

IMPROVED FISH FARMING IN TRIPURA



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Tripura Rural Livelihood Mission (TRLM)

NECESSITY FISH REARING



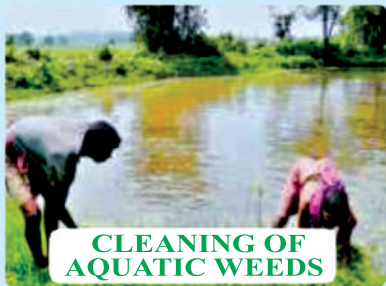
- **Pond**
- **Capital**
- **Lime, Manure and Medicine**
- **Fingerlings**
- **Fish Feed**

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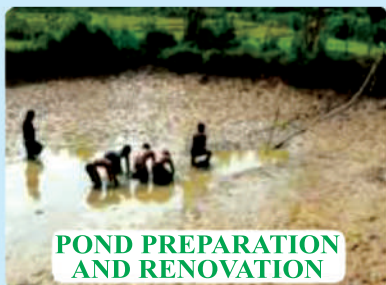
PRE STOKING MANAGEMENT



**CLEANING OF
AQUATIC WEEDS**



**ERADICATION OF
PREDATOR AND WEED FISHES**



**POND PREPARATION
AND RENOVATION**



WATER TEST



**NATURAL FEED
TESTING**



MANURING



LIMING

POND DRY

The pond is dewatered first and bottom is exposed to sunlight at least for 10 days. After 10 days the fertile first layer of bottom soil should be taken out, deposited on the dyke. The bottom should be ploughed and leveled properly. The bottom clay should not be more than 20- 25 cm.

CLEANING OF AQUATIC WEEDS

Aquatic weed of different kinds such as emergent, submerged or floating need to be removed from the pond. It can be removed manually and biologically. Biologically it can be removed by stocking of weed eating fish such as Grass carp, Tilapia, Silver carp (P. gonionotus), Common carp, Gaint gouramy etc.

If the pond cannot be drained then aquatic weed should be removed manually and then partially dewatered to minimum level.

ERADICATION OF PREDATOR AND WEED FISHES

Predator fishes eat the fingerlings and the weed fishes eat the feed. Predator fishes like Channa spp, Notopterus spp, Magur, Singhi, Mystus spp, and a number of weed fishes like Puntius spp, Anabus spp, Gudusia chapre, Osteobama cotio etc. can be removed through repeated netting, dewatering and drying of pond.



LIMING

Different forms of lime are available in the market, but generally in fish ponds agriculture lime and quick lime are mainly used.

Types of lime

- A. Limestone (CaCO_3)/ agricultural lime
- B. Quick lime (CaO)
- C. Slaked lime / Hydrated lime [$\text{Ca}(\text{OH})_2$]
- D. Calcium Cyanamid (CaCN_2)

Among the above Quick Lime (CaO) is widely used as it has higher neutralizing value. When it is applied in water it combines with Carbondioxide(CO_2) and transforms into carbonate.



Liming plays an important role in fish pond productivity as lime increases the alkalinity of water there by increasing the buffering capacity of water and ultimately increasing the production of planktons.

Liming is considered as the first step of fertilization as it supplies calcium, which is one of the essential nutrients for the biological productivity/plankton production in the ponds.

Liming of pond water and bottom mud is important for obtaining neutral or alkaline water because acid water and soil absorbs phosphate, which leads to insufficient carbondioxide (CO_2) and calcium bicarbonate essential for the growth of phytoplanktons and zooplanktons.

Lime is applied based on the pH of water and soil. Usually lime is applied @ 200- 300kg/ha/year

Liming

However, the actual dose of Lime has to be calculated based on the pH of the soil and water as follows :-

Liming should be done 7 days ahead of the process of fertilization so that it is completely dissolved in water; otherwise it will make it difficult to dissolve organic and inorganic fertilizers and it will reduce their absorption.

Soil pH	Nature	Lime dose (kg/ha)
4.0-4.5	Highly acidic	1000
4.5-5.5	Medium acidic	700
5.5-6.5	Slightly acidic	500
6.5-7.5	Near acidic	200
7.5-8.5	Alkaline	Nill/raw cow dung should be used



Basal, monthly and annual requirement of lime is indicated below :

Basal (kg/ha)	Month (kg/ha)	Annual (kg/ha)
200	65	800

Time to Lime

- ✓ 2-3 days after the bottom of the pond settles before pond fertilization.
- ✓ 3-4 days after cleaning the pond banks and weeds.
- ✓ Applying lime in hot sun gives good results.
- ✓ Lime should not be applied if it is cloudy or rainy.

