



Breeding and Rearing of Ornamental Fishes: As an Additional Income Generating Source Especially for Women

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Abstract:

The present study deals with the culture and breeding of ornamental fish in small space - as an additional income generating source especially for women. The study was conducted for a period of 16 months from June, 2010 to September, 2011. The culture and breeding of golden carp and lemon tetra was done in glass aquaria of size 30" x 12" x 15" and 48"x 12"x 18" and cement tank of size 40" x 24" x 22" with a regular monitoring of water quality parameters. Water exchange was also done when needed. The various water parameters such as temperature, pH, CO₂ content, dissolved oxygen, and alkalinity was determined daily during breeding period. Foods offered were mixed food which contains live food (Daphnia, mosquito larvae & earthworms), farax, readymade food and prepared food. Fishes were fed twice a day, in the morning and in the evening. The breeding of above fishes were successfully done in glass aquaria and cement tanks. The average no. of eggs per female produced by golden carp and lemon tetra was 324 and 158 respectively. Although the no. of eggs produced was less. The reason for this is probably small size of brooder, small space for rearing of brooders, a short period of rearing of brooders in natural environment.

Keyword: Rearing and breeding, *Carassius auratus*, *Hyphessobrycon pulchripinnis*.

1.0 Introduction:

Ornamental fish keeping is the most popular hobby in the world and it is considered as an easy and stress relieving hobby. At the dawn of the 21st century aquarium features as an integral part of modern interior decoration (Katia Oliver, 2001). The concept of entrepreneurship development through Ornamental fish farming is gaining popularity day by day. Ornamental fish farming is an important primary industry (Lim and Wong, 1997). The Ornamental fish trade plays an important role for socioeconomic upliftment of backward class and females in our country with little investment of money. The present paper reports on the breeding and rearing of two ornamental fishes, **Gold fish** (*Carassius auratus*) and **lemon tetra**, (*Hyphessobrycon pulchripinnis*) The aim of this study was to provide relevant information's of breeding and rearing of ornamental fishes to farmers (beginners) of the local area to develop ornamental

fish farming as a small scale bio-industry especially for women. The criteria for selection of suitable species for culture is based on its ecological adaptability, adjusting to certain fluctuation in the culture medium and accepting supplementary food etc. The Common **Gold fish** (*Carassius auratus*) is the most beautiful and popular freshwater fish species in the aquarium trade industry. It is a cold water fish but lives comfortably under tropical environment. The optimum temperature for goldfish is between 20°C and 22°C. It belongs to family cyprinidae. It is an omnivorous fish. Goldfish, like all cyprinid, are egg-layers. Their eggs are adhesive and attach to aquatic vegetation or a spawning mop. In semi-tropical region gold fish breeds twice a year, during February-March and September-October. The **lemon tetra**, (*Hyphessobrycon pulchripinnis*), is a species of tropical fresh water fish which originates from South America, belonging to the family characidae. It is a lemon coloured fish and has transparent, glassy

body with a lemon yellow sheen. Lemon tetra requires fairly soft and somewhat acidic water (pH around 6). The species is notably hardy, and will accommodate itself to a wide range of conditions. Temperature range for the species is 21°C to 28°C.

2.0 Material and Method:

The present work was conducted at department of zoology Govt. Girls (P.G.) College, Sri Ganganagar (Rajasthan) for a period of 16 months from June, 2010 to September, 2011. The climatic condition of Sri Ganganagar varies widely with temperature reaching 0°C in winter and those of summer touching 50°C with almost nil to scanty rains. Initially, **Golden carp (*Carassius auratus*) and Lemon tetra, (*Hyphessobrycon pulchripinnis*),** were transported from College of fisheries, Udaipur. After 20 hrs of journey fishes were acclimatized for 30 to 45 minutes and unpacked and released in cement tanks. Fishes were kept species wise in separate tank. According to age and size fishes were fed with farax, readymade food, live food (earthworms, Daphnia) and prepared food. A regular monitoring of water quality parameters were done in all aquaria and cement tanks and water exchange was also done when needed. In culture, chlorine free tap water was used. The various parameters of water such as temperature, pH, CO₂ content, DO and alkalinity were determined daily during breeding period by following the methods of Trivedi and Goel (1984) and APHA (1998). Breeding in Golden Carp was conducted in glass aquaria of size 30" x 12" x 15" which was disinfected with 1ppm solution of potassium permanganate washed thoroughly with

