

**CMFRI**

---

# ***Course Manual***

*Winter School on  
Recent Advances in Breeding and Larviculture  
of Marine Finfish and Shellfish*

30.12.2008 -19.1.2009

*Compiled and Edited by*

*Dr. K. Madhu, Senior Scientist and Director,  
Winter school*

*&*

*Dr. Rema Madhu, Senior Scientist and Co-ordinator  
Central Marine Fisheries Research Institute*



**Central Marine Fisheries Research Institute**

***(Indian Council of Agricultural Research)***

**P.B.No.1603, Marine Drive North Extension,**

**Ernakulam North ,P.O.**

**Cochin, KERALA – INDIA - 682018**



## BREEDING OF INDIGENOUS ORNAMENTAL FISHES



**T.V. Anna Mercy,**

*Professor, College of Fisheries, Kerala Agricultural University, Panangad, Kochi, 682 506.*

*E- mail : annamercy2002@yahoo.co.in*

---

One of the desirable qualities that an ornamental fish should possess is that it should be able to breed under captive conditions. Collection of fish from its natural resources alone will not help in the sustainability of the industry. If we take a look at the ornamental fish industry of India, it can be seen that all ornamental fish being marketed in India are exotic fishes. The most popular gold fish is from China. The queen of ornamental fish –angel- is from River Amazon of Brazil. The much demanding liver bearers are also from South America. Whereas the export market of ornamental fish is mainly dominated by indigenous fishes of India. These are always collected from the wild and exported. This leads to the indiscriminate over exploitation of many species and hence they become endangered. Here arises the necessity of captive breeding.

The captive breeding technology of all exotic fishes has been developed by the scientists/farmers of the respective countries and has been standardized so that we need only to adapt them to our situations. But with regard to the captive breeding technology of indigenous ornamental fishes of India we are still in infancy. The unprecedented and pioneering work on this aspect has been done by College of Fisheries, Kerala Agricultural University, Panangad under the NATP project on "Germplasm inventory, evaluation and gene banking of fresh water fishes" (2000-2004) in which captive breeding technology for a dozen species has been developed and standardized. In this presentation captive breeding of freshwater fishes in general, is discussed.

There are many ways to induce a fish to spawn. Before starting breeding of fishes, one must consider the following aspects

1. Make sure they are healthy

A good way to arrive at a healthy spawning pair of fish is to get about a half a dozen specimens and raise them to full size. This require a bit more patience, but eliminates the

possibility that your purchase might be old or past their useful breeding age. You may also encourage the fish to pair naturally

2. Make sure they are a pair.

It is difficult to ascertain sex in certain cases, and practically impossible. Certain fishes do exhibit sexual differences and easy to select the pair, like the live bearers, gourami, fighter, gold fish, etc. and we can identify their sexes with experience .

3. Make sure they are properly conditioned.

This means feeding generously with proper foods and assuring good health. It is a good practice to keep the male and female in separate aquaria while this conditioning is going on. Some aquarist keep the sexes together and when they are looking for a spawning pair choose a female which is well loaded with eggs and a likely male. The trouble with this system is that the male might have emptied himself of sperm half an hour before with another female. A well conditioned pair may very well begin to spawn a short time after they have been put into the breeding tank. This insures the ripeness of the females as well as the males and gives a control over the time spawning is to take place.

4. Make sure they have enough room

A pair of large, active fish cannot be expected to spawn in a small space. Many fishes exhibit elaborate courtship behavior like the male chasing the female and running behind it, which will be continued for hours. Always use larger tanks for breeding. The advantage of a larger tank is manifold. The fish do not feel cramped and have more areas for spawning to choose from. If the tank is heated, temperature fluctuations are not as great or as rapid in a larger tank. There is less chances of being eaten by the parents as the eggs are spread over a larger area. The fry also stand a greater chance of survival and rapid growth in larger tanks.

5. Make sure they have the proper temperature

In their natural environment, fishes generally spawn when certain stimuli prompt them to. One of these stimuli is temperature. In tropical countries usually when the temperature is low, like monsoon time, or winter time, most of the fishes breed. In the aquarium we must duplicate these conditions to the best of our ability to achieve similar results. A partial change of water gives some of this stimulation. If the fish are in proper condition and all else is to their liking, they will spawn.

6. Make sure they have the proper water conditions.

As all the exotic ornamental fishes are coming from all corners of the world, aquarium fishes are found under all sorts of water conditions. What these conditions are and what should be done to approximate them is very important.

