

# Training Manual of Freshwater Aquaculture in Indian Sundarban

## Progyan Foundation for Research and Innovation (PFRI)

A Subsidiary Research Organ of South Asian Forum for Environment (SAFE)

(An ISO 14001:2015 Certified Organization)

### 1. Pond preparation

#### 1.1 Dewatering and pond drying

The bottom of the pond is dried to remove the unwanted fish species. It also helps to release obnoxious gases from the pond's bottom. Dewater the pond and expose it to sunlight till the top soil cracks completely. If complete dewatering is not possible, apply suitable fish toxicant to kill the existing fish and clean completely to remove the debris, carcasses and algal mats.



**Fig 1 Pond drying**

#### 1.2 Removal of unwanted fish

##### 1.2.1 Mohua oil cake (MOC)

- i. Mahua oil cake is a good piscicide at 250 ppm due to the presence of the metabolite saponin (mowrin) which is used to eradicate unwanted and predatory fishes during initial pond preparation in aquaculture.
- ii. After a week it promotes a dense population of fish food organisms and hence initial manuring is not required.
- iii. Toxicity lasts near about 9-10 days.

#### 1.3 Eradication of aquatic weeds (where complete de-watering is not possible)

- i. **Manual method:** Manual removal of weeds involves the physical removal of the weeds by hand.
- ii. **Chemical method:** Different weedicides are used for the removal of different weeds present in the aquaculture pond namely 2-4D at the rate of 4.5 to 6.5 kg/ hectare.

- iii. **Biological method:** In this method, commonly weed-loving fishes are used for the eradication of aquatic weeds. Grass carp and Black carp can use at the rate of 10 pieces/bigha.
- iv. Complete eradication of overgrown grass in the pond embankment and removal of tree branches over-casting the pond is very important.



**Fig 2 Removal of aquatic weeds**

**1.4 Application of lime**

- i. Lime neutralizes soil acidity and regulates the pH value of soil as well as water in the aquaculture pond.
- ii. Soak the lime in an earthen pot overnight. Thereafter, mix it with water and apply it throughout the pond.
- iii. In a dry pond soaked lime may be broadcasted throughout the pond bottom and slope.



**Fig 3 Liming of pond**

### 1.5 Manuring or fertilizing the pond

- i. To promote the production of natural fish food organisms (e.g phytoplankton & zooplankton), fertilization during pond preparation is very much important.
- ii. Mainly dry cow dung is used as it is easily available in rural areas and cost-effective.
- iii. Apply dry cow dung slurry @600-700 kg/bigha.
- iv. Do not apply manure in such ponds where water turns deep green after liming.



**Fig 4 Pond fertilization**

### 1.6 Test for natural fish food availability

- i. Take pond water in a glass and observe closely through.
- ii. Greenish to brownish color and the presence of actively moving small organisms are indicators of the availability of fish food organisms in the pond.



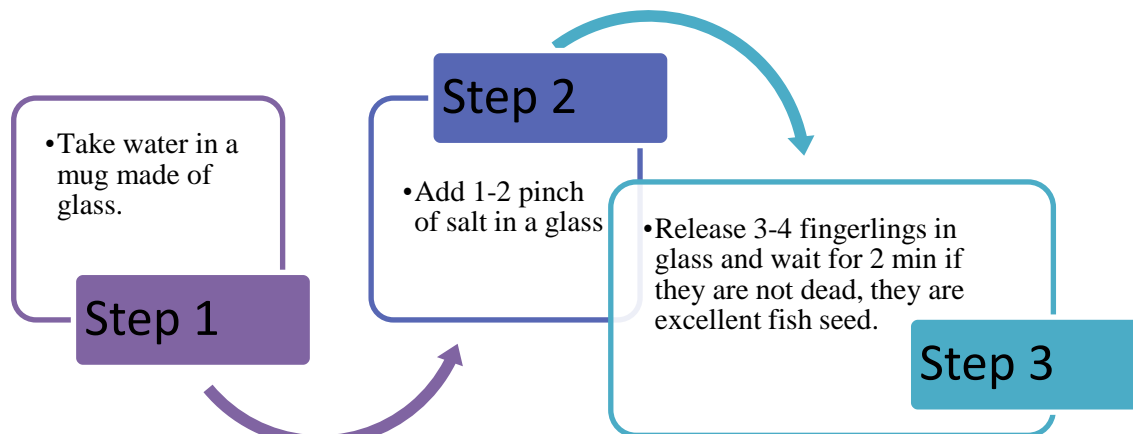
**Fig 5 Water checking for fish feed availability**

## 2. Characteristics of the healthy fingerlings

- i. Vigorous movement activity
- ii. Bright in color.
- iii. Presence of cysts, spots, hemorrhage, discolored patches on the body, gills, fins, etc. are signs of diseased fingerlings. Avoid stocking such fingerlings in the pond.

