

ARTIFICIAL BREEDING OF ENDANGERED GOLDEN MAHSEER, *TOR PUTITORA* (HAMILTON-BUCHANAN)

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ABSTRACT – An attempt was made to induce artificial breeding in the endangered *Tor putitora* during late monsoon at Bhimtal in Kumaon hills (Uttarakhand). In the present study, 10 sets of golden mahseer were bred during September through stripping and dry method with 30-35% fertilization and 60-65% hatching success. Out of 31,322 fertilized eggs, 15,252 spawn were obtained with overall 48.69% breeding success indicating better hatching and survival percentage. The study demonstrated prolonged (protracted) spawning season of this species up to September under agro-climatic conditions of Bhimtal.

Key words : Artificial spawning, seed production, endangered, *Tor putitora*.

INTRODUCTION

The golden mahseer (*Tor putitora*) once constituted one of the main fisheries of Kumaon and Garhwal waters of the Himalayas (Joshi *et al*, 1978; Joshi, 1988) the species has become endangered in recent years (Sehgal, 1991; CAMP, 1998). It breeds thrice in a year in natural water (Khan, 1939), however, Thomas (1897), Qasim and Qayyum (1962) and Bhatnagar (1964) described this species as a partial spawner which breeds in batches. Sunder and Joshi (1976) found the breeding season of this fish to be August-September while Badola and Singh (1984) reported the species to breed once during April to July in Garhwal waters. Using gonado-somatic index (GSI) and relative condition factor, Nautiyal (1984) suggested spawning season of *T. putitora* between July to September in Garhwal region. In the present study, an attempt has been made to breed this fish artificially during late monsoon season.

MATERIAL AND METHODS

Brooders of *Tor putitora* (Hamilton-Buchanan) were collected from Bhimtal with the help of gill net (Fig. 1). Males and females were segregated and stripped during boat operation (Fig. 2, 3). After stripping, fertilized eggs were covered with dark plate to avoid light for better fertilization. The dry method of fertilization was employed and when the eggs became water hardened, the fertilization percentage was noted (Fig. 4). The fertilized eggs were placed in a single tier in wooden hatching trays of size 30 x 45 cm inside a hatchery receiving continuous flow of water. They were kept in the trays till hatching

and the hatchlings were allowed to pass to rectangular tanks along with water flow. Physico-chemical parameters of water utilized during the experiment were monitored regularly using standard method and kept to the optimum levels (APHA, 1985).

RESULTS AND DISCUSSION

The water hardened eggs of *Tor putitora* were small (8.0 mm), round, demersal and light orange in colour. They settled well in wooden trays in the tiers. The hatching took place within 80-90 hours of incubation where 60-65% success was achieved (Table 1). On hatching, the egg shell coalesced to form clumps which were removed manually. Average size of the hatching ranged between 7.5-8.5 mm possessing 5.0-5.5 mm long yolk sac. The hatchlings were found to be negatively photo-sensitive and moved in shoals towards the shade. The spawn became active after 7-8 days of hatching and started accepting natural as well as supplementary feed.

The first attempt to breed *Tor putitora* collected from Bhimtal through hypophysation (pituitary gland extract administration) was by Tripathi (1977). Attempt by Pathani and Das (1979) to induce breed the fish with mammalian as well as pituitary gland extract met with partial success. Subsequently, Joshi (1982, 1986), Sehgal (1991), Sehgal and Malik (1991) succeeded in breeding this fish collected from Bhimtal, Naukuchiatal and Sattal through hypophysation during July-August. Joshi and Saxena (1989) succeeded in breeding this fish by dry method of stripping whereby they obtained hatching success ranging from 9.2-51.7%. Shrestha *et al* (1990) induced bred the



Fig. 1 : Collection of brooders of *Tor putitora*.



Fig. 2 : Stripping of female for eggs.



Fig. 3 : Mixing of milt from oozing males.

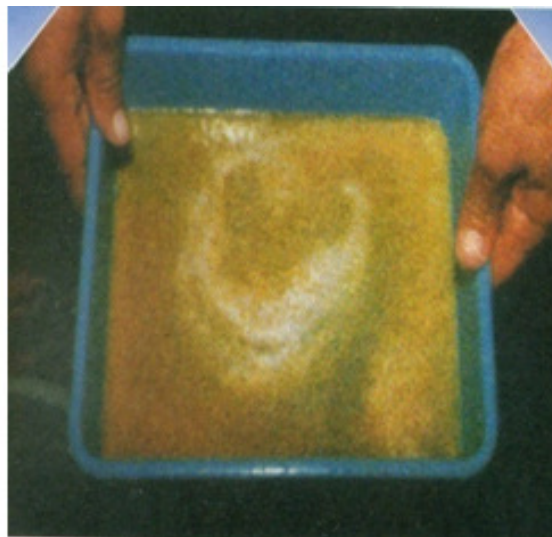


Fig. 4 : Fertilization of eggs.

Table 1: Breeding experiments of *T. putitora* at Bhimtal.