7. Make sure they have proper lighting

If we look into a pond where there are fishes, the light comes in through the surface and you will notice that the fish tend to congregate where there is the least amount, in the shadows, below overhanging banks or among vegetation. These instincts are intensified at spawning time. The tendency for most fishes is to seek out the darkest corner for their spawning activities. If an aquarium is lighted brightly, and planting is not heavy, you will find that spawning is not easily encouraged.

8. Make sure they have a clean aquarium

A clean aquarium is a healthy aquarium. Give a thorough cleaning before the tank is set for breeding. Or the newly hatched fish will have to struggle for existence from parasites or snails etc.

9. Make sure they have the proper planting.

Plants or plant substitutes are indispensable in almost every breeding tank. Many egg layers deposit their eggs in finely leaved plants, while others attach them to the surface of broad-leaved plants. Some use leaves as part of their bubble nest. Plants also serve as a refuge for newly born live bearing fishes, protecting from the voracity of their own parents. Many aquarists have replaced spawning plants with other media. The advantage is that it can be used again and again and may be removed to another container where the eggs will hatch. After use it can be sterilized by boiling.

10. Make sure they have the proper shelter.

Plant shelter is not the only shelter, which must be considered. Some fishes require rocks or pebbles as well. Some prefer the confines of a small cave for their spawning activity. Many species of fishes not only use rocks in spawning but seek protection among them when being pursued.

### Breeding Habits

Breeding habits vary greatly among different genera, in some cases among different species of the same genus. The various fishes will be treated individually, but some general features of the breeding habits of all aquarium fishes are given below.

There are three general groups:



➤ **Egg scatterers:** This group of fishes lays its eggs and then allows them to hatch unattended. The released eggs either adhere to plants or other objects or fall to the bottom. Most of the barbs and characins spawn in this manner. Such fishes release buoyant eggs, which float at the surface. This is the characteristics of the kissing gourami *Helostoma temminskii*

➤ **Egg guarders:** The second group guards the eggs. This duty is performed by one or the other of the parents or both.

1. The eggs are laid on a firm object, such as a rock, plant leaf or plant stem, and are subsequently attended by one or both parents. Most of the cichlids use this method.

2. The eggs are laid in hidden places and guarded. The only difference between this and the first method is that here the eggs are hidden rather than laid on an open surface. The eggs are laid in a depression and guarded.

3. The eggs are placed in a nest, usually prepared in advance by the parent fish. These nests vary from the underwater structures to the floating bubble nest made by some anabantids such as *Colisa*, *Betta* and *Trichogaster* species.

➤ **Live bearers:** The third group, in which the fish give birth to live young ones. The eggs develop within the body of the female. The fry hatch and are released as free-swimming, fully formed young. The popular live bearing fishes, the poecillids are of this type.

### Egg scatterer

This is by far the largest group of fishes with known breeding habits. It includes most of the characins, some of the catfishes, most of the barbs, some of the minnows. Breeding is accomplished by a more or less haphazard scattering of the eggs in all directions; sometimes this is confined to heavily planted sections. With respect to *Corydoras* sp. the eggs are not scattered but are pasted here and there by the females. The common feature with regard to all the fishes in this group is that they lack parental care. The eggs are laid and forgotten. The eggs laid by this group vary degrees of stickiness to none at all. Some are even buoyant and float on the surface.

The parents show the habits of eating the eggs. One thing we can do to prevent them from eating is to cut down on the light. The fishes which spawn among plants can be kept from excessive egg-eating by making the planting so dense that they can just swim through it without recognizing the eggs. The fishes which lay non-adhesive eggs may be curbed from egg-eating in several ways. The simplest of these is a layer of pebbles on the bottom between which the eggs will settle. As an example the breeding of gold fish is given below.

### Breeding of gold fish

It is better to develop a brood stock by growing young fishes of ideal traits like body shape, colouration, fin pattern etc. by giving nourishing food and habitat conditions. They mature in 6-8 months. The male is identified by the presence of white spots called tubercles on the gill cover and anterior part of snout and roughness of the pectoral fish. The female has bulged belly and is without any of the characteristics of male described above.

