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INDUCED SPAWNING OF *PUNTIUS GONIONOTUS* (BLEEKER)

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Abstract

An experiment was conducted to study the induced spawning of Rajputi *Puntius gonionotus* (Bleeker) in the months of April, May, June and July 2005. Five different doses of PG were used in the experiment. In *Puntius gonionotus* all the different doses (doses D_1-3.00 mg/kg, D_2-6.00 mg/kg, D_3-9.00 mg/kg, D_4-12.00 mg/kg and D_5-15.00 mg/kg) were affected equally (100%) in egg release. In the experiment both the males and females were given the 1st dose but the 2nd injection was given only to the females after 6 hours. The highest fertilization rates were 70.10±2.25% in April (dose D_4), 75.00±2.10% in May (dose D_3), 80.00±2.14% in June and 79.20±2.65% in July (dose D_3). The highest hatching and survivability rates were 61.50±3.10 and 55.00±2.13 in April (dose D_4), 68.00±3.5 and 63.00±2.20 in May (dose D_3), 71.80±2.00 and 68.50±2.60 in June (dose D_2), and 70.25±3.50 and 65.70±2.16 in July (dose D_3) respectively. The month of June and the dose D_2 (2mg in first injection and 4 mg in second injection) were found to be most effective for induced spawning of *P. gonionotus.*

Key words: Induced spawning, hatchling, PG dose.

Introduction

Artificial propagation of fishes is done by induced breeding technique. Induced breeding of endemic major carps has been established as a dependable source of fish seeds since the mid 1960's (Ali 1967) in hatcheries for production of fry or fingerlings which contributes significantly to the overall aquaculture production of Bangladesh. Rajputi is an exotic species which breeds normally in streams and rivers like most tropical cyprinids. They can also breed in captivity like pond and tank water. Their breeding season starts from April and lasts till August. The natural source provides a negligible amount of fish seed because of higher mortality rate, mixture of cultivable and non cultivable species and shrinkage of spawning ground which impede the extension and expansion of fish culture. After the first attempt of induced spawning in early thirties this technique had been successfully tried in many countries of the world. The technique of induced breeding of Rajputi *(Puntius gonionotus)* has been reviewed by Hussain *et al.* (1987); Leelapatra (1988); Tangtrongpiros *et al.* (1990); Haque and Ahmed (1991); Sukumasavin *et al.* (1992); Naruepon *et al.* (2000). However despite of prolonged practice and considerable refinement, hypophysation procedure still seems to be lacking of sufficient standardization background of the technique basically from the problems of dose and selection of broods. The present experiment was conducted on the induced breeding of Rajputi (Thai Puti) with the objective to determine the most effective dose and month with regard to egg release, fertilization, hatching and survival of hatchlings.

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Materials and Methods

The experiments were carried out in hatchery tanks (2m × 3m) of the fish seed multiplication farm at Arappur, under Kotwali thana of Jessore district in Bangladesh in cooperation with the farm owner. However some of the analytical works were carried out at the Fisheries Research Laboratory of Zoology Department, University of Rajshahi. The study was carried out during the period from April to July 2005. The hatchery was established in 1985 with a total area of about 10 acres. Mature and healthy *Puntius gonionotus* of both sexes were collected from local fish farmers as well as from the fish seed multiplication farms, a few months prior to breeding season and reared in a well fertilized (10kg/decimal cowdung + 100g/decimal Urea +200g/decimal TSP + 50g/decimal MP). Stocking pond for spawning. The feeds consisting of fish meal (20%), rice bran (35%), mustard oil cake (22%), wheat bran (16%), molasses (6%) vitamin and mineral premix (1%), were supplied to the pond every day at the rate of 2% of the body weight of the total stock. The growth and sexual maturity of brood fishes was examined fortnightly.

Mature, healthy and uninjured fishes were netted out of the pond and sexed on the basis of sexual dimorphic characteristics. The spawners were acclimatized to the ground water in the holding tank before putting them into spawning tank. The selected breeders were removed from the cistern by hand net and wrapped with well soft cloth. The fishes were injected intramuscularly with different doses of Pituitary gland (PG) between the dorsal fin and lateral line with a 6ml hypodermic syringe. In this experiment, the first injection was given to both the sexes but the second injection was given only to the females after 6 hours.

After hypophysation, the breeders were allowed to breed in the breeding cistern. The ready spawners were caught by net for stripping. The female fishes were stripped and the eggs were collected in an enamel-coated bowl. Milt was pressed out and spread over the eggs and mixed by means of a feather. The eggs were shaken mildly in the bowl and kept for five minutes. In this way the instantly obtained eggs were fertilized by sperms of different time interval viz., instant, 2 minutes, 4 minutes, 6 minutes, 8 minutes and 10 minutes after collection. On the other hand, instantly obtained sperms were used on the eggs of different time interval, viz., instant, 5 minutes, 10 minutes, 15 minutes, 20 minutes, 25 minutes and 30 minutes after collection. The eggs were then washed in tap water and were placed in a hatching funnel (62.8 cm × 43.5 cm). A continuous flow of water was maintained. The hatchlings came out after 24-29 hours. The hatchlings were kept in the funnel jar for three days without feeding. After three days the hatchlings were given egg yolk and reared up to sale.

Results and Observation

The results were obtained through 5 induced breeding experiments using 5 different doses of Pituitary gland (PG) (Table 1). The results documented here demonstrate the effectiveness of different Pituitary gland (PG) doses on egg and sperm release, fertilization, hatching rates of eggs and survivability of *Puntius gonionotus*. Five experiments with 5 different doses were carried out during the period from April to July 2005 and the results are shown in Table 2.

