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Induced Spawning and Hatching of Tawes, *Puntius javanicus* (Bleeker)

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Abstract - A preliminary study on induced spawning and hatching of *Puntius javanicus* (Bleeker), revealed the possibility of simplifying spawning and hatching techniques. A single dose of Ovaprim, an ovulating agent, resulted in complete spawning within 4-5 hours. Larvae hatched in 10-12 hours at 27-31°C. When carried out in low cost, laboratory-designed plastic tubs, percent-age hatching ranged between 38.8 and 64.8% with an average of 53%.

Puntius javanicus (Bleeker), popularly known as tawes, is an important cultivable fish species in several Far Eastern countries like Indonesia, Thailand and Vietnam. They grow rapidly in water temperatures of 25-33°C and can at-tain 250-500 g in natural conditions by the end of the first year (Huet 1986). Tawes is macrophagous, feeding primarily on filamentous algae and submerged weeds. Thus, in the absence of grass carp Ctenopharyngodon idella, this fish may be cultured to control aquatic weeds, and is an excellent candidate for polyculture.

Tawes was first introduced into Indian aquaculture in 1972 from Indonesia. In some parts of the country it is reported to attain a weight of over I kg in a year (Shelly et al. 1989). Since then, this species has been steadily gaining im-portance in culture systems in the eastern states of India where it is locally known as Java puthi. However, a major constraint in expanding its culture Is the inadequate supply of seed. In the Far Eastern countries, tawes is known to spawn naturally in specially constructed and prepared ponds (Huet 1986). In some parts of India, the fish is being induced bred through hypophysation dur-ing the monsoon season (May-September), using a Chinese hatchery technique. However, not much research has been conducted on its induced breeding and larval rearing under Indian conditions. In this communication, the results of in-duced breeding and larval rearing are presented.

A pair of mature tawes was placed in a plastic pool containing well-oxy-genated water for proper conditioning. That same evening, each fish was in-jected with a single dose (females - 0.35 ml·kg·1; males - 0.15 ml·kg·1) of an ovulating agent, Ovaprim [S-GnRH + Domperidone; (Syndel Laboratory, Canada)]. Both female and male fish were then released into a spawning chamber. The water level in the chamber was gradually raised to a depth of

0.85 m and maintained at this level until midnight. Thereafter, the water level was slowly reduced and retained at 0.72 m until the end of the experiment. A spray of water was provided to ensure cooling and oxygenation and to maintain optimum conditions for spawning. The results of the spawning experiment are given in Tables 1 and 2.

Table 1. Summary of results of induced spawning of *Puntius javanicus* (Bleeker).

Details of experiment		Observations
Breeders:		
	Female no.	1
	Weight (g)	340
	Length (cm)	30
	Male no.	1
	Weight (g)	105
	Length (cm)	20
Injection:	Ovulating agent	Ovaprim
	Time of injection (hour)	22.20
	Dosage ($ml \cdot kg^{-1}$)	
	Female	0.35
	Male	0.15
Environmental conditions:		
	Air temperature (°C)	28.5
	Water temperature (°C)	29.5
Spawning chamber:	In a circular plastic pool (1.8 m diameter and 0.9 m height), a nylon cloth breeding hapa (2 x 0.66 x 1 m) fixed with an overflow system.	
Water flow:	A shower was provided to sprinkle water over the breeding hapa through a 0.5-inch diameter G.I. pipe to create a mild waterflow at the rate of 100 $ml \cdot sec^{-1}$	
Spawning results:		
	Spawning success (%)	100
	Time of spawning (hour)	02.0-03.0
	Fecundity ($eggs \cdot kg^{-1}$)	169,411
	Fertilization (%)	73.24
	Ova diameter at fertilization (mm)	3.04±0.52
Hatching chamber		Laboratory-designed plastic tubs
Time of hatching (hour)		13.0-14.0
Average hatching (%)		53
Size of hatchling (mm)		2.87±0.35

Table 2. Details of water quality in the three plastic tubs.

Parameters	Tub 1	Tub 2	Tub 3
Water temperature (°C)	27-31	27-31	27-31
pH	7.8	7.6	7.4
Dissolved oxygen ($mg \cdot l^{-1}$)	4.45	2.16	1.98
Free carbon dioxide ($mg \cdot l^{-1}$)	7.92	9.74	12.90
Total alkalinity ($mg \cdot l^{-1}$)	60.0	62.0	54.0
Hatching rate (%)	64.8	55.4	38.0

Fertilized eggs were collected from the spawning chamber and transferred to three 40-l plastic tubs (55 cm diameter and 25 cm high). The tubs were placed over each other, with the top being sprayed with a shower of water. In addition, the water in all the tubs was oxygenated with small aerators. Egg shells were periodically removed from the tubs with a specially woven net of jute ropes. Such nets are effectively used by many local fish seed producers in their hatcheries. On completion of hatching, spawns were separated using a nylon mosquito net.

Fish spawned within 4-5 hours after the injection. A single dose of Ovaprim resulted in complete spawning, yielding about 57,600 eggs. Similar results of successful spawning through a single dose of Ovaprim have been reported in several carp species in India (Nandeesha et al. 1990).

The eggs were transparent and on an average measured 3.04 mm. Larvae hatched within 10-12 hours. However, in Far Eastern countries, tawes larvae are reported to hatch in 2-3 days when they spawn naturally in specially constructed well-oxygenated ponds during the rainy season (Huet 1986; Chakroff 1987), and the eggs measure 2 mm in diameter after swelling (Huet 1986). In natural conditions, hatching of eggs is delayed probably due to low temperature and dissolved oxygen of bottom waters, as temperature and dissolved oxygen of water play an important role in incubation time, percentage of hatching and survival of spawn (Dwivedi and Zaidi 1983). In the present experiment a slight increase in the water temperature and continuous movement of eggs in the tubs may have accelerated development and hatching. The pH and total alkalinity of the tub waters were within the optimal range. This falls within the desirable range for carp eggs as reported by Alikunhi (1957) and Dwivedi and Zaidi (1983). A definite pattern of lower dissolved oxygen, lower pH and higher levels of free carbon dioxide was observed in tubs 1 to 3. Though aerators were used in all the hatching tubs, an irregular supply of electricity caused difficulties in maintaining water quality. At times, the dissolved oxygen level dropped to 1.98 $mg \cdot l^{-1}$ and dissolved free carbon dioxide increased to as high as 12.90 $mg \cdot l^{-1}$. This must have considerably reduced the survival rate of hatchlings. Venugopal (1990) made a similar observation in a portable circular hatchery. Better water quality was maintained in tub 1, which could be attributed to the continuous sprinkling of water over it. Hence, the highest percentage of hatching was recorded in tub 1 followed by tub 2, while tub 3 recorded the lowest percentage of hatching. Dwivedi and Zaidi (1983) reported that lower concentrations of dissolved oxygen may reduce hatching percentage. In the present experiment the average rate of survival of viable eggs to spawn was 53%. Venugopal (1990) obtained an average hatching rate of 71% in carp eggs using a portable circular hatchery with 3.2-8.6 $mg \cdot l^{-1}$ dissolved oxygen concentration.

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