Michigan State University
Department of Fisheries and Wildlife - Extension Program

NUISANCE AQUATIC PLANT CONTROL USING ALGICIDES AND HERBICIDES

by

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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 these requirements, aquatic plants will grow. Aquatic plant growth 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, sewage, feed lot runoff, phosphate detergents, etc. This process is called "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 the algae or weed problem.

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 milfoil, etc.), they have the following drawbacks:

- Algicides and herbicides kill plants without removing them from the water. The material sinks after dying. Its decay consumes oxygen which could result in a fish kill and releases nutrients for new plant growth.

- The poisoned plants disappear only slowly from the treated area. Several weeks to a month may pass before the nuisance plants sink away.

- Beneficial plants are killed as well as the nuisance plants. Each algicide and herbicide kills several or many kinds of plants.

- Algicides and herbicides drift beyond the point(s) of application. Even lakes that appear placid 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 finding alternatives that avoid the perceived possible risks of algicide and herbicide use.

- Areas may be closed to swimming, fishing or others uses for a few days, weeks, or even an entire year, depending on the chemical

- The killed plants are often replaced by other forms of undesirable vegetation, annoyingly soon in some cases. Less than a month after poisoning 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.

- 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 DNR permit required?

A DNR permit is required to add any chemical to a body of water if:

- The body of water is not entirely private or is under joint ownership.
- The body of water drains at any time of the year into another body of water (drain, creek, stream, river, pond, lake...).
- The body of water is 10 surface acres or larger.

You can obtain: Applications for Permit for Chemical Treatment to Control Nuisance Aquatic Plant and/or Algae Growth from District MDNR offices or from:

Inland Lake Management Unit
Land and Water Management Division
Box 30028, Mason Building
Lansing, MI 48909

Failure to obtain a DNR permit when required, is a misdemeanor! Permits are used as a means of recording usage and of screening out mistakes. 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 posting requirements.

2) 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, follow the label instructions for best

3) 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 extension office or the DNR during the permit application process.

4) 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 potential of killing fish and other aquatic organisms directly or indirectly by resulting in a 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:

Acre feet = surface acres X average depth

where:

Surface acres = Length (feet) X Width (feet) X 0.000023
or = Length (yards) X Width (yards) X 0.00021

5) 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 extension office or the DNR during the permit application process. ALWAYS FOLLOW THE LABEL INSTRUCTION OR THE DIRECTIONS OBTAINED BY PERMIT.

6) 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!

7) I've heard that a common aquatic herbicide 2,4-D causes cancer, contains dioxin and is hazardous to my family's health.

A recent study conducted in Kansas has suggested that chemical applicators who regularly apply 2,4-D and do not wear protective clothing (i.e. fail to follow label recommendations) have an increased risk of cancer. The studies DO NOT indicate a risk to the general public exposed to the chemical during treatments or applicators who follow clothing and handling recommendations. The National Cancer Institute, a participant in the study, does not recommend restricting the chemical; but reemphasizes that ALL LABEL RECOMMENDATIONS SHOULD BE FOLLOWED to ensure maximum safety.

2,4-D belongs to a family of compounds referred to as the phenoxy herbicides. Another member of this group of chemicals, 2,4,5,-T, has received considerable attention recently because it contains trace quantities of a particularly hazardous compound, 2,3,7,8,-TCDD, which is commonly referred to as dioxin. However, there are at least 75 different forms of dioxin compounds which are all much less toxic than 2,3,7,8,- TCDD. Though 2,4,-D contains dioxins, it does not contain any of the highly toxic 2,3,7,8,-TCDD.

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

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 UNUSED PESTICIDES AND EMPTY CONTAINERS SAFELY. If possible, follow label instructions. If instructions are not available you can obtain information by calling your County Extension Office or the Michigan DNR, Office of Hazardous Waste Management.
- Additional information is available in "Hazardous Waste Disposal on the Farm," MSU Cooperative Extension Service Bulletin E-1781, which can be obtained from your County Extension Office.

