



## Aquatic Plant Identification and Management Workbook, Series 1

The *Aquatic Plant Identification and Management Workbook Series* is designed to acquaint pond owners in Maryland with naturally-growing aquatic plants and the general means for managing their growth. Aquatic plants play an important role in the natural ecology of ponds: they provide food and shelter for many fish, aquatic animals and other wildlife, and they provide oxygen, which can benefit fish production.

Sometimes, however, growth gets out of hand and the plants become so numerous they interfere with the intended

use of the pond, for example, fishing, swimming, boating—they are then called aquatic weeds. When this occurs, control measures often become necessary.

The suggested chemical controls in this workbook are intended as guidelines and must not replace directions on chemical labels. A separate fact sheet, in color, displays each of the aquatic plants in this series and is available from the Maryland Sea Grant Extension Program or your local Cooperative Extension Office.

### SUBMERGENT VEGETATION

# Water Milfoil

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Vascular flowering aquatic plants are seed-bearing and are characterized by a system of conductive and supportive tissue. They can be classified into several broad categories of vegetation: floating, submergent, emergent and terrestrial. This workbook focuses on water milfoil, a submergent plant.

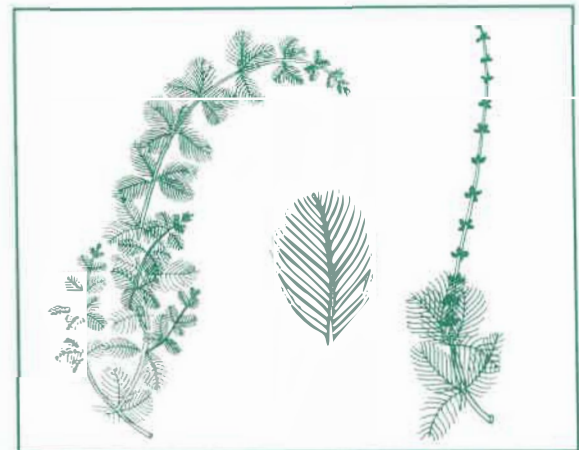
Submergent plants are underwater vegetation usually found in deeper waters. Completely submerged, they are usually rooted to the bottom, lack rigid cell structures (making them appear limp), and often grow up to the water surface. Flowers, when present, often extend above the water surface in spikes.

One of the most common submergent plants found in Maryland is the perennial water milfoil (*Myriophyllum* species). These plants grow in both freshwater ponds as well as the brackish water of the Chesapeake Bay. The most common water milfoil in Maryland is Eurasian water milfoil (*Myriophyllum spicatum*). Water milfoil is useful in aeration of the water through photosynthesis, provides habitat for invertebrates and fish, and is a

common food of muskrats and some waterfowl. The seeds are eaten by many different kinds of birds. However, the plant can become so prolific that dense entangled mats can form, making boating and swimming difficult or impossible. If the water is shallow enough (usually less than ten feet), milfoil can completely cover a pond or sluggish stream.

#### IDENTIFICATION

There are several species of milfoil and it is often difficult to tell them apart without the flowers or seeds. Almost all of the water milfoils have limp dissected featherlike whorled (some are alternate) leaves which radiate from a hollow stem. The flowers are tiny and inconspicuous and are usually present from July through September. Light yellow to brownish in color, they are frequently surrounded by broad undissected axils (bracts) which occur in terminal



Karen Teramura

Submergent Vegetation: Water Milfoil

spikes above the water's surface. Reproduction is by seeds, rhizomes and plant fragments. Water milfoil is sometimes confused with coontail (*Ceratophyllum* species). However, coontail has teeth or serrations on the leaflets, whereas water milfoil's leaflets are smooth. Also, in water milfoil the leaves radiate from the central stem only and the plant has a root system.

#### CONTROL

When chemicals are used to control aquatic vegetation, certain precautions must be followed.

**CHEMICAL CONTROL.** The following is a table of chemicals labeled to treat water milfoil. The table was compiled from information gathered from the aquatic chemical industry. *Inclusion in the table does not imply endorsement by the University of Maryland nor by the authors.* Omission of chemicals is a result of oversight on the authors part or of new label registration. The table is for comparison purposes only and is not intended to replace the chemical label. Labels are subject to change; therefore, always check the label for treatment sites, rates, and precautions before purchasing or applying any chemical. **Do not use the table for treating aquatic plant problems.**

