

OPTIMUM CONDITION OF WATER FOR AQUACULTURE

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A large population of India earns its bread and butter from fish cultivation in ponds. But, many times they suffer from production loss due to lack of technical knowledge in this field. It is very important to know the optimum condition of water required for aquaculture. It will help the fish farmers to maintain the pond properly and ensure a better production. In this article, we have briefly described standard conditions for fish cultivation and how it affects production.

Physical condition of pond water

Various physical conditions of pond water are

- Depth of pond.
- Temperature of water
- Light
- Transparency of water

Depth of Pond

Generally, the depth of water in the fish-culture pond should be between 1.5-2 m. If the depth of the pond is too much, then light cannot properly penetrate to the bottom layer of the pond. So, at the bottom of the pond, plants that are light-dependent cannot properly grow. In contrast, if the depth of the fish culture pond is too less then temperature abnormally increases which is very much harmful to the fish.

Temperature of the water

Temperature determines the growth of fish and the nature of soil-inhabiting microbes. Metabolism of the fish body is also largely influenced by the temperature of the water. If the temperature of the surrounding water increases, the metabolism of the body of fish also increases. As a result, the fish grow rapidly. So, fish grow faster in summer than in any other season. Inversely, in winter season fish grow very slowly, as their metabolic rate becomes very slow so they take a very small amount of food. So, in the winterseason, there is very less requirement of food in the fish pond. Generally, the optimum temperature for fish growth in the culture pond is 25-32°C.

Light

In the presence of light, plants present in the water produce food and oxygen, which is very essential to make their habitat compatible for them. The bank of the pond should always clean, clear and plant free so that sunlight directly can penetrate into the water of the pond.

Transparency of water

Water can become turbid due to the presence of mud. So, sunlight cannot properly penetrate into the pond water and photosynthesis of phytoplankton is disrupted in the water of the pond. As a result, the natural food of fish cannot be produced adequately. Moreover, the granules present in the turbid water rapidly absorb nutrient components of water like phosphate, nitrogen etc. resulting in a decrease in fertility of the water of the cultured pond.

Transparency of water is also greatlydecreased due to the presence of excessive phytoplankton and zooplankton. The amount of plankton present in the water should be in a moderate amount. If the density of plankton in the water becomes very high, then oxygen

depletion can be seen in the water in the early morning, again if the density of plankton in the water become very less, stunted growth can be seen in fish due to the absence of natural food. The ideal transparency of the water should be between 30-40 cm. Secchi disk is generally used for measurement of the turbidity of pond water.

Chemical condition of pond water

Important chemical components of pond water are

- Dissolved oxygen of pond water
- Dissolved carbon-di-oxide of water
- Total alkalinity
- PH of water
- Nitrogen
- Phosphate
- Hydrogen-sulfide
- Ammonia

Dissolved oxygen of water

Oxygen is the most important component of all living organisms. There are two ways through which oxygen can dissolve in the pond water.

- Surface water of the pond get disturbed
- Oxygen can also be dissolved in the water through the photosynthesis of the aquatic plants present in the water body.

Utilization of oxygen in the pond-

- Fish and other aquatic plants present in the water use oxygen for respiratory activities.
- Oxygen is also used for the degradation of organic matters, present at the bottom of the pond soil.

Dissolved carbon-di-oxide of water

Carbon-di-Oxide is an essential element for plant photosynthesis. But the presence of excess carbon-di-oxide in the pond water is not desirable, as it will cause obstruction for plant respiration. So, we can say that 5-15 mg/l carbon-di-oxide is optimum for fish culture.

Carbon-di-oxide can dissolve in the water mainly from

- Atmosphere
- Respiration of aquatic plants and animals.
- Degradation of organic matter which is situated at the pond bottom soil.

Total alkalinity of water

Generally, the total alkalinity of water is indicated by the carbonate, bicarbonate and hydroxide of calcium and magnesium. The ideal range of total alkalinity of water should be between 80-150 mg/l. Application lime is the best solution for the treatment of low alkalinity of pond water.

pH of the pond water

Slightly alkaline water is very much efficient for the culture of fish. But extremely alkaline or acidic water is not desirable for fish culture. Water pH less than 4 and greater than 11 both are lethal for the culture of fish. This pH range of water affects the feed intake capacity of fish as well as their growth. As a result of that fish become vulnerable to different kinds of diseases. The ideal pH range for fish culture is 7.5 to 8.5.

Available Nitrogen of water

Nitrogen is the prime component of protein. So, the presence of nitrogen in the pond water is very much important to increase the productivity of the pond. Nitrogen in the water body comes from the atmosphere in a cyclic pattern through the nitrogen cycle. There are three forms of nitrogen in the water body. They are Ammonia, Nitrite and Nitrate.

Phosphate, hydrogen sulfide and ammonia

The main sources of phosphate in the water body are the excretory products of organisms, degradation of food materials and phosphate fertilizer. Hydrogen sulfide is a toxic gas, the smell of which is like a rotten egg. Regular application of lime can only eliminate this gas. The presence of excess Ammonia gas is very much harmful to the culture pond of fish.

Conclusion

It is very clear from the above discussion that the successful cultivation of fish requires certain optimum conditions in the pond. The physicochemical parameters of the pond should always be taken care of. Any deviation from the normal conditions can hamper the growth and production of the fish. Good knowledge about the optimum condition will help the fish farmer in obtaining a good production and will also ensure a better economy.

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