Pond Preparation for Semi-intensive Fish Culture

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Introduction

Aquaculture refers to the controlled production of water living organisms such as algae, plants, shellfish, crustaceans, finfish and even reptiles such as crocodiles, tortoises and frogs. Aquaculture is conducted over a wide range of water ecosystems that include fresh-, brackish- and seawater, as well as cold, temperature and warm water systems. The harvesting of natural fisheries resources is declining rapidly on a worldwide basis, due to the overexploitation of resources and the disturbance of natural habitats. The sustainable catch of fisheries on a worldwide basis is estimated at about 110 million metric tons per annum, whilst the annual harvest already exceeds 118 million tons. This overexploitation and declining harvests of natural fisheries has led to the rapid development of aquaculture technologies through which man can supplement its ever-increasing food requirements. The world aquaculture production already contributes about 21% of the total human consumption (2000), an increase from 15% in 1995. Aquaculture is seen as a strategic industry for securing future food requirements of the world.

Pond Culture

The intensive pond culture of fish is mainly carried out in small, manmade ponds with a water depth of 1-2.5 meters. The fish are fed commercial food and stocked at a high density to achieve a high production. Pond conditions greatly affect fish growth and fish yield. Under favourable conditions, the yield may be 2 or 3 times higher than that of ponds with unfavourable conditions.

Rearing period refers to the time required to raise the fish from fingerling stage to market size when the fish can be harvested. Rearing periods are determined by local conditions: climate, culturing methods, management, and market demand.

Requirements of the Grow-Out Pond

An area of 7-10 mu (1mu = 1/15 ha) is considered optimal for an intensive culture pond. The optimal area for a fry nursing pond is 1-3 mu. In smaller ponds, water quality is difficult to control and dissolved oxygen is quickly depleted in high density polyculture (different size and species of fish combined). The fish need sufficient space for swimming and feeding and the water is adequately disturbed by the wind to prevent a shortage of dissolved oxygen and to regulate water temperature. In addition, the decomposition of manure and the propagation of plankton can be promoted.

Fresh water should be added to the pond at regular intervals to adjust water depth, control water quality, and replenish the dissolved oxygen supply. The effective water depth varies with geography, climate, species, and culturing method. The average year-round water depth is about 1.5 - 2 meters.

Loamy soil is best at the bottom of a fish pond because it is effective in maintaining water level and fertility. The water will then not become too turbid, the bottom silt will not be too thick, natural organisms will flourish, and operation and management will be relatively easy. Clay soil maintains water level and water fertility because of its low permeability, however the water easily becomes turbid, the bottom silt is often too thick, and a lot of nutritive salts are absorbed and cannot be used by the plankton. Rectangular fish ponds with well formed pond dikes are recommended. Planting of crops onto the pond dikes not only produces food for the fish but also protects the pond dikes from erosion. Large trees and buildings around fish ponds must be avoided, they would block the sunlight and hinder winds. These two factors are essential in ensuring adequate water temperature, plankton growth and dissolved oxygen.

Pond Clearing
After 1 or 2 years of culturing, silt and organic matter accumulate on the bottom of the pond. This allows the propagation of various harmful bacteria. Fish ponds, therefore should be cleared often. The appropriate depth of bottom silt is 10 – 15 cm. If more, then some of the silt should be removed. Chemicals like quicklime (900 – 1125 kg per ha) can be used to eradicate all the wild fish, pathogens, parasites, etc. After pond clearing, fresh water and manure are introduced, about 1 week before stocking.

Manure Application and Pond Filling
Manure application enriches the nutritional value of the water and promotes the proper proliferation of natural food organisms. After pond clearing, a base manure should be applied as early and adequately as possible so that enough natural food is available during the early stages of cultivation. The usual dosage of animal manure is 500 – 1000 kg/mu. Manure is spread evenly on the pond bottom or beside the remaining water and exposed to the sun for several days. After the application of a base manure, the pond is filled with fresh water. The initial addition should bring the water level to about 800 cm – 1 m. When this water becomes fertile, more fresh water is added. The pond could be filled with fresh water at a rate dependent on temperature and fish size.

Selection of Fingerlings
The selection of good-quality fingerlings is important in ensuring high fish yields. Large good quality fingerlings have many merits: strong adaptability, high survival rate, fast growth, short culture period, high marketing rate and economic returns, etc. There are three criteria for selection and purchasing fingerlings: physique, size, and movement.
Physique- Strong, healthy, normally shaped fingerlings are desirable. Fingerlings should have complete scales and fin rays and a smooth, bright colour skin.
Size- Fingerlings of the same age and uniform in size are prefer.
Movement- Healthy fingerlings will jump violently in your hand. Healthy fingerlings will swim actively in groups with their heads downward and caudal fins upward. Only their caudal fins can be observed on the water surface.
Before stocking, a water sample should be analyzed and water temperature and dissolved oxygen (DOC) if possible, taken. A reasonable stocking density can ensure the desirable size and quality of the fish produced. Excessive stocking densities produce fish below marketable size, therefore fish yields are not improved.

The normal DOC requirement (mg/l) of the major freshwater cultured fish

Specie	DOC	Specie	DOC
Tilapia	3.5	Koi-carp	4
Black carp	5	Crucian carp	2
Grass carp	5	Goldfish	2
Silver carp	5.5	Wuchang fish	5.5
Bighead carp	5	Mud carp	4
Common carp	4	Rainbow Trout	12.4

Remember, the dissolved oxygen in the pond water is closely related to the growth and survival of the fish. Oxygen demand varies with species, age, size of fish, and water temperature. The higher the DOC, the better the growth of the fish and the lower the food-conversion rate.
Good luck !
Henk