Profit

- ✓ Helps in the growth of natural food in the pond.
- ✓ Improves water quality and maintains acid-base balance.
- ✓ Increases the effectiveness of alkali.
- ✓ Kills germs.
- ✓ Destroys toxic gases.
- ✓ Cleanses the organic matter located in the soil.
- ✓ Improves the environment.
- ✓ Removes turbidity of water.
- ✓ Access to sunlight is facilitated.

Rules for Liming Ponds

Lime should be wetted by making holes in the side of the pond or in some other earthen or steel container or drum with water. After 12 hours, when the lime boils and cools down, sprinkle lime mixed with water all over the pond.

Warming

- ✓ Do not soak in plastic buckets.
- ✓ Sprinkle lime in flavor of wind.
- ✓ Cover your nose and mouth with a towel/mask while sprinkling lime.



MANURING

The main aim of fertilization or manuring is to increase the primary productivity of the fishpond.

Generally, there are two types of fertilizer

- a. Organic fertilizers
- b. Inorganic fertilizer

Organic fertilizers include various plants and animal wastes such as - cow dung, cattle dung, pig dung, poultry manure etc.

Generally, cow dung is applied @ 15,000kg/ha/year. Initially 1/3 of the total requirement is used and the remaining amount is distributed in the pond in equal monthly installments.

Decomposition of organic manure in pond leads to slow and continuous release of nutrients to the water and help in long term maintenance of rich plankton population whereas inorganic fertilizer dissociates into elemental form which is readily available but no longer needed for the maintenance of rich plankton population.

Time and application of dose can differ depending on the water quality and plankton count of the pond.



Daily application of manure throughout the pond or at least in the four corners as per following rate

Basal Dosage of lime (kg/ha)	Daily Dosage (kg/ha)	Annual Cow dung requirement (kg/ha)
3750	45	15000

Why is it necessary?

- ◆ Fertilizer is not fish food. Fertilizer mixed with water makes natural food for fish.
- ◆ Fertilizer should be applied after 7 days of lime application.
- ◆ Fertilizer should be given 7 days before releasing the fish fry.

Warning

- ◆ Do not apply fertilizer when the sky is overcast.
- ◆ If the color of the water is completely green, stop applying fertilizer.
- ◆ Apply semi-fertilizer in winter than in summer.
- ◆ Water quality (pH) needs to be checked before fertilizing .



NATURAL FEED TESTING

Before stocking the pond, it is necessary to check whether there is sufficient natural food production. This can be done in several ways. For example,



Test by Hand

If the palm of the hand is not visible after dipping the hand up to the elbow in the sunlight during the day, then it should be understood that there is enough natural food. And if the palm is visible, it means that the pond needs fertilization.

Experiment with secchi disc

A secchi disc is a round disc of tin or iron with a diameter of 20 cm. The disc is hung with a thread. Fertility can be determined by the depth to which the disc is visible after immersing the irrigation disc in water, holding the thread by hand. If 25-35 cm is not visible, then it should be understood that there is good food. If more than 35cm depth of secchi disc is seen, it should be understood that the food is low.



By Clear Glass

If you take pond water in a transparent glass and hold it up to the light, the color of the water will appear green or brown. Moreover, many small insects like organisms are seen in the glass water, these particles are animal particles called zooplanktons. These particles are the natural food of fish and shrimp.

Water Purity Test

/ Toxicity Test

One or two days before stocking the fry, place mosquito nets in the pond. After 12 hrs of releasing 20-30 fry, if most of them are healthy and strong, it can be understood that the water is suitable to support life.

Water Test

pH test, Turbidity, Alkalinity, Ammonia, Hardness need to be tested before releasing fingerlings.

STOCKING MANAGEMENT



Selection of Fingerlings



Transportation and Release of Fingerlings

STOCKING OF FINGERLINGS

The pond will be ready for stocking after 15 days of application of fertilizers and testing the water quality. Stocking should be done during cool morning hours or evening hour, and should be avoided during strong sunny or rainy day. Normally stocking density is 9000- 10000 fingerlings/ha but it also largely depend on the input and level of management.

