

# AQUATIC WEED CONTROL

Use of aquatic herbicides is just one of five means of controlling water weeds. But three cooperative extension agents in Florida think it offers advantages the others don't.

**T**here are five major means of aquatic weed control:

- by fertilization;
- by drawdown;
- with mechanical devices;
- with biological controls; and
- with chemical controls.

The following information was excerpted from "Weed Control in Aquaculture and Farm Ponds" by D.D. Thayer, W.T. Haller and J.C. Joyce of the Florida Cooperative Extension Service.

## Fertilization

The theory behind a pond fertilization program is that phytoplankton (microscopic algae) populations increase as a result of the controlled addition of fertilizer nutrients until light penetration is reduced below the level required for growth of submersed weeds.

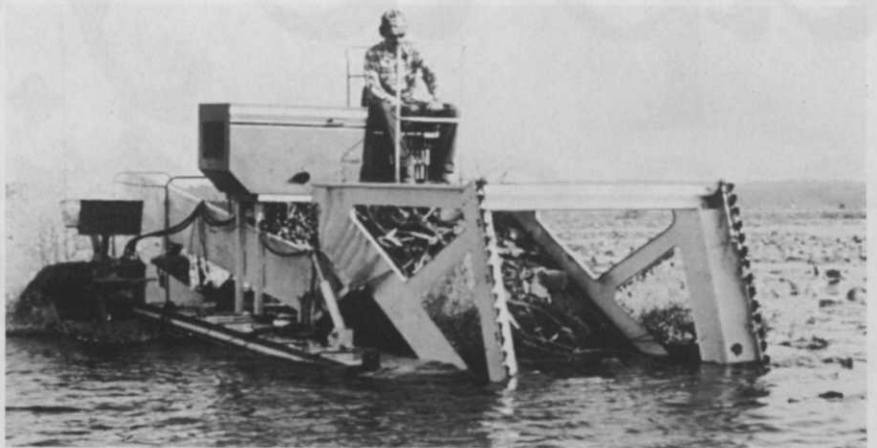
Before beginning a fertilization program for weed control, consider the following:

1) Once a fertilization program has begun, you must always continue the program or face possible severe weed problems.

2) Some weeds, such as hydrilla, have been shown in Florida to out-compete phytoplankton communities for nutrients, thereby making the weed problem worse. It is therefore imperative that fertilization should not be initiated until current weed infestations have been totally controlled.

3) If the fertilization of a pond is intended to be used to stimulate food production in an aquaculture pond, then additional weed control with herbicides or with weed-eating carp *Ctenopharyngodon idella* may be beneficial.

Most fertilization recommendations suggest adding inorganic fertilizer every two weeks until a shiny object placed 18 inches below the surface is no longer visible. Once this level of phytoplankton is obtained, maintain that level with pe-



An aquatic plant harvester clears weeds from the lake's surface.

riodic fertilization. The optimum pH should be at least 6.5 or higher, and liming may be required prior to fertilization.

The best time of year to begin a fertilization program is in the spring before aquatic weeds have begun to grow.

## Drawdown

Water level fluctuation or pond draining can be used very effectively if the conditions are favorable. Exposing the bottom of the pond to the atmosphere will solidify suspended mud and consolidate bottom sediments to a watertight condition. Excessive nutrients suspended in the water column will be diluted as a result of the water exchange.

In order to have a successful drawdown, you must leave the water level down long enough to desiccate and kill submersed plants. An incomplete drawdown may have little to no effect, and some plant species that are not susceptible to drawdown may spread into the de-watered lake bottom more easily. Cattails are often opportunistic and may establish during extended drawdowns.

The consolidation of bottom muck by drying should also improve fish spawning and nursery areas. Drawdowns also increase options for chemical weed con-

trol. Some herbicides are only labeled for use on drained pond bottoms; treatments at this time often provide several years of weed control because the herbicides are bound in the bottom sediments.

## Mechanical control

Mechanical control involves the physical harvesting of vegetation by hand or with specifically engineered equipment. For the owner of a small pond, mechanical control can be helpful for removing small populations of nuisance plants.

