

Aqua-Internship Program  
Asia Link project  
Faculty of Fisheries  
Bangladesh Agricultural University, Mymensingh

*Broodstock Management and Production of  
Monosex Tilapia Fry*



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Name of Aqua-Industry : Agro-3, Boilor, Trishal, Mymensingh



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*Report on  
Field Level Experience of Working on Seed  
Production of Mono-sex Tilapia*



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## ABSTRACT

A field level study was carried out to acquire experience on seed production of mono-sex tilapia at Reliance aqua farms Ukilbari, Boilor, Trishal, Mymensingh. The duration of this study was 3 months (01/04/10 to 30/06/10). Reliance Aqua Farm is occupied 20 acre area of which 1.5 acre is hatchery complex and 18.5 acre pond area. They use 40 hatching jar, 120 hatching tray, 12 cistern and 300 hapa in the hatchery complex for seed production. The size of the breeding hapa is 50ft×25ft×3ft and each hapa contain 50 male and 150 female at 1:3 (male:female) ratio. A single female can produce 1000-1500 eggs/cycle. They use hormone in feed for sex reversal (production of all male tilapia) from the first feeding stage.  $17\alpha$  –methyl testosterone hormone used at 60 mg/kg feed which is dissolved with 95% ethanol solution. 150 mg ethanol is used for per kg feed preparation. Mechanical method is used for hormone mixing in this farm, and then the feed are dried under room temperature. Commercial mega feed is used. After sex-reversal, fingerlings are generally nursed to an advanced size before they are stocked into grow-out facilities. This procedure increases survival in the grow-out stage and utilizes growing space more efficiently. Sex-reversed fingerlings are stocked at approximately 20-25 fish/m<sup>2</sup> in small ponds and cultured for 45-50 days to an average size of 15-20g. Then Marketing is done at three size grades (small/.60 TK, medium/.80 TK, large/1 TK).

## INTRODUCTION

Tilapia (*Oreochromis niloticus*) a hardy fish that can survive in shallow and turbid water conditions and a good converter of organic matter into high quality protein (Stickney *et al.*, 1979; and Pullin and Lowe McCounell, 1982) has been identified as one potential species. In 1974, UNICEF introduced Tilapia (*Oreochromis niloticus*) to Bangladesh. At that time farming of this species also did not flourish due to lack of research, unavailability of seed and inadequate extension services. Therefore the same species once again was introduced to Bangladesh from Thailand in 1987 with the initiative of the Bangladesh Fisheries Research Institute (Gupta *et al.*, 1992). Since then development agencies and scientists have been working together to make tilapia at farm level. Simultaneously, scientific researches have been conducted with the major initiative of BFRI and World Fish Center (Formerly ICLARM). Such effects have successfully resulted in the breeding and farming of Tilapia with higher growth and survival rate, higher yields, lower production cost and also consumer's acceptability.

Another promising synthetic strain of Nile Tilapia is known as GIFT (Genetically Improved Farmed Tilapia) has been introduced in 1994. GIFT strain has a higher growth rate than the local strains. It performs 60% better growth and 50% better survival than commercially available strain of Tilapia. Growth rate of male Tilapia is higher than female so all male Tilapia production is popular in hatchery by using hormone. In hatchery GIFT strain is used to produce all male (Mono-sex) Tilapia fry.

### **Objectives:**

- i. To acquire field level experience on Tilapia hatchery

- ii. To compare theoretical knowledge with field level experience
- iii. To know practical knowledge about mono-sex tilapia seed production.
- iv. To know the seed production technique and gain practical experience on field work

## **METHODOLOGY**

A study was carried out on mono-sex seed production technique in Reliance Aqua Farm for a period of 3 months from 01/04/10 to 31/06/10. In this farm, every year a pure line of GIFT is brought from BFRI which is used as brood fish (150g ) which is kept in breeding hapa (50ft×25ft×3ft) at a density of 50 male and 150 female. Here the ratio of male and female is maintained at 1:3. Normally they used a tilapia up to one year for breeding.



**Fig. Collection of eggs**

### **Collection of eggs and hatching:**

Female fish produce 1000-1500 eggs/cycle. Eggs are collected every seven days interval and we found four stages of eggs after collection. All the eggs collected from the mouth of an individual. Four stages of eggs are given below:

1<sup>st</sup> stage: Yellow colour, 1 day aged (20hr) fertilized eggs. Hatching rate at this stage vary from 50-70%.

2<sup>nd</sup> stage: Merun colour with visible eye.

3<sup>rd</sup> stage: Fry with visible head and tail, swimming power, only with vertical movement.

4<sup>th</sup> stage: Swim up fry and able to move.

If temperature is 28-30°C it takes 24 h to complete each stage and it takes 72 hrs to absorb yolk sac completely. It takes 10 days to change eggs to fry.



**Fig. observation of the water temperature**

**Fig. Biofilter system**

Fertilized eggs or hatched fry with yolk sac that have been collected from the mouth of female breeders are incubated in a series of round bottom jars and flat trays connected to the recirculatory system where fresh water ( $28\pm 1^\circ\text{C}$ ) come directly from header tank by gravity. Immediately after hatching the larvae are deposited at the basement of the attached tray and flat trays connected to the recirculatory system where fresh water come directly from header tank by gravity. Immediately after hatching the larvae are deposited at the basement of the attached tray and they are transferred to the series of separate trays and kept unit their yolk sac absorption stage is over i.e., first feeding fry stage. Each batch of fertilized

eggs needs on an average of 10-12 days to complete the cycle of development (both embryonic and larval stages).