fresh water and then filled with dechlorinated fresh water. Some sterilized aquatic plants like hydrilla and plastic mop was placed in the breeding aquaria. After conditioning four female and four males were released into breeding tank in August, 2010 and three female and three males in March, 2011. The water temperature was about 21^oc and pH 7.2-7.4. Spawning took place after 26 hours (In August, 2010) and after 30 hours (In March, 2011). As soon as spawning was completed, the plants and plastic mops were transferred to a different aquarium tank of size 48"x 12"x 18". Details of spawning are presented in table 2. Breeding of lemon tetra was conducted in cement tank of size 40" x 24" x 22" which was disinfected with 1 ppm solution of potassium permanganate and washed thoroughly with fresh water and then filled with dechlorinated fresh water. Some sterilized aquatic plants like water hyacinth was placed in the breeding tank. After conditioning four female and four males were released into breeding tank in Sept., 2010 and August, 2011. The water temperature was about 25^oc. Spawning took place after 36-40 hours in the morning hours. As soon as spawning was completed, the brooders were transferred to a different tank. Details of spawning are presented in table 2.

3.0 Result and Discussion:

Table 1 gives the water quality of the rearing water. Table show that the water quality remained more or less the same throughout the culture period. All the parameters were within the range acceptable for fish.

Table 1: Physico-chemical parameters of water at the time of culture and breeding of Fish of study tank

| Sr.No. | Parameters | Golden Carp | | Lemon tetra | |
|--------|-------------------------|-------------|----------|-------------|---------|
| | | Culture | Breeding | Breeding | Culture |
| 1 | Water Temperature (Oc) | 20-25 | 21-23 | 25-27 | 22-26 |
| 2 | Alkalinity (mg/l) | 4.6-5.2 | 4.8-5.9 | 5.5-7.4 | 4.9-6.8 |
| 3 | Dissolved Oxygen (mg/l) | 7.0-7.5 | 7.2-7.6 | 7.1-7.6 | 6.8-7.3 |
| 4 | Carbon dioxide (mg/l) | 2.4-3.1 | 3.0-3.6 | 2.9-3.3 | 3.1-3.5 |
| 5 | pH | 7.2-7.6 | 7.0-7.5 | 6.7-7.0 | 6.6-7.2 |

The quality and quantity of feed are important factors affecting growth and reproduction in fishes (Wooton, 1982, Lochmann and Phillips, 1994, James and Sampath, 2002). In the present investigation foods offered were mixed food which contains natural planktons, earthworms, farax and prepared food (soybean flour+ Wheat flour+ mustered oil+ egg+ germinated gram+ salt+ calcium and mineral

powder). Nandeesh *et al* (1994) reported that mixed feeding schedules were superior to the high protein of a single diet because nitrogen retention was high in fish fed with mixed schedules. Farax was given as it is known to be the best food for the aquarium fishes because of its high digestibility and the resultant low metabolic wastes.

The breeding detail of Golden carp is shown in table 2. In August, 2010, from four pairs of brooders total number of eggs laid were 1340 (average no. of eggs 335 per female), whereas in March, 2011 from three pairs of brooders total number of eggs laid were 930 (average no. of eggs 310 per female). Hatching was completed in 48-50 hours. Hatching percentage was 62% in first breeding (Aug., 2010) and 66% in second breeding (March, 2011). After hatching, larvae hang motionless on plants and plastic mops and tank wall.

During this time they get their food from the yolk sac. After about 48 hours of hatching the yolk sac of larvae were absorbed, they become free swimming and at this stage they fed with boiled egg. After 10th day fry were fed with Daphnia, small pieces of earthworm and prepared food. After 20 days of rearing the young ones were transferred to cement tank. After a period of 30 days of rearing 620 fry was survived in first season (Aug., 2010) and 530 in second seasons (March, 2011).

Table 2: The breeding detail of Golden carp and Lemon tetra

| Sr.No. | Particulars | Golden Carp | Golden Carp | Lemon tetra | Lemon tetra |
|--------|--|--------------|--------------|--------------|--------------|
| | | Sept. 2010 | March2011 | Sept.2010 | August2011 |
| 1) | Age of fish at spawning | 18-19 months | 23-24 months | 12-14 months | 22-23 months |
| 2) | Male : Female ratio | 1 : 1 | 1 : 1 | 1 : 1 | 1 : 1 |
| 3) | No. of pairs of brooder selected | 4 pairs | 3 pairs | 4 pairs | 4 pairs |
| 4) | No. of eggs laid | 1340 | 930 | 600 | 660 |
| 5) | Fertilization percent | 90-92% | 90-92% | 80-85% | 80-85% |
| 6) | Hatching period | 36-40 hrs | 36-40 hrs | 44-46 hrs | 44-46 hrs |
| 7) | Hatching percentage | 62% | 64% | 48% | 52% |
| 8) | Average no. of fry survived after thirty days of rearing | 620 | 530 | 150 | 180 |