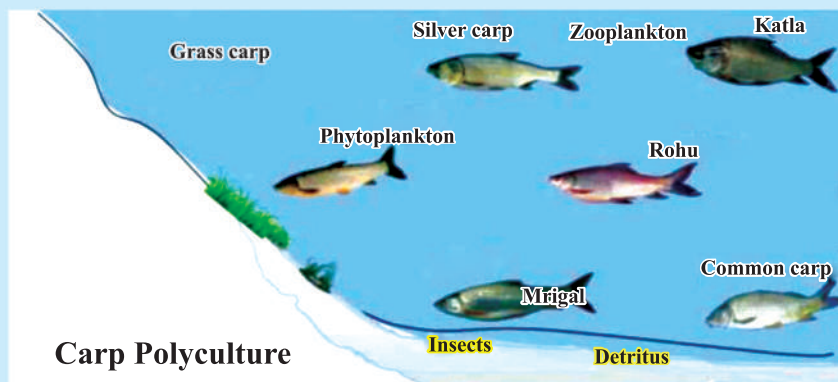
Depending on the availability of seed and market condition, stocking can be done with 3, 4 or 6 species combination.

Indian Major Carp		
Catla	Zoo plankton feeder	Surface feeder
Rohu	Omnivorous	Column feeder
Mrigal	Detritivorous	Bottom feeder

Exotic Carps		
Silver carp	Phytoplankton feeder	Surface feeder
Grass carp	Herbivorous	Surface, column and marginal areas
Common carp	Detritivorous/ Omnivorous	Bottom feeder

Selection of Fingerlings

Depending on the compatibility and type of feeding habits of the fishes, IMC as well as Exotic varieties have been identified and recommended for culture in the composite fish culture technology



Species Combination Ratio			
Species	3-species	4-species	6-species
Catla	4.0	3.0	1.5
Rohu	3.0	3.0	2.0
Mrigal	3.0	2.0	1.5
Silver Carp	-	-	1.5
Grass Carp	-	-	1.5
Common Carp	-	2.0	2.0

Species Based on Feeding Habit				
Feeding groups	Group %	Species	Species %	
Surface feeder	40	Catla Silver carp	15 25	1.5 2.5
Column feeder	20	Rohu	20	2.0
Bottom feeder	30	Mrigal Common carp	15 15	1.5 1.5
Macro vegetation feeder	10	Grass carp	10	1.0

TRANSPORTATION AND RELEASE OF FINGELINGS

Pond Habituation and Except in the Pond

Float the fry carrying container or bag in pond water for 20-25 minutes. Then open the mouth of the bottle or bag and slowly mix the pond water with the water of the bottle or bag by hand. When the bottle or bag is filled with water, reduce some water and mix the pond water again. In this way slowly sign and then release.



Must Remember

- ◆ It is better to remove or release the fry in the morning or in the afternoon.
- ◆ Fry should not be left in hot sun or rain
- ◆ 7-10 cm in size fry should be released.
- ◆ Dead fry should be removed from the pond quickly

POST STOCKING MANAGEMENT



MANURING



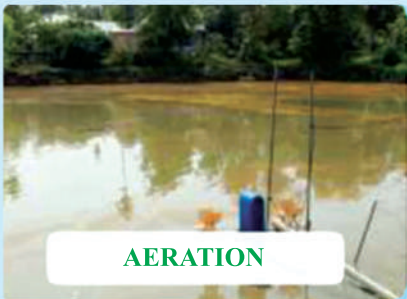
FEEDING



**WATER QUALITY
MANAGEMENT**



HEALTH MANAGEMENT



AERATION



BOTTOM RAKING



**CONTROL OF ALGAL
BLOOM**

FEEDING MANAGEMENT

Regular feeding of fish **Fish grains should be given in this amount**

Average weight of fish	Required Grain
Up to 100 grams	8 % of fish weight
Up to 100-250 grams	6% of fish weight
Up to 250-500 grams	4% of fish weight
500 grams to 1 kg	3% of fish weight
Above 1 kg	1.5-2% of fish weight.



Different types of feed is available in the market for fish of different age groups. We can also prepare feed at our home.

Food Container

There is no wastage of food in trays. A bamboo/wooden frame of 1 square meter size can be made with mosquito nets. 30-40 cm above the bottom of the pond, 2 food containers should be placed. Food should be given in several places rather than in one place in the pond. All fish get food in it.

Food preparation advice

Material	Rate (G/Kg)
Rice husk/Wheat husk	400
Mustard paste	400
Dry Powder	100
Flour	100

Mix all the ingredients together with hot water and make small balls and feed the fish in a food container

Warning

If the water is too green, feed should be applied in low doses or stopped for a few days.

✂ MANURING

In an average productive pond, manuring includes fortnightly application of cow dung @1000kg/ ha to increase the natural feed in the pond.

