03 ± 0.63b	98.03 ± 0.74c
Hatching %	75.86 ± 0.51a	40.37 ± 0.48b	87.98 ± 0.82c
Survival rate%	67.65 ± 1.03a	32.07 ± 0.53b	80.92 ± 0.94c

Mean values bearing different superscripts in the row differ significantly ($p < 0.05$).
NS: Non Significant

455.33 ± 23.22, 2.20 ± 0.13 and 47.81 ± 4.90 respectively and these results were observed in the fishes injected with dose @ 0.11 ± 0.01 ml per kg body weight. Sarkar et al. (2005) found out that the numbers of eggs released by the females were ranged from 52000 to 130000 numbers indicating high fecundity. According to Central Inland Fisheries Research Institute workshop Report (CIFRI, 1982) it was observed that the fecundity data at the Assam centre is 3812-28490 eggs in the fish size range of 74-138 mm per 7-57 g. Banerjee and Thakur (1981) reported shedding of 2000-13000 eggs in seven sets of induced bred A. testudineus (24.8-40.1g) in glass aquaria. Several authors studied the performance of air breathing fishes injected with Ovaprim. Haniffa *et al*. (2000) and Singh *et al*. (2002) reported that the rate of induced breeding for ovulation of Channa spp. and Heteropneustes fossilis were from 0.3-0.6 ml and 0.2 ml kg per kg body weight respectively. However, the Ovatide consisting GnRH analogue in combination with dopamine antagonist was more useful for induced spawning (Gupta *et al*., 2002, Sahoo *et al*., 2004b). Therefore, it was clearly observed that the dose of 0.3 ml/kg body weight induced 98.03% ovulation and its effect on fertilization and hatching was also higher. Similar observation is reported by Sarkar *et al*. (2005) and Mazid and Kohinoor (2003). However, Sharma et al. (2010) reported that a higher dose of 1 ml/kg Ovatide was required to obtain complete spawning in Clarias batrachus. The higher latency period of 15.20 ± 0.78 in H-2 hatchery was observed where as 10.20 ± 0.42 and 7.80 ± 0.78 were observed in H-1 and H-3 hatchery, respectively. This might be due to the higher dose of Ovatide administered that resulted in early ovulation. Similar observation was reported by Habibi, Marchant, Nathorniak, Vander Loo, Peter, River and Vale (1989) in goldfish, Carassius auratus. Longer latency period in low dose of synthetic hormone Ovatide was reported by Pandey, Koteeswaran and Singh (2002). ANOVA test showed significant ($p < 0.01$) difference in fertilization, hatching rate and survival for three different doses of Ovatide while considering the ovulation rate where H-3 was significantly ($p < 0.05$) higher than others. The lowest Ovatide dose of 0.1 ml/kg body weights found in H-2 which is detrimental for fertilization and hatching. A significant decrease ($p < 0.05$) in fertilization, hatching and was observed with dose of 0.1 ml Ovatide/kg body weight during the study. So fertilization and hatching percentage was low compared to H-1 and H-3 hatchery. The highest and lowest fertilization, hatching and survival rates were 98.03 ± 0.74, 87.98 ± 0.82, 80.92 ± 0.94 and 60.03 ± 0.63, 40.37 ± 0.48, 32.07 ± 0.53 in H-3 and H-2 hatcheries, respectively. Similar observation is reported by Sarkar *et al*. (2005) and Singh *et al*. (2012). The study revealed that the highest fertilization, hatching and survival rates was obtained with a dose of 0.3 ml Ovatide per kg body weight of fish spp. A. testudineus followed by 0.1 ml and 0.2 ml doses.

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NAAS Rating : 5.26

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Published by Aditi Publications, Patliputra, Patna

The Bioscan
An International Quarterly Journal of Life Sciences
ISSN : 0973-7049
Volume 15(3) : 2020
Published as an official organ by
NATIONAL ENVIRONMENTALISTS ASSOCIATION

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