## 2.1 Prophylactic treatment

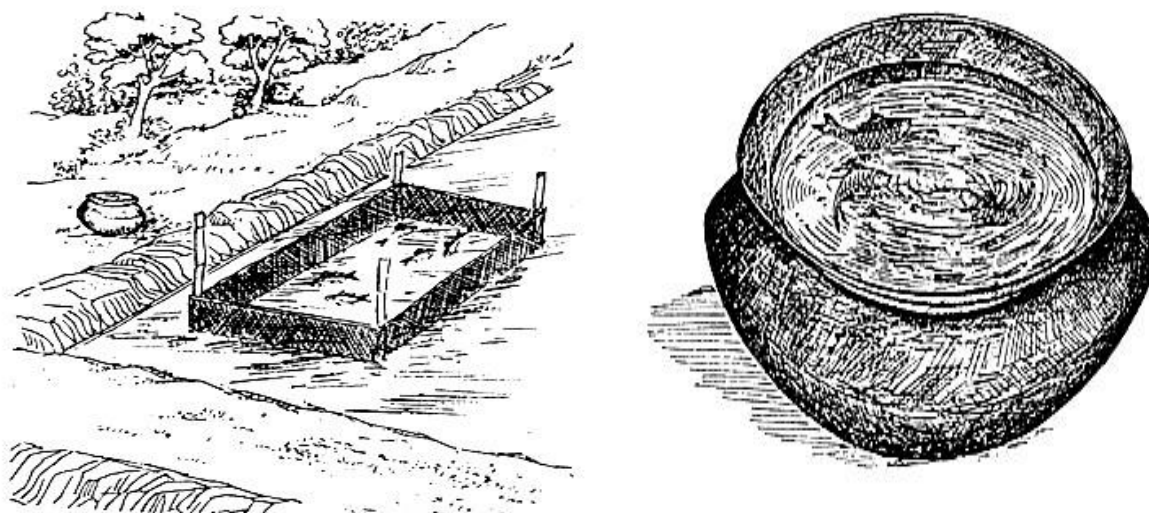
Dip the fingerlings for 30-40 sec either in potassium permanganate solution or common salt solution before stocking them in the pond.



**Fig 6 Identification of healthy fingerling**

## 2.2 Toxicity testing of water

- i. In case the pond was poisoned, it is advised to test the toxicity of the water prior to stocking.
- ii. Fix a hapa in the pond and release a few fish fries and observe for 24 hours. If they remain healthy and exhibit normal activity the pond is fit for stocking.
- iii. In case, hapa is not available, collect pond water in a container and release a few fish fry to test the toxicity.

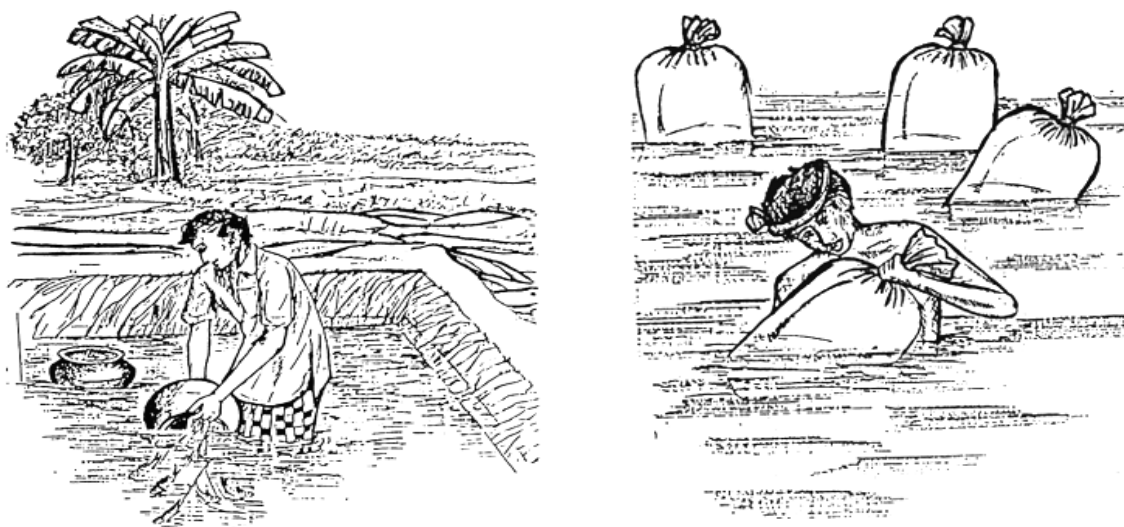


**Fig 7 Water toxicity assessment**

## 3. Stocking of fish fingerling

- i. Stock 20gm size of Catla, Rohu, and Mrigal fish fingerling at a 4:3:3 ratio. 3-4 inch size of fish fingerling @1000 to 1200/ bigha is recommended.
- ii. Stock the pond during cool morning or evening hours.
- iii. Do not stock during heavy rain or strong sunny weather.

