

Spawn conditioning:-

The spawn can be kept in the incubation chamber till the yolk sac is absorbed and then it is to be shifted to separate spawn holding tanks after assessing the quantity of spawn by volumetric method. Spawn collected in this chamber is measured by means of measuring cups. Spawn count varies from 600 to 650 numbers /ml. In spawn holding tank, facilities for aeration and water exchange are provided to avoid mortality of spawn due to oxygen scarcity or water pollution because of accumulation of metabolic wastes.

In early years, hatching was done in hatching hapas. In such cases the inner hapa is removed along with the remains of egg shell etc. and spawn will be retained in the outer hapa till yolk sac absorption.

Nursery rearing:-

By 4th day after hatching, spawn is to be released in to a well prepared nursery tank for growing the post larvae to fry stage. Carps spawn of multiple spawning take 60 hrs for yolk sac absorption. If spawn is released into the tank which is not well prepared there may be chance of heavy mortality of spawn due to following reasons:-

Wide variation in the physio-chemical condition between spawn holding chamber or outer hatching hapas and nursery tank. :-

While releasing spawn temperature, pH, DO, alkalinity of nursery tank is to be checked. The ideal water quality parameters shall be water temperature - 28°C -32°C, turbidity - 8-15cm, pH - 7.5-8.0, DO - 5mg/lit or above, free CO₂ - below 5mg/lit, total alkalinity- 60-80 mg/lit, P₂O₅ - 0.04 - 0.1mg/lit, NH₄N - 0.08-0.2mg/lit, NO₃N - 0.04 -0.08mg/lit, NH₃ less than 0.01mg/lit , nitrite less than 0.01mg/lit , iron less than 0.3mg/lit and manganese less than 0.15mg/lit.

Usually polythene bag containing spawn is left floating in nursery tank for about ½ an hour to equalize the water temperature of polythene bags and tank gradually, so that spawn is acclimatized.

Dissolved Oxygen: -

For In a pond ecosystem, depletion of DO is noticed during early morning hours. Facilities aeration should be provided to enhance DO level during critical hours.

Accumulation of metabolic wastes:-

When a high density of spawn is stocked in nursery tank, nitrogenous metabolic wastes such as ammonia and respiratory wastes such as carbon dioxide get accumulated in the ecosystem beyond the tolerable limit.

Dearth of choice live feed organism for the spawn:-

Carp spawn with the yolk sac fully absorbed when released into the nursery tank feed on the available live feed organism voraciously. Natural plankton fauna get exhausted within 1-2 days. Artificial feeding is also required for healthy growth of spawn.

The presence of predatory insect or predatory fish:-

. They are to be eradicated before the stocking of spawn to avoid loss of spawn due to predation by these organisms.

Preparation and Management of nursery tank

Nursery pond of small size (0.02-0.05 hac. area) having a water depth of 0.5-1m are ideal for spawn stocking. The pond can be either earthen pond or brick line with cement plastering. Soil layer of 15-30 cm is to be provided to the pond bottom. Ploughing the pond bottom enhances aeration of soil by the process of oxidation. Further Weed mineralization humus is also enhanced. As the water is filled in the pond again reduction process sets in the pond bottom ferric form change into ferrous, sulphate to sulphite, nitrate and nitrites to NH₃ there by loosing its adsorption capacity causing release of the nutrients to the water phase gradually The different steps in the preparation and management of nursery tank are:-

1. Weed clearance: - Excess growth of aquatic weed is usually found in perineal nursery tank. Weeds are to be eradicated from the pond before spawn is released. Presence of aquatic weed is harmful as follows:-

Aquatic weed utilize the available nutrients in the water as a result plankton production is reduced.

It promotes siltation, and makes harvesting difficult.

It causes oxygen depletion in water, particular during night hours.

It limits the living space of fish and hinders there free movement.

It provides shelter to predatory fish, insect, weed fishes, which are harmful to can be removed manually by hand picking and uprooting. The common weedicide used is 2, 4-D (2, 4-Dichlorophenoxy acetic acid) @ 4.5-6.7 kg/hac. Other chemical such as Taficide (2, 4- Sodium salt) 4-6 kg/hac are also recommended. For fully submerged weeds such as hydrilla, aquathol is recommended as 2,4-D is not very effective.

2. Eradication of Predatory fishes and weed fishes: - Presence of predatory fishes in a nursery pond is harmful as they directly feed on carp spawn/ fry. Predatory fish spawn first in comparisons to carps. Weed fish shall compete with carp spawn/fry for food. The pond is to be made free from predatory as well as weed fishes before the release of spawn. When dewatering is not possible repeated drag netting is coupled with use of hooks and lines are recommended. The fish poison is of different categories:-

Plant derivative poison

Chlorinated hydrocarbons

Organophosphates

Urea and bleaching powder

They are as follows:-

Plant derivative poisons: - Common fish poison derives from plants are Mahua oil cake and derris powder. Mahua oil cake contain 4-6% saponin which is toxic to fish by causing haemeolysis of red blood corpuscles. Derris powder is prepared from the dry root of derris plant, Derris trifoliata. It contains rotenone (5 %) which damages the respiratory organs.