✂ AERATION

Aeration of pond will improve the dissolve oxygen (DO) content and reduce the concentration of heavy metals.

The DO concentration is dependent upon temperature, salinity and atmospheric pressure, as when temperature increases DO concentration of water decreases, so aeration is necessary.



BOTTOM RAKING OF POND

It helps in removing the toxic or noxious gases from the pond bottom and help in overall improvement of pond environment. Bottom raking should be done with the help of nylon rope fixed with several sinkers/ with iron chain 2-3 time in a month. It should be done during bright shiny day at 12-2:00pm.



CONTROL OF ALGAL BLOOM

Algal bloom are caused by unicellular and filamentous algae, which occurred normally due to imbalance between production and consumption of planktonic algae. Algae appear as bright green, blues green, brick red in color, which are mainly due to the development of green algae, diatoms, din flagellates, euglena , and blue green algae etc. 2 types of algal bloom are found commonly - Temporary algal bloom and permanent/persistent algal bloom.



- **Temporary Algal Blooms** appear as reddish-brown or greenish-brown in color.
- They last for short period of time and may be controlled by stopping the application of fertilizers and feeds.
- **Permanent Algal Blooms** are generally caused by Blue-green algae such as *Microcystis*, *Anabaena*, *Oscillatoria*, etc. They form obnoxious scum on water surface.

Controlling Measures

Algal bloom can be controlled manually - by using banana leaves or biologically by introducing aquatic weeds like eichornia, duckweed and chemically by using Copper Sulphate (CuSO_4).

WATER QUALITY MANAGEMENT

Management of water is important, as high manure load leads to fall of water contents at dawn. During summer season, water is warm and depth is less, due to this fish start surfacing and this can lead to death if it is prolonged. Immediate corrective measure during this situation should be taken which can be as follows :-

Favorable ranges of water quality parameters for fresh water composite fish culture

Parameters	Safe limit for culture
Turbidity	30-40 cm
Salinity	Less than 0.5ppt
Dissolved oxygen	5-9 ppm
Ammonia	Less than 0.025 ppm
Nitrite	Less than 0.1ppm
Nitrate	Less than 50 ppm
Carbon dioxide	Less than 12 ppm
Iron	Less than 0.5ppm
Total alkalinity	40-200 ppm
Total hardness	20-200 ppm
Hydrogen sulphide	Less than 0.002 ppm

Controlling Measures

- Stop application of manure suspended feeding of Grass Carp.
- Beat the water surface with bamboo. If possible, change the water of the pond.
- Reduce fish density, if necessary, by partial harvesting.

HEALTH MANAGEMENT

Disease in fish are mainly caused by three factors

- Environmental
- Nutritional
- Biotic

Large scale mortality of fish culture system are often caused by parasite and microbes which are generally termed as Biotic factor.

Common diseases occurring in fish

- Protozoan disease
- Fungal disease
- Bacterial disease
- Viral disease
- Crustacean disease
- Helminthes disease

Wound Disease (EUS)



Malnutrition Diseases



Tail and Fin rot Disease



Dropsy (Flatulence)



Fish Lice



COMMON DISEASES AND REMEDIES OF FISH

Disease name and Cause



Cause of Disease

- ◆ A type of fungus and bacteria are responsible for this.
- ◆ If the pH of the water is low.
- ◆ Prevalance is higher when the water temperature is low (below 25 °C)

Symptoms


- ◆ In the initial stage, small red spots are seen on the fish.
- ◆ Gradually, a deep wound forms at the site of the red spot.
- ◆ Decomposition and lesions are seen in the body of the fish, especially in the tail, fins and gills.
- ◆ The fish do not take food and the body spines of more affected fish are often seen coming out.
- ◆ Dies in large numbers gradually.

Remedy

- ◆ The normal cleanliness of the pond should be maintained.
- ◆ Ponds should be disinfected before stocking fish fry.
- ◆ Lime should be applied according to the pH of the water in the affected pond.
- ◆ The next day after liming, the fish should be pulled well and dipped in water mixed with KMnO_4 (50 mg of KMnO_4 in 10 liters of water) and 5% salt water (500 grams of salt in 10 liters of water).
- ◆ Mix 1-2 grams of oxytetracycline per kg of supplementary food and feed 5-7 days.