Water Milfoil				
Chemical Name	Chemical Type	Application	Restriction Periods	Comments
Aquashade	Acid Blue 9	1 gal/4 acre ft	no swimming until after dispersal, no drinking	
Aquathol K	Dipotassium salt of endothall	use concentration 2.0-3.0 ppm, at depth 4 ft, =2.0 ppm, 5.1 gal/acre =3.0 ppm, 7.7 gal/acre	livestock watering, spraying, irrigation, drinking—14 days, use fish—3 days, swim—24 hours	
Weedtrine II	Ethylhexyl ester 2,4-D	100-150 lb/acre	do not use for irrigation or drinking	vapors can damage nearby crops
Aqua-Kleen	2,4-D	100 lb/acre	do not use water for irrigation, spraying, livestock, or drinking	
Aquazine	Simazine	3.4-6.8 lb/acre ft	irrigation, spraying, drinking—12 months	do not apply more than 10 lb/acre where striped bass fry or fingerlings will be cultured immediately
Weedtrine-D	Diquat dibromide	5-10 gal/acre	livestock watering, spraying, irrigation, drinking—14 days	do not use in muddy water
Aquaquat	Diquat dibromide	0.25-0.50 ppm cation	livestock watering, spraying, irrigation, drinking—14 days	do not use in muddy water
912 Aquatic Weed killer	Diquat dibromide	10-20 gal/acre	livestock watering, spraying, irrigation, drinking—14 days	do not use in muddy water
Sentry	Diquat dibromide	Depth 1 ft 7-14 gal/acre 3 ft 21-42 gal/acre 5 ft 35-70 gal/acre	livestock watering, spraying, irrigation, drinking—14 days	do not use in muddy water
Watrol	Diquat dibromide	48 gal/acre	livestock watering, spraying, irrigation, drinking—14 days	do not use in muddy water
Ultimate	Diquat dibromide	10-20 gal/acre	livestock watering, spraying, irrigation, drinking—14 days	do not use in muddy water
Norkem 500	Diquat dibromide	20-40 gal/acre	livestock watering, spraying, irrigation, drinking—14 days	do not use in muddy water
Diquat Herbicide-H/A	Diquat dibromide	1-2 gal/acre	livestock watering, spraying, irrigation, drinking—14 days	do not use in muddy water
Aquacide	Sodium 2,4-D	2.5 lb/100 sq ft	do not contaminate water used for spraying, irrigation, or drinking	do not use in muddy water
Aquathol	Dipotassium salt of endothall	use 2.0-3.0 ppm concentration depth 4 ft 2.0 ppm=215 lb/acre 3.0 ppm=323 lb/acre	irrigation, spraying, drinking—7 days, use fish—3 days, swim—24 hours	

Chemical Name	Chemical Type	Application	Restriction Periods	Comments
Hydrothol 191	Mono salt of endothall	27-136 lb/acre ft (0.5-2.5 ppm concentration)	do not use water for irrigation, use fish—3 days	toxic to fish (0.3 ppm)
Weed Boomer	Diquat dibromide	8 gal/acre	livestock watering, spraying, irrigation—10 days, drinking—14 days	do not use in muddy water
Sonar A. S.	Fluridone	depth <3 ft 0.5-0.75 qt/acre 3-5 ft 0.75-1.0 qt/acre >5 ft 1.0-1.5 qt/acre	irrigate established tree crops—7 days, new crops and turf—30 days	do not use in tidewater or brackish water or where crayfish are farmed
Sonar 5P	Fluridone	depth <3 ft 10-15 lb/acre 3-5 ft 15-20 lb/acre >5 ft 20-30 lb/acre	irrigate established tree crops—7 days, new crops and turf—30 days	do not use in tidewater or brackish water or where crayfish are farmed
Sonar SRP	Fluridone	depth <3 ft 10-15 lb/acre 3-5 ft 15-20 lb/acre >5 ft 20-30 lb/acre	irrigate established tree crops—7 days, new crops and turf—30 days	do not use in tidewater or brackish water or where crayfish are farmed
Norosac 10G (Northern water milfoil)	Dichlobenil	100-150 lb/acre	do not use water for irrigation, livestock watering or drinking, use fish—90 days	do not use in commercial fish or shellfish waters
Casoron 10G (Northern water milfoil)	Dichlobenil	100-150 lb/acre	do not use water for irrigation, livestock watering or drinking, use fish 90 days	do not use in commercial fish or shellfish waters

Always read the label and follow the directions. It is best to spot treat areas where the water milfoil are first sighted instead of waiting until they take over a pond completely. Determine the water uses and any use restrictions associated with the chemical control. Obtain all of the necessary permits. Make sure that you have properly identified the aquatic plant and have chosen the correct chemical control. Mix and apply the chemical according to the label directions. Keep the necessary records—they are required by law. Finally, monitor the water for dissolved oxygen and pH shifts after treatment to determine the effectiveness of the treatment and whether any fish kill occurs. Heavy plant die-off can cause oxygen depletion, while heavy growth can cause pH shifts on a daily cycle.

#### REFERENCES AND FURTHER READING

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**NOTE:** Because of the ecological role and sensitivity of aquatic vegetation, as well as Baywide efforts to restore this important resource, the state does not permit the use of chemical control in tidal waters, and greatly restricts their use in nontidal, flowing waters. Acquaint yourself with all regulations governing plant control activities, and obtain all necessary permits. Non-chemical means should be utilized where practicable.

## FOR FURTHER INFORMATION

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