Simple Method for Backyard Production of Snakehead (*Channa striata* Bloch) Fry

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Introduction

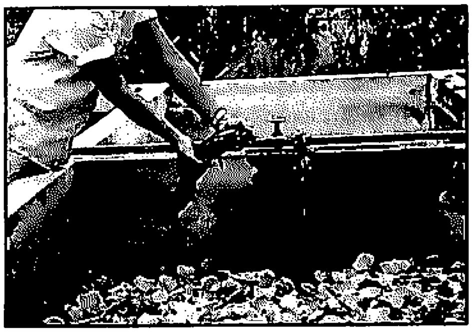
The snakehead (*Channa striata* Bloch) is a common freshwater fish species in Malaysia. It is dominant in shallow water areas such as ricefields, irrigation canals, ditches and borrow pits due to its ability to breathe atmospheric air and tolerate high water temperature (Mohsin and Ambak 1983). Ricefields have traditionally been the largest source of snakehead production (Tan et al. 1973) but catches have declined due to rice double cropping and the related problems of short growing seasons and widespread herbicide and pesticide use (Ali 1990). Lately there is an increase in the demand for snakehead due to the widespread belief that its consumption hastens the healing of wounds and internal injuries. Snakehead flesh contains high levels of arachidonic acid which is a precursor for prostaglandin and thromboxin, chemicals that affect blood clotting and the fusion of endothelial tissue during wound healing (Mat Jais et al. 1992).

A good market price (US$3-4/kg) has led to an increase in the demand of snakehead fry for pond culture. Furthermore, farmers practising polyculture and tilapia culture like to use the snakehead as a 'police fish' to control overpopulation of tilapias (Wee 1982). At present, fry are obtained from the wild, but this will not sustain increased demand in the future.

There is a simple technique for breeding snakehead, suitable for small-scale farmers practising backyard aquaculture. The technique, using water level manipulation, was tried and tested at the Aquaculture Unit of the Universiti Sains Malaysia, Penang.

Methods

Concrete tanks measuring 3.0 x 1.5 x 1.2 m were used for the study. Fish from ricefields were kept in the tanks (20 individuals per tank) and fed with minced trash fish. No aeration was provided. The stagnant water was changed once a week. Water hyacinths were used to provide shade. At intervals, fish were checked for maturity and suitability for spawning. Juvenile fish (15-20 cm total length) took about five to six months to mature in the tanks.



Snakehead broodfish (Channa striata) being stocked in a spawning tank.

For comparisons, two techniques were tried to induce spawning. The first used water level manipulation to simulate rain. The second used injection with human chorionic gonadotropic (HCG) hormone. Sexing mature broodstock was based on morphological features, as suggested by Parameswaran and Murugesan (1976). The mature female is larger (than the male) and its belly is enlarged, drooping ventrally and soft to touch. The female genital pore is prominent and ranges in diameter from 2 to 4 mm. The prespawning male has a much narrower body than the female. Its genital papilla is small and hidden under the anal scales. For confirmation of prespawning condition, the method suggested by S. Pathmasothy (pers. comm.) can be used, whereby a small glass rod is gently inserted in the genital pore. The depth of insertion is longer (2-3 cm) for females than males (<1.5 cm).

Four pairs of broodstock were used in the study. For the first technique, two pairs of mature broodfish were stocked in separate spawning tanks with the water level initially kept at 15 cm and about half the surface covered with water hyacinth. A gentle water flow of about 0.5 to 1.0 l/s was also provided. A seed culture of zooplankton (*Moina* spp.) was added to the tank water. Next day, the water level was then suddenly increased to about 45 cm and kept at that level until spawning occurred; usually between the second to the fourth day after water level manipulation.

For the second technique, each of the two pairs of mature broodfish was injected intramuscularly (just below the dorsal fin) with 5 international units of HCG per gram body weight and returned to their separate spawning tanks. They spawned the following day.

For both techniques, water flow was stopped during the spawning period in order to prevent the spawned eggs being washed down the drain.

Results and Discussion

The means or ranges of water quality parameters during the study (measured using a Hach DR-EL 5 Water Analysis Kit) were as follows: ammonia, 0.36 mg/l; nitrite, 0.01 mg/l; pH, 6.85-6.91; dissolved oxygen, 0.8-2.5 mg/l and temperature, 25-28°C.

With both techniques, the breeding pairs displayed mating behavior and spawned early in the morning. The male kept encircling and nudging the female. During actual spawning, the male bent its body close to the female and fertilized the eggs as they were released.

