CHAPTER 10 - CAPTIVE MATURATION, BREEDING AND LARVAL REARING

10.1. INTRODUCTION

The fish species which are generally grow up to a length of about 25cm or 9inches at adult stage are commonly known as Small Indigenous Species (Felts *et al*., 1996; Hossain *et al*., 1999). Overfishing and habitat deterioration cause the heavy decline in small indigenous fish species (Thilsted *et al*., 1997). Nearly 39% freshwater species are under endangered condition worldwide (IUCN Bangladesh, 2000). There are a number of small indigenous species available in India which has a great ornamental value as well. *Ctenops nobilis* is one of them which have a huge market demand. Due to its darker colour with which bands, clam nature the fish is preferred by foreign countries also. The entire indigenous ornamental fish supply primarily will collection dependent (85%), only 15% fish are captive bred (Mahapatra and Lakra, 2014). In order to decline the natural population of the fish, meet the market demand cannot be met by only wild collection, so seed production in captive condition is very important. Not only for bio-diversity conservation by culture practice also involving rural people in respect of their sustainable livelihood. The price of *C. nobilis* in local market varies between Rs. 12/- to 30/- per piece (Mahapatra *et al*., 2005) whereas the export value of the fish is 1-2 US$ per piece. As the fish is larvivorous (IUCN Bangladesh, 2000) in nature so it can be cultured to control of mosquito, fly etc. The breeding of gourami species were studied by

different authors (Cole, 1999; Zalina *et al*., 2012; Gupta, 2015). Breeding behaviour of *C. nobilis* also studied by Britz, 1992; Ruber, 2006; Armitage, 1987 and Bitsch, 1987. But there is a huge data deficient for successful captive breeding and large scale seed production of the fish.

10.2. MATERIALS AND METHODS

10.2.1. Broodstock development:

5 different types of feed viz. Tubifex, Daphnia, Mosquito larvae, Artemia and dry feed (commercial dry feed by CP) was given @ 2% body weight for 120 days for gonadal maturation of the fish. Each experimental tank in duplicate contains 4 pairs of fish (1:1 male and female ratio) (**Figure 55**). The experiments on broodstock development of the fish were made in Ramkumar Fishery Farm, Domjur. At this time temperature varies from 27-32^{o}C and pH varies between 7.6-8.

Figure 55. Experimental design of Gonadal maturation of *C. nobilis* with feeding intervention

10.2.2. Collection of Brood Fishes and Release in Breeding Tank:

Matured brood fishes were collected from captive raised stock by netting from rearing tank in just before the breeding season (first week of July) (**Figure 56**). Utmost care was taken so that brood fishes sustain least possible handling stress. The fish was treated with @1PPM potassium permanganate before breeding.

Figure 56. Brooder selection from rearing tank

(See colour photo in Plate No. XI, Fig. 31)

10.2.3. Breeding setup:

After segregating male and females, 24 pairs of the male and female were kept in 6 separate glass aquariums with the provision of sufficient aeration (**Figure 57)**. The size of the aquarium was 4′x2′x1′ and having the water holding capacity 240lt each. *Hydilla sp.* and gravel base were provided in each aquarium. At this time Tubifex @2% body weight given as food. Water quality management checking was made in 7 days interval. The optimum temperature was maintained by thermostat.

Figure 57. Breeding tank of the fish

(See colour photo in Plate No. XI, Fig. 32)

10.3. RESULT

10.3.1. Gonadal Development of the fish:

After 90 days of study the gonadal development of the fish observed (**Table 69 Figure 58**). Feed with Tibifex and mosquito larvae gives the best gonadal maturation (GSI 6.42 and 5.55 respectively).

Table 69. Gonadal maturation of *C. nobilis* with different feeding intervention

Exp. group	Weight (g)	Gonad weight (g)	Body weight without gonad	GSI
Mosquito larvae	6.30	0.35	5.95	5.55
Daphnia	6.25	0.31	5.94	4.96
Tubifex	6.38	0.41	5.97	6.42
Artemia	6.15	0.23	5.92	3.73
Dry feed	5.15	0.17	4.98	3.30

Figure 58. Matured female fish

(See colour photo in Plate No. XI, Fig. 33)

10.3.2. Mating of the fish:

The male fish chase a particular female selecting from a sole. After that both swim, mouthing towards each other. Sometimes the females also respond by opening the throat and flaring the pectoral fish and anal fin. The process can continue up to 3-4 days (**Figure 59**).

Figure 59: Different stages of mating of *C. nobilis*

(See colour photo in Plate No. XII, Fig. 34)

10.3.3. Breeding of the fish:

At the time of breeding the distensible skin at lower jaw of female is expand. The breeding process takes several hours to complete. When the female release the eggs, males fertilized them and female soon collect the eggs inside her mouth (**Figure 60**). Sometimes eggs also observed in male mouth. At this time the mouth-brooding male or female cannot accept food. It is observed that after 10 days the carrier fish started to spat out 10-15 numbers of larvae and the process was continued up to 18-20 days (**Table 70**). The hatchlings were come out from the mouth with attaining the length of 3-6 mm and freely moved in the water (**Figure 61**). The microscopic view of the larvae shows in the **figure 62**. A total 115-160 fry were come out from one pair (**Figure 63**). The water temperature was around 27-32^{o}C, pH should be 7.6-8 and alkalinity varies from 135-170 PPM (**Table 71**). At this time if there were any stresses they can engulf the eggs also. Soon after hatchlings come out the adult fishes were separated in different tank and Methylene blue solution was added in fry tank.

