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Fact sheet

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# Controlling Bacteria, Algae, and Weeds in Irrigation Ponds

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Ponds are used as reservoirs for irrigation water in many areas of New Jersey. Where pond water is used for drip irrigation, controlling bacteria, algae, and weeds is essential to prevent clogging of drip irrigation systems. Where sprinkler irrigation is used, controlling pond vegetation is required only if the growth is so dense that it effects the performance of the irrigation system. Screen and/or media filtration is usually all that is required to provide excellent water quality where groundwater is used as a water source. Pond water often requires additional treatment in order to keep irrigation lines free of biological materials.

Bacteria, algae, and weed growth in an irrigation pond complicate drip irrigation water treatment. Uncontrolled growth of these organisms can overload media filters, causing excessive backwashing and can lead to clogging of the media and, in severe cases, filtration system failure. Algae and weeds can also clog the intake pipes leading to pumps.

Algae are primitive plants that are observed as hair-like strands or as tiny, floating single cells that give the water a clouded, "soupy" appearance. Higher plants have roots and leaves and live above or below the water. In this fact sheet, higher plants will be referred to as "weeds" because they are undesirable. Bacteria are also present in ponds and can cause drip irrigation clogging if other water conditions favor bacteria growth.

The best way to control algae and weed growth is to prevent it from occurring. If these pests are present, there are two effective methods of eliminating them. The first is by mechanical means. Raking or dragging weeds out of the pond may be practical for very small ponds or where weed growth is confined to the edge of the pond. In the majority of ponds, however, chemical control is the safest, easiest, most effective, and most economical control method.

## Controlling Algae and Weeds with Copper Sulfate

Granular copper sulfate is an excellent herbicide which is available for control of bacteria, algae, and weeds in ponds. The amount needed to provide effective control is influenced by (1) the kind and amount of vegetation to be destroyed, (2) pond size, (3) water temperature, (4) water hardness, and (5) the amount of water flowing through the pond. Control is easiest and most effective if made shortly after plant growth has started.

Control with copper sulfate is most effective when water temperature is above 60°F. Low water temperatures are generally not a problem in New Jersey where pond vegetation problems occur in mid- to late-summer. However, if water temperature is below 60°F, a greater amount of copper sulfate will be required to provide effective control. **If higher than necessary amounts of copper sulfate are used, fish, insects, and other pond animals may be endangered.**

Dying weeds and algae will use oxygen in the water, and possibly suffocate fish. If the pond is heavily infested, treat only a portion of it at a time. Again, the best method of preventing a build up is to treat early, in May or June, after water temperature has risen above 60°F. Applications should be repeated as necessary, and typically may be required every two to four weeks.

Applying the proper amount of copper sulfate requires that the volume of the pond be estimated. In Table 1, the pounds of copper sulfate required to obtain a given copper sulfate concentration are listed. In this table, pond volume is given in acre-feet and gallons. A pond with a 1 acre-foot volume has a surface area of one acre and a depth of one foot. **When treating ponds with outlets, these should be closed during treat-**

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**ment and for several days following treatment.**

Generally, a dose of between 1/4 and 1 ppm of copper sulfate is sufficient and safe for treatment of algae. Heavily infested ponds will require higher concentrations, as will "hard" water (water which has a high concentration of calcium and/or magnesium). In most cases, the single cell, "soupy" type of algae can be controlled with 1/4 ppm of copper sulfate. For the stranded, "pond scum" variety of algae, 1/2 ppm is usually adequate. Certain weeds will require much higher concentrations of copper sulfate, sometimes as high as 40 ppm. **At these concentrations, aquatic life is endangered.** In most cases, it is not necessary to control weeds if algae can be controlled with lower copper sulfate concentrations.

Media filtration is probably sufficient for minor algae problems. Floating inlet pipes will also reduce the amount of treatment necessary by reducing the amount of algae and trash drawn from a pond. Where a floating inlet is used, it is important to draw water from a foot or two below the water surface. A simple floating inlet can be constructed by strapping the irrigation system inlet pipe to the bottom or side of a sealed 55-gallon drum.

## Controlling Bacteria With Chlorine

Waters which are free of algae and weeds may contain bacteria. Both surface and groundwater sources can contain bacteria if water pH is 4.5-6.5, temperature is above 45°F, iron is present at concentrations of 0.2-1.0 ppm or hydrogen sulfide is present at concentrations of 0.1 ppm or greater. Under these conditions, bacteria secrete a slime which can plug emitters. Chlorination is the most common and efficient treatment for bacteria.

Chlorine is available in several forms. Liquids containing between 5-15% sodium hypochlorite are commonly used. Gaseous chlorine is more economical, but is extremely dangerous to use. Solid forms of chlorine containing 65-75% calcium hypochlorite are also available. It is important to note that both liquid and solid forms of chlorine will cause water pH to rise. This is critical because chlorine is most effective in acidic water. If water pH is above 7.5, it must be acidified for chlorine injection to be effective.

Several options are available for chlorine treatment of irrigation water. Since most bacteria grow and multiply when the system is not running, an effective control method is to fill the irrigation system with chlorinated water during the end of each irrigation cycle. For this treatment method 10-20 ppm of chlorine (10-20 ppm of calcium hypochlorite or sodium hypochlorite) are recommended. Another possibility is to inject higher concentrations (50-100 ppm of calcium hypochlorite or sodium hypochlorite), during the last 15-30 minutes of irrigation cycles once or twice each month.

Chemical treatment of irrigation water will prevent many of the clogging problems that can seriously disable drip irrigation systems. Keep in mind that the injection of chlorine and copper sulfate require that labeled products be used, and that the operator possess a New Jersey Private Applicators License. New Jersey legislative code also requires that a functioning backflow prevention device be used where chemicals are injected into an irrigation system. An Aquatic Use Permit is required where copper sulfate is added to ponds with outlets, such as a pond which is fed by a stream.

## TABLE 1. Pounds of copper sulfate required to achieve desired concentration in various size ponds

| Pond volume | | Desired copper sulfate concentration (ppm) | | | |
|---|---|---|---|---|---|
| acre-feet | gallons | 1/4 | 1/2 | 3/4 | 1 |
| 0.2 | 65,000 | 0.14 | 0.27 | 0.4 | 0.5 |
| 0.4 | 130,000 | 0.27 | 0.54 | 0.8 | 1.1 |
| 0.6 | 195,000 | 0.41 | 0.82 | 1.2 | 1.6 |
| 0.8 | 261,000 | 0.54 | 1.09 | 1.6 | 2.2 |
| 1.0 | 326,000 | 0.68 | 1.36 | 2.0 | 2.7 |



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