COOPERATIVE EXTENSION SERVICE • Maryland Institute for Agriculture & Natural Resources
Maryland Sea Grant Extension Program

Aquatic Plant Identification and Management Workbook, *Series 2*

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 list of fact sheets describing a variety of aquatic plants and their management is available from the Maryland Sea Grant Extension Program or your local Cooperative Extension Office.

SUBMERSED VEGETATION

Curlyleaf Pondweed

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INTRODUCTION

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, submersed, emergent and terrestrial. This workbook series focuses on curlyleaf pondweed, a submersed plant.

Submersed 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.

Rebecca Haefner

Submersed Vegetation: Curlyleaf Pondweed

CURLYLEAF PONDWEED (*Potamogeton crispus*)

The potamogetons are probably the most common and diverse group of aquatic vegetation found in Maryland. They are perennials and found in all types of freshwater of the Chesapeake Bay. Curlyleaf pondweed is actually an exotic plant believed to have been introduced from Europe in the 1800s, and gets its name from the obvious curls in the leaves. The plant generally prefers moderately moving fertile waters, and silty-clay bottoms. It can be an indicator of pollution. In the winter, the plant turns blue-green in color and the leaves become more flattened.

CHEMICAL CONTROL. The following is a table of chemicals labeled to treat curlyleaf pondweed. 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. Do not use the table for treating aquatic plant problems.

Curlyleaf Pondweed

Chemical Name	Chemical Type	Application	Restriction	Comments
Weed Boomer	Diquat dibromide	8 gal/acre	livestock watering, swimming, spraying, irrigation-14 days	do not use in muddy water
Hydrothol 191	Mono salt of endothall	27-136 lb/acre ft (0.5 ppm-2.5 ppm)	do not use water for irrigation use fish-3 days	toxic to fish (0.3 ppm)
Aquathol	Dipotassium salt of endothall	Varied for concentration in ppm.	irrigation, spraying, drinking-7 days use fish-3 days swimming-24 hours	
Sonar A.S.	Fluridone	Depth < 3 ft 0.5-0.75 lb/acre 3-5 ft 0.75-1.0 lb/acre > 5 ft 1.0-1.5 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 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 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
Diquat Herbicide-H/A	Diquat dibromide	2 gal/acre	livestock watering, spraying, irrigation, drinking-14 days	do not use in muddy water
Norkem 500	Diquat dibromide	40 gal/acre	livestock watering, spraying, irrigation-14 days	do not use in muddy water
Ultimate	Diquat dibromide	20 gal/acre	livestock watering, swimming, spraying, irrigation-14 days drinking-25 days	do not use in muddy water
Watrol	Diquat dibromide	48 gal/acre	livestock watering, swimming, spraying, irrigation-14 days	do not use in muddy water
Sentry 1 ft 14 gal 3 ft 42 gal 5 ft 70 gal	Diquat dibromide	Depth	livestock watering, spraying, irrigation-14 days	do not use in muddy water
912 Aquatic Weed Killer	Diquat dibromide	20 gal/acre	swimming, spraying, irrigation-14 days	do not use in muddy water
Aquaquat drinking-14 days	Diquat dibromide	1/4-1/2 ppm cation dilute 10:1 with water	livestock watering, spraying, irrigation,	do not use in muddy water
Weedtrine-D	Diquat dibromide	10 gal/acre	livestock watering, spraying, irrigation, drinking-14 days	do not use in muddy water
Aquashade	Acid Blue 9 Acid Yellow 23	1 gal/4 acre ft	no swimming until after dispersal do not use water for human consumption	

Chemical Name	Chemical Type	Application	Restriction	Comments
Aquazine	Simazine	3.4-6.8 lb/acre	irrigation, spraying, drinking-12 months striped bass fry or fingerlings will be cultured immediately	do not apply more than 10 lb/acre where
Aquathol K	Dipotassium salt of endothall	varies with depth and concentration in ppm	livestock watering, spraying, irrigation-14 days use fish-3 days	
Kocide Copper Sulfate Pentahydrate Crystals	Copper sulfate pentahydrate 99%	1.6-2.4 lb per cubic ft per second per day	concentration cannot exceed 1 ppm if water is used as a potable source	may be toxic to fish
Norosac 10G	Dichlobenil	100-150 lb/acre	do not use water for irrigation, livestock watering, drinking use fish-90 days	do not use in commercial fish or shellfish water
Casoron 10G	Dichlobenil	100-150 lb/acre	do not use water for irrigation, livestock watering, drinking use fish-90 days	do not use in commercial fish or shellfish water

High concentrations of this plant could interfere with fishing or boat movement. This potamogeton has marginal to moderate value to waterfowl, with some birds feeding on the seeds or roots. It also provides protection for small fish.

IDENTIFICATION

All potamogetons have alternate (rarely opposite) leaves. Curlyleaf pondweed has curly or undulating leaves with leaf margins that are finely serrated (toothed). This plant is the only species of potamogeton which does not have entire (smooth) leaf margins. It has a sheath at the base of the leaves, and 3 to 5 distinct veins and a midrib. The stem is infrequently branched, flat, smooth and submerged. The plant can be almost 3 feet long.

Curlyleaf pondweed reproduces by seeds and stem sections through vegetative reproduction. The vegetative reproduction occurs generally in July by the formation of terminal "burrs" on the stems. These burrs are made up of compact clusters of leaf bases which detach and can remain dormant on the pond or river bottom for many months.

Flowers are spikes found on short pedioles (stalks) that extend up to the water surface. The flowers blossom between April and June. The plant usually dies back during the summer months and remain dormant until the fall, when the vegetative buds then germinate and the cycle starts over again.

CONTROL

When chemicals are used to control aquatic vegetation, certain precautions must be followed. Always read the label and follow the directions. It is best to spot treat areas where the curlyleaf pondweed is first sighted instead of waiting until it takes 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 record — it is 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 kills occur. 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. Aquaint yourself with all regulations governing plant control activities, and obtain **all** necessary permits. Nonchemical means should be utilized where practicable.

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