Controlling Weeds

Vegetation that grows under, on, or out of the water in a pond may be undesirable for a variety of reasons. It may interfere directly with fish production and harvest. By providing hiding places for small fish, vegetation may reduce the effectiveness of predators and hasten the day the fish population becomes unbalanced. Some plants give the water an unpleasant taste or smell. Vegetation also interferes with fishing, swimming, boating, and almost every other recreational use of the pond.

The microscopic plants in the water provide necessary oxygen and fish food. Large plants are not needed for fish life. Also, a mat of threadlike filamentous algae floating on the surface greatly increases the rate of water loss through evaporation.

Vegetation that grows in a pond may be divided into four general groups. The first includes the microscopic plants that, along with microscopic animals, are called plankton. Plankton are a vital link in the food web.

The other three groups are all undesirable from a management standpoint. The first and probably the most common vegetation problem affecting Ohio ponds is floating weeds. The second group is submerged weeds; they grow attached to the pond bottom with most of their leaf surface below the water's surface. The third group, emergent weeds, grows in shallow water and along the shoreline with the leaf surfaces above the water.

Undesirable vegetation in a pond can be controlled mechanically, biologically, or chemically. All three methods should be considered before making a decision to proceed. Factors to consider include extent of control desired, feasibility, long- or short-term effectiveness, and cost.

Mechanical Weed Control

Vegetation around the pond edge can be controlled by hand pulling, cutting, or mowing. This can be effective against emergent weeds such as cattails and some submerged weeds and should start in spring when leaves first begin to appear. By repeatedly removing the leaves on cattail plants, the food supply in the underground tuber will be depleted and the plant will eventually die. This method, requiring persistence on the part of the pond owner, can have noticeable results in one growing season.

A longer-lasting, but expensive, solution is to eliminate the shallow areas that are conducive to weed growth. A minimum water depth of three feet will prevent rapid establishment of aquatic vegetation. Shoreline edges can be steepened with a dragline to give the sides a 3:1 slope and a minimum of shallow water. The only exception should be swimming areas where steep dropoffs could be hazardous.

Biological Weed Control

Another method of control that should be considered is biological control. This involves disrupting plant growth by modifying the aquatic environment through natural manipulation, or it can mean the introduction of a living organism capable of controlling the weeds.

Biological control of weeds includes the maintenance of a level of fertility high enough to foster a good microscopic plant and animal population in the water (see discussion of fertility and fertilization in an earlier section, page 7). This plankton population will "cloud" the water and prevent the light penetration necessary for weeds to become established. This form of biological control requires intensive management and more time than the average pond owner normally devotes to the pond.

Inert Dyes

Another method by which light penetration can be reduced is through the use of inert dyes. Such dyes are commercially available and the color (usually blue) they impart to the water can reduce light penetration and help control both filamentous algae and submerged weeds. These dyes will not be effective in water less than two feet deep, or if weeds are on or above the water surface.

Triploid White Amur

Biological control can also be achieved through the introduction of a vegetation-eating fish, the triploid white amur. Commonly referred to as "grass carp," this fish is a member of the minnow family and may grow to 60 pounds or more in size and live up to 15 years. Possession of the natural form (diploid) of this fish continues to be illegal in Ohio due to concerns that it could escape from private ponds and lakes and become established in public waters. The triploid form is sterile and would not become established if it did escape.

The type and quantity of vegetation should be used to determine the number of triploid white amur to stock. If the vegetation is primarily milfoil, musk grass, pondweed, or naiad, these stocking rates are recommended:

Percent of pond covered by plants	Number of fish per surface acre
0 - 20	none
20 - 40	5
40 - 60	10
more than 60	20

If the vegetation is primarily coontail or elodea, the stocking rates should be doubled. In situations where filamentous algae is the only aquatic vegetation present, some control

can be expected. However, since this is the least desirable food, other aquatic plants will likely be eaten first, and noticeable control of algae may not be evident. If copper sulfate is used to control algae in ponds where white amur have been stocked, strict observance of the recommended rate of 2.7 pounds per acre-foot and uniform application methods should be followed.

Where largemouth bass or other predatory fish are already present in the pond, triploid white amurs should be at least 8-10 inches in length when stocked; otherwise they may be eaten by other fish.

