

# NUISANCE AQUATIC PLANT CONTROL USING ALGICIDES AND HERBICIDES FOR 2003

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Aquatic plants are a normal and beneficial part of a lake or pond ecosystem. They provide food, directly or indirectly for all of the animals that live in or are associated with aquatic ecosystems, including insects, fish, waterfowl and other types of wildlife. Plants also provide refuge for small fish from predators, are a source of oxygen, and help reduce erosion of the shoreline by reducing turbulence from wind and wave action and boat wakes. However, when aquatic plants become too abundant and interfere with pond and lake recreation or esthetics, they become a nuisance. Usually the first question asked by pond and lake property owners experiencing aquatic plant problems is "What chemical can I use to kill the algae (or weeds)?" The answer to this question, unfortunately, is not as simple as it may seem.

Aquatic plants require light, warm temperatures, water and nutrients for vigorous growth, just like terrestrial plants. If you have adequate levels of these plant requirements, aquatic plants will grow. Aquatic plant growth is affected by the soil type and water depth but is accelerated by chemical nutrient input to lakes and ponds. These increases are most often a result of human activities such as runoff of lawn fertilizers, agricultural runoff, drain tiles, septic systems leakage, erosion due to construction, etc. This process is called "cultural eutrophication," which means over-feeding. The chemical nutrient of primary concern is phosphorus. The only long lasting cure is to bring waste discharges, disruptive land uses and other nutrient sources under control. But the necessary alteration of the surrounding human community can take many years and, in some instances, may be impossible. In the meantime, algicide or herbicide treatments are a band-aid approach to consider in contending with algae or weed problems.

Although the use of aquatic algicides and herbicides can have the advantages of convenience, low initial cost and avoids some of the shortcomings of harvesting (hard work, frequency of treatment, weed disposal, fragmentation and spreading Eurasian watermilfoil, etc.), they have the following drawbacks:

- Algicides and herbicides kill plants without removing them from the water. The plant material sinks after dying and begins to decay. The decaying process consumes oxygen, which could result in a fish kill, and releases nutrients stimulating new plant growth. Formation of organic sediments may be accelerated by chemical treatments.
- The treated plants may disappear slowly from the treated area. Ten days to two months may pass before the nuisance plants sink away.
- Beneficial plants may be killed as well as the nuisance plants. Each algicide and herbicide may kill several or many kinds of plants.
- Removal of aquatic plants may negatively affect insects, fishes, amphibians, waterfowl, and other wildlife that depend upon the plants for food, nesting materials, and habitat.
- Algicides and herbicides can drift beyond the point(s) of application. Even lakes that appear placid may have currents making it impossible to confine herbicides to a localized area of a lake without cumbersome physical barriers. In lakes with significant currents, chemicals may be diluted before the desired treatment effects occur.

- Lake owners and users seem increasingly concerned with the perceived risks of algicide and herbicide use.
- Areas may be closed to swimming, fishing or other uses for one to several days or even weeks depending on the chemical used.
- The killed plants are often replaced by other forms of vegetation, annoyingly soon in some cases. Less than a month after treating rooted plants, the area may become clogged with masses of stringy algae. Algae may reappear in 10-14 days after an algicide treatment. As long as light, warmth and nutrients exist in a lake, nature will strive to fill the water with some form of vegetation, often with aggressive nuisance forms of plants and algae.
- Treatment costs and efforts are recurring, in most cases annually or even more often. The expenditures must be repeated for as many years as control is desired, for centuries if need be, until the nutrient sources of the problem are abated by some other means. Costs for herbicide treatments can be substantial, depending on the type, frequency and the amount of chemicals needed.

Keeping these limitations in mind, chemicals may still be the best band-aid for your weed control problems. You must ask yourself the following questions to determine what and how much chemical to use.

