

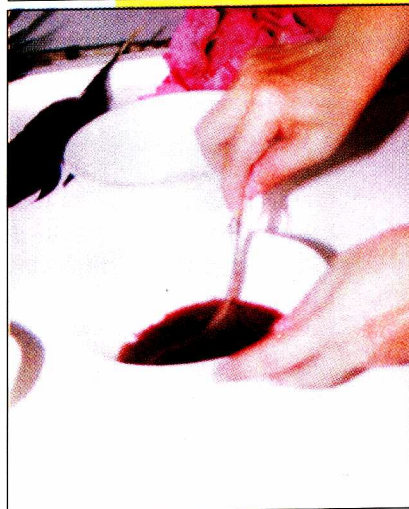
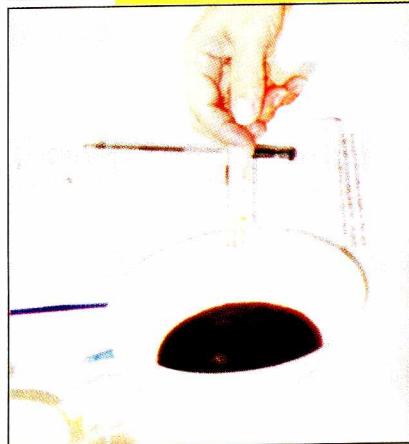
Fermin did refinement of hatchery and nursery techniques to mass produce the fry. In addition, Dr. Corazon Santiago's study on the development of broodstock diet for *C. macrocephalus* was also funded by FSP.

Dr. Fermin's dissertation showed that there is a best time to induce the breeding of catfish. Although catfish can be induced to spawn whole year round, reproductive and larval performances are relatively inferior when spawning runs are carried out during the months of January to March in the Philippines.

One of the main constraints in the artificial propagation of *C. macrocephalus* is the practice of sacrificing males to obtain the milt in fertilizing eggs. Dr. Fermin tried to solve this problem by testing several hormonal treatments that will induce the milt release of male catfish. As in the results of the FSP-funded study of Dr. Garcia, spontaneous or manual release of milt was not observed. In previous reports, catfish milt was usually suspended in saline solution, and one male was sacrificed to fertilize the eggs from one female. Although Dr. Fermin found out that sacrificing catfish males was inevitable, she saw an efficient way of maximizing the use of milt. By dilution of and adding a lower saline concentration to the milt, one male is enough to fertilize the eggs from 3-4 females.

In 1998, Dr. Fermin tried putting all the best results of her experiments into one study to verify the breeding and hatchery protocol developed at AQD for catfish that can be widely adopted by the private industry. When Mr. Fermin started to work on abalone and later became the project leader, there

## SEAFDEC/AQD's induced maturation and breeding protocol



### Acclimation

Catfish broodstock can feed on formulated diet of 36% protein. During induced spawning runs, sexually mature male and female fish are taken in the morning from broodstock tanks and stocked separately in smaller tanks. The body weights of each female fish are recorded prior to stocking.

### Hormone preparation

Different hormones such as luteinizing hormone releasing hormone analogue (LHRHa) + pimozide (PIM), human chorionic gonadotropin (hCG), pituitary gland extract (PG), Ovaprim (Syndel Pharmaceuticals, Canada), Ovotide (Hemmo Pharma, India) etc. are used to spawn the female catfish. Hormones are prepared just before females are injected, and the remaining solution is kept in a sealed vial inside the refrigerator.

### Injection

Gravid females are injected with any of the hormones in the afternoon, between 2 to 5 PM. Hormones are injected into the dorsal musculature of the fish.

### Artificial fertilization

The next morning, about 16 to 20 hours after hormone injection, ovulated eggs are manually stripped from the females by squeezing the lower abdomen. Just before females are stripped of eggs, male catfish are sacrificed to get the reproductive tract that is then macerated and crushed to obtain milt, the hydrated suspension of sperm. Catfish milt is suspended in saline solution and the milt-saline mixture is poured into the basin that holds the stripped eggs also. Milt from one male can fertilize eggs from three females that are of the same body weight. Ovulated eggs are mixed with the diluted milt with a dry feather for about 1-2 minutes. Few drops of water from the faucet are added to the egg-milt, with continuous stirring. The fertilized egg mass is then transferred to a small scoop net, washed gently with



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### Summary

The catfish industry in the Philippines is budding and projected to expand in the coming years. This is evident from conversations with active catfish farmers who all hope to be able to expand production, whether backyard or commercial because their present production can hardly supply the demands of buyers.

NIFTDC a fisheries technology and development center in Dagupan City, however, says that unless the government has a catfish program, expansion of the industry would be slow. Work on catfish research is only just starting and the culture methods remain to be on a gut feel basis. The farmers are left to survive on their own. Luckily for them, catfish is hardy, easy to grow, and has a growing market. Clearly, if catfish can provide cheap protein for more people, scientific support must be made available for the farmers.

### POSTSCRIPT

The Mangabol Lake (located between the provinces of Pangasinan and Tarlac) used to be the biggest source of catfish (native or hitong tagalog, *C. macrocephalus*) in Luzon, perhaps even the Philippines (Philippine Fisheries, 1952). An annual festival used to be held in the area, according to people in Bautista, Pangasinan. Fishers from all over Luzon would gather in Mangabol Lake, and on the day of the festival, a fog horn would sound and fishers simultaneously dive into the lake with their snare. The diver who got the biggest catch would win a prize (usually prestige). But the 1991 Mt. Pinatubo eruption overran the lake and Mangabol Lake remains to be unproductive until the present time.

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running water and then placed inside the incubators. Incubators can be made of marine plywood or plastic basin with a flow-through water system and provided with aeration.

Pituitary glands can be dissected from the heads of sacrificed male catfish. Pituitary glands contain hormone(s) that can also be used to spawn the female catfish in subsequent runs.

### Fertilization and hatching

Using the above procedure, fertilization rate can reach more than 90%, while hatching rate may range from 30 to 70%. When stripped, there are approximately 100 eggs per gram body weight of the female fish; about 500 eggs are contained in one gram. A female catfish has 20-25 g of stripped eggs on the average.

### Hatchery and nursery rearing

Larvae can be maintained for four days in the same incubators without feeding. Catfish larvae are then transferred to bigger tanks and fed with newly hatched *Artemia* nauplii for three days and *Moina* for four days. Thereafter, larvae are given formulated feed of 150-200 microns size that contains 44% protein. Two week-old catfish fry can be sold to grow-out pond operators, who are advised to rear the fry in net cages suspended in either tanks or ponds. Or, the fry are reared further for 4-6 weeks in bigger nursery tanks or ponds to reach 3-5 cm, the appropriate size for stocking in grow-out ponds:

### Packaging and transport

Catfish fry are counted and graded according to size, and then placed inside a plastic bag half-filled with water at 500 to 1000 fry per bag. The bag is thereafter oxygenated and tied. Native "bayong" bags may be used to hold the plastic bags in, when transporting a short distance only. When transporting by plane however, the plastic bags are better placed in styrofoam boxes with crushed ice filled to the brim.—NJD