



## Southeast Exotic Pest Plant Council Invasive Plant Manual

**Common Name:** Hydrilla

**Scientific Name:** *Hydrilla verticillata* (L. f.) Royle

Hydrilla is an aquatic plant and member of the Hydrocharitaceae or Frog's-bit family. Its appearance is variable depending on the growing conditions. It may be monoecious or dioecious. It was sold as an aquarium plant, which may have been the origin of its initial introduction into natural water systems. However, it is now listed by the federal government, and most states, as a noxious weed. As a result, its sale in recent years has been limited.

**Height:** Hydrilla is variable in height depending primarily on the depth of the water.

**Leaves:** The leaves are in whorls of 4 to 8. Individual leaves measure 0.6 to 2 cm long and 2 to 4 mm wide. The margins have 11 to 39 sharp teeth per centimeter and sometimes spines on the underside along the reddish midrib.



Photo by Tim Murphy

**Flowers:** The axial pistillate flowers are 10 to 50 mm long and 4 to 8 mm wide. The three sepals are whitish in color with three translucent petals. They arise from the tip of the stem and float on the surface of the water. The female flower resembles an inverted bell filled with a bubble. The free-floating staminate flowers have three whitish to reddish sepals and petals. Both types of flowers are produced singly surrounded by a bract or spathe.



Photo by Tim Murphy

**Turions:** Hydrilla primarily reproduces through turions (compact dormant buds) and tubers. Turions are produced in the axils of the leaves and the tubers on the rhizomes or stolons. The turions are condensed shoots 5 to 8 mm long with 12 to 15 internodes surrounded by alternating whorls of fleshy leaves. They are dark green in color and are spiny in appearance. The tubers are terminally produced on the rhizomes or stolons. The whitish to yellow tubers are 5 to 10 mm long and may be submerged in 30 cm of sediment.

### Life History

Hydrilla is an obligate aquatic plant that usually is attached to the bottom of the body of water. Fragments may break off and continue to live in a free-floating state. It can grow very rapidly (up to 2.5 cm per day) to reach the water surface. Once it reaches the surface, it



Photo by USDA APHIS Archives

produces numerous branches, effectively shading-out other aquatic plants. Reproduction occurs from stem fragmentation, seed monoecious populations), axillary buds (turions), and tubers. Small fragments from one to three whorls are capable of establishing new colonies. Although seeds are produced, viability is relatively low and seeds probably do not play a major role hydrilla reproduction. The turions, fragments and tubers are the primarily means of propagation. Turion production begins in September, continues until December, and then increases again in late spring. Floating plants have significantly higher turion production than rooted plants. Tubers are the most prolific means of vegetative reproduction. They are produced primarily during shorter days in the spring and fall. One tuber may produce as many as 6000 new tubers per square meter under ideal conditions. The tubers can remain viable for several days out of water and for over four years submerged in sediment.



Photo by USDA APHIS Archives

### Origin and Distribution

It is believed that Hydrilla is native to Asia and/or India. It was discovered in Florida in the 1960's and by 1988 it had spread to an estimated 20,000 ha of water. It is believed that at least two separate introductions occurred since two different forms of hydrilla occur. Boats and trailers are the primary means it is spread to new water systems. Current distribution includes all of the southeastern states, Connecticut, Delaware, Maryland, Virginia, Alabama, Texas, Arizona, California, and Washington. It has been listed as a Federal Noxious Weed and is prohibited or restricted in eleven states.

### Similar Species

Hydrilla resembles the native elodea (*Elodea canadensis*) and the non-native egeria (*Egeria densa*). The main distinguishing feature is that Hydrilla has leaves arranged in whorls of four to eight and the other two have whorls of three and four to five, respectively.

### Habitat

Hydrilla is an obligate submerged perennial aquatic plant and can be found in a variety of aquatic habitats such as reservoirs, lakes, ponds, springs, rivers, and tidal zones. It can tolerate a wide range of water chemistry conditions including lakes and ponds of high and low nutrient concentrations. It is rarely found in fast moving water systems. Hydrilla will tolerate salinities as high as 7‰ and a wide range of acidity, although optimum growth is seen at a pH of 7. It will grow in very low light conditions, 1% of full sunlight, allowing it to colonize deeper depths than many native plants.

### Management Recommendations

#### Mechanical Control

**Harvesting:** Harvesting may manage small initial populations. Where possible, remove all of the plant parts from the water and dispose of properly. Plant fragments as small as one whorl can potentially start a new infestation. Consistent monitoring for several growing seasons is required to control new or missed plants. For larger infestations in high value areas, specialized harvesters are available, although the cost may be prohibitive at as much or more than \$1000 or more per acre. Up to six harvests per year may be necessary due to hydrilla's rapid growth.

**Drawdowns:** When growing in bodies of water that have control structures, hydrilla may be controlled by seasonal drawdowns. Drawdowns are most effective while the tubers are developing in the fall and before regrowth occurs in the spring. Tubers may remain dormant and viable in the soil even after the

lake or pond has been drained, so drawdowns are limited in effectiveness.

### Herbicidal Control

**Fluridone:** Fluridone is a selective herbicide depending on application rates, contact times, and timing of application. Application rates depend on site-specific factors such as infestation size, water depth and chemistry, and water flow rates. It is intended for use on whole ponds and large-scale infestations (greater than 2 ha). It has been used successfully with minimal long-term effects to native plants. Fluridone is intended to reduce but not eliminate Hydrilla. Refer to manufacturer's label for specific information and restrictions regarding use.

### Biological Control

**Triploid Grass Carp:** Sterile grass carp or white amur (*Ctenopharyngodon idella*) may be an option in areas with adequate control structures to ensure retention of released fish. Grass carp will eat a variety of vegetation including native species. This method is an option only in areas where impact to all of the vegetation is acceptable. The stocking rates for grass carp have not been established. Local and state laws should be checked before release.

Since 1981, the U. S. Department of Agriculture, U. S. Army Corps of Engineers and the University of Florida-IFAS have conducted worldwide surveys for other biological control agents. Over forty insect species have been identified as feeding on hydrilla and are currently being evaluated. The larvae of a weevil (*Bagous affinis*) discovered in India and Pakistan feeds on the subterranean tubers of hydrilla. This insect is only effective in areas of intermittent wet and dry periods or where periodic drawdowns are possible. It has not become established. A leaf-mining fly (*Hydrellia pakistanae*) has been released in Florida but it has had no impact. *Hydrellia balciunasi* was released in 1989 but had limited success due to variation in hydrilla populations and parasitism by native wasps among other factors. The accidental release of an aquatic moth (*Parapoynx diminutalis*) was shown to defoliate plants but leave viable stems.

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