### 1) Is a Michigan Department of Environmental Quality (DEQ) permit required?

The use of chemicals to control nuisance aquatic plants in Michigan is regulated by the Public Health Code(Act 368 of 1978). The law allows lake and pond front property owners to control nuisance aquatic plants on their property under a permit from the DEQ. A DEQ permit is required to add any chemical to a body of water. A permit-by-rule exemption under new rules (3/13/03) authorizes an individual to treat a body of water without obtaining a permit if **all** the following criteria are met:

- < The body of water is owned by a **single entity** (individual, business, or other legal entity) or, if owned by more than one entity, **all owners** have provided written permission.
- < The body of water does not have an outlet.
- < The body of water is less than 10 surface acres.
- < There is no record of any state endangered or threatened species.

In all other cases, a permit is required. You can obtain copies of the Administrative Rules for Aquatic Nuisance Control (ORR # 2000-073) which contains additional requirements that primarily affect commercial applicators or an Application for Permit for Chemical Treatment to Control Nuisance Aquatic Plant and/or Algae Growth from District DEQ offices or from:

Inland Lakes and Remedial Action Unit  
Water Division  
Constitution Hall, 525 W. Allegan St.  
P.O. Box 30273  
Lansing, Michigan 48909-7773

Phone: 517-241-7734  
Web site: <http://www.michigan.gov/deq>

The best time to apply for a permit is early in the year and at least two months prior to the date that you propose to treat your pond or lake. Permit processing begins in January. Failure to obtain a DEQ permit when required is a misdemeanor! Permits are used as a means of recording usage and improving treatments. It also provides a way of informing others so that they can make informed decisions regarding the use of the treated water in shared aquatic ecosystems. Few applications are refused. Applicants will receive useful advice in the process, including any changes in approved chemicals and water use restrictions, safe methods for chemical application and requirements for posting signs.

## 2) Is there a fee for the DEQ permit?

There is no fee for a permit if the pond or lake is under single ownership. If ponds or lakes are owned by two or more households, the permit fee is based on the size of the treatment area. No fees are charged for treatment areas less than ½ acre. A \$50 fee is charged for treatment areas of ½ acre to less than 2 acres. A \$150 fee is charged for treatment areas of 2 or more acres.

## 3) When is the best time to apply aquatic herbicides?

Generally, late spring or early summer is the best time to apply herbicides. Plants are in a period of rapid growth and highly susceptible to herbicide treatment. However, always follow the label instructions for best results.

## 4) What chemicals are approved for use in Michigan ponds and lakes and what plants will they kill?

USE ONLY CHEMICALS SPECIFICALLY LABELED FOR AQUATIC USE! Algicides and herbicides approved for aquatic use and the plants they control are listed in Appendix 1. This listing should be used for preliminary planning only since chemical approvals for aquatic use may change. Up-to-date information should be obtained annually from your county MSU-Extension office or the DEQ during the permit application process.

## 5) How much algicide or herbicide should I add?

- < Dosage rates are listed on the label. FOLLOW LABEL DIRECTIONS CAREFULLY! General application rate recommendations cannot be made since chemicals may be sold with different levels of active ingredient or with different active forms.
- < **DO NOT OVER-TREAT!** Over-treatment will increase the probability of killing fish and other aquatic organisms either directly or indirectly as a result of rapid plant die-off and subsequent oxygen depletion due to decomposition. Some herbicides may not produce the desired effects if applied at concentrations above the recommended level.
- < In general, treatment rates are based on acre feet of water of treatment area. Acre feet can be easily calculated by:

$$\text{Acre feet} = \text{surface acres} \times \text{average depth}$$

where:

$$\begin{aligned} \text{Surface acres} &= \text{Length (feet)} \times \text{Width (feet)} \times 0.000023 \\ \text{or} &= \text{Length (yards)} \times \text{Width (yards)} \times 0.00021 \end{aligned}$$

## 6) Are there any limitations on pond use after herbicide application?

Use restrictions for lake and pond water after chemical treatment are listed in Appendix 2. This listing should be used for preliminary planning only because the listings may change. Up-to-date information should be obtained annually from your county MSU-Extension office or the DEQ during the permit application process. ALWAYS FOLLOW THE LABEL INSTRUCTIONS AND THE DIRECTIONS SPECIFIED BY THE PERMIT.

