EDITORIAL

Aquaculture is the world's fastest growing food production sector. It is expected to bridge the growing gap between supply and demand for fish and to contribute to food security. Over 85% of global aquaculture production occurs in tropical developing countries, characterized by small-scale operations. Besides being sustainable and environmentally friendly, new aquaculture technologies should be affordable to the small-scale farmers who are the backbone of the industry. This issue contains articles dealing with low cost hatchery technology to produce catfish seed and increase pond fish production through the promotion of substrate based microbial biofilm in ponds.

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Low Cost Breeding and Hatching Techniques for the Catfish *(Heteropneustes fossilis)* for Small-scale Farmers

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Abstract

The high demand for the stinging catfish (*Heteropneustes fossilis*) and declining wild stocks led the Centre for Aquaculture Research and Extension in India to look for methods for the culture of the species. This paper presents a low cost, simple breeding technique developed and tested by the Centre that can be easily adopted by rural farmers.

Introduction

The stinging catfish *(Heteropneustes fossilis)* is widely distributed throughout India and is cultured along with other species in community ponds in southern India. Due to its high market value, rapid growth, tolerance to high stocking densities, utilization of atmospheric oxygen in oxygen-depleted waters (Dehadrai et al. 1985) and low fat, high protein and iron content (Alok et al. 1993), it can be cultured more intensively. In southern India, *H. fossilis* naturally spawns during the southwest monsoon (July-August) and spawning can be induced by manipulation of water levels (Fermin 1992). Ovulation of the species can be induced during non-spawning season not only by environmental manipulation but also by hormonal stimulation (Sundararaj and Vasal 1976).

The availability of wild *H. fossilis* has declined in India in recent years. Intensive culture to meet market demand has had limited success due to the high mortality (>80%) of eggs and hatchlings. The Centre for Aquaculture Research and Extension has succeeded in inducing the breeding of *H. fossilis* in cement aquaria with mud/sand beds. But when the submerged eggs hatch in mud or sand beds, the hatching rate is poor due to the low oxygen level and high turbidity of the water. Moreover, collection of the hatchlings from the aquaria bed is time-consuming and laborious. Hence, a low cost, simple breeding and hatching technique that can be practiced with ease by rural farmers has been developed.

Breeding Chamber and Hatchery

The breeding chamber is a modified round plastic trough with a capacity of 25 l. The breeding chamber contains a removable earthen tile to allow fish to hide and is covered with a net to prevent them from jumping out during breeding.

The hatchery consists of a cylindrical glass tube (8 cm in diameter) and 30 cm high, with a capacity of 1 l. The tube has one opening at the bottom and two openings at the top, one as a water outlet (5 mm dia) and the other to introduce eggs (15 mm dia). The inlet opening (5 mm dia) at the base of the glass tube is connected to a flexible tube (5 mm dia) for water flow.

Induced Breeding and Hatchery Operation

Eleven male and eleven female brood fish weighing 200-310 g each were separately weighed and intramuscularly injected in a single dose with 0.5 ml/kg body weight of the hormone ovaprim. The injected fish were released into a breeding chamber containing 20 l of well-water. The fish spawned 10-14 hours after injection. Each female laid 8 000-12 000 eggs. The submerged eggs were collected from the floor of the chamber and transferred directly to the hatchery.

The hatchery unit (cylindrical glass tube) was filled with well-water and was placed inside a plastic trough of 25 l capacity. The plastic trough had an outlet guarded by a fine net. The collected eggs were introduced into the hatching unit through the large opening at the top, the opening was plugged, and water was pumped through the inlet. On average, 30 000 eggs were incubated at a time.

For the first 8 hours, water flow was maintained at 0.5 l/min to keep the eggs rotating inside the hatchery jar. After 8 hours, water flow was increased to 1 l/min to facilitate the removal of unfertilized eggs and to increase oxygen supply to the developing eggs. The unfertilized eggs came out through the outlet with the water flow. After 24 hours, the hatched larvae propelled themselves to the surface of the water and were carried into the plastic trough.

The hatched larvae were collected from the plastic trough of the hatchery unit and transferred to separate plastic troughs of 50 l capacity covered with bamboo mesh to minimize light. Four days after hatching, by which time yolk absorption had taken place, larvae were fed with boiled egg whites.

Lab to Land Transfer of Technology

For an aquaculture program to be successful, its techniques and costs must be affordable to rural farmers. In the study detailed

Fig. 1. Breeding chambers for H. fossilis.

Fig. 2. H. fossilis *eggs collected from the breeding chamber.*

Fig. 3. Glass jar hatchery in operation.

Fig. 4. Introducing H. fossilis *eggs into the hatchery jar.*

Fig. 5. Model hatchery for rural aquafarmers made from discarded mineral water bottle.

above, the breeding chamber did not have any sand or mud base, thereby reducing turbidity and oxygen depletion. It also made collection of hatchlings easier. In this study, a glass container was used as a hatchery. However, to reduce costs and increase availability, farmers can use discarded 1 l mineral water bottles. When a bottle is used, the inlet can be made at its base. The cap at the top has a small hole (5 mm dia) attached to a flexible tube. The eggs are introduced by opening the bottle cap. After introducing the eggs, the cap is replaced and water is run through the inlet at the bottom. Water comes out through the outlet in the cap. A 1 l plastic bottle can be used to incubate about 25 000 to 40 000 eggs with an 80% hatching rate. Many bottles can be connected serially, to meet the demands of a small-scale aquaculture unit.

Fig. 6. Different types of bottles used for hatching H. fossilis.

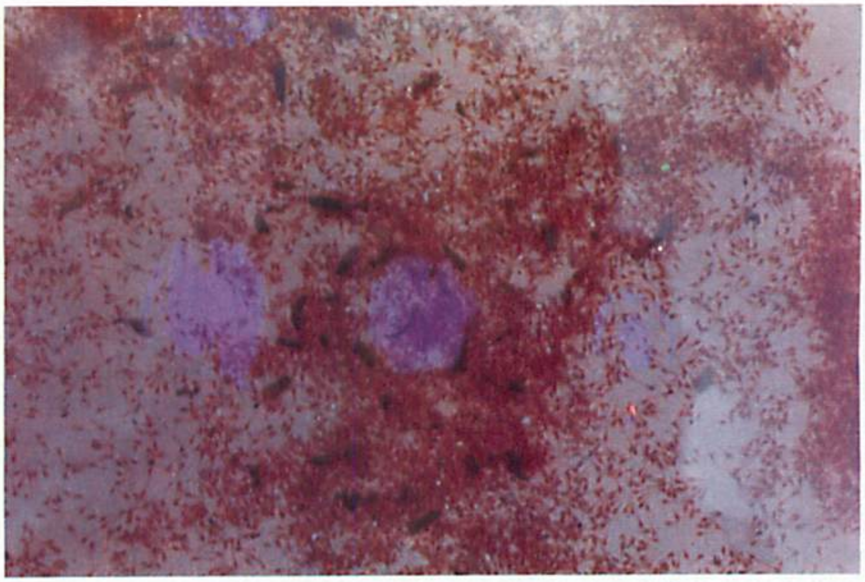

Fig. 7. H. fossilis *larvae (10 days after hatching) in the nursery tank.*

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