Seed production of Magur (*Clarias batrachus*) using a rural model portable hatchery in Assam, India – A farmer proven technology

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The Asian cat fish (locally known as Magur fish, *Clarias batrachus* is an important air-breathing cat fish with good markets especially in North-Eastern parts of India where it fetches a higher price than the major carps. In some parts of Assam, the fish is sold at more than Rs. 250 per kg ($US 5.21). The fish is revered as nutritious and therapeutic in nature. It is generally cultured in ponds along with carps. However, the culture practices of this species have not received much attention, probably due to inadequate supplies of seed and proper feed.

In natural waters, the fish spawns during rainy season in Assam (June-August). For spawning, the fish swims to shallower regions of the already flooded ponds, swamps, streams, rice fields and other water bodies. It has been reported to grow to 198 mm in the first year, 262 mm in the second, 305 in the third and 335 mm in the fourth year. It attains maturity at the end of first year.

The potential to obtain magur seed from natural sources has become low due to the increasing use of pesticides in the paddy fields-which are the main breeding grounds of this fish. Therefore, we conducted an experiment to develop a farmer-proven induced breeding and seed production technology for magur using a low-cost hatching device in Assam. The project was conducted under a farmer participatory small-scale aquaculture project funded by the ARIASP (World bank).

Breeding techniques

The standard breeding technique developed by the Central Indian Fisheries Research Institute was employed with little modification. We used Magur that were about one year old and weighing about 100 g. each. Gravid females are easy to identify as they are comparatively heavier, have a round and bulging abdomen and their vent is more red than that of the males. In the female, the genital papilla is short, oval and slit-like (figure 1); whereas in males, the papilla is conical and elongated with a pointed reddish tip (figure 2). We stocked the brood fishes in a specially prepared fish pond in the month of April. The fishes were fed with a mixture of trash fish and rice bran at 9:1 proportion at about 10% of the body weight of the stocked fish daily. For induced breeding, both female and male magur were given single dose of hormone ovaprim at the same time. Hypodermic syringes with a small size needle (No.24) were used to inject hormone into the muscle of broodstock. We kept the treated male and female fishes separately in two tanks.

18-21 hours after injection we examined the fish for ovulation by hand stripping. Fish that yielded a good stream of transparent green-brown eggs were rated as ovulated. We released the eggs by gently pressing the abdomen towards the vent, collecting them on a stainless steel plate. The milt is then added and mixed well with the help of a feather and a small amount of water to activate the sperm. Earlier, the injected males were sacrificed to prepare sperm suspension in clean water. The testes were dissected out and cut into small pieces with the help of small scissors and a clean blade. The sperm suspension was sprinkled evenly over the eggs and clean water was added. We fertilized the hand-stripped eggs artificially using the dry method. Eggs and sperm were allowed to mix by gently moving the tray for 4-5 minutes. We washed the fertilized eggs thoroughly and transferred them to hatchery specially developed for our study before the eggs began to adhere. We removed unfertilized or dead (opaque/white) eggs immediately to prevent fungal infection. On the fourth

Figure 1: A mature female magur

Figure 2: A mature male magur

Figure 3: Stripping the eggs

Figure 4: Eggs & milt are mixed with a feather

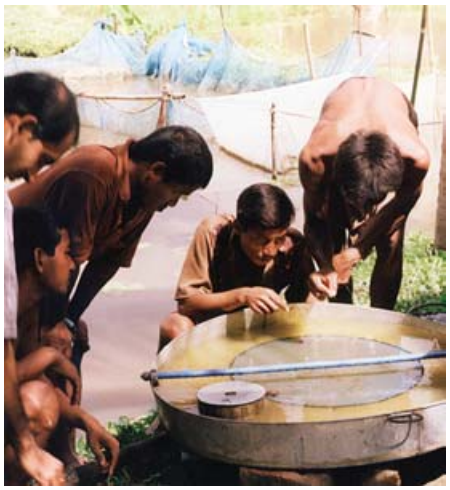

Figure 5: Production of magur hatchlings with farmer participation.

Figure 6: Harvesting fry

day, we transferred the hatchlings to a hapa fixed in a pond fertilized with pig manure for further rearing.

Construction and operation of the hatching trough

The low-cost hatchery we have developed has three main structures (Figure 5): a) a circular trough of 140 cm diameter made of galvanized iron sheets, b) a circular hatching ring of 70 cm diameter made of iron to which a nylon net is fitted and stretched and c) an ordinary water drum with a water storage capacity of 170 liters. The fertilized eggs are spread on the circular net fixed inside the hatching trough and water is sprinkled over it through a perforated 1.25cm diameter PVC pipe. The piped water supply is essential, as this enables the adjustment of flow and oxygenation as well as allowing the controlled application of treatments to combat the spread of bacterial and fungal disease. Eggs of two female magur fish (not exceeding total weight of 200 g) can easily be spread on the circular net ring for hatching. The fertilized eggs are evenly spread on the surface of the nylon net tied to a circular steel frame and a mild water current (20 ml / second) is maintained. At a water temperature of 27 – 300C, eggs normally hatch out within 26 hours. The emerging larvae have a large yolk sac, which gets absorbed in 4 days. A few clean stones are placed on it so that the net is always submerged in water and provide shelter for the hatchlings. The eggshells and debris should be removed periodically from the hatching trough. The three-day old (4th day) larvae can be fed with boiled hen egg yolk and zooplankton. In our trial, we used pond water fertilized with pig manure in the hatchery.