## 7) Are algicides and aquatic herbicides safe to use?

Use directions on algicide and herbicide labels are designed to protect both the environment and the user from unreasonable risk. Maximum allowable dosage rates, proper handling and protective clothing (including goggles, face mask, coveralls, gloves and protective foot wear) will assure a high degree of safety. Once again, it is important to emphasize READ AND FOLLOW ALL THE LABEL INSTRUCTIONS CAREFULLY!

## 8) I've used Aquazine to control pondweeds for years but it is no longer sold, can I use other simazine products?

No. Only products labeled for control of pondweeds can be used legally in ponds. The manufacturer did not renew the aquatic label for simazine products when it expired because of concerns over possible groundwater contamination.

## 9) Are there any other precautions that I should take if I choose to use chemicals to kill my aquatic plants/algae?

Yes. Regardless of the type of chemical used:

- < **DO NOT USE VERY OLD PESTICIDE PRODUCTS.** Chemicals can change with time and become unsafe to use. Only buy the amount of chemical that you need.
- < **NEVER STORE PESTICIDES IN ANYTHING BUT THE LABELED CONTAINER.** Pesticides are poisons which can cause serious illness or even death. Placing a pesticide in an unlabeled or mislabeled container could lead to a serious accident.
- < **DISPOSE OF OLD, UNUSED PESTICIDES AND EMPTY CONTAINERS SAFELY.** Always follow label instructions. If instructions are not available, you can obtain information by calling your county MSU-Extension office, the Michigan Department of Agriculture (MDA), Pesticide and Plant Pest Management Division, or your regional MDA office.

MDA Pesticide and Plant Pest Management Division  
P.O. Box 30017  
Lansing, MI 48909  
phone: 517-373-1087

### < **Additional information is available from your county MSU-Extension office:**

"Hazardous Waste Disposal on the Farm," MSU-Extension Bulletin E-1781

"Aquatic Pest Management: A Training Manual for Commercial Applicators," MSU -Extension Bulletin E-2437. (Available online at: <http://www.msue.msu.edu/msue/imp/modet/morefile/e-2437.pdf>)

"Managing Michigan Ponds for Sport Fishing," MSU-Extension Bulletin E-1554

"A Citizens Guide for the Identification, Mapping and Management of Common Rooted Aquatic Plants of Michigan Lakes," MSU-Extension Bulletin WQ55.

"Integrated Pest Management for Nuisance Exotics in Michigan Inland Lakes," MSU-Extension Bulletin (number to be assigned)

**10) If I decide to use chemicals to control nuisance aquatic plants, should I do this job myself?**

Many aquatic algicides and herbicides are labeled for use by the general public, while others are restricted to certified applicators only. IF YOU ARE UNCERTAIN ABOUT WHAT CHEMICALS TO USE, HOW TO CALCULATE TREATMENT RATES, AND HOW TO APPLY THEM, OR IF RESTRICTED CHEMICALS ARE NEEDED, HIRE A CERTIFIED AQUATIC PLANT CONTROL APPLICATOR.

Current listings of certified aquatic plant applicators can be obtained from the MDA office listed above.

**11) Do the blue dyes really help control nuisance aquatic plant growth?**

The blue dyes may be used to reduce nuisance aquatic plant growth in very small lakes and ponds under certain conditions. The dye acts as a chemical shade by reflecting some of the blue wavelengths of light needed by the plants for photosynthesis. The plants cannot grow effectively without active photosynthesis. Dyes should only be added to very small lakes and ponds that are under the full control of the applicator. A permit from DEQ is required if conditions under Question 1 are met. There are limitations to using dyes to reduce aquatic plant growth:

- < Plants can still grow in the top 18 inches of water. If your pond has shallow bank slopes, large areas may be less than 18 inches deep and they will still support active plant growth.
- < If the color intensity is not maintained, plants will grow. Ponds with flowing outlets will lose the dye and the color intensity may decrease over time requiring additional dye treatments. Dyes must be retained in the treated water body, it is illegal to discharge the dye into a drainage ditch, stream, or lake.
- < The dye may cause unwanted water colors if the water is not clear and should not be used in an attempt to change water color.
- < Dye and herbicides or algicides should not be added to a pond at the same time. Plants must be actively growing for herbicides or algicides to be effective. After the herbicides and algicides have killed the nuisance aquatic plants, dyes can be added to reduce regrowth in the deeper areas of the pond.
- < Dyes should not be used in ponds that are used for swimming. (Note: we do not recommend ponds for swimming)