✓ COMMON DISEASES AND REMEDIES OF FISH

Disease name and Cause

Tail and Fin rot Disease	Cause of Disease
	<ul style="list-style-type: none"> ◆ Increase in organic matter in water and soil. ◆ Presence of different types of bacteria and other unicellular organisms

Symptoms

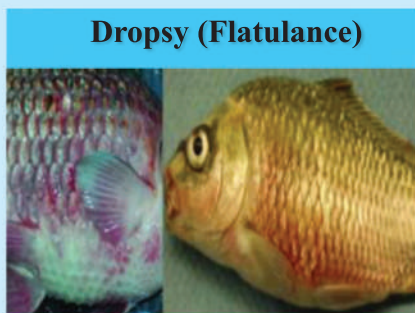
- ◆ The fins of the fish tear and slowly decay.
- ◆ The body of the fish is cloudy in color.
- ◆ Reduces skin slippage.
- ◆ Generally, fish are affected by this disease during summer and monsoon

Remedy

- ◆ Infected fish can be released by immersing them in water mixed with copper sulphate (mulberry), (1 gram of mulberry in 2 liters of water) for 1-2 minutes.
- ◆ 500 grams KMnO_4 and 50-60 kg of lime should be added to each kani pond.

✓ COMMON DISEASES AND REMEDIES OF FISH

Disease name and Cause



Dropsy (Flatulence)

Cause of Disease

- ◆ Non-nutritious food.
- ◆ Presence of different types of bacteria

Symptoms

- ⊙ In this disease, water accumulates inside the body of the fish and the stomach swells.
- ⊙ The scales become erect and water accumulates at the base of the scales.
- ⊙ This disease causes lack of blood in the body of the fish.

Remedy

- ⊙ 75 mg of oxytetracycline per kg of feed for 4-7 days.
- ⊙ Infected fish should be immersed in water mixed with KMnO_4 (50 mg of KMnO_4 in 10 liters of water) for 1 minute.

✓ COMMON DISEASES AND REMEDIES OF FISH

Disease name and Cause

Fish Lice



Cause of Disease

- If the organic matter in the pond is high.
- A type of ectoparasite (Argulus).

Symptoms

- Red marks are seen on the body of the fish.
- A fish rubs its body against a hard bamboo or stone.
- The fish scales open

Remedy

- The affected fish should be immersed in salt water (30-50 grams of salt in one liter of water) for 2-3 minutes.
- 500 gm of KMnO_4 , at the rate of 4 mg per liter should be applied to each kani pond.

✓ COMMON DISEASES AND REMEDIES OF FISH

Disease name and Cause

Malnutrition Diseases



Causes of Disease

- Deficiency of moderate mineral salts and vitamins .

Symptoms

- Affected fish become emaciated and weak, with the head appearing larger than the rest of the body.
- Fish can also be infected by single - celled parasites if they become too weak.

Remedy

- Application of balanced food, food rich in minerals and vitamins should be given to the pond regularly.

HARVESTING AND MARKETING



Harvesting is generally carried out after a period of 10-12 months, when the fish attain average weight of 800 gm to 1.25 kg. With proper management a production of 4 to 5 tons/ha can be obtained in a year.

Harvesting is done by partial dewatering and repeated netting. In some cases it is resorted to complete dewatering of ponds. Some farmers resort to partial harvesting depending on the season and demand for the fish.

Specially in festive season when the demand is so high in the market, farmers can be more benefited if harvesting is done on time.





PRODUCT AVAILABLE FOR FISH AND FISHERY RELATED ITEM THOUGH ONLINE AND OFFLINE ORDER

A collage of images for Satadol Lime. It includes a photo of several white bags of lime in a warehouse, a close-up of a broken bag showing the dark, clumpy lime powder, and a pair of hands holding a large quantity of small, brown, irregular lime granules. Overlaid on the collage is a product label for "SATADOL LIME" with the following details:

- Logo: A circular logo with a stylized "S" and "A" and the word "SATADOL" below it.
- Text: "BEST Quality" in a circular seal, "SATADOL LIME" in large red letters, and "GOOD QUALITY ICHAMATI LIME" in smaller red letters.
- Usage: "Use in Fishery / Food Grade / Use as Paints / Industrial Use".
- Price: "MAX. RETAIL PRICE: RS. (EXCLUSIVE OF ALL TAXES)".
- Weight: "NET WEIGHT 12 KG (WHEN PACKED)".
- GSTIN: "GSTIN: 36ABACS9701124".

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TRIPURA RURAL LIVELIHOOD MISSION



Tripura Rural Livelihood Mission

NECESSITY FISH REARING



- Pond
- Capital
- Lime, Manure and Medicine
- Fingerlings
- Fish Feed



**PRODUCT AVAILABLE FOR
FISH AND FISHERY RELATED ITEM
THOUGH ONLINE AND
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