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Note

Successful induced spawning and hatching of hill stream carp, *Labeo dyocheilus* (Mcclelland) in Kosi river

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ABSTRACT

Among the food fishes in the Kumaon Himalayan region of India, the carp, Labeo dyocheilus has high consumer preference as well as good market value. The fish belonging to the order Cypriniformes is in an endangered species. Successful breeding of L. dyocheilus (McClelland) by intramuscular administration of synthetic hormonal drug, ovaprim is reported. 90-95% fertilisation and high rate of hatching was observed. The performance of various facilities used for spawning and incubation process is discussed. Successful breeding of this fish enabled us to produce populations in the natural stream environment.

Induced spawning and the release of induced bred individuals into the wild are among the techniques used for the conservation of endangered fish species. Attempts have been made to breed the endangered hill stream fish Tor putitora in the Kumaon region (Tripathi 1977; Pathani and Das, 1979; Sehgal, 1991; Shyam Sunder et al., 1993; Ogale 1997) and at Lonavala and Western Ghats. Pandey et al. (1998) succeeded in induced spawning of pond raised endangered golden mahseer with ovaprim administration and (Bhowmik et al. 2000 in non-airbreathing catfish Ompok pabda. Scanning of literature indicates that no research have been done on the biology, life history, captive breeding and induced spawning of coldwater medium carp L. dyocheilus either in pond condition, laboratory condition or in streams.

In the Kumaon Himalayan region, L. dyocheilus locally called 'Kali' one of the most economically important fish (Joshi, 1994) has been categorised at different times as threatened (Desai, 1994) and vulnerable (Dubey, 1994; Prasad, 1994; Sinha 1978). The fish is a bottom feeder inhabiting upland streams and rivers at an elevation of 400-800m. The fish is reported to attain a length of 91.44 cm (Day, 1977; Hora, 1936). Over the last 10 years, its wild population has undergone a steady decline (>50%) and is listed among the 82 vulnerable freshwater fish species of India (CAMP, 1998). The induced spawning of this species has not yet been attempted. Hence the present study was undertaken to breed the fish in the natural environment with ovaprim.

The induced breeding programme was

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carried out in the Kosi streams of Kumaon Himalayan region in June 1999. Brood fish of L. dyocheilus captured by repeated cast netting in the protected pools of the Kosi river (80m x 10m x 5m) located near Jim Corbett National Park, U.P. The location map is given in Fig. I. Brood fish (3 females and 3 males), were kept in nylon hapa (4.5' x 2.3' x 1.5') fixed in the side stream with moderate water velocity (4.55 km/hr.). The males weighed from 0.5 to 0.8 kg and released milt on gentle pressure on belly. Females varying from 0.65 to 1.75 kg. showed soft and bulged abdomen with a swollen light reddish vent. During acclimatisation in the hapa direct sunlight was avoided. Both male and female fish were kept in the same hapa. First, the females were administered intramuscularly single dose of ovaprim (GnRHdomperidone) of 0.6 ml/kg body weight. Males were injected 10 hours later. After breeding, the brood stock were released back into their natural habitats. Incubation was carried out under three different conditions: (i) hapa fixed in the flowing stream, (ii) plastic tubs kept submerged in stream without water connection to stream and (iii) excavated pit in stream with no flow of water. Details of the experimental setup is given in Table II. The instream incubation was carried out by fixing small boulders in the enclosed area. The physico-chemical variables of the stream water during breeding experiment were: pH 8.6, temperature 28°C, transparency 32 cm and conductivity

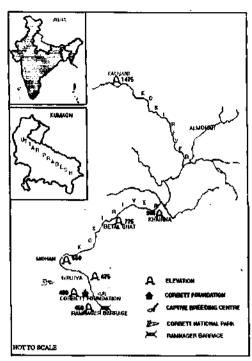


Fig.1. Diagramatic represention showing the captire breeding of *L. dyocheilus*

88.5 µScm⁻¹.

In the present study, it was observed that all the female *Labeo dyocheilus* released viable eggs after 18 hours of injection. Water temperature of the hapa ranged from 28-31 °C. At the time of spawning little splashing of water was observed. Though the natural spawning of *L. dyocheilus* was observed in hapa, the female was still carrying egg. Simultaneously stripping was also done and fertilised by dry methods.

