

## BREEDING OF POND-RAISED HYBRIDS OF MAHSEER FISH, *TOR KHUDREE* (SYKES) AND *T. TOR* (HAM.)<sup>1</sup>

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First generation hybrids between *Tor khudree* and *T. tor* do mature even in small ponds in oxygenated water and with special feeds. Gravid specimens of these fish can be stripped and eggs fertilised successfully without the use of pituitary hormone injections. *T. tor* can also be bred similarly.

### INTRODUCTION

Depletion of stocks of the mahseers all over India is well known, and different methods for their rehabilitation and conservation are being considered. Experimenting with various methods of breeding the fish has therefore, assumed considerable importance for conserving the mahseer resources of our country. Several authors had in the past drawn attention to this problem.

In recent years (1970), concrete steps for artificial propagation and rehabilitation for conservation of the Deccan Mahseer, *Tor khudree* were taken at the fish seed farm of Tata Electric Companies at Lonavla (Maharashtra), thanks to the foresight of Shri S. Moolgaokar, who visualised the problem and initiated the efforts. As a result of these studies, Kulkarni (1971) gave a preliminary account of the spawning habits, eggs and early development of the fish, including a method of stripping the spawners. The report of the Agricultural Commission of the Government of India (1976) also emphasised the need to conduct biological and ecological investigations on the life history of different mahseers.

These recommendations encouraged such studies on *Tor puitora* in the Kumaon and Garhwal regions of the sub-Himalayan tracts (Pathani 1982, Das 1978 and Nautiyal 1985) and on *Tor tor* near Hoshangabad on the Narmada river (Desai 1970). Tripathi (1978) attempted breeding *Tor puitora* by stripping on a small scale, while Kulkarni and Ogale (1978) elaborated the method of artificial propagation of Deccan Mahseer, fertilising more than five lakh eggs every year since 1974. However, as the method of collecting ripe spawners for stripping has its limitations, efforts were made to breed mahseer successfully by hypophysation method (induced breeding) with the help of pituitary hormone injections at the Lonavla fish farm and the particulars have been detailed by us earlier (1986). However, since further simplification in breeding methods of this fish was desirable, fresh experiments were undertaken and the results are recorded in this paper.

*Limitations of the stripping method:* Stripping the spawners (male and female), artificial fertilisation of eggs and their rearing afterwards are the conventional methods followed extensively in Europe, America, Japan, etc., especially in the case of Salmon and Trout. However, the collection of ripe and oozing spawners is the crux of the problem. In the case of the salmon, this becomes possi-

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ble because of its very distinct migratory habits for spawning, provision of suitable fish ladders and the consequent concentration of population of spawners in small areas. In the case of mahseer, such detailed study is yet to be accomplished and collection of mahseer spawners continues to be a problem. In Walwhan and Shirawta lakes where Kulkarni and Ogale (1978) had conducted most of their studies, the spawners could be collected because of special environmental conditions which were favourable for the purpose. Both these lakes are surrounded by hills and the rain water running through the small ravines formed temporary streams which cascade into the lakes at certain points in the marginal area. These streams form torrents when the rainfall is heavy and create a mild fluctuating condition in that part of the lake. Consequently, gravid fish which are attracted by the sound of running water and its high oxygen content, follow their breeding instinct but being unable to ascend the forceful streams, keep on milling in the shallow marginal area of the lake. In this condition, some of them re-absorb their reproductive products, while some release them on a small scale and breed. The rate of survival of the young being very poor. If fishing is done in this area with the help of gill nets or large cast nets, ripe spawners can be caught and used for stripping. But in many of the mahseer streams seen by the senior author, such favourable situations do not prevail and gravid fish keep on migrating into small streams which are very much dispersed in the forest area, resulting in dispersal rather than concentration of the breeding population. Collection of spawners for stripping thus becomes a problem and sometimes disappointing. Breeding of the fish in farm ponds, therefore, assumes greater importance.