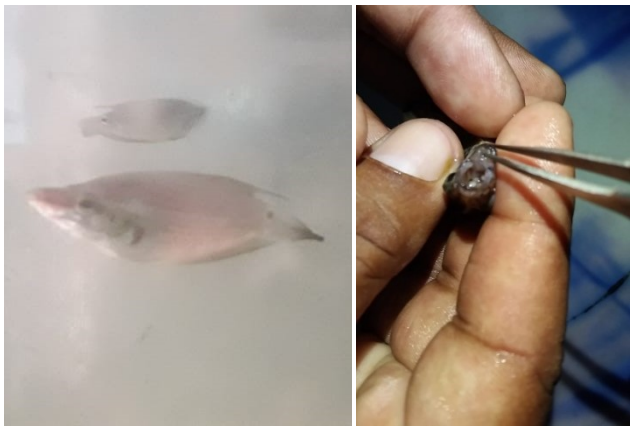

Figure 60. Mouth breeding of *C. nobilis*

(See colour photo in Plate No. XII, Fig. 35)

Table 70. Breeding and hatchlings disposal process of *C. nobilis*

No. of Day	Observations
1st	Chasing start by male fish
2nd -3rd	Chasing and mating process
4th	Spawning and female mouth full of whitish eggs
10th	10-15 Nos. of hatchlings with length 3mm
12th	18-36 Nos. of hatchlings with length 3mm
15th	32-47 Nos. of hatchlings with length 4mm
19th	55-62 Nos. of hatchlings with length 6mm

Table 71. Water quality parameters during breeding period of *C. nobilis*

Parameters	Range
Temperature	27-32°C
pH	7.6-8
Alkalinity	135-170 PPM
Hardness	98-110 PPM

Figure 61. Length of spat out larvae of *C. nobilis*

(See colour photo in Plate No. XII, Fig. 36)

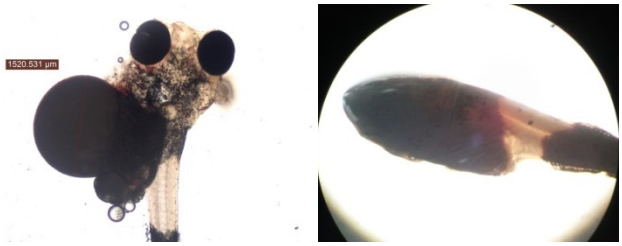

Figure 62. Microscopic view of the larvae

a. Larvae of 11th day **b. Larvae of 18th day**

Figure 63. Different days old larvae come out from parent

(See colour photo in Plate No. XII, Fig. 37)

10.3.4. Larval development of *C. nobilis*:

Incubation of fertilized egg occurred inside the mouth cavity of the parent fish. Hatchlings come out from the parent fish were required 2-5 days for yolk sac absorption. Initially the spawn were fed with small Daphnia and Rotifer for 4-5 days. The early fry were fed with Artemia. The larval survivality rate was about 35-40%. At the time of larval rearing water temperature should not exceed 32°C. After one month the fry was fed on Tubifex and mosquito larvae. Fry attained 25-30 mm length and 0.20-0.37 g weight with 4 months of culture and attained adult size (65-70 mm length and 4.35-6.50g weight) within 9-10 months (**Figure 64**).

a) 4 months old fish **b) 9 months old fish**

Figure 64 (a-b). Haul of *C. nobilis* after 4 and 9 month of rearing

(See colour photo in Plate No. XIII, Fig. 38)

10.4. DISCUSSION

Breeding of *C. nobilis* in captivity is little hazardous. As the fish is very much sensitive so there is a huge chance of bacterial and fungal infection and mortality. Like other gourami species *C. nobilis* cannot make nest for spawning but the fish is mouth brooder like Chocolate gourami (Armitage, 1987; Bilke, 1992; Britz, 1992 & 1993). In the present study parental care observed in both male and female fish which is corroborate with the observation made by Ruber, 2006. It is revealed from the present study that male is more aggressive and stated the courtship which is also similar as observed by Bitsch, 1987. In this study 116-160 hatchlings recorded from one female or male mouth which is quite similar with the data (150 Nos. from one male) given by Bitsch, 1987. The size of spat out larvae recorded 3–6mm and the similar record of 5-6mm sized larvae observed by Bitsch, 1987. It is observed in the present study and earlier works (Bitsch, 1987) that the fish throw the hatchling time to time and the whole process takes time up to 20-25 days. The larval survivality rate was very poor may be due to water quality parameters. The fish takes 9-10 months to achieve adult size.