Table 1. Effect of ovaprim on the spawning and hatching of Labeo dyocheilus

Weight (kg) Female Fish	Weight (kg) Male Fish	Hormone Dose (ml/kg body weight)	Time taken for response (hrs)	Number of eggs spawned	Fertilisa tion (%)
1.75	0.80	0.6	18	14,500	90
0.70	0.50	0.6	18	13,100	95
0.65	0.80	0.6	18	12,900	90

SI.	Туре	Incuba	ition Tem	p. (°C) Egg	Incubation		
No.		Atmosphere		Water		incubated (%)	period (hr.)
		Day	Night	Day	Night		
1	HAPA	Day	33,	Day	28,	70	13
	(4.5 x 2.3' x 1.5')	Night	29	Night	24		
2	PLASTIC TUB	Day	33,	Day	31,	31, 95 28	12
	(2 x 1.5)	Night	29	Night	28		
3.	INSTREAM	Day	33,	Day	25,	20	18
	(3 x 1.5')	Night	29	Night	21		

TABLE 2. Details of experimental set up for incubation of Labeo dyocheilus eggs

The fertilised eggs were kept in three different conditions to examine the hatching process (Table 1). About 40,000 eggs were fertilised.

In the hatching hapa, the flow of stream water was regulated by placing boulders one meter upstream from the hapa. The incubation was first noticed in the eggs kept in plastic tub fixed in the stream where aeration was provided and the temperature recorded was 31°C (Table 2). The incubation percentage was 95 and duration 12 hours. Fertilised eggs kept in hapa (water temperature 28°C) exhibited 70% of incubation which took 13 hours. Aeration was provided in hapa. Under stream condition, however, the percentage of incubation was very low (20%) after 18 hours (Table 2). Twitching stage of embryo was noticed after ten hours of fertilisation for the eggs reared in plastic tubs.

Eggs of *L. dyocheilus* were creamy white in colour and the size of the ovarian eggs (Stage VI) ranged between 1.19 ± 0.20 and 1.38 ± 0.18 mm. The absolute fecundity observed was 85838. The eggs were semiadhesive in nature and the water hardening of the eggs took 5 hours. The average diameter of the fertilised egg was 3.3 ± 0.65 mm. Hatching was preceded by movement of the larvae inside the egg shell. The hatchlings were whitish in colour. The average size of the one day hatchling was

 $3.19\pm0.15\,$ mm. Very fast swimming movement the hatchlings was noticed . All the hatchlings produced were released into low velocity areas of the stream.

In the present study, the experimental instream incubation technique of fixing plastic tubs in streams which has yielded the best results can be utilised in breeding trials of other endangered species having similar kind of eggs. The dose of 0.60 ml/kg body weight of ovaprim could be utilised in future breeding of *Labeo dyocheilus* especially for instream condition. However, more experiments are needed for standardisation of doses under captivity.

Ovaprim is highly effective in inducing ovulation of L. dyocheilus. The time taken for response in L. dyocheilus is lower (18 hours) compared to *Tor* putitora (24 hours) as reported by Pandey et al. (1998). The rate of fertilisation in the present experiment is higher (90-95%) compared to earlier reports in T. putitora (Pandey et al., 1998) using ovaprim. Sridhar et al. (1989) reported 75% fertilisation rate in endangered catfish Ompok bimaculatus using ovaprim. The variation observed for incubation of fertilised eggs in different systems might be due to variations in temperature, dissolved oxygen, water flow, depth and other physico chemical factors.

As L. dyocheilus is one of the

important food fishes of local people in the hilly region, it is very essential to conserve natural stocks and improve its fishery. The successful instream induced breeding opens avenues for enhancement of stocks of endangered species through collection of wild broodstock, induced breeding at the collection site itself and releasing hatchlings into natural habtiat.

Acknowledgements

The authors express their deep sense of gratitude to Dr. A.G. Ponniah, Director NBFGR for providing necessary facilities, guidance and encouragement. They are also thankful to Miss Roy for typing the manuscript.

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