IMPROVED FISH FARMING

IN TRIPURA

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Tripura Rural Livelihood Mission (TRLM)

TECHNICAL SUPPORT
Sesta Development Service (SDS)

NECESSITY FOR FISH REARING

- Pond
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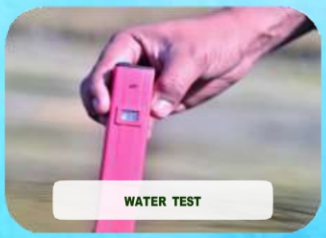
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POND DRY

The pond is dewatered first and bottom is exposed to sun light at least for 10 days. After 10 days the fertile first layer of bottom soil should be taken out deposit on the dyke and plough the bottom and leveled properly. An bottom clay should not be more then 20-25cm.

CLEANING OF AQUATIC WEEDS

Aquatic weed are of different kinds such as emergent, submerged or floating were needs 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 barb (P. gonionotus), Common carp, Gaint gouramy etc.

If the pond cannot be drained then aquatic weed should be removed manually, 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 form of lime are available, but generally in fish ponds agriculture lime and quick lime are mainly used.

Type of lime

A. Limestone (CaCo3)/ agricultural lime
B. Quick lime (Cao)
C. Slaked lime / Hydrated lime [Ca(OH)2]
D. Calcium Cyanamid (CaCN2)

Among the above CaO is widely used as it has higher neutralizing value, when it applies in water it combined with Co_2 and transform into carbonate and further to bi carbonate.

Liming play an important role in fish pond productivity as lime increase the alkalinity of water there by increase the buffering capacity of water and ultimately increase the production of planktons.
Liming is considered as the first step of fertilization as if supplies calcium, which is one of the essential nutrients for the biological productivity/plankton production.
Liming of pond water and bottom mud is important for obtaining neutral or alkaline water because acid water and soil absorbs phosphate , will lead to insufficient carbon dioxide and bicarbonate / calcium for the growth of phytoplankton and zooplankton.

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

Liming

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

Liming should be done 7 days ahead of fertilization as it should be completely dissolved in water otherwise it makes difficulty in dissolving of organic and inorganic fertilizer and reduced the absorption capacity of soil.

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	Nil / raw cow dung should be used 1.6 ton

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 settles7 days 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.

Warning

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

MANURING

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

a. **Generally, there are two types of fertilizer**
b. Organic fertilizers
c. 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 application @ 15,000kg/ha/year, initially 1/3 of the total required is applied and the rest is applied in the pond at equal monthly installment.

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 maintenance of rich plankton population

Time and Application of dose can be 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 fish fry release.

Warning

- Do not apply fertilizer if 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 palms are seen, it means that there is no necessary to fertilize the pond.

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 can be seen 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 at least 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 zooplankton. These particles are the natural food of fish and shrimp.

Water Purity Test / Toxicity Test

1-2 days before stocking the fry, by placing mosquito nets in the pond, after 12 hours of releasing 20-30 fry, most of the fry are healthy and strong, but it should be understood that the water is suitable for life.

Water Test

PH test, Turbidity, Alkalinity, Ammonia, Hardness need to be test 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 qualities. Stocking should be done during cool morning hour or evening hour, avoided during strong sunny or rainy day. Normally stocking density is 9000- 10000 fingerlings/ ha of (15cm), but it also largely depend on the input and level of management .

Depending on 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 FINGERLINGS

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 different age of fish. 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 content and reduce the concentration of heavy metals.

The DO concentration is dependent upon temperature, salinity, and atmospheric pressure, as temp increase DO concentration of water decrease 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 blur green algae etc. 2 type of algal bloom are found commonly - Temporary algal bloom and permanent/ persistent algal bloom.

Temporary it is appear as reddish brown, green/brown in color.
This is lasted for short period of time and may be control by stopping the application of fertilizers and feeding.
Permanent is generally caused by Blue green algae, such as- microcystis, anabina, oscillatoria etc. They form obnoxious scum on water surface

Controlling Measures

Algal bloom can be control Manually - by using banana leaves or biologically. Introducing aquatic weed like eichornia, duckweed and chemically by using $CuSo_4$.

WATER QUALITY MANAGEMENT

Management of water is important, as high manure load led to fall of contain in water at dawn. During summer season water is warm and depth is less, due to this fish start surfacing and lead to death if it is prolong Immediate corrective measure during this situation are as follow

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	40-200ppm
Total hardness	20-200ppm
Hydrogen sulphide	Less than 0.002ppm

Controlling Measures

- Stop application of manure suspended feeding of grass carp.
- Beat the water surface with bamboo, if possible, exchange water.
- Reduce fish density, if necessary, by partial harvesting.

HEALTH MANAGEMENT

Disease in fish is mainly caused by three factors

- Environment
- Nutritional
- Biotic

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

Common disease occurred 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 (Flatulance)

Fish Lice

COMMON DISEASES AND REMEDIES OF FISH

Disease name and Cause

Wound Disease (EUS)

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 degree)

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 Kmno4 (50 mg of Kmno4 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
	♦ Increase in organic matter in water and soil. ♦ Presence of different types of bacteria are 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.

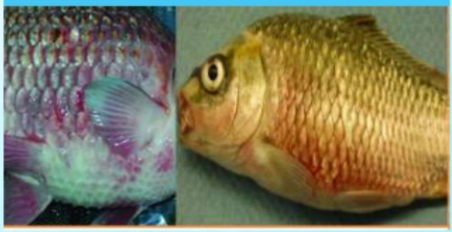
Remedy

- 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 Kmno4 and 50-60 kg of lime should be added to each kani pond.

COMMON DISEASES AND REMEDIES OF FISH

Disease name and Cause

Dropsy (Flatulance)



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 Kmno4 (50 mg of Kmno4 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 of the pond is high.
- A type of ectoparasite (Argulus) responsible for.

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 and left the pond.
- 500 gm of Kmno4, 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	Cause of Disease
	♦ Deficiency of moderate mineral salts and vitamins.

Symptoms

- Affected fish become emaciated and weak, with the head appearing fatter 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 month, when the fishes 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 complete dewatering of ponds is resorted to. Some farmers resort to partial harvesting also depending on the season and demand for fish.

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

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