#### *Raising and breeding of hybrids*

The impression prevalent so far has been that like the commercial carps such as Catla, Rohu etc. the mahseer also would not breed naturally in farm ponds. Hypophysation was, therefore, considered essential. This method was tried for mahseer in the Lonavla fish farm and had proved successful (see Kulkarni and Ogale 1986). However, a search for simpler method of breeding mahseer by improvement of environment such as running water, exercise, better feeding and then stripping the gravid fish was considered promising and attempted successfully.

Incidentally the farm had a stock of hybrids between *T. khudree* and *T. tor*. In 1982, gravid specimens of *T. khudree* collected from Walwhan lake were stripped and 2000 ova were cross fertilised with semen of *T. tor* raised in the fish farm. Fertilisation was almost cent percent. About 90% eggs hatched out and the resultant fry and fingerlings were then grown in a separate pond. The hybrids of this first generation showed characters intermediate between the two species concerned and the rate of growth was almost similar to that in both.

During the monsoon of 1985, both sexes of the stock appeared to be unripe. However, improvement in gonadal development was achieved both with age as well as special feed and exercise. In early August 1986, two females were stripped and 3,500 ripe ova obtained and fertilised with semen of *T. khudree*. Fertilisation appeared complete but the hatching rate came down to 70%. The effort was repeated on October 18, 1986 when five females were stripped. One of them gave bad eggs with their perivitelline membrane ruptured. This was probably the result of the ovary being in a state of resorption. The remaining four females gave 5,200 ova which were again

fertilised with semen of *T. khudree* without administration of pituitary hormone injections to either sex. The rate of fertilisation was slightly lower, being about 95%. The eggs were hatched in the usual hatching trays (Kulkarni & Ogale 1978) but at this time the water temperature was 24°C and ambient temperature 29°C. As expected, the hatching time was reduced to 50 to 60 hours. However, the mortality rate went up to 50% which was much higher than in the case of females caught directly from the lake. No evident reason for this high mortality could be given but the possibility of better results if the efforts were made in the earlier month cannot be ruled out when the climate was cooler. However, the hatching rate improved to 90% and the fry and fingerlings were healthy and active as usual.

*Special care of the brood fish:* The brood fish which were used for experimentation were stocked in a small rectangular pond 10 m × 25 m and a depth of 1.2 m, along with other major carps, such as Catla, Rohu, Mrigal etc. The special care of the brood fish consisted in using a feed additive of 3 nitro (3 nitro-4 hydroxyphenylarsonic acid), a 5% premix in the usual feed of groundnut cake and rice polish 1:1 ratio. This works out to 1 gm of premix per kg. of feed and this feed was given at 3 to 4 p.c. of the body weight of the prospective brood fish. Further, the fish were given exercise by netting the pond once or twice

a week from January to June. A small 4 cm wide pipe provided constant running water to the pond. These conditions represent the minimum requirements for the growth of the gonads and these cannot be said to be very specialised and difficult for any fish farm.

Our recent efforts indicate that pure *Tor tor* can also be stripped and bred in a similar manner. In *Tor tor* the method is more fruitful because they mature in ponds even in April. Such mature fish were examined and stripped in April 1984 in a lake, Telcosagar, near Pune. With such early maturity, three trials can be taken with each pair of fish and a sufficient number of eggs obtained.

*Conclusion:* Maturation of gonads and stripping of eggs and their successful fertilisation without use of pituitary or any other hormone in *T. khudree* and *T. tor* have great significance in mahseer breeding and its conservation. Fecundity in these experiments was found to be comparatively low, but these results provided a proof that mahseers can be raised in pond and bred, thus creating a dependable source of fry and fingerlings for stocking depleted waters. Second finding is that the mahseers can be easily hybridised and the resultant progeny is likely to have useful characters but this would need extensive research and observation. Further, what is true in the above two species is likely to be true in the case of other species of mahseers also, but this too needs actual trials.

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