

## Hapa Nets for Mass Fingerling Hatchery Production

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### Summary

Inadequate supply of high-grade fingerlings from improved fish breeds is one of the main constraints to the expansion of the aquaculture industry across Sub-Saharan Africa. This situation discourages investments and reduces the viability of aquaculture enterprise. Poor and uneven growth rates, and high fingerling mortality present major limitations in open ponds. Birds, reptiles, amphibians, and even aquatic insects can cause massive losses in stocks of young fish. Artisanal and commercial hatcheries must achieve rapid and uniform production of fish stock for reliable supply to the local aquaculture industry, thereby allowing stable returns on investment. Small cage-like enclosures, referred to as “hapa” nets established within a pond are well suited to keeping brooders, hatchlings, and juveniles so they are readily accessible and protected from predators and other fish. Hapa are simple to build with fine mesh screen netting material and wooden poles or floating barrels, making them affordable for any size of hatchery. This technology eases management of the brooder, fry, and fingerlings, as it enables operators to monitor the performance of their stock more closely and adjust breeding, feeding or aeration regimes. Hatcheries can realize higher fertilization rates of eggs, even growth of fish seed and reduced mortality, increasing production of fry and fingerlings per unit area with the right management of hapa enclosures.

### Technical Description

Using hapa is a convenient means of collecting fry from the mouth of a tilapia brooder and rearing fingerlings inside a pond. The stocking density of the hapa affects fish survival, size variation and production rate, so it must be considered when determining the method and profitability of a hatchery. This simple containment system offers large benefits for all male fingerling production through manual sexing, hormonal reversal or YY male technology. However, management of brooders, fry and fingerling in the net enclosure is more demanding compared to traditional open-pond methods. Complete feeding regimes are required within the enclosure and must be adjusted during different stages of growth. Severe injury and mortality may occur due to aggressiveness among fish during spawning. Net materials degrade in sunlight and require periodic replacing. Storms, winds, or heavy rainfall can damage structures causing stock to escape. Hapa mesh becomes clogged over time and limits water circulation and aeration unless

cleaned. Higher localized feeding can also lead to poor water quality within the net without adequate circulation.

### **Uses**

Brooders, fry, and fingerlings from all common aquaculture species such as tilapia, catfish, carp, and prawn and crayfish can be stocked in hapa nets. The net enclosures may be installed in earthen ponds, riverbeds, and large concrete tanks, and the shape and size adjusted to the dimension and depth of a water body. In ponds that are fitted with a plastic liner (see Technology 4), there is need of floating types of hapa. Hapa can be set up in ponds that are stocked with other fish without risk of competition. They are suitable for shallow water (less than 1.6 m deep) with low water flow rate and level of fluctuation.

### **Composition**

Various shapes and sizes of hapa are used, most commonly the enclosures measure about 3 m long, 3 m wide, and 1.5 m deep. Hapa are made of wooden poles that are sunk into the bed of the pond and a screen with mesh size of 0.01 mm to 2.5 mm depending on whether fry, fingerlings or fish are inside. Bamboo is ideal for constructing hapa since it is flexible in high wind. Polyethylene material is the most durable and cost-effective for nets. The net is attached to poles with nylon thread and double stitched to prevent splitting. A cover on top of the hapa prevents brood fish from jumping out and prevents birds from attacking the fish inside.

### **Application**

In fingerling production, use of hapa requires periodic scrubbing because the mesh will get clogged, therefore limiting water circulation. It could also result to poor water quality due to accumulation of uneaten feed and fish waste. They are easily cleaned by scrubbing with a brush whilst washing with pond water. Dirty hapa nets can be removed from the pond, soaked with urea for 72 hours, and washed with cleaner and rinsed. Fry production in hapa is normally done with brooders of 300 g average weight at a male to female ratio of 1:2 or 1:3, and stocking density of 4-5 brooders per square meter. Hapa should be inspected for fry every day, which are subsequently transferred into other hapa tanks or rearing ponds. The hatchery operator must record the number of fry and fingerlings that are harvested from individual hapa along with feed input to monitor and achieve high levels of rearing efficiency.

<b>Agroecologies</b>	All Agroecologies.
<b>Regions</b>	Africa South of Sahara.

