

## Technical Bulletin #33:

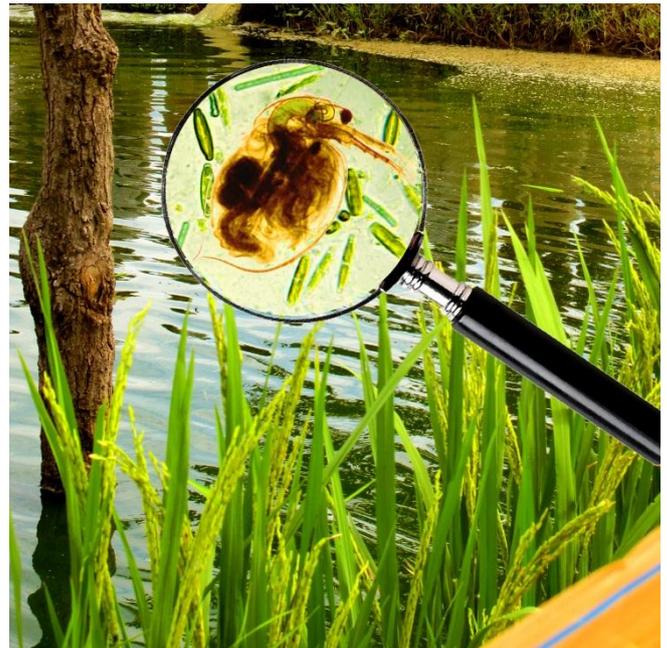
# How to Fertilize a Fish Pond

## Using Compost and Chemical Fertilizers

### Why should fish ponds be fertilized?

The natural foods for young fish are very small and highly nutritious animals in the water called zooplankton. Zooplankton eat even smaller plants called phytoplankton. Phytoplankton, like all plants, use water, sunlight, and nutrients to grow. This means that for fish to grow, zooplankton must grow. To grow zooplankton, phytoplankton must grow. And to grow phytoplankton, there must be a supply of water, light, and nutrients. A few species of fish, like tilapia and silver carp, can also feed on the phytoplankton directly.

The most common thing limiting this chain of feeding is at its very beginning: nutrients. Nitrogen and phosphorus are two of the most common nutrients in short supply, and thus are known as limiting factors. If the amount of nutrients available to phytoplankton increases, the phytoplankton can grow and multiply. The more phytoplankton there is in the environment, the more food there is for the zooplankton. Soon the zooplankton begins to grow and reproduce. As the number of zooplankton in the pond begins to increase, the fish in the pond are able to grow.



Fertilizers are a source of plant nutrients. Fertilizing a pond increases the amount of phytoplankton in the pond and eventually how much food there is for fish. Increasing the available food for fish means that the fish will grow faster and bigger. Because of this, the carrying capacity of the pond is increased.

### What types of fertilizer can be used in a fish pond?

Nitrogen and phosphorus levels are commonly increased in one of two ways: organic or chemical fertilizer. Both methods of fertilization are effective. However, both also have some limitations and risks that go along with them.

### How should organic fertilizers be used in a fish pond?

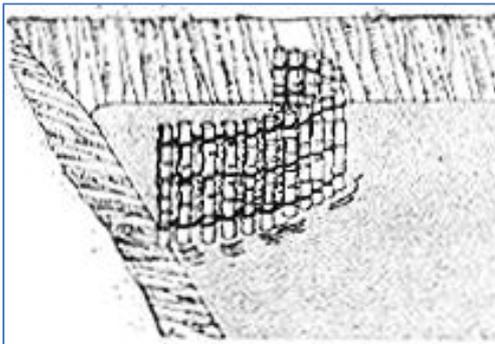


Figure 1: Compost crib in corner of pond

Kitchen scraps, manure, and nutritious on-farm greens can be used as ingredients for the compost and added to a crib. Put in a half liter (pressed down) per day for every 10 square meters of pond. It is best to add these items to a compost crib. Should a day be missed, add double the volume on the next day.

