Hydrilla [*Hydrilla verticillata* (L.F.) Royle]

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Fig. 1. Hydrilla stem showing leaves with spiny midribs and serrate margins.

Fig. 2. Hydrilla can form dense surface mats that impede recreation and water movement.

Fig. 3. Hydrilla tubers (left) are found buried in sediment and resist both dessication and herbicides. Hydrilla turions (right) are formed in the axils of leaves.

Introduction

Problems caused

Hydrilla is an invasive aquatic macrophyte that was introduced into the United States by tropical fish and plant dealers. First seen on the west coast of Florida in 1960, it was confused with *Elodea canadensis*. It grows in ponds, canals, ditches, lakes and rivers. Considered a federal noxious weed since 1974, economic losses and environmental harm are related to hydrilla worldwide. Hydrilla decreases recreational use of rivers and lakes (fishing, swimming and boat traffic). It chokes waterways, clogs irrigation pumps, changes nutrient cycles and alters endemic flora.

Regulations

Hydrilla has been a federal noxious weed since 1974. It is a class A noxious weed in Alabama and Mississippi, and recognized throughout the US states as a potentially problematic species.

Description

Vegetative growth

Hydrilla, a completely submersed plant, has erect stems that are rooted in the sediment. Its lance-shaped leaves are about 0.1” (2-4 mm) wide and 0.25”- 1.0” (6-20 mm) long arranged in whorls. Hydrilla has small teeth on the leaf margins, and small spines on the leaf midrib. It reproduces by vegetative (asexual) means. Asexual reproduction occurs by means of turions and tubers, although stem fragments may also develop into new plants. The tuber is an enlargement of the terminal node of the rhizome growing underground the sediment. Its color is white to black with 0.2-0,6” (4-15) mm in length. The turion is a dormant spiny green bud of 0.1”-0.5” (3-12 mm) in length that arise from the leaf axils or branches. Hydrilla is the only species in this family found in the United States that forms tubers and axillary turions.

Flowering/fruiting

Two biotypes occur in US: a dioecious biotype and a monoecious biotype. Flowers have three sepals and three petals growing from the spathe. It floats in the surface promoting pollen transport by the wind. Viable seeds are produced by the monoecious biotype. The seed are fusiform and brown in color and about 0.1” (2-3 mm) in length. But seeds rarely initiate new colonies in the wild. Water and light are the requirements to germinate. The dioecious biotype, the only biotype found in the MidSouth, does not produce viable seeds in the US.

Dispersal mechanisms

Dispersal can be from tubers, turions, or stem fragments. Wave action, boating activity, and currents can all cause the formation of stem fragments from existing colonies of plants.

Spread by

While hydrilla was likely introduced into the US by the aquarium trade, it has spread predominantly by boat trailering from one water body to another. Boats should be cleaned thoroughly, removing all plant fragments before moving from one water body to another.

Habitat

Freshwater ecosystems are susceptible to hydrilla colonization. Hydrilla is able to grow in water with different chemical composition, including salinities of up to 7 parts per thousand (slightly brackish), a wide range of pH, and trophic states from oligotrophic to eutrophic lakes. Physical factors within the water body such as water depth and low intensity of light allows hydrilla growth as well. Hydrilla often grows to a depth of 15', but may grow in deeper water if water is very clear.

Distribution

This weed, native to the warmer regions of Asia, is widely distributed in Europe, Africa, Australia, South and North America. Dioecious biotype occurs in AL, AR, AZ, FL, GA, LA, MO, MS, OK, PR, SC, TN and TX. The monoecious biotype occurs in CT, DE, ID, IN, MA, MD, ME, NY, PA, WA, and WI. CA, NC, VA and GA have both biotypes.

Control Methods

Biological

Hydrellia pakistanae is the most successful insect biocontrol agent but requires large and often-repeated releases to lessen the long-term growth of hydrilla. A fungal pathogen, *Mycoleptodiscus terrestris* or Mt, is being developed. The grass carp (*Ctenopharyngodon idella)* has successfully controlled hydrilla in isolated water bodies, typically at a stock rate of 10 fish/acre. Many environmental concerns surround their use, even when sterile triploid fish are used. States may have stocking restrictions; contact your state's natural resource agency for information.

Chemical

Chemical control techniques have been successful for managing hydrilla. Fluridone is a systemic aquatic herbicide widely used to control hydrilla, although some hydrilla in Florida have developed a tolerance to it. Contact herbicides successful in controlling hydrilla include chelated copper, diquat, and endothall. While the industry standards are listed in the table, generic products are widely available. New systemic herbicides are undergoing the aquatic label registration process, so new products may soon be available for hydrilla control. Carefully read all herbicide labels before use, and check with your local natural resource or regulatory agency for any additional permits or restrictions.

Mechanical

Harvesting has been used to control hydrilla nuisance growth, but does not provide long-term control. Hand picking has also been effective for scattered individual plants.

Physical

Drawdown has been used to control hydrilla growth, but will not affect hydrilla tubers, so it is ineffective. Benthic barriers may be effective for small colonies.

Chemical	Formulation	Rate of Formulation Application
Diquat	Liquid	2 gallons per acre
Endothall	Liquid	1.3 to 2.6 gallons per acre-foot
	Granular	8.8 – 17.6 lbs per acre-foot
	Liquid	1.4-2.7 gallons per acre-foot
	Granular	54-108 lbs per acre-foot
Copper Complex	Liquid Emulsified	1.2-18.0 gallons per acre-foot
	Emulsified	3.6-8.7 gallons per acre foot
Fluridone	Liquid	0.42 to 3.8 ounces per acre-foot
	Pellets	0.27 to 2.5 lbs per acre-foot

References

Langeland, K. A. 1996. *Hydrilla verticillata* (L.F.) Royle (Hydrocharitaceae), "The perfect aquatic weed". Castanea 61 (3):293-304.

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