A large tank is necessary for breeding gold fish, the larger the better. This should be well stocked with plants; some breeders use the roots of the Water Hyacinth, which float on the surface for catching the eggs. This plant can be removed easily when spawning is complete and place in another container for hatching. Three males to one female is the usual proportion and will result in the largest number of fertile eggs. The males soon give chase and eggs are scattered all over the tank, most of them on the plants Spawning usually takes place early morning and is completed in about 3 hours, after which the parents are removed. Eggs hatch out in a day and once the yolk sac has been absorbed the fry begin swimming. They should be fed regularly and generously. The optimum stocking density for

stocking fry is 5/litre and the young ones are ready for marketing in 3-4 months when they attain proper coloration. Gold fish is a prolific breeder, breeding interval is two to four weeks.

### Egg guarders

Most interesting examples in this category are the angel fighter and gouramis. As an example the breeding of angel fish is given below.

### Breeding of Angel fish

Angel fish can be mass bred in ponds as well as in controlled conditions. Sex identification is comparatively difficult or impossible. Generally angels are grown in large numbers in a tank and when they themselves form pairs each pair is transferred to a breeding aquarium. They are fed with mosquito larva profusely or any other live food. A piece of slate or a glass piece of 100 sq.cm is placed at 45° against the wall of the aquarium for adhesion of eggs. They also attach eggs on leaves. Both the parents take part in the breeding and caring of eggs. Angels lay 400-600 eggs that hatch out in two days and start free swimming in another 5 days. The fry accepts brine shrimp, larvae of shrimp or *Moina*. They can be reared in cement tanks or earthen pond on artificial feeds and plankton. The spawning interval is 3-6 weeks. Although both parents guard and nurse the eggs, it is advisable to remove the parents into another tank. Alternatively the slate piece with eggs can be removed to another hatching tank containing methylene blue solution.

### Livebearers

Platy, guppy, mollies and sword tails come under this group. The male can be easily identified by the presence of a gonopodium which is a modification of anal fin as an elongated copulatory organ. The female is usually bigger in size and less colourful. The lower lobe of the caudal fin is elongated in sword tails. Fertilization is internal, in the body of the female. The first spawn is produced in about three months. The sperm is stored in the reproductive tract of the female and can fertilize 5-6 batches of eggs. The spawning interval is about 3-4 weeks and the offspring produced varied from 30-50 for mollies, guppies and platys and 80-100 in sword tails.

Live bearers can be produced in cement tanks, silpaulin tanks or earthen ponds. They have the habit of devouring their young ones and hence plenty of aquatic plants should be provided in the breeding tanks for their hiding. The offspring can be separated from the breeding tanks and reared.

### Breeding of Indigenous ornamental fishes:

Before starting the breeding of any new species, the following Ten Commandments are to be followed in addition to those mentioned above.

### The Ten Commandments for the breeding of a new species

1. The breeding season of fish chosen
2. The breeding habit, viz., egg scatterer, egg guarder etc.
3. The feeding habit of the species.
4. The sexual dimorphism and size at first maturity
5. The water quality parameters required for breeding
6. The requirements of egg scatterers if they are so
7. The exact spawning and courtship behavior
8. The attitude of parents to the eggs and young ones
9. The breeding intervals of the species, life span of the fish.

10. The feeding habits of the hatchlings and young ones.

Under the NATP project carried out at College of Fisheries, captive breeding technology of ten prioritized species have been developed. They are *Puntius fasciatus*, *Puntius melanostigma*, *Puntius filamentosus*, *Puntius pookodensis*, *Puntius exclamatio*, *Puntius sarana subnasutus*, *Chela fasciata*, *Danio malabaricus*, *Garra mullya*, *Nemacheilus triangularis*, *Nemacheilus semiarmatus* and *Pristolepis marginata*.

Among these *Pristolepis marginata* alone exhibited parental care. They are nest builders and lithophils. All the others are egg scatterers. The eggs of *Puntius filamentosus*, *Danio malabaricus*, *Puntius exclamatio* and *Puntius sarana subnasutus* are adhesive to plants whereas those of *Chela fasciata*, and *Puntius pookodensis* are adhesive to the roots of floating plants and they are all categorized as phytophils.

*Puntius fasciata*, *Garra mullya*, the two loaches, *Nemacheilus triangularis* and *N. semiarmatus* simply scattered their eggs. The eggs of *Puntius melanostigma* were adhesive to the stones or pebbles at the bottom of the tank.

The details of their sexual dimorphism, spawning and courtship behaviour, embryonic development will be presented as photos and video clippings during the presentation.

