Controlling aquatic weeds with chemical, mechanical, and biological means

by Ron Morris, technical editor

Mechanical harvesters of aquatic weeds are usually too large for all but the largest golf course lakes, but fish such as the white amur can effectively control aquatic weed growth where legal.

Control of aquatic weeds in a golf course pond or lake can amount to thousands of dollars in a superintendent's budget. Further, efforts are made hazardous by aquatic herbicides' toxicity to the turfgrass that the water is used to irrigate. And in a pond with desirable fish and other animal inhabitants, efforts must be selective to avoid harm to them.

Aquatic weeds may be broken down into three general categories: floating, submergent, and emergent. Algae is a category by itself. However, it is not often that a superintendent will only have to rid his pond of just one type of weed. The problem is generally a combination of several weeds.

The first step in controlling a nuisance aquatic weed problem (and most other problems as well), is identification of the weed causing the problem. If the plants are growing completely under water, they are described as submersed aquatic plants. Plants growing in, but protruding above, water are said to be emersed aquatic plants. Floating weeds are divided into two categories: those such as duckweed and water hyacinth, which are not rooted, are surface aquatic or unattached-floating plants; those which are rooted are called attached-floating aquatic plants. Describing the growth pattern of an undesirable species of aquatic weed is instrumental in determining a control program. Obviously, a program centering on control of floating weeds will not generally be as effective in controlling submersed weeds.

Materials to aid in identification of aquatic weed species are available from many manufacturers of aquatic weed control products.

Chemical control

Economy in time, labor, and equipment still makes chemical weed control the most popular method. Methods of application include liquid and granular products.

After lowering the water level, liquids may be applied much as land pesticides are applied, to exposed vegetation. Diluted liquid herbicides are often sprayed over the surface of the water or onto emersed species as contact herbicides. Liquid formulations may also be added to water to yield a predetermined concentration upon final dilution.

Granular materials may also be applied during a water drawdown of the pond. They can be broadcast into the water so that they sink and dissolve to form the final desired concentration. They may also be distributed over ice in winter (no more than 8-inch thickness of ice) to sink to the bottom as the ice thaws. The latter treatment works best on small ponds, as lake ice may tend to shift and the herbicide granules become strewn about in an ineffective manner.

Invert emulsions of herbicides into water have been proved successful. The bifluid system, coming out of Florida, has an oil center, an outer layer of water, and a third layer of oil around the water. Herbicides can be incorporated into either the oil or water phase or both.

A simple invert system has a layer of oil surrounding a water droplet. These methods appear to have good potential in controlling submerged aquatic weeds by carrying the herbicide to the desired control location. They are also instrumental in controlling drift.

The methods do have drawbacks. Materials must be mixed carefully and accurately. The mixtures are usually lighter than water and must be weighted with an inert material to be effective.

One system currently on the market uses a mechanical inverter. It contains a phenoxy type herbicide to control broadleaf species of weeds. Another, to control grasses, can be added to the water phase of the system.

Being lighter than water, an invert system can be used for excellent control of floating species. Sprayed onto a weed such as duckweed, the invert will attach to the weed or float until it does come in contact.

By adding inert materials to weight the mixture, control depth can be modified to "get to the root of the problem." This can avoid problems from using granular materials in deeper water. The granules often tend to move to deeper areas which do not really contain the weeds.

In contemplating use of inverts, proper equipment to distribute the material, a good herbicide, and an emulsifier go together to make the system work.

Mechanical control

Mechanical methods of aquatic weed removal are usually restricted to larger lakes due to the size of the mechanical harvester. Basically, a mechanical weed harvester is simply an underwater mower. The process must be repeated as often as necessary to achieve control. They can provide a feasible alternative to chemical control, because the harvesters do not create a phytotoxic situation in irrigation water. However, disposal of the harvested clippings can present a problem.

Biological control

Biological controls have been brought to the forefront, particularly by research into the use of the white amur. Research has shown that the fish will control aquatic plants, and its use has been legalized in some states under strict conditions. More research into the projected proliferation of the species is needed before wholesale release can be carried on.

In one research project in Florida, it was necessary to stock 2-pound fish at a rate of 160 fish per acre to achieve control of hydrilla and marginal grasses that had taken over a small pond. Control was gained, however, in 8 weeks. Research is currently underway to determine the value of using herbicides in addition to the fish.

Another fish, *Tilapia zilleii*, has begun to gain favor in warmer climates. This fish can also effectively control aquatic weeds, reportedly makes an excellent angler fish, and is being sold in California grocery stores.

Other biological controls being researched include *Arzama densa*, a moth that is a natural enemy of water hyacinth. Researchers at Mississippi State University are studying techniques of mass rearing the moth to determine its effectiveness. In California, research is underway to determine the value of plant competitors to force out undesirable aquatic weeds. Texas scientists are studying the use of a fungus as a possible biological control of water hyacinth.

Conclusion

There are some precautions one can take to avoid a stagnant, weed-infested irrigation pond. Shallow areas can be dredged. Depths of less than 3 feet are undesirable, with 8 to 10 feet more satisfactory. The lake or pond should not be surrounded by trees that shade the water. Avoid bare areas in the watershed around the pond. Erosion can significantly speed up siltation, or filling in, of the pond. Good air circulation over the surface of the pond is needed to mix upper and lower water levels and avoid stratification.

Finally, there is a computerized, 10,000-item collection of aquatic weed literature and information at the University of Florida. Collected and cataloged by Dr. George Allen, the information is in 15 categories, including biocontrol, chemical control, and plant species.

The system can be directed to print out bibliographic references for an entire category or to cross reference two categories — e.g., chemical control and a particular plant species.

To obtain category lists and further specifics, write: Information Storage and Retrieval System, IPPC Aquatic Weed Program, 3103 McCarty Hall, University of Florida, Gainesville, FL 32611. □