Because white amurs have a natural tendency to follow moving water, barriers to prevent their escape can be installed in ponds with inflows and outflows (including high-water spillways). Care should be taken, however, to ensure that such barriers do not become clogged with debris.

This herbivorous (plant feeding) fish should be considered as another tool for aquatic weed control and not as the ultimate solution. White amur represents a biological control option that may reduce the need to use aquatic herbicides. This can be especially important for those who use their water for potable or livestock uses as well as for managers of larger private lakes where annual aquatic herbicide treatment costs are prohibitive.

Triploid white amur are available from dealers with permits from the Ohio Department of Natural Resources, Division of Wildlife. County wildlife officers can provide a list of these dealers. When purchasing triploid white amur, you should receive a receipt from the seller indicating the number and size of fish purchased and the seller's name. Save this receipt as documentation that you purchased and stocked sterile (triploid) fish.

Chemical Weed Control

Chemical weed control, the third method available to the pond owner, is the one most often used. Three considerations are a must before starting a chemical weed control program. First, uses of the pond and the pond water will influence selection of the chemical. Second is the time of year when the chemical is to be applied. Finally, the kind of weeds to be controlled must be considered. Most herbicides recommended for aquatic weed control carry complete instructions for use on the container label. Always read the entire label on any herbicide before applying.

Read the label for restrictions on use of the water treated. Some chemicals are not suitable for use in ponds from which water is used for domestic and livestock consumption. Other chemicals should not be used if the pond is a source for irrigation or spray water. Fish should not be eaten for varying periods of time after treatment with some chemicals, and swimming is restricted with others. Read the label!

Application time of chemicals is critical in aquatic weed control. The best time to apply aquatic herbicides is when the target plants are growing most vigorously and before they

flower and produce seed. This normally occurs before July 1 for most aquatic weeds in Ohio. Proper timing of herbicide applications produces better results and also reduces the hazard of fish kills.

Killing of heavy infestations of weeds after midsummer can contribute to a summer fish kill. The decomposition of weeds is an oxygen-using process, and a large amount of decomposing vegetation may reduce the dissolved oxygen level below that which fish require. A well-timed weed control program also eliminates weeds that, if uncontrolled, die and decompose during the winter and can contribute to a winter fish kill. Even with proper timing, the control of aquatic vegetation with herbicides is a maintenance measure usually requiring treatment each year.

Finally, selection of the chemical to be used and the amount to apply should be decided only after the weed or weeds have been identified. Some weeds are more resistant than others and require higher concentrations of an herbicide. Use only as much herbicide as is recommended and apply it as specified on the label.

Floating Weed Control

The most common type of floating weed in Ohio ponds is filamentous algae (moss or pond scum). This weed, which looks like a dense mat of hairlike fibers, starts to grow on the pond bottom and on submerged objects. It floats to the surface, often covering large areas of the pond.

Most species of this plant group can be controlled with very low concentrations of copper sulfate. The recommended rate is 2.7 pounds per acre-foot of water (see Pond Measurements, page 5.) Double this rate for very hard waters (more than 12 grains or 200 parts per million of hardness).

Determine the size of the area to be treated and then calculate the amount of chemical needed. The application method will determine what grade of copper sulfate to purchase. For best results, dissolve copper sulfate in water and spray it on the surface of the algal mat or on the water surface over the algae. Finely ground, "snow grade" or "instant" copper sulfate dissolves easiest and is best for this method. Mix the desired amount of copper sulfate with enough water to cover the area to be treated.

In large ponds and when spray equipment is not available, it may be easier to treat with copper sulfate for algae control by placing the larger crystals of this chemical in a burlap bag and towing the bag through the water in the area to be treated until all of the crystals have dissolved.

If the algae is so abundant that it covers more than half the total pond surface, a complete treatment may result in an oxygen depletion and fish kill. This hazard is greatest during very hot, overcast weather. When these conditions exist, treat only half the pond and wait 10 days to two weeks before treating the other half.

Copper sulfate is corrosive to galvanized containers. The solution should be mixed in wooden, earthenware, plastic, stainless steel, or copper-lined containers. If a copper-lined, plastic, or stainless steel sprayer is not available, you may broadcast the solution with a bucket and dipper. Strive to treat the weeds directly. Contact is important.