A compost crib should be used in a fish pond (see Figure 1). The compost crib should cover about 10 percent of the pond's surface area. The upright sticks of the compost crib should be about 15 cm apart, so fish can enter. Do not allow the upright sticks to protrude too far above the surface of the pond, as they can serve as perches for fish-eating birds. The compost crib ingredients should be mixed every day or at minimum every few days as they begin to build up. If some of the inputs float out of the crib, do not worry.



If there is a limited supply of composting materials, and compost is needed for both a home garden and a fish pond, use the compost for the garden. One of the limitations of compost in a fish pond is that it reduces the amount of oxygen in the water. The fish need oxygen to live, so if the compost reduces the oxygen too much, it can kill the fish. Watch for signs of low oxygen. A good indicator of low oxygen in a pond is fish coming to the surface and gulping air, a behavior called piping. Sometimes this is mistaken for the fish being hungry. In fact, when fish are doing this, they are trying to get oxygen from the air. One hour of piping in the morning is not bad for species like tilapia and gourami – it is actually a sign of good fertility. Longer periods of piping will result in fish stress, low growth, increased risk of disease, and eventually death.

### **How should fish be checked for growth?**

Sample the fish in the pond monthly using a cast net or small seine (*See Technical Bulletin: How to Sample a Fish Pond*). If fish growth is low, consider adding more or better things to the compost crib. Remember to keep records of sampling data and the number of buckets added to the compost crib each week. Also record the types of things that were added to the compost crib. Expected production using compost is highly variable depending on quality of inputs. It is normal for compost to produce between 0.1–0.3 kg/m<sup>2</sup> of pond surface area. This is equal to 10–30 kg of fish in a 100 m<sup>2</sup> pond.

### **How should chemical fertilizers be used in a fish pond?**

Chemical fertilizers solve two of the basic problems encountered with composting: high variability and the consumption of oxygen in the pond water. With chemical fertilizers, it is much easier to determine how many nutrients are being added to a pond. Chemical fertilizers dissolve faster, are more concentrated, and do not use up oxygen. The fertilizer that gives the most fertility for the money is a combination of Diammonium Phosphate (DAP) and Urea. The recommended application rate for DAP is 2 g/m<sup>2</sup> per week and the rate for urea is 3 g/m<sup>2</sup> per week.

To determine the surface area of the pond, measure it with a tape measure and multiply the length times the width.

$$\text{Surface Area (m}^2\text{)} = (\text{Length of pond in meters}) \times (\text{Width of pond in meters})$$

This means that a pond with a surface area of 100 m<sup>2</sup> would require 200 g of DAP and 300 g of Urea every week.

To use the chemical fertilizer, first weigh the required amount carefully using a scale. Then place the measured dose in a small bucket. Fill the bucket half full with water and gently stir it with a stick until it is dissolved. Once the fertilizer is dissolved, fill the bucket nearly full of water, gently stir to mix, and broadcast the solution over the pond. Be careful not to spill any on the ground, because it will be wasted.

Remember to always keep records of sample data and the amounts, types, and times of fertilizer application.

### **Is the same amount of fertilizer always used?**

The simple answer is no. The fertilization rates that are shown above are standard rates that usually work well. However, there are many things in a pond and in the water that change the way fertilizer can behave. Because of the constant change in the pond, it must be monitored closely, and if necessary, the amount of fertilizer used must be adjusted in order to keep the fish healthy and properly fed.



**How should fertilization be monitored?**

When using fertilizers to grow fish, it is very important to monitor the effect of the fertilizers on the fish pond. The simplest way to do this is to use a Secchi disk. A Secchi disk is a 20 cm circle that is painted alternately black and white. This is used to measure how far light can penetrate into the pond. It is simply placed in the pond and lowered slowly until it is not visible to the naked eye any longer. Record the depth of the Secchi disk when it disappears and use the table below to determine if the pond needs more or less fertilizer. Always record the Secchi disk's depth in the pond records.



Secchi Disk Depth (cm)	Interpretation
0-20	Too much fertilizer. Danger of low oxygen in the morning; stop fertilizing.
20-30	Plankton becoming over abundant.
30-45	Ideal.
45-60	Plankton becoming too scarce.
>60	Water is too clear. Inadaquate fertilization.

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