9) 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 even be impossible as is the case in storm runoff storage ponds and lakes. Ponds and lakes may also have high levels of phosphorus in the lake basin which would reduce the effectiveness of limiting phosphorus inputs. Under these conditions, chemical treatment may be a desirable alternative to weed choked or algal filled lakes.

APPENDIX 1. Aquatic herbicides permitted for use in Michigan and their effectiveness[1] (F = fair, G = good, E = excellent) of control. Names in parenthesis are an example of a common brand name. Columns within double lines indicate chemicals are restricted to certified applicators only.

Plant species	Copper Sulfate[2]	Chelated Copper[3] "Cutrine Plus"	Amine Salts of Endothall "Hydrothol"	Dipotassium Salts of Endothall "Aquathol"	Diquat[4]	2,4 D	Simazine[5] "Aquazine"	Isopropylamine Salts of Glyphosate "Rodeo"[6]	Copper Ethylene Diamine "Komeen"	Fluridone "Sonar"[7]
ALGAE			CERTIFIED APPLICATORS		CERTIFIED APPLICATORS					
Planktonic	E	E	E				E			
Filamentous	F - E	F - E	F - E				E			
Chara, Nitella	E	E	E				E			
MACROPHYTES										
Submergent										
Curly leaf pondweed			E	E	E		E			G
Richardson pondweed			E	F	F		E			G
Naiad			E	E	E	F	E		F - G	G
Bladderwort					G	G				G
Coontail			E	E	E	F	G			G
Milfoil			E	E	E	E	G			G
Elodea			E		E				F - G	G
Wild celery			F		F		G			
Emergent										
Water lily						G - E				G
Pickerelweed						G				
Cattails					G	G		E		G
Bulrush					F	E		E		
Floating										
Duckweed				F	E	G				E

[1]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.

[2]NEVER USE IN TROUT PONDS! Trout may be killed.

[3]Do not use in trout ponds if hardness is below 50 ppm calcium carbonate.

[4]Diquat products are restricted for all aquatic uses except in small farm ponds which do not require permits. Only applicators certified by the Michigan Department of Agriculture can purchase and use this chemical.

[5]May only be used in small farm ponds which do not require permits. This chemical may kill trees near ponds when absorbed into their roots and is considered a potential groundwater contaminant.

[6]"Rodeo" cannot be applied within 0.5 miles upstream of a drinking water intake.

[7]"Sonar" cannot be applied within 0.5 miles upstream of a drinking water intake.

Appendix 2

Waiting periods for uses of ponds following treatment with chemicals to control aquatic nuisance plants (1991). THIS TABLE 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 PERIOD RESTRICTIONS ON THE CHEMICAL CONTAINER! Never use chemicals from a container that lacks an up-to-date commercial label stating restrictions for aquatic use. The waiting periods below are a summary for chemical dosages on label instructions. DO NOT EXCEED DOSAGES IN THE LABEL INSTRUCTIONS.

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
Hydrothol	14 days	14 days	14 days	24 hours	3 days[1]
Aquathol	14 days	14 days	14 days	24 hours	3 days[1]
Diquat	14 days	14 days	14 days	24 hours	no waiting
2,4 D	indefinite	indefinite	indefinite	24 hours	no waiting
Aquazine[2]	12 months	12 months	12 months	24 hours	no waiting
Rodeo[3]	no waiting	no waiting	no waiting	24 hours	no waiting
Komeen	no waiting	no waiting	no waiting	no waiting	no waiting
Sonar[4]	no waiting	30 days	no waiting	24 hours	no waiting

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

2 May only be used in smal farm ponds which do not require state permits. Aquazine is very toxic to trees and may kill trees near ponds when absorbed into their root systems. May contaminate ground water.

3 Rodeo may not be applied within 0.5 miles upstream of potable (municipal drinking) water intakes.

4 Sonar may not be applied within 0.25 miles upstream of potable (municipal drinking) water intakes.