



REPUBLIC OF KENYA
MINISTRY OF FISHERIES DEVELOPMENT
DIRECTORATE OF AQUACULTURE DEVELOPMENT



6. HATCHERY MANAGEMENT AND TILAPIA FINGERLING PRODUCTION

Introduction

Although tilapia breed freely in ponds, it is important for farmers (producers) to consider using properly produced fingerlings. They need to invest in hatcheries for fry and fingerling production. Quality fingerlings in tilapia aquaculture are very important. For this reason it is advisable for farmers to generate their own fingerlings if they cannot ascertain the quality of those from other sources. Poor fingerlings result to poor harvests. This will also allow the farmer to have ready fingerlings whenever he needs them. As long as the demand for fingerlings exists, a well-managed hatchery can turn out to be a good business.

Three methods of tilapia fingerlings production which are commonly used in Kenya are;

- i). Open ponds which is the most commonly used
- ii). Hapas (net enclosures placed in ponds)
- iii). Tanks (made of plastic, fibre glass or concrete)

Open pond method

This is the simplest and most common method of tilapia fingerling production in Kenya. A properly constructed and well fertilised pond serves both for breeding and rearing fry. Brooders are stocked into the ponds and allowed to spawn naturally. The brood fish are stocked at the rate of 100 to 200 kg /ha at a sex ratio of 1:3 or 1:4 (males to females). A female brood fish of 90-300 g produces as much as 500 eggs per spawning. They should produce 6-15 fry/m²/month. To increase seed production, use larger brooders. Brooders of 1-1.5 kg can produce 45 fry/ m²/month. For this case, you need to harvest every 17-19 days.



Earthen fish ponds used for fingerlings production in Kenya
(Mbugua HM)

Harvesting for fry from the ponds is done every 15-21 days (More frequently where average water temperatures are above 25°C). The brooders can be used for 3-5 years.

Fry harvesting should be done by hand scoop nets along the edges of the pond to minimise pond disturbance and fry mortality.

Tank method

Tank-based hatcheries are relatively expensive to set up. The tanks should be circular in shape and can be made of concrete, plastic, fibreglass or even metallic.



Hatchery tanks in a fish farm in Kenya (Mbugua HM)

When using this method:

- The tanks should be 1-6 m diameter and a water depth of 0.5-1 m.
- Stock 100-200 g brooders at a density of 3-5/m² at a sex ratio of 1 male to 2-7 females.
- Feed using a 30-40% crude protein diet at a rate of 1-2% body weight/day.
- Collect fry every 10-14 days

Yields of up to 400-3,000 fry/m²/month can be realised using this method.

An advantage of using the tank method is that tanks are easy to manage. However, they are relatively expensive to set up compared to ponds and hapas.

The “hapa” method

A hapa is a rectangular or square net cage open at the top and placed in a pond for holding fish for various purposes. The mesh size of the hapa should not allow fish to leave or enter the hapa.

Hatchery hapas sizes vary but the ideal size measures 3 m long, 3 m wide, and 1.5 m deep.



Mbugua HM

Inspecting tilapia breeding hapas

When using hapas to generate fingerlings:

- Stock brooders weighing about 100 to 200 g at a ratio of about 1:5 to 1:7 males to females.
- Stock the brooders at a density of 4-5 brooders / m².
- Hapas should be inspected for fry every day
- Remove the fry using a scoop net after two week and stock them into tanks, other hapas, or a rearing ponds.

Production in hapas range from 150 fry/m²/month to over 880 fry/ m²/month.

Feeding fry in hapas

- Fry reared in a hapa should be fed 4 times/day on a daily basis until the fry reach the desired size (5 g).
- Use a diet in powder form at the rate of 5-10% of the total body weight per day.

Advantages of using hapa method	Disadvantages of the hapa method
<ul style="list-style-type: none"> • Handling of fry and brooders are easily handled • Production on a per unit area is high. • Assurance of uniform fry of relatively the same age • Minimised loss of fry • Hapas can be set up in ponds stocked with fish 	<ul style="list-style-type: none"> • Management is more demanding compared with the other methods • Mortalities may occur due to aggressiveness during spawning • Feeding is a must • Hapas can be destroyed during stormy weather • Hapa material will degrade and need replacing • Fish may easily escape if the hapa is damaged • Localised poor water quality is likely due to uneaten feed and fish waste • Hapa mesh will get clogged limiting water circulation and need periodic cleaning

Production of all-male fingerlings

Males-only fingerlings can be obtained by three methods:

- Hybridization
- Sex-reversal and
- Manual sexing.

None of these methods is always 100 percent effective, and a combination of methods is recommended. Hybridization can be used to produce better results of males only. The hybrids can then be subjected to hand sexing or a sex-reversal treatment. Producing sufficient numbers of hybrid fry may be difficult because of breeding incompatibilities between the parent species. Sex-reversal is more complicated and requires obtaining recently hatched fry and rearing them in tanks or hapas where they are subjected to hormone-laced feed for about three weeks.

Manual sexing (hand sexing) involves separating males from females by visual inspection of the external urogenital openings. Secondary sex characteristics may also be used to help distinguish sex. Reliability of sexing depends on the skill of the workers, the species to be sorted and its size. Experienced workers can easily sex 20-gram fingerling *T. hornorum* and *T. mossambica*, 30-gram *T. nilotica*, and 50-gram *T. aurea*.

Hormonal sex reversal

- To do this, you need a tank-based or hapa-based hatchery that will allow fry to be collected at the yolk sac or first feeding stages (no later than one week after they have been released from the female).
- Transferred healthy fry of uniform size to the tank or hapa where you will feed them with hormone-laced diet for 21-28 days

The sex reversal feed is prepared as follows:

- Mix 30-70 mg of hormone (methyl or ethyl testosterone) in 700 ml of 95% neutral ethanol
- Add 700 ml of hormone solution to each kg of finely ground feed then mix thoroughly and dry. At this stage you may add any needed supplements
- This feed should be kept under refrigeration if it is not going to be used immediately
- Feed the fry at a rate of 10-30% of body weight per day, at least four times a day for 21-28 days.
- The fry must eat this feed to sex-reverse

Tilapia males are preferred for culture because they grow faster than females. Females use considerable energy in reproduction and do not eat when they are incubating eggs. Males only culture permits the use of longer culture periods, higher stocking rates and fingerlings of any age. High stocking densities reduce individual growth rates, but yields per unit area are greater. If the growing season can be extended, it should be possible to produce fish of up to 500 grams. Expected survival for all-male culture is 90 percent or greater. A disadvantage of male mono-sex culture is that female juveniles are discarded.

Females included in a population of mostly male tilapia affects the maximum attainable size of the original stock in grow-out. A stocking rate of 2/m² is commonly used in Kenya to achieve yields of 1kg/ m². At this stocking rate the daily weight gain will range from 1.5 to 2.0 grams. Culture periods of 6 months or more are needed to produce fish that weigh close to 500 grams. There are cases in Kenya where stocking densities of 6 juveniles/ m² is practiced with a production of up to 3kg/ m². Higher stocking densities will require water aeration and sub-optimal feeding rates may have to be used to maintain suitable water quality.