Table 1. Amount of PG doses for induced spawning of *Puntius gonionotus*.

Name of doses	1st dose	2nd dose	Total dose (mg)
D_1	1.00	2.00	3.00
D_2	2.00	4.00	6.00
D_3	3.00	6.00	9.00
D_4	4.00	8.00	12.00
D_5	5.00	10.00	15.00

Table 2. Effect of different doses of PG on egg release response, fertilization, hatching rate and survivability of *Puntius gonionotus* in the months of April, May, June and July, 2005 (values are arithmetic mean±SD).

Months	Doses	% of egg release	% of Fertilization	% of Hatching	% of survivability
April	D_1	0.00	0.00	0.00	0.00
	D_2	50.00±2.00	31.00±2.35	22.33±2.50	18.00±2.20
	D_3	85.00±.10	55.00±2.10	46.75±3.10	38.20±2.13
	D_4	100±00	70.10±2.25	61.50±3.10	55.00±2.13
	D_5	100±00	63.00±3.15	54.26±3.24	49.20±1.12
May	D_1	18.00±2.00	45.00±3.40	36.20±1.20	30.00±2.00
	D_2	100±00	45.00±3.10	36.0±1.20	30.00±2.00
	D_3	100±00	75.00±2.10	68.00±3.50	63.00±2.20
	D_4	100±00	70.00±3.28	62.25±2.14	58.00±2.00
	D_5	100±00	61.00±3.00	52.50±3.40	48.00±2.25
June	D_1	45.00±3.00	55.00±2.10	45.15±3.10	40.00±2.10
	D_2	**100±00**	**80.00±2.14**	**71.80±2.00**	**68.50±2.60**
	D_3	100±00	75.25±2.60	68.67±2.57	63.20±1.50
	D_4	100±00	70.20±2.75	65.15±2.68	60.00±2.85
	D_5	100±00	55. 00±2.80	50.25±2.85	45.00±2.00
July	D_1	40.00±4.00	58.00±3.10	52.20±2.25	47.50±1.50
	D_2	100±00	72.25±2.16	64.50±3.15	58.70±1.57
	D_3	100±00	79.20±2.65	70.25±3.50	65.70±2.16
	D_4	100±00	65.00±1.65	6.00±2.65	56.20±2.85
	D_5	100±00	60.50±2.76	55.68±3.10	50.00±2.10

In the present study, pituitary gland (PG) extract was used as the inducing agent for breeding of *P. gonionotus.* Fish pituitaries in general were found to be most effective in artificial fish breeding practice (Chaudhury 1969). Effectiveness of carp pituitary extract in artificial breeding of fishes was supported by Davy and Chouinard (1980) and Rothbard (1981). In the present study the dose D_1 (1st dose 1 mg/kg, 2nd dose 2 mg/kg) did not show any ovulation response. Dose D_2 to D_5 showed partial to 100% ovulation

response. In June the dose D_2 found to be most effective with regard to the egg release, fertilization, hatching and highest survivability (Table 2). As soon as the female release their eggs, the males also release the spermatozoa and fertilize the eggs.

Many authors made attempts to standardize the PG dose for breeding the fish. But there exists some ambiguities in the results reported by them and are also in variance with the findings of the present study. Bhowmick *et al.* (1978) suggested priming dose to the female ranging 2 to 3 mg/kg, the second being 10-12 mg/kg. Hussain *et al.* (1987) used 2.00-5.00 mg/kg body weight of exotic Sorputi to breed and found the doses effective to ovulate the females. Kohinoor *et al.* (1995) showed that a dose of 5 mg/kg to 6 mg/kg body weight of female indigenous Sorputi was suitable for breeding. The reported PG doses are lower (It is higher than the D_1 and D_2) than the doses used in the present study. The differences in the results of various studies may be attributed to a number of factors, including (a) readiness of brood fish, (b) age and physiological state of brood fish, (c) seasonal variations, (d) environmental factors and (e) source, age and maturity of donor fish etc. In different months, the variation of fertilization, hatching and survivability rates were found statistically significant (Table 3).

Table 3. Values of regression co-efficient 'b', intercepts 'a' and co-efficient of correlation 'r' in F/TL, F/TW, F/GL, F/GW relationships.

Relationship		Value of 'a'	Value of 'b'	Value of 'r'
Ordinate	Abscissa			
Fecundity	Total length	-22078	242.94	0.84 ″
Fecundity	Total weight	3795	199.25	0.95 ″
Fecundity	Gonadal length	74243	280.64	0.86 ″
Fecundity	Gonadal weight	10890	1110	0.87 ″

″ Highly significant.

As shown in the results, the best ovulation, fertilization, hatching and survivability rates were achieved under higher dose during early (D_4 in April) and later part (D_3 in July) of breeding season. On the other hand, relatively lower dose was required in the middle part of the breeding season (D_2 in June). So the month of June and the dose D_2 (2 mg/kg weight of fish in first injection and 4 mg/kg in second injection) were found to be most effective for induced spawning of *P. gonionotus.* According to Chaudhuri (1976), Jhingran and Pullin (1985) and Woynarovich and Horvath (1980) slightly higher dose of hormone was required at the beginning and latter part of the spawning season and comparatively lower dose was required at the middle of the breeding season. The findings of the present study are thus almost in conformity with the findings of the above authors.

Conclusion

From the above experiment it can be concluded that *P. gonionotus* can easily be induced and reared, thus it can play an important role in aquaculture.

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