Asian Fisheries Science 3(1990): 257-261.
Asian Fisheries Society, Manila, Philippines
https://doi-org/10-33997/j-afs-1990-3-2-008

Seduced Breeding of Indian Major Carps (*Labeo rohita, Cirrhina mrigala* and *Labeo calbasu*)

M.S. SHAH and M.A. RAHMAN
Fisheries Research Institute
Freshwater Station
Mymensingh-2201, Bangladesh

D. DEPPART
Aquaculture Advisor
DANIDA, Dhaka, Bangladesh

M.A. RAB
Satkhira Shrimp Project
Directorate of Fisheries
Dhaka, Bangladesh

Abstract - Seduced breeding was tested in *Labeo rohita, Cirrhina mrigala* and *Labeo calbasu* in two different breeding pool selections, where the males were always injected with pituitary gland hormone (PG) and the females were either not injected or a portion of the females injected with a single or two split doses of hormone (PG). There were fourteen attempts involving 135 different females in all the species. The average percentage of females ovulating was 96% in the noninjected group (seduced breeding) while the percentage of females ovulating in the mixed group (sympathetic breeding) averaged 63%. The average rates of fertilization in the two breeding pool selections were both around 83%. The results of the experiments suggest that the females during their optimum reproductive period can successfully undergo seduced or sympathetic breeding under hatchery conditions.

Induced breeding of Indian major carps by hypophysation has been practiced extensively for the past two decades with varying degrees of success (Ali 1967; Hague 1974; Islam and Chaudhury 1976; Ahmed et al. 1982; Rahman et al. 1985). Use of hormones is considered a basic prerequisite and often the only means of artificial propagation of Indian carps. Our attempt to breed them by seduction and/or sympathetic breeding is a new proposition in Bangladesh. The idea is that females can be brought to breeding condition without hormone treatment and persuaded or seduced to breed in the presence of either hormone-injected males alone or hormone-injected breeding pairs actively participating in breeding activities (Jhingran 1982; Lai et al. 1984).

Hormones are a costly input in breeding programs. Induced breeding and production of fish seed without hormones or even by reduced dosages of hormones would have a far reaching implication on carp culture as a whole. The objectives of the present work were to identify the period of breeding without hormone injection and to determine the extent to which hormone requirement can be reduced.

The work was carried out at the Freshwater Station of the Fisheries Research Institute, Mymensingh, Bangladesh, during the 1986 and 1987 breeding seasons (April to August). The brood fish used were reared in polyculture ponds measuring 0.2 to 0.6 ha at a stocking density of 1,300-1,900 kg·ha^{-1}. The species stocked included *Catla catla, Hypophthalmichthys molitrix, Labeo rohita, Cirrhina mrigala* and *Ctenopharyngodon idella* in the ratio of 3:6:5:5:1. *Labeo calbasu* was stocked separately with *C. idella* in a 0.2 ha pond in the ratio of 7:3. Fertilization of the ponds was done bimonthly with Urea (25 kg·ha^{-1}) and Triple Super Phosphate (50 kg·ha^{-1}). Supplementary feeding was done with wheat bran (40%), rice bran (15%), sesame oil cake (20%), mustard oil cake (10%), fish meal (5%), wheat flour (5%) and molasses (5%) at the rate of 1.5% of the total biomass. The brood fishes after seining from the ponds were acclimatized gradually to deep tubewell water in the hatchery for a period of 6-12 hours.

Two breeding pools were formed. The first consisted of females without hormone treatment while the second had some of the females receiving either a single dose or two split-doses of routine pituitary gland (PG) preparation. Males were invariably injected with a single dose of PG preparation. We term the situation where females were not injected as "seduced breeding" and that in which only a portion of females were injected as "sympathetic breeding". The flow of water in the hatchery was maintained at 500 l·min^{-1}. The eggs were collected for incubation 6-14 hours after injection when the females had started spawning. The rate of fertilization and hatching time were recorded.

Fourteen separate trials were made in the two breeding pools involving 135 different females belonging to the three species of Indian major carps. The number of seduced breeding trials was 5 involving 36 different females of the two species *C. mrigala* and *L. calbasu*. A total 25 females of *C. mrigala* spawned successfully and the average fertilization was 85% (Table 1). While in the case of *L. calbasu*, all the females spawned successfully and fertilization was 81.33% (Table 1). Seduced breeding of *L. rohita* was not possible during the 1986 breeding season. Only sympathetic breeding was

attempted (Table 2). No breeding trials were performed in 1987 because the breeders were in poor condition resulting from heavy parasitic infestation by *Argulus* sp.

Table 1. Seduced breeding trial and success of breeding in *Cirrhina mrigala* and *Labeo calbasu*.

Trial no.	Species	Date	Total no. of fish used	Females ovulating fully (%)	Females ovulating fully & partially	Fertilization rate (%)
1.	*C. mrigala*	25.06.86 (No injection)	5	80	80	85
2.	*C. mrigala*	30.07.86 (No injection)	20	100	100	85
3.	*L. calbasu*	14.07.86 (No injection)	1	100	100	85
4.	*L. calbasu*	20.05.87 (No injection)	2	100	100	74
5.	*L. calbasu*	09.08.87 (No injection)	8	100	100	85

Table 2. Sympathetic breeding trial and success of breeding in *Labeo rohita, Labeo calbasu* and *Cirrhina mrigala*.