<b>Developed in Countries</b>	Zambia, Uganda, Togo, Tanzania, Sudan, South Sudan, Sierra Leone, Senegal, Rwanda, Nigeria, Niger, Mozambique, Mali, Malawi, Madagascar, Kenya, Ivory Coast, Guinea, Ghana, Ethiopia, Eritrea, Equatorial Guinea, Djibouti, Democratic Republic of the Congo, Central African Republic, Cameroon, Burundi, Burkina Faso, Botswana, Benin, Angola.
<b>Available in</b>	Zambia, Uganda, Togo, Tanzania, Sudan, South Sudan, Sierra Leone, Senegal, Rwanda, Nigeria, Niger, Mozambique, Mali, Malawi, Madagascar, Kenya, Ivory Coast, Guinea, Ghana, Ethiopia, Eritrea, Equatorial Guinea, Djibouti, Democratic Republic of the Congo, Central African Republic, Cameroon, Burundi, Burkina Faso, Botswana, Benin, Angola.
<b>Solution Forms</b>	Equipment.
<b>Solution Applications</b>	Fish Farming.
<b>Agricultural Commodities</b>	Fish.
<b>Beneficiaries</b>	Small-scale farmers, Commercial farmers.

## Commercialization

### Commercialization Category

Commercially available

### Startup Requirements

Net material for hapa is available from a broad range of suppliers in African countries. When starting production in hapa, operators of hatcheries must: 1) Determine a good position and size within the pond, 2) Source net materials with the right sized mesh opening, 3) Calculate the optimal stocking density of fish or fry, 4) Ensure supply of high-grade feed at a low cost for fast growth and high profit, and 5) Promote use of cultured fingerlings within the local aquaculture industry.

### Production Cost

Installing hapa enclosures inside a pond or waterway is not expensive and does not require highly skilled labour. The materials for a hapa made of bamboo poles and fine

mesh net costs about US \$1 per square meter with finer meshes costing more. More solid or floating structures are required in less secure waters, thereby increasing this cost.

### **Customer Segmentation**

Using hapa for fingerling production is applicable for small-scale and commercial hatcheries.

### **Potential Profitability**

The use of hapa for mass production of fingerlings in ponds allows a higher survival rate. Monthly production of fingerlings in hapa ranges from 150 per square meter to over 900 per square meter. With hapa nets, a single hatchery can supply between 8 and 20 fish farmers, resulting in huge benefits to the local aquaculture industry.

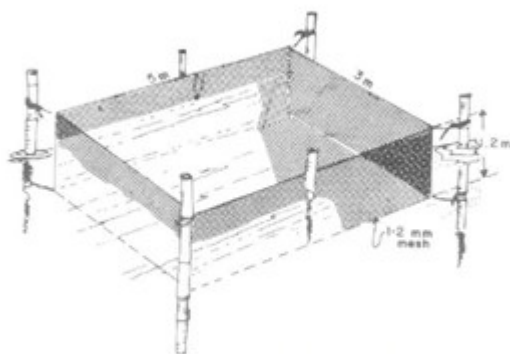
### **Licensing Requirements**

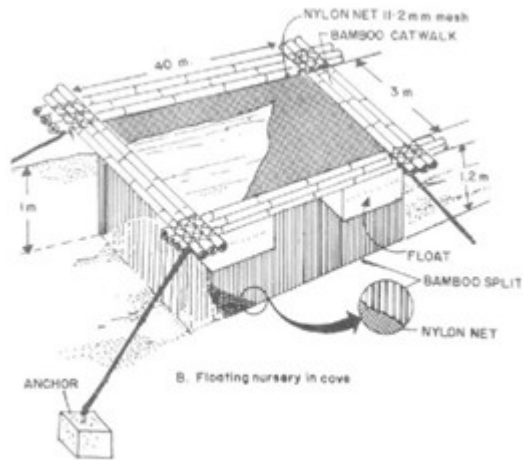
Netting must be purchased but other structural materials may be fabricated from local materials.

### **Innovation as a Public Good**

The technical knowhow of fingerling production in hapa nets is a Regional Public Good disseminated by WorldFish.

## **Solution Images**





*Design of a floating hapa with poles or barrels on pond surface*



*Collection of fingerlings from hapa*

## **Institutions**



## **Accompanying Solutions**

[All Male Tilapia Fingerlings with Greater Yield and Uniformity](#)

[Fast Growing and Hybrid African Catfish](#)