While the simplest mechanical harvesting devices are often the cheapest and often highly effective, commercially-made harvesters designed specifically for aquatic weed management are available. The harvesters vary in size from simple hydraulic sickle-bar cutters powered by a 5 hp engine and mounted on the front of a pontoon boat to 10,000-capacity harvesters which convey cut vegetation on board for transport to shoreline dumping sites.

## Biological control

Ideally, the best weed control agent is  
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## AQUATIC WEED

## CONTROL

### FLOATING PLANTS

Common duckweed (*Lemna minor*)

Biological; grass carp. Chemical: diquat, simazine, 2,4-D LV ester, fluridone.

Common salvinia (*Salvinia rotundifolia*)

Biological: partial control with grass carp. Chemical: diquat.

Waterhyacinth (*Eichhornia crassipes*)

Biological: partial control with hyacinth weevil and fungus. Chemical: 2,4-D, 2,4-D + dicamba, diquat, glyphosate.

Waterlettuce (*Pistia stratiotes*)

Chemical: diquat, endothall liquid.

### EMERSED PLANTS

Pickeralweed (*Pontederia lanceolata*)

Biological: partial control with grass carp. Chemical: 2,4-D, 2,4-D + dicamba.

Alligatorweed (*Alternanthera philoxeroides*)

Biological: alligatorweed flea beetles and thrips; partial control with grass carp. Chemical: partial control with 2,4-D, 2,4-D + dicamba, glyphosate.

Cattail (*Typha species*)

Chemical: 2,4-D + dicamba, diquat, glyphosate, fluridone, dalapon.

Pennywort (*Hydrocotyle unbellata*)

Chemical: 2,4-D + dicamba, diquat, 2,4-D.

Smartweed (*Polygonium hydropiperoides*)

Chemical: 2,4-D + dicamba, glyphosate, 2,4-D.

White water lily (*Nymphaea odorata*)

Chemical: fluridone, 2,4-D liquid and granular, glyphosate.

Spatterdock (*Nuphar luteum*)

Chemical: glyphosate, fluridone, 2,4-D liquid and granular.

### SUBMERSED PLANTS

Coontail (*Ceratophyllum demersum*)

Biological: grass carp. Chemical: dichlobenil, diquat, endothall liquid and granular, fenac, simazine, fluridone, 2,4-D granular.

Hydrilla (*Hydrilla verticillata*)

Biological: grass carp. Chemical: copper, diquat, endothall liquid and granular, fluridone.

Bladderwort (*Utricularia species*)

Biological: grass carp. Chemical: diquat, 2,4-D granular, fluridone.

Southern naiad (*Najas guadalupensis*)

Biological: grass carp. Chemical: dichlobenil, diquat, endothall liquid and granular, fenac, simazine, fluridone, 2,4-D granular.

Fanwort (*Cabomba caroliniana*)

Biological: grass carp. Chemical: simazine, fluridone, 2,4-D granular.

Pondweed (*Patamegeton species*)

Biological: grass carp. Chemical: copper sulfate, dichlobenil, diquat, endothall liquid and granular, fenac, simazine, fluridone, 2,4-D granular.

### GRASSES AND SEDGES

Torpedograss (*Panicum repens*)

Biological: partial control with grass carp. Chemical: glyphosate, fluridone.

Maidencane (*Panicum hemitomon*)

Biological: partial control with grass carp. Chemical: glyphosate.

Paragrass (*Branchiaria purpurascens*)

Biological: partial control with grass carp. Chemical: glyphosate, fluridone, hexazinone.

Sedge (*Cyperus species*)

Chemical: partial control with glyphosate.

### DITCHBANK BRUSH

Wax myrtle (*Myrica cerifera*)

Chemical: partial control with glyphosate, 2,4-D + dicamba, hexazinone, tebuthiuron, imazapyr.

Willow (*Salix species*)

Chemical: 2,4-D glyphosate, 2,4-D + dicamba, hexazinone, tebuthiuron, imazapyr.

Brazilian pepper (*Schinus terebinthifolius*)

Chemical: glyphosate, 2,4-D 2,4-D + dicamba, tebuthiuron, imazapyr.

