

Fertilizing Fish Ponds

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Farmers know that proper fertilization can greatly increase crop yields. Similarly, pond fertilization can increase fish yields three to four times. Also fish will be in better condition, and the quality of catch by fishermen usually improves. Fertilizers used in ponds stimulate the growth of microscopic plants called algae or plankton. As primary elements of the food web, algae are eaten by microscopic animals called zooplankton and insects which serve as food for bream, which in turn are eaten by bass. Algae also make the water turn green, which helps to shade the pond bottom, preventing growth of troublesome rooted weeds and filamentous algae commonly called pond "moss or pond weeds."

Types and Grades of Fertilizer

There are many commonly used fertilizers produced for a variety of applications. Fertilizer manufacturers are required to list the grade on each fertilizer container by the percent of nitrogen (N), phosphorus (P) as phosphoric acid (P₂O₅) and potassium (K) as potassium monoxide (K₂O). Therefore, a 20-20-5 grade fertilizer contains 20 percent nitrogen, 20 percent phosphorus as P₂O₅ and 5 percent potassium as K₂O. "Complete" fertilizers contain N, P₂O₅, and K₂O while "incomplete" fertilizers contain only one or two of these elements. Common incomplete fertilizer sources are normal superphosphate (0-20-0), triple superphosphate (0-46-0), diammonium phosphate (18-46-0) and liquid ammonium polyphosphate (10-34-0). Examples of common complete fertilizers are 13-13-13, 20-20-5, and 4-12-12.

Additions of phosphorus in ponds usually provide a much greater increase in fish production than from either nitrogen or potassium. However, nitrogen in combination with phosphorus is sometimes better than phosphorus added alone.

Liquid fertilizers are generally superior to the traditional granular form fertilizers in promoting rapid growth of plankton algae in farm ponds. This is because the nutrients are immediately in solution, making them more rapidly available to the algae. Also, smaller applications of liquid fertilizers (more as concentrates) can be used which may reduce the cost and labor of application but still improve the effectiveness of pond fertilization.

Common grades of liquid ammonium polyphosphate fertilizer are 10-34-0 and 11-37-0. Liquid ammonium orthophosphate, commonly sold as a 13-38-0 grade, can also be used. Nutrients are found in a ratio of about 1:3 in liquid fertilizers.

Any grade of liquid fertilizer can be used, as long as approximately 3 to 4 pounds of phosphorus as P₂O₅ are applied per application.

In recent years, fertilizer formulations which contain all three nutrients have become popular as a result of their effectiveness. In a dry, flour-like form, the 12-48-8 formulation produces excellent phytoplankton blooms which vigorously stimulate bream and bass growth.

Standard Fertilization Schedule

The following standard fertilization schedule can be used with any of the fertilizers and rates recommended in the fertilization table.

1. Make the first application of fertilizer in late February or early March. (When water reaches 60 degrees) Follow with two additional applications at two-week intervals.
2. Make three more applications at three-week intervals.
3. Continue applications at monthly intervals or whenever the water clears enough that a white disk attached to a yardstick is visible to a depth of 18 inches.
4. Stop applications by the last week in October.

Fertilizer			Pounds of Fertilizer/ Acre/Application
Type	Grade		
Liquid	9-32-0 10-34-0 11-37-0 13-38-0	(either ammoniated polyphosphate or orthophosphate)	10 (all grades)
Granular	20-20-5	(fish pond fertilizer)	40
	18-46-0	(diammonium phosphate)	18
	0-46-0 plus 34-0-0 12-48-8	(triple super-phosphate) (ammonium nitrate) Dry powder	18 plus 24 5

Because watershed fertility and pond uses vary, the standard fertilization schedule and recommended rates are not necessarily the most efficient for all ponds. The following considerations can help guide you to modify them to meet your needs.

Pond Use

Not all ponds have to be fertilized. Large unfertilized ponds which are fished by only a few people may produce excellent fishing. Heavily fished ponds, such as club ponds, should generally be fertilized. Sometimes less fertilizer is needed in ponds in watersheds where cattle are grazing, due to nutrients from droppings. Ponds which typically have strong flow-through after rain events or are a part of a stream where water retention time is low- that is the pond has a lot of flow-through- fertilization nor lime is not recommended.

Application Methods

Liquid fertilizers generally weigh about half again as much as water. Because they are heavier than water, they must be diluted with water or applied into turbulence so that they mix with the pond water and don't sink to the bottom.

One method of application of liquid fertilizer is to drip it slowly into the water from the bow of a boat driven by an outboard motor so that the wake of the boat and the action of the propeller will mix fertilizer into the water before it has a chance to sink. It can also be applied by pouring it directly into the turbulence caused by the outboard motor.

Another method of application is to pour the liquid fertilizer into a wash tub, plastic trash can or similar container placed in a boat. The liquid fertilizer is then diluted at 5:1 with pond water and is siphoned or drained over the transom.

Still another approach is to set up a vessel as described above at the pond's edge. Dilute the fertilizer by mixing more than 10 parts of water with it and slosh or splash the mixture onto the pond surface. A small pump can also be used to dilute the fertilizer with water and then pump the solution out onto the pond. This method is only appropriate for ponds smaller than 2 acres.

