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Aquatic Weed Control Overview

Aquatic plants are essential parts of natural aquatic systems and form the basis of a waterbody's health and productivity. Invariably aquatic plants become over abundant or unsightly and require control.

Aquatic Weeds

Proper identification of aquatic weeds is of primary importance to their control. Aquatic plants that cause weed problems are divided into four groups: algae, floating weeds, emergent weeds (foliage above water) and submerged weeds (majority of foliage below water).

Algae are the most common group of weeds in South Carolina ponds. Their shape and size vary from microscopic single- or multiple-celled plants to branched plants that resemble submerged aquatic weeds. Unlike other aquatic plants, algae do not produce flowers or seeds. Algae are divided into three groups: plankton algae, filamentous algae (pond moss) and the stoneworts (colonial algae which resemble higher vascular plants).

Duckweed (*Lemna minor*) is a common floating water weed.
W. Cory Heaton, ©2015, Clemson Extension

Floating weeds float in or on the surface of the water and obtain their nutrients from water rather than from soil. Duckweed, water hyacinth, mosquito fern and watermeal are examples of common floating weeds.

Emergent weeds are rooted in the bottom but have stems leaves and flowers that extend above the water surface. They primarily occur on the shoreline and in shallow water. Common emergent weeds are waterlily, water primrose, cattail and alligatorweed.

Waterlilies (*Nymphaea odorata*) are rooted at the bottom but have leaves that float on the water's surface.
W. Cory Heaton, ©2015, Clemson Extension

Submerged aquatic weeds grow primarily under and up to the water surface. Most submerged weeds have flowers and seed heads that extend above the surface of the water. Examples of common submerged weeds include hydrilla, niaids, water milfoils, spikerush and Brazilian elodea.

Aquatic Weed Control Decision-Making Checklist

- Plant identification (similar looking species may be managed differently)
- Control period – time to initial control and duration of control
- Use of the body of water (irrigation, potable water, livestock, fishing, etc.)
- Physical, environmental, and economic constraints
- Equipment availability
- Water quality (impacts of water quality on weed management efficacy as well as the impacts of management operations on water quality)
- Fish and wildlife populations (including threatened and endangered species)
- Pond ownership or management permission

Aquatic Weed Control Methods

Preventative Methods: Prevention is the most important course of action in aquatic weed control. Preventing the establishment and growth of unwanted aquatic vegetation requires a combination of proper pond location and design, regular pond care and maintenance, and avoidance of intentional or accidental weed introductions. It is easier and less costly to prevent weed problems than it is to control them once they develop. Careful pond site selection and proper pond construction practices are the first steps in preventing aquatic weed problems. Most aquatic weeds and algae usually begin growing in shallow water (less than two feet). Edges of new and existing ponds should be deepened so shallow water areas are minimized. USDA Natural Resources Conservation Service provides technical assistance for pond construction and renovation.

Cultural Control Methods: Cultural techniques modify the environment to make conditions less suitable for weed growth. They include fertilization, dyes, drawdowns and the use of benthic barriers. ***Fertilization:*** One goal of fertilization is to reduce light penetration through the water column. Nutrients released from fertilizer stimulate the growth of planktonic algae, thereby increasing the turbidity (cloudiness) of the water and decreasing light penetration. Pond fertilization can be an effective way to suppress the growth of filamentous algae and submerged macrophytes, which are rooted in the pond bottom and are dependent on sunlight for survival and growth. A fertilization program can also enhance fish production in ponds. However, fertilization must be done correctly and must be continued once it is started. A common mistake is to fertilize once or twice and then stop. This results in the loss of the plankton bloom within a few weeks. The planktonic algae settles out, and the water column once again becomes clear. Filamentous algae and other weeds then grow rapidly as they absorb the nutrients that are released at the bottom of the pond by the decomposing plankton.

Another common mistake is to attempt to control emergent weeds (such as cattails, rushes, and grasses) and floating weeds (such as duckweed and watermeal) with fertilization. The added fertility will cause these plants to grow prolifically; making further weed control measures necessary. Never fertilize when filamentous algae or submerged macrophytes (weeds that grow beneath the surface only) are already present because the added nutrients will only compound the problem. Take care to avoid overfertilization. Overfertilization may lead to the development of noxious algal blooms. Die-off of the bloom and the decomposition of dead algae during the summer may also cause oxygen depletion, resulting in fish kills. For more information, request HGIC 1710, *Fertilizing Recreational Fish Ponds*, or HGIC 1711, *Liming Recreational Fish Ponds*.

Pond Dyes: As an alternative to fertilization, pond dyes can be used to reduce light penetration into the water column. Pond dyes block the wavelengths of light that are necessary for photosynthesis. The upper two feet of the water column remain productive and provide food for fish. Application rates depend on the volume of water to be treated. Treatments usually are effective for six months or occasionally longer, depending upon the rate of water loss from the pond and the amount of fresh water entering the pond. If dense growths of algae or other weeds are present, mechanical removal or an herbicide treatment may be needed before applying a pond dye.

