

Alien Invasive Aquatic and Wetland Plants



WATER HYACINTH

An Invasive Plant heading towards Manitoba ??

Eichhornia crassipes (Martius) Solms

The most damaging aquatic weed in the world.

Water hyacinth forms large free-floating monospecific mats that outcompete other aquatic plants for light, nutrients and oxygen (Batcher 2000). Water hyacinth is an USA federal noxious weed believed to have been imported from South America as a water garden ornamental in 1884. It is regarded as the most damaging aquatic weed in the world.

BIOLOGY

Water hyacinth best can be identified by its highly glossy leaves, showy lilac flowers and one-sided swelling of its petioles. It grows in ponds, wetlands, marshes, large lakes, reservoirs, and rivers (Batcher 2000). Water hyacinth can tolerate extreme environmental conditions including large water fluctuations, nutrient availability, pH, temperature and toxic substances.

Batcher (2000) described water hyacinth as a free-floating aquatic macrophyte that forms dense floating mats. Its leaves are thick, waxy, rounded, and glossy and rise above the water on stalks to as high as 0.5 meters. The leaves are ovate to circular, 10-20 cm in diameter and incurved. Leaf stalks can grow to be 50 cm long, are bulbous and spongy, and carry a single flower spike with 8 to 15 flowers. As much as 50% of water hyacinth's biomass can be the roots.

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It has spread rapidly in Africa impacting human health.

The flowers are sessile, have six petals, are purple to pink in color and the uppermost petal has a yellow blue-bordered central splotch. Each spike has 4-25 flowers with six stamens.

Reproduction is vegetatively by short runners (or stolons) as well as by seed (note that vegetative reproduction seems more important in dispersal). Vegetative reproduction is described as through a mother plant which sends out stalks which grow daughter plants, which matures and sends out another daughter plant, and so on.

Seeds are in a thin-walled capsule enclosed in a hypanthium with as many as 450 seeds per capsule. Seeds can survive on floating mats of water hyacinth as well as on riparian banks and have been reported to remain viable up to twenty years.

ECOLOGICAL DAMAGE

Center et al. (2002) reported that water hyacinth invasions reduce available light for submerged plants hence depleting oxygen, alters the composition of invertebrate communities, impacts fisheries, displaces native plants and wildlife, and increases sediment loading. Water hyacinth infestations also threaten human health by intensifying mosquito problems by increasing habitat for species that attach to plants.

Water hyacinth has deleterious impacts on aquatic habitat and general water use. Populations reduces water flow in drainage canals. In irrigation canals it impedes flow and clogs intake pumps. It interferes with recreational and commercial water crafts. Water hyacinth interferes with water-skiers, sport fish populations, displaces native vegetation, boating, and tourism.

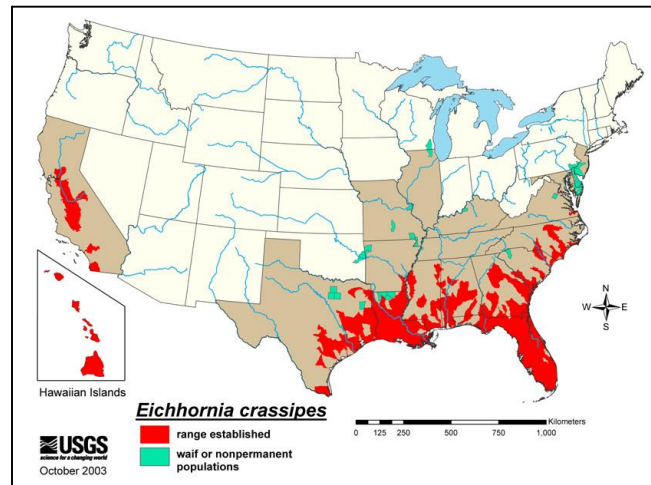
ECONOMIC IMPACTS

Center et al. (2002) provided a summary of some of the costs associated with water hyacinth invasions - losses of \$43 million US dollars in 1956 to water hyacinth infestations in Florida, Mississippi, Alabama, and Louisiana; Florida spent more than \$43 million US dollars during 1980 to 1991 to suppress water hyacinth and waterlettuce; annual costs for water hyacinth management ranged from \$500,000 in California to \$3 million in Florida; and Louisiana herbicidally treats about 25,000 acres of water hyacinth per year, mostly at boat ramps, at an annual cost of \$2 million US dollars.

GEOGRAPHIC DISTRIBUTION

Water hyacinth is found globally in the tropics and subtropics, but its spread is limited by severe cold. In North America water hyacinth is mostly found in the southeastern United States. A population of water hyacinth was discovered in the state of Washington in

2000, which borders western Canada. Populations have been found in Arizona, Arkansas and Washington, however these are believed to have been eradicated. Water hyacinth has been reported in New York, Kentucky, Tennessee and Missouri where plants escape summertime cultivation but do not persist through the winter. It continues to be available for sale through aquarium and garden supply dealers over the internet.



