OSU
OKLAHOMA COOPERATIVE EXTENSION SERVICE

Aquatic Weed Management

Control Methods

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Southern Regional Aquaculture Center

Many different aquatic plants can be found in, on, and around fish culture ponds. These plants range from microscopic organisms known as plankton algae which drift suspended in the water, to larger plants rooted in the pond bottom. Certain types of aquatic plants are essential for fish production. However, aquatic plants that interfere with commercial fish production are considered to be weeds.

Intensive fish production often involves adding large amounts of commercial feeds and inorganic fertilizers to ponds. Nutrients introduced into the water through feeds and fertilizers often create an ideal habitat for aquatic weed growth. Submersed aquatic weeds are particularly undesirable because fish harvesting seines will ride up over the weeds and allow fish to escape. Ponds with dense weed infestations can be impossible to harvest since the weight of the weeds accumulating in the seine can become too great to be pulled. Additionally, separating fish from weeds is a slow process and can severely stress the fish.

Aquatic Weeds

Aquatic plants that cause weed problems may be placed into four groups: algae, floating weeds, emersed weeds (foliage above water), and submersed weeds (majority of foliage below water) (Figure 1).

Algae are the most common group of weeds in aquaculture ponds. Shape and size vary from microscopic single- or multiple-celled plants to branched plants that resemble submersed 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 *(Chara* spp. and *Nitella* spp.).

Plankton algae produce the majority of dissolved oxygen in the pond and are essential to fish survival. In the presence of sunlight, green plants release oxygen as a by-product of photosynthesis. At night, plants and other pond organisms consume oxygen. Because of this diurnal cycle, oxygen concentrations are the lowest at dawn and highest in the mid-afternoon. Cycle imbalances can lead to oxygen depletion and subsequent fish death.

In commercial fish ponds, excessive plankton algae may result from the high feeding rates necessary to produce large fish yields. In many cases, fish production rates are limited by the amount of feed that can be applied without plankton algae blooms becoming so dense that dissolved oxygen problems cannot be managed. The complexity of this cycle makes attempts to treat ponds with algicides to "thin out" excess algae growth very risky. Although spot treatments of plankton algae scums are effective, problems with low dissolved oxygen concentrations following algicide applications limit their use in fish culture primarily for the control of filamentous algae and stoneworts.

Certain types of algae produce compounds which cause a musty flavor or odor in fish flesh. These compounds are absorbed by the fish and can cause a highly offensive taste known as "off-flavor." This condition can be corrected within 3 to 10 days if fish are moved to water that does not contain these "off-flavor" compounds. There is no definitive evidence that thinning the plankton algae bloom with algicides reduces the incidence of "off-flavor."

Floating weeds float in or on the surface of the water and obtain their nutrients from water rather than soil. Duckweed

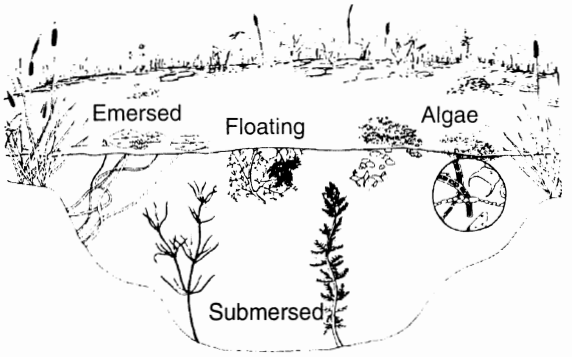

Figure 1. Aquatic Plant Groups

(Lemna minor and *Spirodela polyrhiza)* and watermeal *(Wolffia* spp.) are examples of common floating weeds.

Emersed weeds are rooted to the bottom, but have stems, leaves and flowers which extend above the water surface. They primarily occur on the shoreline and in shallow water up to 10 feet deep. Common emersed weeds are waterlily *(Nymphaea* spp.) and alligatorweed *(Altemanthera philoxeroides).*

Submersed aquatic weeds grow under and up to the water surface. Most submersed weeds have flowers and seedheads that extend above the surface of the water. Examples of common submersed weeds include hydrilla *(Hydrilla verticillata)* and Brazilian elodea *(Egeria densa).*

Management Methods

Aquatic weed control is a management plan that incorporates preventive methods such as proper pond construction and maintenance, biological methods such as the grass carp *(Ctenopharyngodon idelld),* and the use of labeled aquatic herbicides. The development of an aquatic weed management plan is dependent upon correctly identifying the problem weed(s) and selecting control methods that are compatible with efficient fish culture procedures.

Basic methods used to control weeds include preventive, mechanical, biological and chemical techniques. Determining which of these techniques to use involves consideration of the target weed species, fish production objectives for the pond, secondary water uses, and the cost of treatment options.

Preventive Methods

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. Rooted aquatic weeds and algae usually begin growing in shallow water (< 2 feet). Edges of new and existing ponds should be deepened so shallow water areas are minimized. The USDA Soil Conservation Service provides technical assistance for pond construction and renovation.

Farm ponds are commonly fertilized to increase the fish production capacity of the pond. Fertilization is also an effective and economical way to prevent the growth of many aquatic weeds. Fertilization stimulates the growth of plankton algae. This algal growth is known as a bloom. The bloom blocks sunlight from reaching the pond bottom which limits the establishment of rooted aquatic weeds. The key to successful control of aquatic weeds with fertilization is to establish and maintain a bloom before rooted weeds begin spring growth.

Decreasing the pond water level exposes shallow areas to freezing temperatures and drying and can effectively limit certain types of submersed weeds. For a drawdown to be effective, the water level should be lowered in the late fall and not -allowed to refill until the early spring. Some weeds, such as hydrilla and cattail *(Typha* spp.), are tolerant to drawdown and cannot be controlled by this method.

Biological Control

The grass carp is a practical and economical way to control certain types of pond weeds. Grass carp effectively control weeds with tender succulent vegetation such as filamentous algae and duckweed, but are ineffective in controlling weeds that have tough, woody vegetation such as waterlily and cattail. Many states regulate the use of grass carp. Contact your Department of Natural Resources representaive for state regulations on the use of grass carp.

Mechanical Methods

Various types of aquatic weed cutters and harvesters have been developed for canals and large reservoirs. Use of these machines is not practical in fish ponds. Early manual removal of weeds by seining or raking can prevent some weed problems.

Chemical Control

Herbicides may be used to control weeds in commercial fish ponds. The first step in successful chemical control is accurate identification of the problem weed. Weed identification assistance is available through county Extension and Department of Natural Resources offices. After the weed has been identified, a herbicide that is labeled for commercial fish ponds may be selected. The herbicide label must be read and fully understood by the user prior to application to the pond. SRAC Publication No. 361, Aquatic Weed Management - Herbicides, contains information on commercial fish pond herbicides.

Integrated Weed Management

Herbicides should be considered as a temporary control method. 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 grass carp stocking will effectively control and prevent the reoccurrence of most submersed weed problems.

For more information about aquaculture in Oklahoma, see our OSU county Extension agent or contact Marley D. Beem, Extension Aquaculture Specialist, 303J Ag Hall, Stillwater, OK 74078-6013 (phone: 405-744-9636).

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