**12) Can I selectively treat nuisance aquatic plants without eliminating desirable aquatic plants?**

Nuisance aquatic plants may be selectively treated by using appropriate chemicals, using lower dose rates, or adjusting the timing of a chemical treatment. Approved granular forms of certain chemicals can be used to treat specific areas; however, drift of the chemicals from the area may occur making "spot" treatments less effective. Drift occurs as the result of wind and wave action after treatment or from in-lake currents caused by springs or in- or out-flow from creeks and streams.

The DEQ Inland Lakes and Remedial Action Unit has investigated the use of fluridone as a whole lake treatment at low dose rates in Michigan as a selective treatment of Eurasian watermilfoil. Administrative rules for use in Michigan have been developed and recently published (R 323.3107, Fluridone Use, 3/13/03). A permit may be issued if the DEQ determines that there is widespread distribution of Eurasian watermilfoil in the lake and the abundance of the Eurasian watermilfoil causes it to be an aquatic nuisance. The permit application will require additional information including an aquatic vegetation survey performed in August or September of the year before the proposed treatment and a lake management plan in a format specified by the administrative rules. All whole lake treatments require obtaining written permission from all riparian property owners or may be done under the authority of a public works agency such as a lake board or township.

Permits will authorize a whole lake treatment in the spring with fluridone concentrations of no more than 6 parts per billion (ppb). A possible additional treatment may be authorized 14 to 21 days following the initial treatment to reestablish 6 ppb concentration. The DEQ will only authorize treatment with fluridone once every three years unless it is determined that the initial treatment was a failure.

**13) Do I have any other choices in treating my aquatic plant problems?**

Chemical treatment is only one of a number of band-aid treatments which remove the plants temporarily. Other types of band-aids include phosphorus precipitation chemicals, chemical or physical shading, harvesting, aeration, and water level manipulation. However, none of these band-aids cure the problem: excessive nutrients, primarily phosphorus. Phosphorus inputs must be limited by diverting nutrient laden runoff, use of fertilizers which contain no phosphorus, and the development of marshes and greenbelts (natural grass-shrub areas) to remove nutrients before they reach the lake or pond. Realistically, this may take years or may not be possible as is the case of storm runoff storage ponds and lakes. Ponds and lakes may also have high levels of phosphorus in the lake sediments which would reduce the effectiveness of limiting additional phosphorus inputs. Under these conditions, chemical treatment may be a desirable alternative to weed-choked or algal-filled lakes.

**14) Do barley straw, enzymes, or bacteria work in controlling nuisance algae or aquatic plants?**

Currently, there is no peer reviewed, scientific publications that clearly demonstrate the effectiveness or reliability of barley straw, enzymes, or bacteria to control algae or other aquatic plants in lakes and ponds. Two research projects on the use of barley straw to control algae under conditions similar to those found in Michigan indicated that results were highly variable with little or no control provided.

APPENDIX 1. Aquatic herbicides permitted for use in Michigan and their effectiveness<sup>1</sup> (F = fair, G = good, E = excellent) of control. A name in parentheses is an example of a common brand name. Shaded areas indicate chemicals that are restricted to certified applicators only.

Plant species	Copper Sulfate <sup>2</sup>	Chelated Copper <sup>3</sup>	Amine Salts of Endothal <sup>4</sup>	Dipotassium Salts of Endothal	Diquat <sup>5</sup>	2,4-D	Isopropylamine Salts of Glyphosate <sup>6</sup>	Copper Ethylene Diamine	Fluridone <sup>7,8,9</sup>
ALGAE					CERTIFIED APPLICATORS				
Planktonic	E	E	E						
Filamentous	F - E	F - E	F - E						
Chara, Nitella	E	E	E						
MACROPHYTES									
Submergent									
Curlyleaf pondweed			E	E	E				E
Richardson pondweed			E	F	F				
Naiad			E	E	E			F - G	F-G
Bladderwort					G	G			
Coontail			E	E	E	F			G
Watermilfoil			F	F	E	E			E
Elodea			E		E			F - G	F-G
Wild celery			F		F				
Emergent									
Water lily						G - E			
Pickerelweed						G			
Cattails					G	G	E		
Bulrush					F	E	E		
Floating									
Duckweed				F	E	G			

<sup>1</sup> Adapted from: Westerdahl and Gesinger. 1988. Aquatic plant identification and herbicide use guide. Vol. 2. Tech. Rept. A-88-9, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

<sup>2</sup> NEVER USE IN TROUT PONDS! Trout may be killed.