U.S. Drainage Distribution Map, occurrences, and other information about *Eichhornia crassipes* was prepared by C. Jacono of the U.S. Geological Survey, Nonindigenous Aquatic Species Program, which is located on the [USGS-NAS web site](#).

DISPERSAL MECHANISMS

With the increasing popularity of water gardening and home ponds, water hyacinth is sold by many nurseries for its exotic appearance and attractive flowers.

MANAGEMENT

Very small infestations can be controlled by hand pulling. Harvesting may cost as much as \$800 US dollars per acre with additional equipment mobilization cost of between \$35,000 to \$110,000 US dollars.

Rodeo (glyphosate) and 2,4-D (2,4-dichlorophenoxyacetic acid), copper sulfate and copper chelate have been used to manage water hyacinth. Herbicides however will damage or kill other aquatic organisms. Chemical control may cost as much as \$1,000 US dollar per acre. Herbicide management is costly and temporary. Floating barriers have been used to restrict the in-lake spread of water hycinth.

BIOLOGICAL CONTROL

Biological control has included the use of insects and herbivorous fish including Chinese grass carp (*Ctenopharyngo idella* and hybrids), as well as *Tilapia melanopleura* and *T. mossambica*. Chinese grass carp prefer other food and hence will impact natural areas by reducing the abundance of all native plant life.

Over 100 species of insects including lepidoptera, coleoptera, hemiptera, dermaptera, diptera, and orthoptera have been investigated as possible biological control agents against water hyacinth.

Julien and Griffiths (1998) and Center et al. (2002) summarized the following biological control agents that are in use in the United States. *Neochetina bruchi*, a water hyacinth weevil (Coleoptera) introduced from Argentina in 1974. *Neochetina eichhorniae*, a water hyacinth weevil (Coleoptera) introduced from Argentina in 1972. *Neochetina* are semiaquatic weevils (Center et al. 2002) whose herbivory may result in shorter and smaller leaves and an overall reduction in plant vigor. The pyralid moth *Niphograptia* (= *Sameodes*) *albiguttalis* (Warren) (Lepidoptera) released in 1977. These three agents, plus the mite *Orthogalumna terebrantis* Wallwork, are now widely used (Center et al. 2002). *Bellura densa* (or *Arzama densa*) (Lepidoptera) was introduced from Argentina in 1977. The fungus *Orthogalumna terebrantis* and *Cercospora rodmanii* have also been released. Biological control agents can slow the growth of water hyacinth and make the plants more susceptible to other causes of mortality.

SPECIES INFORMATION LINKS

Batcher, M.S. 2000. Element Stewardship Abstract for *Eichhornia crassipes* (Martius) Solms water hyacinth. The Nature Conservancy, Wildlife Invasive Species Team, Arlington, VA.

Center, T.D, Hill M.P., Cordo, H. and M.H. Julien. 2002. Waterhyacinth. In: Van Driesche, R., et al., 2002, Biological Control of Invasive Plants in the Eastern United States, USDA Forest Service Publication FHTET-e00e-04, 413 p.

Julien, M.H. and M.W. Grithiths (editors). 1998. Biological Control of Weeds: a world catalogue of agents and their target weeds. 4th Ed. CABI Publishing, Oxon, UK.

A Practical Guidebook to the Control of Invasive Aquatic and Wetland Plants of the San Francisco Bay Delta Region.

www.sfei.org/nis/hyacinth.html

Invasive Plants of the Eastern United States - Waterhyacinth

<http://www.invasive.org/eastern/biocontrol/4WaterHyacinth.html>

Explore Biodiversity in Conjunction with the Army Corp of Engineers: Exotic, Invasive Problem Plants

Water Hyacinth Movie (2.02 minutes)

http://explorebiodiversity.com/problem_plants/video/waterhyacinth.htm

Biological Control of Invasive Plants University of Florida

<http://aquat1.ifas.ufl.edu/hyacin.html>

United States Geological Survey Invasive Species Program Water Hyacinth

<http://biology.usgs.gov/invasive/CaseFiles/Waterhyacinth.htm>

PICTURE GALLERIES

	<p>Organization: Invasive Plants of the Eastern USA</p> <p>Link: http://www.invasive.org/eastern/species/3020.html</p>
	<p>Organization: Invasive Aquatic and Wetland Plants of the San Francisco Bay Delta Region</p> <p>Link: http://www.sfei.org/nis/hyacinth.html</p>