The eggs contain high amount of lipids and thus floated to the surface and became trapped among the water hyacinth roots. As soon as spawning had finished, a gentle flow of water was initiated with the trapped eggs shaded from the sun and protected from being washed away. After one to two hours, the pale yellow fertilized eggs began to develop black spots in the center, whereas unfertilized eggs became whitish (Fig. 1). During this period, both parents circled beneath the eggs guarding them.

When the eggs hatched, the larvae, dark in color, swam to the bottom and stayed close to their parents' bodies. The postlarvae did not begin exogenous feeding until the third day after hatching. By this time, the *Moina* population had already multiplied and was available as feed. The larvae gradually changed to orange in color and after ten days swam all over the tank as one school. Fry were fed with finely chopped fresh fish after about 15 to 20 days after hatching. The school began to break up about 35 days later, at which time they were separated from their parents to prevent cannibalism. The parents became ready to spawn again between one to three months after being transferred to other tanks.

Table 1. Egg production of snakehead (*Channa striata* Bloch) spawned using two methods: water level manipulation and injection with human chorionic gonadotrophic (HCG) hormone.

Eggs spawned (no.)	Dead eggs (no.)	Eggs hatched (no.)	Eggs hatched (%)	Female weight (g)	Male weight (g)	Eggs per gram body weight (no.)
Water level manipulated spawners						
9,500	130	9,300	97.9	800	600	11.6
4,792	1,706	3,086	64.4	617	523	7.8
HCG-induced spawners						
10,215	4,785	5,430	53.2	640	535	16.0
7,460	3,250	4,210	56.4	575	430	13.0

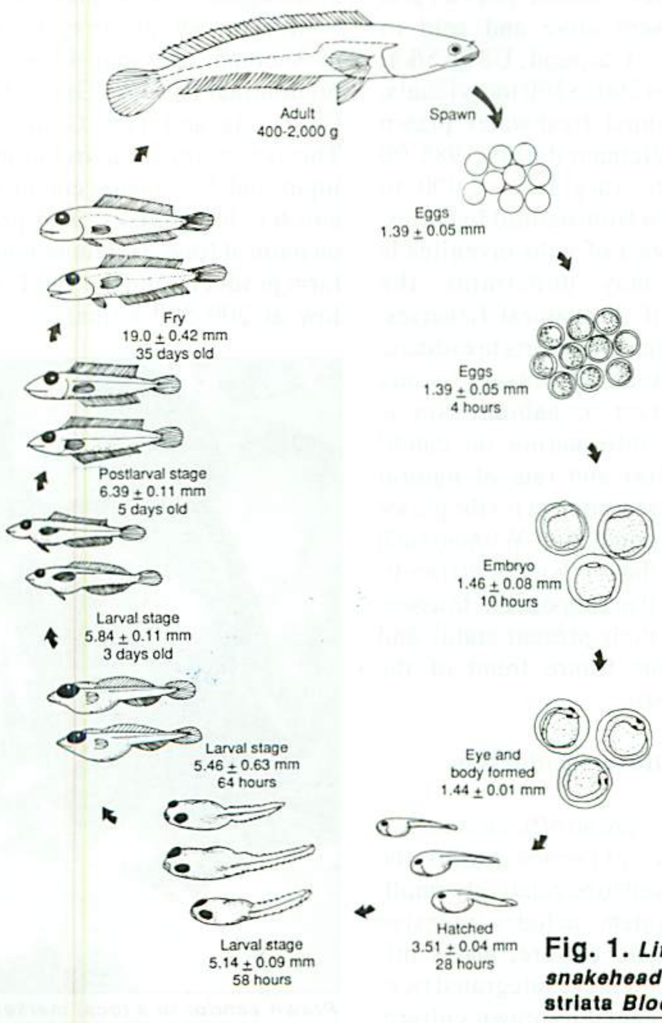


Fig. 1. ***Life cycle of snakehead (Channa striata Bloch).***

The number of eggs obtained with these two techniques ranged from about 5,000 to 10,000 (Table 1). As also observed by Parameswaran and Murugesan (1976) for fish spawned naturally, those spawned here by water manipulation had lower relative fecundity (eggs per gram) than those induced by HCG. Hatching percentages were higher for fish spawned by water manipulation, possibly because these eggs, released naturally, were more mature and viable than those released after hormone injection.

In conclusion, the more 'natural' spawning technique was found to provide a viable alternative for small-scale farmers. It is much simpler than hormone injection. Concrete or fiberglass tanks set up in series to provide water flow of between 0.5 to 1.0 l/s and later sudden flooding can be used for manipulating the water level, as occurs in the wild (Wee 1982).

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