When copper sulfate is applied at the recommended rate, it will be so diluted or inactivated after 12 hours that it will not present a hazard to livestock or swimmers. **Caution:** Do not apply any copper compound when fish are spawning unless you wish to kill the new hatch of fish.

Copper is also available in a buffered, or chelate, form (see "Aquatic Herbicide Table," page 24). This material contains complete instructions on the label for use in the control of filamentous algae. Several other herbicides recommended for the control of other weed problems will also control algae. Where a mixed problem of algae and submerged weeds exists, the chemical suitable for control of the submerged weed also may kill algae. Do not mix or apply different chemicals at the same time unless the label states clearly that this may be done. Some combinations may be ineffective and others may be toxic to fish.

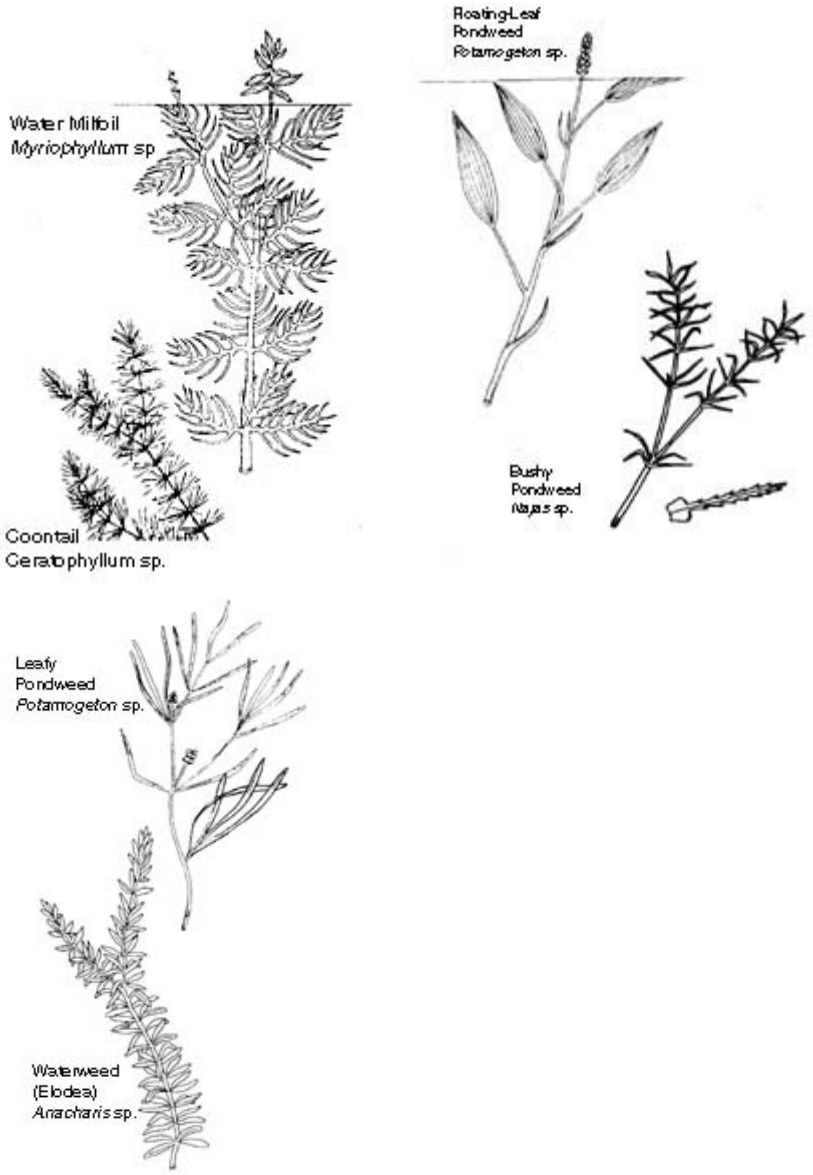
There is another form of algae that grows attached to the bottom and resembles the submerged weeds discussed in the next section. This is Chara, commonly called muskgrass or stonewort. It usually grows in clumps in shallower areas. When crushed it may have a musky or skunky odor. Although Chara is a form of algae, copper sulfate applied at 2.7 pounds per acre-foot of water will not control it. Buffered formulations of copper will control Chara when applied according to the label, as will the amine salt of endothall (see the table on page 24 for trade names).


