



## 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.

### EMERGENT VEGETATION

# Arrowheads

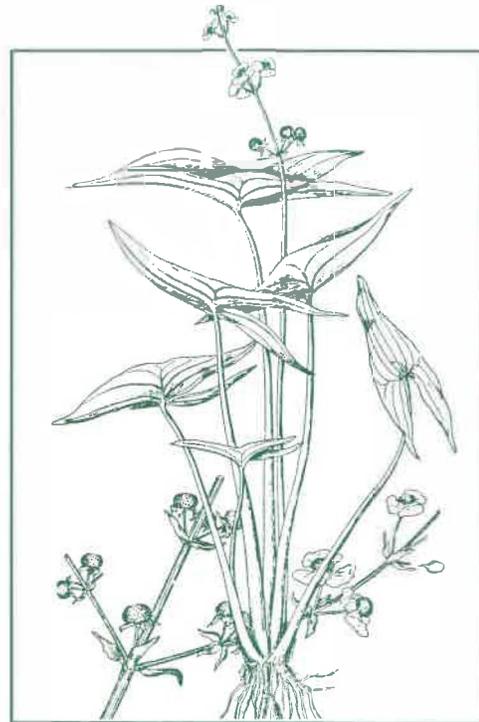
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#### INTRODUCTION

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 focuses on arrowhead, an emergent plant.

As a group, emergent plants are usually found rooted in shallow waters and all or part of the plant extends above the water line or hydrated soil. Some plants are not truly aquatic, and may be found in dry fields completely removed from a water source. The plants are usually rooted to the bottom of a pond, have a rigid cell structure, and are not dependent on the water column for support.



*Emergent Vegetation: Arrowheads*

#### ARROWHEAD (*Sagittaria* spp.)

At least two different species of arrowhead occur in Maryland, the coastal arrowhead (*Sagittaria graminea*) and the common arrow-

**CHEMICAL CONTROL.** The following is a table of chemicals labeled to treat arrowhead. 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.

<b>Arrowhead</b>				
<b>Chemical Name</b>	<b>Chemical Type</b>	<b>Application</b>	<b>Restriction Periods</b>	<b>Comments</b>
Weed Rhap A-4d	Dimethylamine Salt 2,4-D	2.5 -4.5 pt/acre in 50 - 100 gal of water	do not use water for irrigation or domestic purposes	least volatile form of 2,4-D
Weed Rhap P LV-6D	Isooctyl Ester 2,4-D	1 2/3-3 pt in 50-100 gal/acre	do not use water for irrigation or domestic purposes	at temperatures above 95°F, vapors may harm crops
Weed Rhap P LV-4D	Isooctyl Ester 2,4-D	2.5-4.5 pt in 50-100 gal/acre	do not use water for irrigation or domestic purposes	at temperatures above 95°F, vapors may harm crops
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

head (*S. latifolia*). Both are perennial herbs, both emerge from the water and can reach 5 feet, and both have above-water leaves. Coastal arrowhead often has underwater leaves, especially the young plant which is narrow and stalkless and found in clumps. The leaves of common arrowhead are usually shaped like arrow heads.

These plants are commonly found in shallow fresh water that is static or slow moving; they also can be found in low salinity waters along the shoreline of tidal creeks. Arrowheads are a native of North America and are generally considered beneficial in that they stabilize shoreline and have some aesthetic beauty. Sometimes called duck-potato the plant also has considerable value as a food source for wildlife, in that the tubers and seeds are consumed by waterfowl and muskrats. Often these plants are planted to enhance waterfowl feeding areas. The tubers can also be eaten by humans in late summer through winter after boiling or roasting.

#### IDENTIFICATION

Coastal arrowhead leaves are erect and lance-shaped, usually 2 to 5 inches long. They can be stiff or flaccid and are usually sharp pointed. This plant rarely grows over 2 feet tall. The tall flower stalk has 2 to 12 three petaled white flowers in whorls, which appear May through September. The upper flowers are usually male, while the lower flowers are usually female. The fruit is usually found in the lowest whorls.

Common arrowhead has the typical arrowhead shaped leaves rarely without lobes. These basal lobes are triangular to linear and 1 to 8 inches wide and 2 to 18 inches long. The plant also has a stout

fleshy rhizome. As in coastal arrowhead, the flowers are white and found in whorls of 2 to 15 with the upper whorls being the male flowers. The flowers appear from July through September. The fruit of common arrowhead is about 1/8 inch long and winged on both edges.

Reproduction of arrowheads is by seeds and the rhizomes. The plant overwinters by means of the tubers that are produced in autumn.

#### 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 arrowhead 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 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 kills occur. Heavy plant die-off can cause oxygen depletion while heavy growth can cause pH shifts on a daily cycle.

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.

#### REFERENCES AND FURTHER READING

- Dalrymple, B. 1972. Survival in the outdoors. Outdoor Life E.P. Dutton & Co., Inc., New York.
- Harrell, R.M. and J.N. Hochheimer. 1985. Aquatic vegetation control. Fact Sheet Number 415. Cooperative Extension Service, University of Maryland, College Park.
- Hotchkiss, N. 1972. Common marsh plants of the United States and Canada. Dover Publications, Inc., New York.
- Lorenzi, H.J. and L.S. Jeffery. 1987. Weeds of the United States and their control. An AVI Book, Van Nostrand Reinhold Company, New York.
- Prescott, G.W., 1969. How to know the aquatic plants. Wm.C. Brown Company, Publishers, Dubuque, Iowa.
- Seagrave, C. 1988. Aquatic weed control. Fishing News Books, Ltd., Farnham, Surrey, England.
- Traver, D.P., J.A. Rodgers, M.J. Mahler and R.L. Lazor. 1978. Aquatic and wetland plants of Florida. Bureau of Aquatic Plant Research and Control, Florida Department of Natural Resources, Tallahassee.
- Wellborn, T.L. 1984. Arrowhead. Aquatic weed identification and control. Mississippi State University Cooperative Extension Service Information Sheet Number 1026, Mississippi State.

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