- iv. Keep the fish seed container in the pond and wait for a few minutes for acclimatization, after that slightly lean the container and let the fingerling swim out of the container naturally.



**Fig 8 Fish release technique**

#### 4. Application of Fish feed

- i. The application of fish feed is mandatory for a good growth rate.
- ii. Home-made fish feed with simple ingredients is useful as ready-made fish feed.

**Table 1 Fish feed calculation**

Weight of fish	Feed percentage (%)
100 gm	4-5
500 gm	2-3
1 kg	1-2

**Table 2 Fish feed according to the age of fish**

Culture period	Daily fish feed
1 <sup>st</sup> month	800 gm
2 <sup>nd</sup> month	1 kg
3 <sup>rd</sup> month	1.2 kg
4 <sup>th</sup> month	1.6 kg
5 <sup>th</sup> month	2 kg
6 <sup>th</sup> month	2.4 kg
7 <sup>th</sup> month	2.8 kg
8 <sup>th</sup> month	3.2 kg
9 <sup>th</sup> month	3.6 kg
10 <sup>th</sup> month	4 kg
11 <sup>th</sup> month	4.4 kg
12 <sup>th</sup> month	4.8 kg

## 4.1 Homemade feed preparation

- i. Rice bran: Mustard oil cake=1:1
- ii. In addition, blood meal, or the byproduct of drying fish from the market, may be added
- iii. Soak the rice bran and mustard oil cake in water overnight to make a dough. Make balls and apply them to the pond by scattering or feeding trays fixed in the pond. The tray should be placed 1–1.5 feet below the water surface.
- iv. To obtain the best result, the application of fish feed should be **regular** and at the **same time**.
- v. The application of feed will be as per the body weight of the fish.
- vi. The feeding percentage will depend on the average weight of fish that is calculated by 25-30 days intervals of netting operation.



**Fig 9 Fish feed application**

## 5. Harvesting

Harvest the fish according to prevailing market price and demand. Harvest some of the fish like Catla and Silver carp as they grow to marketable size within 3–4 months of stocking.

## 6. Activity Schedule

### 6.1 Daily Schedule

- i. Pond inspection (watercolor, unnatural fish behaviour)
- ii. Observe whether any dead or diseased fish near the pond embankment.
- iii. Application of fish feed should be given on the basis of the total fish biomass present in the pond otherwise it will deteriorate the water quality.
- iv. For every 100 kg fish in the pond give 1 kg of mustard oil cake and 1 kg of rice/wheat bran

## 6.2 Weekly Schedule

- i. Rake pond bottom 2–3 times a week using, a bamboo racker, chain, or rope with tied brick pieces, stones, etc. It aerates pond bottom sediment and releases marshy gasses and nutrients.
- ii. Check the water quality parameters especially pH with pH paper.
- iii. Trim the overgrown branches of marginal trees overcasting the pond.



**Fig 10 Raking procedure**

## 6.3 Monthly Schedule

Netting the pond at least once every month and checking the general health of the fish is mandatory. For any symptoms of disease, the growth rate of each species should be marked carefully. Adjust the feeding ratio as per their growth.

## 7. Common diseases and treatments

### 1. Gill rot

#### ❖ Symptoms

- High mucus secretion
- Deeply red gill
- Fish shows lethargic activities

#### ❖ Treatment

- Keep the fish in  $KMNO_4$  solution at 5 ppm concentration for 1hr and release



### 2. Dropsy

#### ❖ Symptom

- Swelling of the abdomen.
- Eyes that are beginning to swell and bulge.
- Scales that start to point outward instead of lying flush with their body give a 'pinecone' appearance.
- A loss of color in their gills.
- Clamping of the fins.

- #### ❖ Treatment
- Use oxytetracycline in the feed at the rate of 1-1.5 gm for 100gm feed



### 3. Tail rot & Fin rot

#### ❖ Symptoms

- Fin edges turn white.
- Fins appear ragged and split.
- Bases of fins inflamed.
- The entire fin may rot away.

#### ❖ Treatment

- Keep the fish in  $KMNO_4$  solution at 5-7 ppm concentration for 1hr and release
- Use lime at the rate of 10-12 kg/ bigha



### 4. EUS -Epizootic ulcerative syndrome

#### ❖ Reason

- Sudden fluctuation in temperature, chloride, hardness, pH

#### ❖ Symptoms

- A deep red spot or injury can be seen on the body
- Inflammation from red spot

#### ❖ Treatment

- The powder of Neem seeds may use
- Methylene blue can use at the rate of 5 ppm