Evaluation of the technique

Altogether we conducted six trials were conducted on magur breeding using this small-scale hatching trough. The results of the trials are summarized in Table 1 and 2. On an average, about 6,000-7,000 eggs are obtained from a fully ripe female. The fertilization percentage obtained varied from 89 to 96% with an average of 93.16% whereas the hatching percentage varied between 23 and 75 % with an average of 55.10 %. An average of 21.55 % survival was achieved from spawn to fry stage with a maximum of 34 %. Hatching time varied between 23 hours and 26 hours at a temperature range of 31 – 37.5 C and water pH range of 7.6 – 8.1.

The low hatching rates and survivability of the magur seeds produced in our hatchery can be attributed to several factors such as a) high air and water temperature b) high water pH c) absence of aeration facility (only a water circulation was maintained) d) delay in removal of egg shells and debris, resulting in deterioration of water quality and e) inadequate densities of zooplankton and other live food for the hatchlings.

"...rearing magur can be achieved at the village level using a simple low-cost technology."

The maximum survival percentage from spawn to fry was 34%. This is fairly a good percentage for a village level production system, as this stage is regarded as the most crucial in magur seed production. We tried three different dosages of ovaprim. Out of these, a single injection of 0.6ml/kg body weight was the most effective. The males were given a single dose of 0.1-0.2 ml/kg body weight. In hapa nursing of magur, we achieved an average survival of 51% while feeding with rice bran and mustard oil cake mixture at 1:1 ratio and termite twice daily.

There is little information available on the use of low–cost rural model magur hatcheries in India. Several experiments were conducted on magur breeding in the natural condition in Assam, but with little success. This is the first attempt to produce magur seeds using a low-cost village-level hatchery technique in Assam.

Figure 7: Magur seeds are being nursed in hapa

Lessons learnt

Our trials show that the breeding and rearing of magur (*Clarias batrachus*) can be achieved at the village level condition using a simple low-cost technology. Since it is a small-scale unit a greater number of farmers can adopt the technology for producing the seed as per requirement. The following lessons were learnt during the magur seed production trials.

1. The condition of brood fish must be excellent and over 100 g in weight.
2. Water quality plays an important role in hatching and survival of magur seed. Water temperature over 33 C. and water pH over 8.0 lead to reduced development and survival of eggs and larvae.
3. Addition of aeration facilities, and prompt removal of eggshells and debris would likely improve survival by preventing the deterioration of water quality.
4. The survival of larvae can be increased if boiled egg yolk and adequate densities of live food are provided.

The simple technique thus developed under this study can easily be adopted by farmers and this would help in meeting the growing demand for seeds of magur fish to some extent.

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Further reading

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What's New in Aquaculture

Vietnamese Trading Centre Opens

In the past local shrimp farmers of Can Gio region of Vietnam have had difficulty in selling their product, there were simply to many sellers and too few buyers. As a measure to alleviate this situation the Can Gio Fisheries Trading Centre has been opened in Ho Chi Minh City.

In its initial session in April, 14 farmers accounting for 16.9 tonnes of sugpo shrimp have enlisted at the trading centre. The opening of the centre is a direct response to the demands of local shrimp producers for a well-organised trading centre. By May 27 shrimp farmers had registered to sell 74.3 tonnes

The center currently comprises of transaction offices, markets and booths for trading. Cholimex, the company responsible for its construction plans ice production and freezing stores for a second stage.

In addition to its trading function the center will also serve as a source of information regarding prices and demand for shrimp, breeding techniques, feed and veterinary medicines, loans and transport services. *(Source: Saigon Times Daily, April 23, 2002, Saigon Times Daily, May 14, 2002; Asia Pulse Pte Ltd, May 28, 2002, Tuesday).*

Thai Prawn Farmers address the EU ban

In Thailand, the Surat Thani Prawn Farmers Club in association with Thai Prawn Raisers Association is implementing chemical free treatment programmes. Black tiger prawn farmers have stopped using antibiotic chemicals in response to the EU banning of shipments containing excessive amounts. In addition prawn farmers have rehabilitated mangrove forests by reducing the use of these antibiotics and discharge of wastewater into the sea. 300 members have contributed to a laboratory where prawn fry can be screened for disease prior to release. The organisation is campaigning to correct the misunderstanding that prawn farming is environmentally degradating. Mangrove forests along the coasts of Chumphon and Surat Thani have recovered and prawn farms have moved inland allowing mangrove recovery to take place. Organic shrimp farming is also making an appearance. *(Source; Bangkok Post May 6th, 2002).*

Hazard analysis vital for US fish exports

At a workshop at the Saigon Times Club on May 13th the director of International Seafood Quality Assurance of Surefish relayed the importance of obtaining a Hazard Analysis and Critical Control Point certificate (HACCP) in order for fish processors to export fish to the US. The meeting hosted by Surefish and the Vietnam Association of Seafood Export Processors (Vasep) discussed aspects of food safety management with reference to the US Food and Drug Administration (FDA). *(Source: The Saigon Times Daily, May 14, 2002).*

CP reorganizes in China, to focus on the wealthy

CP, The Charoen Pokphand group is reorganizing its agribusiness sector in China, where it is known as Chia Tai (CT), to focus in on high-value-added products. The group is now integrating plants in seven provinces and four or five smaller provinces. It is investing in aquaculture facilities within China, all products of which will be distributed within the Chinese market. One of these products is turbot to be raised in Shandong province and expected to market to the 130 million individuals in China classified as rich. Other species targeted include mouse grouper. Turbot, which brings in a price of around (44 US$) per kg will be mainly marketed in the east coast including Beijing and Shanghai, Grouper which brings in a coast of over (88 US$) per kg will be focused upon southern regions such as Guangxi and Guangdong. *(Source: AFX News Limited, May 1,Wednesday, 2002, Bangkok Post, May 1, 2002).*

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