Liquid fertilizer can be applied full strength using a garden sprayer. Direct the spray onto the pond surface while walking around the pond. With some sprayers the fertilizer must be diluted with water so that it will pass through the small nozzle openings.

Especially in late spring and summer, liquid fertilizer may be used more efficiently and produce a more stable "bloom" if applied at half the recommended rate, but twice as often as the standard fertilization schedule calls for. For example, you can apply 5 pounds per acre at two-week intervals in summer, instead of 10 pounds at monthly intervals.

Granular forms of fertilizer should be kept from direct contact with the pond mud, because phosphorus in the fertilizer becomes trapped in the mud and unavailable to the algae. A fertilizer platform positioned one foot under water can be used to hold granular fertilizer off the bottom. Pour fertilizer or place open or slitted bags on the platform. The fertilizer will slowly dissolve and be distributed by water currents. A platform measuring 45 square feet is adequate for a 5- to 10-acre pond. Smaller platforms can be used in smaller ponds. More than one platform should be used in ponds larger than 15 acres.

Fertilizer granules can be broadcast in shallow water, but this method is not as good as the platform method. Never broadcast fertilizer granules in deep water.

Excess Water Flow

A large continuous flow of water through the emergency spillway or standpipe will flush fertilizer from the pond. If the volume of water flowing out of the pond during any month of spring or summer is more than the total pond volume, fertilization is usually ineffective. Some ponds have heavy outflow only during winter and early spring, and respond well to fertilizer during drier weather. Constructing diversion ditches, enlarging the pond and/or constructing another pond above the existing one are techniques which can help to reduce excessive water outflow and retain fertilizer and lime.

Muddy Water

When muddy water reduces visibility to less than 12 inches, algae respond poorly to fertilizer because the sunlight they need for growth is blocked. Therefore, fertilizing muddy ponds is usually ineffective. The following methods can be used to clear muddy water, but are only temporary until erosion of the watershed is stopped.

1. Apply barnyard manure at the rate of 1 ton per acre at 3-week intervals. Use extreme caution; however, as an oxygen depletion may result
2. Apply 75 pounds of cottonseed meal with 10 pounds of triple superphosphate per acre at 2- to 3-week intervals.
3. Apply Gypsum or alum as recommended by your county Extension agent.

Gypsum (pea-nut lime or calcium sulfate) can be highly effective as a tool to clear clay particles from ponds. Generally 250- 1000 pounds per acre give excellent results.

Pond Weeds

Do not fertilize weedy ponds--the fertilizer will only make the weeds grow faster. Weeds can be controlled by using chemicals designed for aquatic plant control. The grass carp (white Amur) are a highly effective aquatic weed management tool. However, fertilizing in early spring before weeds begin growing rapidly may put a stop to their growth. Ask your county Extension agent for publication ANR-48, "Chemical Weed Control in Lakes and Farm Ponds", for methods to control pond weeds. Another web resource for aquatic plant management is: <http://aquaplant.tamu.edu/> or our extension site: <http://www.aces.edu/dept/fisheries/>

Liming

Ponds with soft, acid water may not respond to fertilizer. If the water does not turn green from plankton bloom development after 6 to 8 weeks of fertilization, liming may be necessary. Agricultural limestone will increase water hardness and alkalinity and decrease acidity, thereby increasing the effectiveness of fertilizers. A pond soil sample is needed to determine the lime requirement. Ask your county Extension agent for publication ANR-232, "Liming Fish Ponds", for soil sampling instructions and liming information (<http://www.aces.edu/pubs/docs/A/ANR-0232/>).

Measuring Algae Density

Because all ponds are not equally productive or responsive to fertilization, intervals between fertilizer applications can best be determined by measuring plankton density. This method may be more economical than strictly following the fixed intervals of the standard fertilization schedule above.

Measure the algae density using a solid white disk or one painted with alternate black and white quadrants. The depth at which the disk disappears from view in the water gives an indication of plankton density. The more dense the plankton,

the shallower the disc will disappear. When the disc is visible at more than 18 inches, plankton density is too low and it is time to fertilize. Best plankton density measure is when the disc disappears between 8 and 16 inches. Do not fertilize when disc visibility is less than 12 inches. A visibility of less than 6 inches is a warning that an oxygen depletion may occur. Do not use the visibility method when the water becomes temporarily muddy.

Reminders

1. Do not practice haphazard fertilization. Fertilizing once or twice a year is worse than not fertilizing at all. It's like alternately feeding and starving the fish.
2. Do not attempt to kill weeds by broadcasting fertilizer over them during the spring and summer. This can have the same effect as adding gasoline to a fire.
3. If plankton blooms do not develop and grow after fertilizing, check for:
 - Lime requirement
 - Excess water outflow
 - Weeds
 - Muddy water
4. Sometimes plankton blooms are difficult to initiate or reestablish even after potential problems have been eliminated. Temperature, clouds and possibly other weather-related factors may be the cause. Continue fertilizing every two weeks until the desired bloom develops.