

# hydrilla

## *Hydrilla verticillata* (L. f.) Royle

Synonyms: *Elodea verticillata* (L.f.) F. Muell., *Serpicula verticillata* L.

Other common names: Florida elodea, waterthyme

Family: Hydrocharitaceae

**Invasiveness Rank:** 80 The invasiveness rank is calculated based on a species' ecological impacts, biological attributes, distribution, and response to control measures. The ranks are scaled from 0 to 100, with 0 representing a plant that poses no threat to native ecosystems and 100 representing a plant that poses a major threat to native ecosystems.

### Description

Hydrilla is a submerged, aquatic, perennial plant. Stems typically root in the substrate and branch freely. Stem nodes and fragments can develop adventitious roots. Leaves are sessile, linear to lanceolate, whorled in groups of four to eight, and 6 to 19 mm long. Leaves have toothed margins, which are usually visible to the naked eye. The roots are slender and unbranched. They develop ovoid tubers at the tips. Tubers are tough, white to brown-black, and 19 mm long. Male and female flowers float on long, thread-like flower tubes. Sepals and petals are translucent and white to red. Male flowers detach at maturity and float on the surface of the water, where they release pollen. Monoecious (both male and female flowers on the same plant) and dioecious (male and female flowers on different plants) biotypes occur in North America. Fruits are narrowly cylindrical and smooth or irregularly spiny (Thorne 1993, DiTomaso and Healy 2003).



*Hydrilla verticillata* (L. f.) Royle. Photo by R. Vidéki.

*Similar species:* Hydrilla can be confused with Canadian waterweed (*Elodea canadensis*). Canadian waterweed is native to the central and northern United States and parts of Canada but is exotic in Alaska. Canadian waterweed can be distinguished from hydrilla by the presence of leaves that are arranged in whorls of three (DiTomaso and Healy 2003).

### Ecological Impact

*Impact on community composition, structure, and interactions:* Hydrilla can form dense mats near the water surface, intercepting sunlight and eventually displacing native aquatic plants. Hydrilla infestations may reduce the seed production of native plant species, which would result in a reduction in the number of native plants in the community (de Winton and Clayton 1996). Hydrilla may also shift the phytoplankton composition of its habitat (Canfield et al. 1984). Infestations adversely affect fish populations. Hydrilla appears to provide habitats for a number of mosquito species (Hearnden and Kay 1997).

*Impact on ecosystem processes:* Hydrilla infestations slow the movement of water, causing flooding. They degrade water quality, increase sedimentation rates, and increase water temperatures (Bossard et al. 2000). Hydrilla affects water nutrient turnover (Bole and Allan 1978, Sinha et al. 2000).

### Biology and Invasive Potential

*Reproductive potential:* Hydrilla reproduces sexually by seeds and vegetatively by fragmentation, tubers, and turions (Spencer and Rejmanek 1989, Steward 1992). Turions (axillary leaf buds) are small, light weight, and well-suited for dispersal. Tubers, which are formed terminally on rhizomes, are heavier and better adapted for winter survival. They contain large amounts of starch.

*Role of disturbance in establishment:* Hydrilla is known to establish in undisturbed aquatic communities (Bossard et al. 2000). Mechanical disturbances increase the possibilities for the establishment of hydrilla.

*Potential for long-distance dispersal:* Tubers can survive being ingested by waterfowl and can be

transported from one body of water to another (Joyce et al. 1980).

*Potential to be spread by human activity:* Small pieces of hydrilla stems can be dispersed on boat trailers or planes (Bossard et al. 2000).

*Germination requirements:* Seed production appears to have little importance in hydrilla reproduction. Turions and tubers are able to germinate in complete darkness. Optimal germination occurs at fairly low light intensities.

*Growth requirements:* Hydrilla is able to grow in a wide range of aquatic habitats. It is found in both low and high nutrient waters. It is best adapted to fresh water (Twilley and Barko 1990), but it can tolerate low salinity (Haller et al. 1974, Steward and Van 1987). Hydrilla also tolerates a wide range of pH, but grows best at pH 7. This species generally grows in warm climate areas; however, it is capable of significant photosynthetic activity at temperatures as low as 10.5°C.

*Congeneric weeds:* No other weedy *Hydrilla* species are known to occur in North America (USDA 2010).

#### Legal Listings

- Has not been declared noxious
- Listed noxious in Alaska
- Listed noxious by other states (AL, AZ, CA, CO, CT, FL, MA, ME, MI, NC, NM, NV, OR, SC, TX, VT,

WA)

Federal noxious weed

Listed noxious in Canada or other countries

#### Distribution and abundance

Hydrilla grows in lakes, streams, rivers, and bayous (eFloras 2008).