Water primrose (*Ludwigia species*)

Chemical: glyphosate, fluridone, 2,4-D granular, imazapyr.

### ALGAE

Macrophytic algae

Biological: grass carp. Chemical: copper, dichlobenil, endothall liquid and granular, simazine.

Filamentous algae

Biological; grass carp. Chemical: copper, diquat, endothall liquid, simazine.

Planktonic algae

Chemical: copper, simazine.

Hydrilla can spread by plant fragments, underground stems, seed, leafbuds or buds on underground stems.



Cattail is an emerged plant which must be controlled by chemicals such as glyphosate.

## A VIRUS TO LIVE WITH

Research using a virus to biologically control a certain type of noxious blue-green algae has shown promising results, says an aquatic microbiologist with the Institute of Food and Agricultural Sciences (IFAS), at the University of Florida in Gainesville.

E. J. Phipps, Ph.D., a researcher in the Fisheries and Aquaculture Department, has isolated a virus effective in controlling one species of microcystus blue-green algae. He hopes to isolate a number of other viruses by the end of the year.

Phipps and his staff collect water samples from sewage systems, polluted lakes and waterways throughout the state searching for viruses which kill only blue-green algae. Phipps tests these viruses with the algae in his lab, since the two rarely exist together in the water.

Herbicides have been the most popular method for controlling aquatic fo-

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one that keeps weed pests restrained naturally. Many native plants have biological restraints that keep them from growing prolifically.

Years of research are required to ensure that the introduced organism does not become another dangerous pest. Most biological organisms will not eradicate the host plant, but will instead reduce the plant's potential to become a serious pest.

**Insects and plant pathogens** — Over the years, insects have proven to be the most popular biological control agents due to their high degree of host specificity.

The alligatorweed flea beetle (*Agasicles hygrophila*), discovered in South America and introduced into the United States in 1964, is the best example of an extremely successful biocontrol program using insects.

The waterhyacinth has had several biocontrol agents to help reduce its prolific growth. However, unlike alligatorweed, these biocontrol agents don't appear capable of quickly controlling the plant. Two waterhyacinth weevils (*Neochetina eichhorniae*, *N. bruchi*), the waterhyacinth mite (*Orthagalumna terebrantis*) and fungus (*Cercospora rodmanii*) can often be found associated with the plant.

**Herbivorous fish** — Numerous ex-

otic fishes around the world are reported to consume aquatic vegetation.

Of the fishes examined to date, the grass carp appears to be the best candidate for aquatic plant control in a variety of situations and climates, and may provide the only practical control method for water bodies where herbicides cannot be used. This fish has provided excellent control of submersed plants, filamentous algae and small floating plants such as duckweeds.

The grass carp is used by Arkansas and other states for this purpose in natural lakes and has been researched by a number of other states. Florida has conducted research and has approved the use of the triploid grass carp, which has three sets of chromosomes as opposed to the normal two sets and is thus sterile.

The three possible management strategies using grass carp:

- 1) complete vegetation removal within one to two years with a heavy stocking rate;
- 2) winter stocking, before the spring growth of weeds begins, using fewer fish to maintain a lesser amount of vegetation in the system and increasing the grass carp population as needed; and
- 3) integrated control using chemical treatments to obtain desired levels

quickly and stock grass carp to maintain this level.

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### Chemical control

Controlling aquatic plants with herbicides is the most commonly used method of weed control. Chemical weed control has several advantages:

- Herbicides may be directly applied to undesirable vegetation, offering a high degree of selectivity and leaving desirable levels of vegetation.

- Pre-emergence application of appropriate herbicides can provide early weed control. This may be used to promote desirable vegetation without competition during critical early growth stages.

- Herbicides reduce the need for mechanical control which can increase turbidity and affect fish populations.

- Erosion may be reduced by promoting the lower growing grass species for cover.

- Many weeds, especially perennials, that cannot be effectively controlled by other methods are generally susceptible to herbicides.

- Routine use of herbicides under a maintenance program usually reduces the cost of weed control.

For chemical aquatic weed control agents, see the accompanying chart.

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