Sl. No.	Date	Weight offemale (kg)	Weight of male (kg)	Total number of eggs	Total spawn
1	16.9.1996	0.60	1.25	6,900	3,795
2	17.9.1996	0.70	0.85	3,840	1,344
3	18.9.1996	1.00	1.50	6,600	3,600
4	19.6.1996	0.90	1.00	780	273
5	20.6.1996	0.90	1.40	5,100	1,785
6	21.9.1996	1.20	0.70	2,460	1,353
7	22.9.1996	0.60	0.40	3,060	1,683
8	23.9.1996	0.80	0.60	1,600	880
9	24.9.1996	0.70	0.48	552	303
10	25.9.1996	0.80	0.60	430	236
Total				31,322	15,252

fish through hypophysation in Pokhara Valley of Nepal in August while Ogale (1997) bred this fish through ovaprim administration during July at Lonvla (Pune district), Maharashtra. In the present study, the fish were bred successfully during September and out of 31,322 fertilized eggs, 15,252 spawn were obtained with overall 48.69% success depicting better hatching and survival percentage. Pandey *et al* (1998) also induced bred the captive stock of golden mahseer successfully at Baint-wali-Mandi (near Dehradun) through ovaprim injection during mid-September. The present study demonstrated that *Tor putitora* may be bred successfully in late monsoon with fairly good survival under agro-climatic conditions of Bhimtal.

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REFERENCES

- APHA (1985) *Standard Methods for the Examination of Water and Wastewater*. 16th Edn. American Public Health Association, Washington D. C. 1268 p.
- Badola S P and Singh H R (1984) Spawning of some important coldwater fish of the Garhwal Himalaya. *J. Bombay Nat. Hist. Soc.* **81**, 54-58.
- Bhatnagar G K (1964) Observations on the spawning frequency and fecundity of certain Bhakra reservoir fishes. *Indian J. Fish.* **11**, 485-502.
- Joshi C B, Sehgal K L and Shyam Sunder (1978) Observation on the fishery resources of the hill streams of the Jammu province with special reference to mahseer and other commercially important species. *Indian J. Fish.* **25**, 197-206.
- Joshi C B (1986) Induced breeding of mahseer, *Tor putitora* (Hamilton). *J. Inland Fish. Soc. India* **20**, 66-67.
- Joshi C B (1988) Mahseer fishery of some hill stream in western Himalayas. *Indian J. Fish.* **35**, 327-329.
- Joshi C B (1982) Artificial breeding of golden mahseer (*Tor putitora*). *J. Inland Fish. Soc. India* **13**, 73-74.
- Joshi L M and Saxena B N (1992) Artificial propagation of *Tor putitora* (Hamilton). In: *National Workshop on Research and Development Needs of Coldwater Fisheries* (January 30-31, 1989). 16. National Research Centre on Coldwater Fisheries, Haldwani.
- Khan H (1939) Study of the sex organs of mahseer, *Barbus (Tor putitora)*. *J. Bombay. Nat. Hist. Soc.* **41**, 232-243
- Nautiyal P (1984) Natural history of the Garhwal Himalayan mahseer, *Tor putitora* (Hamilton). II. Breeding biology. *Proc. Indian Acad. Sci. (Anim. Sci.)* **93**, 97-106.
- Ogale S N (1997) Induced spawning and hatching of golden mahseer, *Tor putitora* (Hamilton) at Lonvla, Pune Dist. (Maharashtra) in Western Ghats. *Fishing Chimes* **17** (1), 27-29.
- Pandey A K, Patiyal R S, Upadhyay J C, Tyagi M and Mahanta P C (1998) Induced spawning of endangered mahseer (*Tor putitora*) with ovaprim at State Fish Farm near Dehradun. *Indian J. Fish.* **45**, 457-459.
- Pathani S S and Das S M (1979) On induced spawning of mahseer (*Tor putitora*) by mammalian and fish pituitary hormone injection. *Sci. Cult.* **45**, 209-211.
- Qasim S Z and Qayyum (1962) Spawning frequencies and breeding season of some freshwater fishes with special reference to those occurring in the plains of Northern India. *Indian J. Fish.* **8**, 24-43
- Sehgal K L (1991) *Artificial Propagation of the Golden Mahseer, Tor putitora (Hamilton) in the Himalayas*. Special Pub. No. 2. National Research Centre on Coldwater Fisheries, Haldwani. 12 p.
- Sehgal K L and Malik D S (1991) Efficiency of flow-through system for seed production of *Tor putitora* (Hamilton) at Bhimtal, Kumaon Himalaya. *Indian J. Fish.* **38**, 134-137.
- Shrestha B C, Rai A K, Gurung T B and Mori K (1990) Successful artificial induced spawning of Himalyan mahseer (*Tor putitora* Hamilton) in Pokhara Valley, Nepal. In: *Proceedings of the Second Asian Fisheries Forum* (eds. Hirano R and Hanyu I), 573-575. Asian Fisheries Society, Manila, Philippines.
- Sunder S and Joshi C B (1976) Preliminary observations on spawning of *Tor putitora* in Jammu Province during 1969. *Indian J. Fish.* **24**, 153-158.
- Thomas H S (1879) *The Rod in India*. 3rd Edn. W. Thacker & Co., London.
- Tripathi Y R (1977) Artificial breeding of *Tor putitora* (Ham.). *J. Inland Fish. Soc. India* **9**, 161.