<sup>3</sup> Do not use in trout ponds if hardness is below 50 ppm calcium carbonate.

<sup>4</sup> Due to toxicity to fish, the use of amine salts of endothal for submerged macrophytes is suggested only by commercial applicators on a marginal or sectional basis. The DEQ may restrict its use to commercial applicators where permits are required.

<sup>5</sup> Diquat products are restricted for all aquatic uses except in small farm ponds which do not require permits. Only applicators certified by the MDA can purchase and use this chemical.

<sup>6</sup> Glyphosate cannot be applied within 0.5 miles upstream of a drinking water intake.

<sup>7</sup> Fluridone cannot be applied at the full label rate within 0.25 miles of a potable (municipal) drinking water intake in lakes and reservoirs.

<sup>8</sup> The DEQ has developed administrative rules for fluridone use in Michigan for the selective control of Eurasian watermilfoil, please refer to question 12 for specific guidelines.

<sup>9</sup> Control of aquatic plants with fluridone is rate dependent, most plants will be eliminated if fluridone is used at the labeled rate; at the DEQ permitted rate of up to 6 ppb, only the plants indicated will be affected.

## APPENDIX 2

Typical waiting periods required by Michigan Department of Environmental Quality for uses of lakes and ponds following treatment with chemicals to control aquatic nuisance plants (2003).

PRODUCT	TYPE OF POND USE				
	Household	Irrigation	Livestock	Swimming	Fishing
Copper Sulfate	no waiting	no waiting	no waiting	no waiting	no waiting
Chelated Copper	no waiting	no waiting	no waiting	no waiting	no waiting
Amine Salts of Endothall	14 days	14 days	14 days	24 hours	3 days <sup>1</sup>
Dipotassium Salts of Endothall	14 days	14 days	14 days	24 hours	3 days <sup>1</sup>
Diquat	3 days	3 days <sup>2</sup> 5 days <sup>3</sup>	1 day	24 hours	no waiting
2,4-D	indefinite	indefinite	indefinite	24 hours	no waiting
Glyphosate <sup>4</sup>	no waiting	no waiting	no waiting	24 hours	no waiting
Copper Ethylene-diamine	no waiting	no waiting	no waiting	no waiting	no waiting
Fluridone <sup>5</sup>	no waiting	14 - 30 days	no waiting	24 hours	no waiting

<sup>1</sup> If lake treatment area is 5% or greater, waiting period may not overlap weekends or holidays.

<sup>2</sup> For turfgrass irrigation.

<sup>3</sup> For crop irrigation.

<sup>4</sup> Glyphosate may not be applied within 0.5 miles upstream of potable (municipal drinking) water intakes.

<sup>5</sup> Fluridone cannot be applied at the full label rate within 0.25 miles of a potable (municipal drinking) water intake in lakes and reservoirs. The DEQ has developed administrative rules for fluridone use in Michigan for the selective control of Eurasian watermilfoil, please refer to question 12 for specific guidelines.

**THIS APPENDIX IS ONLY A GENERAL GUIDE FOR PRELIMINARY PLANNING! This information may be out-of-date in subsequent years or may not apply to certain formulations. IN ALL CASES, USE CHEMICALS SPECIFICALLY LABELED FOR AQUATIC USE AND FOLLOW THE WAITING RESTRICTIONS ON THE CHEMICAL CONTAINER AND ON THE MDEQ PERMIT! Never use chemicals from a container that lacks an up-to-date commercial label stating restrictions for aquatic use. The waiting periods are a summary for chemical dosages on label instructions. DO NOT EXCEED DOSAGES IN THE LABEL INSTRUCTIONS.**