Muskgrass
Chara sp.

Submerged Weed Control

Many water weeds grow below the surface of the water. Some are loosely rooted and others are firmly rooted. Still others appear to be suspended fragments or clusters. Some have a few leaves that float on the surface, while many blossom and produce seed on a stem that extends above the water surface. This general group is referred to as submerged weeds. They thrive in clear, calm, shallow waters.

Many species of submerged weeds are found in Ohio ponds. The common kinds include the large family of pondweeds (Potamogeton), coontail (Ceratophyllum), water milfoil (Myriophyllum), water weeds (Elodea), and naiads (Najas).



There are two general formulations of herbicides for the control of submerged weeds - liquids and granules. The active ingredient in a liquid is immediately available, whereas the granular forms release the active ingredient slowly as the inert carrier breaks down. Granular herbicides are best suited for application early in the growing season and for spot-treating. The liquid forms may be used through midsummer. No aquatic herbicide is currently approved for submerged weed control that does not place some restriction on the use of the treated water.

Many herbicides on the market carry label recommendations for the control of submerged weeds, and new products are being introduced all the time. Therefore, it is impossible to discuss each of these. Several of the most common are described in a later section. Visit your local agricultural chemical dealer to see what is available. Each container will carry complete instructions on the label for the herbicide's use, a list of the weeds it will control, application rates, precautions, and restrictions. **Read each label completely and select the one that best fits your needs and your application equipment.**

Illustrations of some common submerged weeds that occur in Ohio ponds appear in this bulletin. They should help you identify most pond weed problems.

Emergent Weed Control

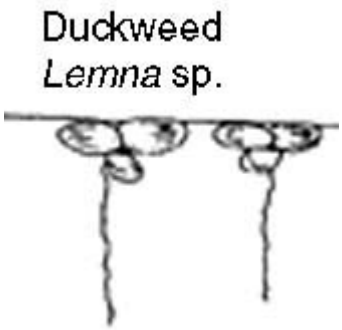
This group of weeds includes those growing along the margin of the pond as well as in other shallow waters. Their stems and leaves protrude above the water surface. Examples are cattails (Typha), bulrushes (Scirpus), arrowhead (Sagittaria), and spatterdock (Nuphar). Some, especially cattails, may spread rapidly by growth of underwater stems and may reach depths of three feet or more.

Constructing the pond properly to maintain as little shallow water as possible is the best control for these weeds. If you have shallow water, these weeds will turn your pond into a marsh unless they are controlled. Emergent weeds, especially cattails, are a preferred food of muskrats, which may result in the use of shorelines protected by cattails and other emergent weeds for their burrows. Mechanical deepening of shallow areas will reduce these problems. Control also can be achieved by cutting and pulling emergents if this practice is started soon after they appear. There are also several herbicides labeled for the control of emergent aquatic weeds.

Some of the herbicides labeled for submerged weed control are effective on emergent weeds, including diquat dibromide andgranular 2,4-D. In addition, fluridone and glyphosate are approved for emergent weed control. Diquat dibromide and glyphosate are applied as sprays and will give better results when applied with a wetting or sticking agent. These agents are available commercially, or liquid household detergent may be used as a substitute. Add two tablespoons of liquid detergent to each gallon of spray mixture and spray on the exposed surfaces of the emergent weeds so that a thin film covers the leaves. Do not use kerosene or fuel oil emulsions as they can cause undesirable flavors in fish. To reduce the amount of herbicide falling on the water surface when spraying emergent weeds, apply from a boat, directing spray toward the shore.

Each aquatic herbicide has complete instructions for its use on the package label. **Read and follow label directions carefully.**

Another group of weeds occasionally occurs in Ohio ponds, especially very sheltered ponds that have little wind action on the surface. These weeds are duckweed (Lemna) and watermeal (Wolffia). Although they float freely on the water surface, they are treated as emergent weeds. Duckweed has tiny, usually three-lobed leaves with rootlets that hang down in the water. Watermeal appears as minute green grains floating on the water. Dense populations of these weeds often form a green blanket on the water surface. Diquat dibromide and fluridone will provide some control of these weeds. Follow information on the label regarding its application.



Note: The use of herbicides for the control of submerged, emergent, and floating aquatic weeds is a maintenance measure and usually requires annual applications. Applications made early in the growing season usually will give better results and will reduce the hazard of oxygen depletion later.