The breeding detail of Lemon tetra is shown in table 2. Breeding was conducted in cement tank in September, 2010 and August, 2011. Four pairs of mature brooders were kept in breeding tank in each season. The total number of eggs laid was 600 (average 150 eggs per female) in September, 2010 and 660 (average 165 eggs per female) in August, 2011. Fertilized eggs were transparent and they kept in water having temperature 25-28^oc. Aerator was used for aeration. Hatching completed in 44-46 hours with hatching percentage 48% (in September, 2010) and 52% (in August, 2011). After about 48 hours of hatching the yolk sac of larvae were absorbed, they become free swimming and at this stage they fed with boiled egg. After 10th day fry were fed with Daphnia, small pieces of earthworm and prepared food. Average number of fry survived after 30 days of rearing was 150 (in September, 2010) and 180 (in August, 2011). The breeding of gold fish and lemon tetra were successfully done. Although the no. of eggs produced was less. There are several factors, such as environmental conditions, genetic factors, nutrition and content of feed that influence reproduction in fish. (Bromage, 1995, Dzikowski *et al* 2001, Mehrad and Sadagur 2010). The other reason for this is probably small size of brooder, small space, a short period of rearing of brooders in natural environment and immaturity of brooders.

The small size of brooder was used due to the availability of small space. A large, active fish cannot be expected to spawn in a small space. (Mercy Anna, T.V. 2009). As the larger fish (length weight) has drastically more fecundity than the smaller size. (S. Solomon *et al* 2011). In egg laying fishes a general ratio of one male to one female (1:1) was maintained. The economics of ornamental fish (Golden carp/ Lemon tetra) are presented in table 3. Out of the total stock 20% of fishes were sold after 15 days of rearing when they attained a size of about 2-3 cm. and after 30 days another 20% sold. The rest 60% of the stock were reared up to 60 days and sold when they attained size of 6-7 cm. Table 3 show that an additional income will be generated by breeding and rearing of different ornamental fishes (Golden carp, Lemon tetra) in small space with less investment and high benefit. In West Bengal a considerable number of small farmers are engaged in this trade to maintain their livelihood (Ghosh and Debnath, 1998; Ghosh *et al.*, 2000). But due to hardy climatic conditions of study area and lack of knowledge no anyone farmers engaged in this trade. Therefore, it is necessary to develop a body of knowledge regarding commercial breeding and rearing of the ornamental fishes under local conditions. By maintaining the temperature, the ornamental fish can be bred and

Table 3: Economics of Golden carp/ Lemon tetra rearing (for 2000 fry rearing)

| Sr.No. | Particulars | Rate(Rs.) | Total Value |
|---------------------|--|-------------|-------------|
| CAPITAL COST | | | |
| 1 | Cement Tanks or Aquarium (8 nos.) | 1000/-pc | 8000/- |
| 2 | Air Pumps (6 nos.) | 200/-pc | 1200/- |
| 3 | Water Heater (6 nos.) | 200/-pc | 1200/- |
| CULTURE COST | | | |
| 4 | Cost of brooders (100 nos.) | 10/-pc | 1000/- |
| 5 | Cost of feed for 60 days | 20/-per day | 1200/- |
| 6 | Miscellaneous expenditure | | 1000/- |
| SALE | | | |
| 7 | After 15 days of rearing(400 pieces) | 3/-pc | 1200/- |
| 8 | After 30 days of rearing(400 pieces) | 7/-pc | 2800/- |
| 9 | After 60 days of rearing(1200 pieces) | 10/-pc | 12000/- |
| 10 | Profit in two months culture period | | 16000/- |
| 11 | Annual profit (2 crops) | | 32000/- |
| 12 | Annual net profit (after deducting capital cost) | | 18400/- |

reared in an indoor aqua- business. In rural areas and small towns a small open space of house may be converted into a small ornamental indoor fish culture unit and can generate additional income source from this trade especially by women.

4.0 Conclusion:

It is concluded that this study will help in popularization of ornamental fish farming in local area and in turn will help to set profitable small scale ornamental fish farm in small space under the hardy climatic conditions (low and high temperature) with less investment.

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