Chlorinated hydrocarbons: - It includes poisons such as endrin, dieldrin, aldrin etc. It is not advisable to apply in water because of their high residual toxicity.

Organophosphates: - a poison such as Malathion, phosphamidon, DDVP (nuvan) monocrotophos etc belongs to this category. These chemicals are easily degradable in aquatic environment, and have very less residual toxicity.

Application of bleaching powder and urea: - Bleaching powder (with 30 % chlorine) is applied at a dose of 150 -250 kg/hac in ponds. This has been proved as the best method as all fishes are killed and toxicity also last for a shorter duration.

Manuring and fertilizing the pond

Next step in the preparation of nursery pond is the application of manures and fertilizers which is aimed at the sustained primary production in water. To start with liming is done. Dose of lime has to be decided based on the pH of water. Application of lime has several advantages viz

It has buffering action in water

It can neutralize the harmful effects of acids such as humic acid and sulfuric acid.

It speeds up decomposition of organic matter

It counteracts the toxicity of some metallic ions such as K, Na, Mg.

It can aggregate soil colloidal particles and make it release P into overlying water.

It is necessary for the formation of cell wall of some algae, molluscan shell, and exoskeleton of arthropods.

It works as a disinfectant killing harmful bacteria and fish parasites present in water.

It is also required to meet the Ca requirement of the growing fish.

5 -7 days after the application of lime, organic manure is too applied. The best organic manure is raw cowdung. It may be added @ 10-15 tons/hac, 5-7 days before stocking.

If mahua oil cake is used to eradicate predatory fishes, cowdung may be reduced to 5 tons / hac.

Cowdung promotes nitrification, formation of good colloidal structure and in the formation of good pond mud. Next to this inorganic fertilizers are to be added. Some workers have recommended application of a mixture of GOC @ 750 kg/hac. Raw cow dung 250 kg /hac and SSP @ 40 kg /hac in liquid form. Dense population of zooplankton is reported to develop within 24-96 hrs.

Control of predatory insects

The pond environment provides an ideal habitat for aquatic insects mainly because of the stability of water in the pond unlike water current that exist in stream or wave action in ocean. Plants provide hiding places, material for cases and cocoons, place to lay eggs, encourage, food and O₂ for insects. Predatory insects usually have prehensile forelegs or strong lower lips in seizing and holding its prey.

About 3% of the total insect population is found in water. Many of aquatic insects are harmful to carp spawn as they attack and kill them. Majority of aquatic insects belong to 3 orders such as: - Coleoptera, Hemiptera, Odonata though several species of other groups such as Plecoptera, Trichoptera, Ephemeroptera, Lepidoptera, Hymenoptera etc are found in aquatic ecosystem.

Procedure for killing Predatory insects

For better survival of carp spawn it is necessary to clear the pond of insect population immediately before spawn stocking. The common method to kill predatory insects is to spray an emulsion of mustard or coconut oil with cheap washing soap at a proportion of 56:18 kg/hac, 12-24 hrs before stocking. Dragnet is operated to remove all the dead insects. Instead of soap, teepol B-300 (560 ml of teepol in 56 kg mustard oil) has been used by a few workers. Other combinations of emulsion tried are as follows:-

50 lit of diesel oil + 25-30% (by weight) of cheap washing soap /hac.

1 lit of light speed diesel oil, 0.75 ml Hyoxid 1011 and water 40 ml @ 1040 ml /200m² of water surface.

Kerosine @ 75 lit/ hac or high speed diesel @ 50 lit / hac.

Application of such emulsion has to be done on calm days as wind will break up the oil film on water surface.

Spawn stocking and Supplementary feeding:-

In a well prepared pond carp spawn can be stocked @ 6-10 million/hac. Stocking is done either in morning or evening hours to avoid mortality of spawn due to abrupt change in temperature. It is better to limit the water depth at the time of stocking to 40 cm. Later at 4 days interval, water depth can be increased in a phased manner, low initial depth is advantageous to carp spawn.

Soon after stocking, spawn feeds on zooplankton voraciously. The starter feed for spawn is rotifers such as branchionous of 100-150 µm of size. Hence at this stage, water should have a rotifer density of 2,000-5,000 per lt. This is followed by micro cladocerans like Daphnia, Moina and Bosmina. Larger copepods like Cyclops are harmful to spawn.

Supplementary feeding

As the freshly stocked spawn start feeding on natural live feed organisms of the pond, these planktonic organisms may get exhausted within 2-3 days. Hence the natural feed is supplemented with artificial feed. Finely powdered mustard oil cake or GOC and rice polish (1:1) is given 4 times the weight of spawn for first 5 days. Then from 6th to 12th day, the quantity can be doubled. For optimum growth and maximum survival protein in the diet has to be 40-45 %, carbohydrates - 26-30 % and the feed has to be fortified with vitamins and minerals and micronutrients like CoCl_2