Woody Plants

Woody plants may create problems on embankments and along the shoreline of a pond. Willows and cottonwoods are particularly troublesome in some areas. These can be controlled by cutting or pulling when they are seedlings, or with herbicides. Formulations of glyphosate are available for use as foliage spray, injection, or frill treatments. Frill treatments involve making notched cuts completely around the woody plant and then spraying an herbicide in the cut.

Aquatic Herbicides

Many chemicals may kill aquatic weeds; however, select only those approved for aquatic use by the U.S. Environmental Protection Agency and labeled for this use. Brief descriptions of several chemicals follow. These are identified by their chemical names. See the table on page 24 for trade names and manufacturers.

Copper Sulfate

This is the least expensive and most widely used material for the control of algae (except Chara). It has little or no effect on other aquatic plants. Copper sulfate is a contact herbicide, so direct contact is required. In highly alkaline waters (greater than 250 ppm CaCO3), copper sulfate forms an insoluble precipitate and becomes unavailable for algae control. Therefore, a higher concentration of copper sulfate must be used. Copper sulfate is toxic to fish eggs, so its use should be suspended during spawning periods. There are no restrictions on the use of the water following treatment, but it is desirable to wait 24 hours to let the metallic smell dissipate from the water.

Copper Chelates

The copper chelates (copper held in an organic molecule) are formulations that prevent copper from precipitating out of the water, especially in hard water. As a result they should provide somewhat longer-lasting results than copper sulfate. The chelates are formulated as liquids and granules, making them somewhat easier to apply.

Diquat Dibromide

This is a contact aquatic herbicide and is available in liquid form. It will kill most submerged weeds. It is applied by pouring directly from the container or by diluting with water and injecting below the water surface. For best results, it should be applied before weed growth has reached the surface. When sprayed on emergent weeds, the herbicide is mixed with water and a nonionic surfactant. Diquat dibromide should not be used in muddy water.

Endothall

This herbicide is available as an amine salt or a potassium salt and is available in both liquid and granular formulations. Fish are sensitive to the amine salt, but not the potassium salt. Endothall is a contact herbicide and is most effective in waters 65 degrees F and above. It will control most of the common submerged weeds that grow in Ohio. The liquid form is mixed with water and sprayed on the water surface or injected below the surface. The granular form is best applied with a cyclone-type spreader. Tables for determining amounts required, application instructions, precautions, and restrictions are on the product label. **Read the label!**

Fluridone

Fluridone is a systemic aquatic herbicide that interferes with a plant's ability to make food. By inhibiting carotenoid synthesis, chlorophyll is gradually destroyed and the plant dies. This process takes 30 to 90 days to work so treatment early in the growing season is recommended. This aquatic herbicide is available in liquid and slow-release pellet formulations. **Read the label for application information and restrictions.**

Glyphosate

Glyphosate is a systemic herbicide that moves through the plant from the point of foliage contact into the root system. It is a liquid and produces the best results when applied after emergent plants have reached full growth. It gives good control of cattails and other emergent aquatic plants as well as woody plants growing on the shorelines.

Granular 2,4-D

This systemic aquatic herbicide is easily applied using a cyclone-type spreader. It should be applied to coincide with rapid growth of the root systems of submerged weeds for best results. Effective on most submerged weeds found in Ohio ponds, granular 2,4-D also may be used to control some emergent weeds. **Read the product label carefully for application rates, precautions, and restrictions.**

Warning!

Aquatic herbicides recommended for submerged weed control are safe for use in ponds stocked with fish unless otherwise stated on the label. Each has different restrictions on water use following treatment, so **read the entire label** on the product you select before applying it.

Although non-injurious to fish when applied at the recommended rate, an herbicide application can still contribute to a fish kill. If large amounts of floating or submerged weeds are killed at one time, their subsequent decomposition can result in an oxygen depletion and the death of fish from suffocation. To reduce the hazard of such a fish kill, treat weeds early in the growing season. When more than half of the pond is covered with weeds, treat half the pond and wait 10 to 14 days before treating the other half.

When applying herbicides along shorelines or spot-treating weed beds, it is best if applications are started along the shoreline or in the shallowest area and applied out to the deeper water. This will enable fish to move into deeper water to escape the chemical.