Drawdowns: Drawdowns are effective mainly on submerged vegetation and are not generally recommended unless the pond is larger than one

Biological Control Methods: Although many organisms feed on aquatic weeds, only herbivorous fish have proven both effective and relatively easy to obtain and manage for aquatic weed control in South Carolina. Various herbaceous fish species, including Tilapia species, various strains of the common carp, and grass carp have been recommended for aquatic weed control. Aquatic weed identification is still required for biological control since each fish species selectively controls certain weed species while having no preference for other plants.

Tilapia: Tilapia are tropical fish species that resemble our native sunfish and can control certain aquatic vegetation. Two species of tilapia are recommended for aquatic weed control. Blue tilapia feed entirely on algae (both planktonic and filamentous) but do not readily consume submerged vascular plants. Redbelly tilapia feed primarily on submerged vascular plants rather than algae, but most pond managers prefer triploid grass carp for control since grass carp offer multiple year control and are easier to manage. Because tilapia are tropical fish, they cannot survive normal winter water temperatures in most of South Carolina. Annual restocking is generally necessary unless a warm water supply (such as thermal spring or power plant cooling reservoir) is available as a refuge where the fish can overwinter.

Tilapia cannot survive normal winter water temperatures in most of South Carolina and need to be re-stocked each year. W. Cory Heaton, ©2015, Clemson Extension

Tilapia are stocked at a rate of 200 to 400 fish per acre in the spring. The higher rate has been demonstrated to achieve faster control in approximately one month. Tilapia do reproduce and their offspring also consume aquatic plants. They are an excellent foodfish and resemble a two-pound bream when fully grown. In Texas, tilapia are stocked to give an extra forage base in trophy bass management.

Common Carp: Various strains of common carp, especially Israeli carp, have been recommended for filamentous algae control. These long-lived carp control filamentous algae by feeding in the pond bottom and breaking off the algae as it begins to grow. Their feeding habit can have detrimental effects on ponds by causing muddy water in certain instances. If you are concerned about the potential problem of muddy ponds you should consider other control methods.

Grass Carp: Sometimes referred to as white amur, grass carp were introduced into the United States in the 1960s. There was great debate among fisheries biologists as to the ecological damage that a reproducing population of grass carp would have on natural fisheries habitats so grass carp use was severely restricted.

In the early 1980s, biologists artificially produced a grass carp that is incapable of reproduction. Just after fertilization, eggs are put under specific temperature and pressure regimens which cause fish to develop an extra set of chromosomes (triploid). These fish are sterile, and there is no danger of these fish reproducing if they escape. Triploid grass carp became widely used as a method of aquatic weed control. Only triploid grass carp from certified dealers may be stocked in private ponds in South Carolina.

The grass carp may consume more than their own body weight of fresh vegetation in a single day and grow to more than 50 pounds. Grass carp feed largely on soft-stemmed submersed weeds (such as hydrilla, pondweed, spikerush and naiads) and are recommended primarily for control of these aquatic weeds. Triploid grass carp will also control filamentous algae when the fish are small. As the fish grow their ability to control filamentous algae diminishes, so approximately six months of control should be expected from fish stocked at 10 inches long.

Grass carp occasionally feed on duckweed and various emergent vegetation types but generally do not provide satisfactory control of these species. Grass carp may give up to 10 years of weed control, but managers usually plan for five years with a supplemental restocking of 20% of the initial stocking rate each year.

Grass Carp mainly feed on soft-stemmed submersed weeds such as hydrilla, pondweed, spikerush, and naiads.
W. Cory Heaton, ©2015, Clemson Extension

Most submerged aquatic weeds can be controlled with 20-25 triploid grass carp per acre of vegetation. Certain considerations need to be made when using grass carp. They are relatively expensive, but give multiple year control. The control is slower than chemical control, but the stocking is easier for pond managers who do not have the equipment for most chemical applications and who generally aren't trained in aquatic application. The pond owner/manager should take a few precautions when stocking. If large bass are present, larger triploid grass carp (a minimum of 10-12 inches in length) should be stocked to reduce loss due to bass predation. If there is a large discharge from the pond, it should be screened and checked routinely to remove debris, and repaired. Grass carp are a riverine fish and will migrate from a pond if the opportunity is there.

If there are no aquatic weed problems in a pond, a general recommendation is to stock five triploid grass carp per acre to actively prevent the growth of aquatic weeds before problems start. The South Carolina Department of Natural Resources (SC DNR) now requires a free of charge permit to stock tilapia and triploid grass carp for aquatic weed control in private ponds in South Carolina. You can obtain a permit from SC DNR at 803-734-3891 or from registered dealers in South Carolina. The short permit can be FAXed (803-734-4748) for a rapid turn around. A permit number from SC DNR is required prior to stocking tilapia and triploid grass carp. Public waterbodies may not be stocked by private citizens.

Integrated Aquatic Weed Management: The most cost-effective approach to aquatic weed control is a combination of two or more tactics into an integrated pest management effort. Herbicides and mechanical removal should be considered as temporary control methods. Depending upon the herbicide selection and the weed species, duration of control can range from a few weeks to several months. Long-term weed control can be achieved by using a combination of recommended aquatic weed methods. For example, use of the proper herbicides followed by triploid grass carp stocking will effectively control and prevent the reoccurrence of most submersed weed problems for multiple years.

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