### **Production of mono-sex by using hormone**

When yolk sac resorption stage is over i.e., they become suitable to treat with hormone then they are transferred to the transitory hapa and kept 3 days to make them adapted to take hormone treated feed. At this hapa 50% of their body wt is given. After 3 days the fry are transferred to the treatment hapa and kept here for 20 days. Treatment hapa are of two types one is primary hapa (12ft×6ft×3ft) another is secondary hapa (20ft×10ft×3ft). In primary treatment hapa they are stocked at a density of 30,000fry / hapa for 20days, here they are supplied with hormone treated feed 4-5 times per day at 100% body wt. For better confirmation, they treat another 7 days in secondary hapa (20ft×10ft×3ft), where the density of the fry is 20000 fry/hapa.



**Fig. Hatching jar and tray**

### **Preparation of Feed**

17 $\alpha$  –methyl testosterone is mixed with feed at the rate of 60mg hormone/kg feed. Usually steroid hormone is dissolved in 150 ml of ethanol and mixed with 1 kg feed. The feed is screened by fine meshed net. 35-40% protein rich feed is used;

normally they used commercial mega feed. To mixed hormone homogenously with feed a stirring machine is used in which feed is taken first and then hormone poured in it slowly. The machine is moved at 150 rpm. After mixing of hormone, the feed is dried at room temperature which allowed ethanol to evaporate. Here ethanol is used to make a stock solution of hormone in order to mix it homogenously with feed.



**Fig. Hormone mixing**



**Fig. Supply of hormone treated feed**

### **Rate of sex conversion:**

Usually the application of hormone treated feed at 30 days gives good result but they commercially apply hormone treated feed 20 days which leads to 95-97% success rate i.e., production of 97% male fish which is considered as good quality whereas 95% sex reversed is called mono-sex. The error percentage is usually 2-5%. The success rate is related to proper environment and proper dose. Usually 28-30°C temperature is best. In polluted water, feeding efficiency decrease. Oxygen concentration should be 4-5 ppm. It should be noted that over feeding or over dosing makes the fish sterile the sex of the stock is checked by dissecting the fry to know where the sex is changed successfully.





**Fig. Nursery hapa**

### **Nursing:**

After 20 days the fingerlings are transferred to the nursery pond where nursing is completed. Before stocking in the nursery pond, pond are prepared by using 250g lime/dec removing frog, snake and other undesirable species and surrounding the pond with net. Here 0.2-0.5 g size fingerlings are stocked at a nursery hapa (20ft×10ft×3ft). Here they are nursed for 45-50 days by supplying with protein rich feed (35-40%) at 80% body wt. After 45-50 days the weight is reached to 15-20g.

### **Marketing:**

Usually their are there size grad the size category are given below-

Size	Average wt.	Average length	Price
Small size (S)	200mg±	2 cm	0.60 Tk.
Medium size (M)	400mg±	2.5cm	0.80Tk

Large size (L)	1gm	4 cm	1Tk.
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Before selling the fry are transferred to the conditioning hapa where no feed is given to avoid faces which pollute the water and create O<sub>2</sub> deficiency usually transportation is done in oxygenated plastic bag. Two plastic bags and one wrapping bag are used to improve firmness of the bag.

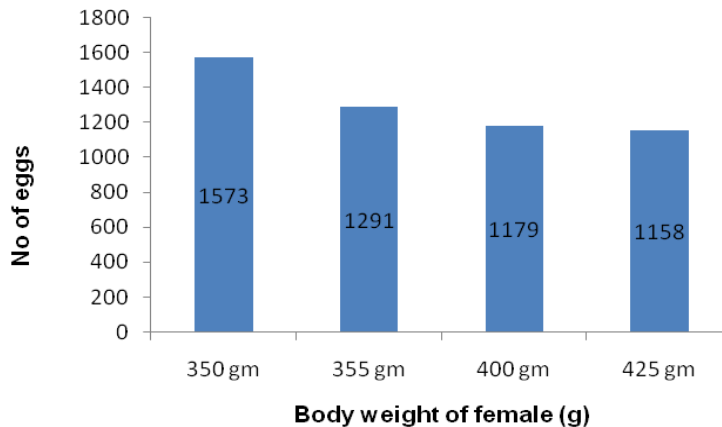
## RESULT AND DISCUSSION

Number of eggs per female varies, we observed female fish and count their eggs.

The findings are given below:

<b>Fish wt. in g</b>	<b>no of eggs</b>
350 g	1573
355 g	1291
400 g	1179
425 g	1158

In case of *Tilapia nilotica*, there is an inverse relationship between the number of eggs and the body wt. of female i.e., the lower the wt. of mature female, the more will be the number of eggs and vice versa (Velasco 2003).



**Fig. Relationship between body weight and no of egg**

For this reason, <400 gm brood fish size is preferable collect good quantity of eggs.

GIFT strain has a higher growth rate than the local strains. It performs 60% more growth and 50% more survival than commercially available local strain of tilapia. Growth rate of male tilapia is higher than female so all male tilapia production is popular in hatchery by using steroid hormone. Sex ratio of broods at 1:3 (male:female) gives the best result. Standard size of breeding hapa is 50ft×25ft×3ft. In Reliance Aqua farms they normally stock 50 male and 150 female per hapa. A single female can produce 1000-1500 eggs/cycle. From the first feeding stage hormone mixed feed is supplied to the fry (60mg/kg feed). Sex is changed within 20 days of treatment but for better confirmation hormone mixed feed is supplied for another 7 days. 97% all male production is observed by sexing method in the Reliance Aqua Farm.

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