*Native and current distribution:* Hydrilla is probably native to the warmer regions of Asia (Cook and Lüönd 1982). It is a cosmopolitan species that occurs in Europe, Asia, Australia, New Zealand, the Pacific Islands, Africa, North America, and South America. In the United States, hydrilla populations occur in all of the southeastern states, Arizona, California and Washington (USDA 2010). Hydrilla has not been documented in Alaska.

#### Management

The cost of hydrilla management is extremely high. Management methods currently include mechanical removal, herbicide applications, and biological controls. Hydrilla fragments easily, and damaged plants that are not completely removed by mechanical control methods can act as sources for the reestablishment of populations. Several species of weevils, leaf-mining flies, and moths have been introduced to control hydrilla (Langeland 1996, Bossard et al. 2000).

---

#### References:

- Bole, J.B. and J.R. Allan. 1978. Uptake of phosphorus from sediment by aquatic plants, *Myriophyllum spicatum* and *Hydrilla verticillata*. *Water research* 12: 353-358.
- Bossard, C.C., J.M. Randall and M.C. Hoshovsky. 2000. Invasive plants of California's wildlands. Pp. 218-221.
- Canfield, D.E.Jr., J.V. Shireman, D.E. Colle, W.T. Haller, E.E. Watkins and M.J. Maceina. 1984. Prediction of chlorophyll a concentration in Florida Lakes: importance of aquatic macrophytes. *Can. J. Fish. Aquatic. Sci.* 41: 497-501.
- Cook, C.D.K. and R. Lüönd. 1982. A revision of the genus *Hydrilla* (Hydrocharitaceae). *Aquatic Botany* 13: 485-504.
- DiTomaso, J.M. and E.A. Healy. 2003. Aquatic and riparian weeds of the West. California: University of California, Agriculture and Natural Resources; Pp. 96-105.
- de Winton, M.D. and J.S. Clayton. 1996. The impact of invasive submerged weed species on seed banks in lake sediments. *Aquatic Botany* 53: 31-45.
- eFloras. 2008. Published on the Internet <http://www.efloras.org> [accessed 23 September 2010]. Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, Cambridge, MA.
- Invaders Database System. 2010. University of Montana. Missoula, MT. <http://invader.dbs.umt.edu/>
- Joyce, J.C., W.T. Haller and D.E. Colle. 1980. Investigation of the presence and survivability of hydrilla propagules in waterfowl. *Aquatics* 2: 10-14.
- Haller, W.T., D.L. Sutton and W.C. Barlowe. 1974. Effect of salinity on growth of several aquatic macrophytes. *Ecology* 55: 891-894.
- Hearnden, M.N. and B.H. Kay. 1997. Importance of *Hydrilla verticillata* (Hydrocharitaceae) as habitat for immature mosquitoes at the Ross River Reservoir, Australia. *Journal of the American Mosquito Control Association* 13: 164-170.
- Hultén, E. 1968. *Flora of Alaska and Neighboring Territories*. Stanford University Press, Stanford, CA. 1008 p.
- Langeland, K.A. 1996. *Hydrilla verticillata* (L.F.) Royle (Hydrocharitaceae), "The perfect aquatic weed". *Castanea* 61: 293-304.
- Pfauth, M. and M. Sytsma. 2005. Alaska aquatic plant

- survey report 2005. US Fish and Wildlife Service Contract number: 7012050114, Center of Lakes and Reservoirs, Portland State University, Portland, OR. Available online <http://www.clr.pdx.edu> [March 13, 2006].
- Sinha, S., R. Saxena and S. Singh. 2000. Fluoride removal from water by *Hydrilla verticillata* (l.f.) Royle and its toxic effects. Bulletin of Environmental Contamination and Toxicology 65: 683-690.
- Steward, K.K. 1992. Survival and growth of stem fragments from various hydrilla races. Florida Scientist 55: 129-135.
- Steward, K.K. and T.K. Van. 1987. Comparative studies of monoecious and dioecious hydrilla (*Hydrilla verticillata*) biotypes. Weed Science 35: 204-210.
- Spencer, D.F. and M. Rejmanek. 1989. Propagule type influences competition between two submersed aquatic macrophytes. Oecologia 81: 132-137.
- Thorne, R.F. Hydrocharitaceae Waterweed family. In: Hickman, J.C., editor. The Jepson manual higher plants of California. Berkeley, Los Angeles, London: University of California Press; 1993. Pp. 1150-1151.
- Twilley, R.R. and J.W. Barko. 1990. The growth of submersed macrophytes under experimental salinity and light conditions. Estuaries 13: 311-321.
- USDA. 2010. The PLANTS Database. National Plant Data Center, Natural Resources Conservation Service, United States Department of Agriculture. Baton Rouge, LA. <http://plants.usda.gov>