Trial no.	Species	Date	Total no. of fish used	Females ovulating fully (%)	Females ovulating fully & partially (%)	Fertilization rate (%)
1.	*L. rohita*	14.07.86 (No injection) 14.07.86	5	80	100	84
		4 mg · kg^{-1} (Single injection)	3	33	66	84
2.	*L. rohita*	04.08.86 (4 mg · kg^{-1} single injection)	7	43	86	90
		04.08.86 (No injection)	6	50	100	90
3.	*C. mrigala*	30.04.87 (No injection)	3	33	33	87
		30.04.87 (2 mg · kg^{-1} single injection)	3	100	100	87
		30.04.87 (2 mg + 6 mg · kg^{-1} two split-dose injections)	3	100	100	87
4.	*C. mrigala*	12.05.87 (No injection)	3	33	66	88
		12.05.87 (2 mg · kg^{-1} injection)	16	31	69	88
5.	*C. mrigala*	20.06.87 (No injection)	3	66	66	89
		20.06.87 (2 mg · kg^{-1} single injection)	6	66	66	89

Continued

Table 2. Continued

Trial no.	Species	Date	Total no. of fish used	Females ovulating fully (%)	Females ovulating fully & partially (%)	Fertilization rate (%)
		20.06.87 1:5 mg + 2 mg · kg^{-1} (Two split-dose injection)	4	75	75	89
6.	*C. mrigala*	24.06.86 (No injection)	4	100	100	98
		24.06.86 (1 mg + 6 mg · kg^{-1} Two split-dose injection)	3	100	100	98
7.	*L. calbasu*	18.05.87 (No injection)	2			
		18.05.87 (3 mg · kg^{-1} injection)	4	50	100	62
8.	*L. calbasu*	07.06.87 (No injection)	3	100	100	80
		07.06.87 (2 mg · kg^{-1} single injection)	7	86	86	85
		07.06.87 (4 mg · kg^{-1} single injection)	3	66	100	85
9.	*L. calbasu*	12.07.87 (No injection)	3	66	66	86
		12.07.87 (2 mg · kg^{-1} single injection)	4	100	100	86
		12.07.87 (1 mg + 4 mg · kg^{-1} Two split-dose injection)	4	100	100	86

The number of trials, total number of females used, the number of females spawning successfully and the percentage of fertilization observed in sympathetic breeding pools are presented in Table 2. In case of *L. rohita*, all the 11 females without hormone injection spawned while 8 out of 10 females receiving a single dose of injection spawned.

The percentage of females spawning successfully and belonging to various categories (i.e., not injected; single-dose injected and split-dose injected) from a total of nine trials under sympathetic breeding are as follows: *C. mrigala* - 66%, 78% and 92%, respectively; *L. calbasu* - 55%, 96% and 100%, respectively; and *L. rohita* - not injected 100%, single dose injected 76%. Our results indicate greater success with seduced breeding than with sympathetic breeding.

There are hardly any published reports on the breeding of Indian major carps without hormone injection under hatchery conditions. In a slightly different context, Jhingran (1982) reported the case of

seducing breeders to spawn in the dry bundhs with the introduction of breeders injected with hormones. The breeding season of the Indian major carps generally starts from April and continues to August, with an optimum period between May and June. The dosage of hormones required and the time interval between the preliminary and resolving dose of injection were found to vary throughout the breeding season, usually requiring lesser doses near the optimum period (M.A. Rahman et al., unpubl. data). In the present study, seduced breeding was tried during the months of May to July while the sympathetic breeding trials were performed during April to August.

The greater success achieved by seduced breeding may be due to the fact these trials were performed at the peak of the breeding season. Sympathetic breeding trials, on the other hand, were carried out even during the relatively unfavorable months. It is also possible that males may tend to court with injected (excited) females rather than with females which need to be coaxed into breeding.

References

Ahmed, N.U., S.C. Dhar, M. Ali and H. Mahmood. 1982. Report on the results of induced breeding of carps in pilot hatchery, Chandpur, Comilla in the year 1979-80. Freshwater Fisheries Res. Rep. No. 5.

Ali, M.Y. 1967. Induced spawning of major carps in ponds by pituitary hormone injection. Agri. Inform Serv. Dhaka.

Islam, M.Z. and A.Q. Chowdhury. 1976. Induced spawning of major carp for commercial production of fry in the fish seed farm. Bangladesh J. Zool. 4(2): 113-123.

Jhingran, V.G. 1982. Fish and fisheries of India. Hindustan Publishing Corporation, Delhi (India).

Haque, K.A. 1974. Some observations on the induced spawning of major carps by pituitary hormone injections. Freshwater Fish. Res. St. Chandpur, Bll. 1, 19-24.

Lai, Z., J.H. Liu, F.L. Ye, C.P. Li and D.F. Chen. 1984. The experiments on the seduced spawning of mud carp by the spawners injected with hormone. J. Fish. China-shui-chan xuebao 8(4): 287-293.

Rahman, M.A., S. Dewan, S.M. Rahmatullah and N. Das. 1985. Experiment on induced breeding of indigenous major carps by pituitary hormone injection. Bangladesh J. Aquaculture 6-7(1): 51-67.

Manuscript received 9 November 1988; accepted 21 September 1989