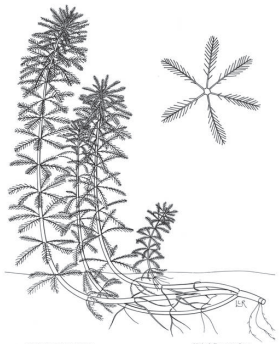
Parrot feather, (*Myriophyllum aquaticum*): A Non-Native Aquatic Plant in New Jersey Waterways

Fact Sheet FS1232







Cooperative Extension

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Description

A member of the water-milfoil family Halogragaceae, Parrot feather is a perennial rooted aquatic plant that has both a submersed and an emergent form which can extend up to 30 cm (12 in) above the water surface. Submerged leaves are often decayed or limp with a more reddish appearance and are 1.5–3. 5 cm (0.5–1.5 in) long, with 10–15 leaflet pairs per leaf. Sturdy, sparsely branched stems grow up to 2 m long and 5 mm in diameter. When shoots reach the water surface, plant growth changes to a horizontal pattern with extensive lateral branching followed by vertical stem growth (Fig. 1). Emergent leaves are stiff, bright green to bluish green, 2–5 cm long arranged in whorls of 3–6 leaves around the stem (Fig. 2). The leaves themselves are divided into 12–35 leaflet pairs giving them a featherlike appearance (Fig. 3). They sprawl along the water surface or wet soil and can rise up above the water and look almost like small fir trees up to 30 cm (1 ft) tall. Tiny 0.5 mm, four sepal white flowers are produced on short stalks at the base of emergent leaves. In South America, male and female flowers are on separate plants, but in North America only female plants are produced. Plants spread by rhizomes and growth from plant fragments. Adventitious roots emerge from the stem nodes allowing the plants to grow vegetatively.

Parrot feather may be confused with bladderworts, hornworts and other leafy milfoils; however the stiff, finely-divided featherlike emergent leaves are distinctive.

Distribution

Parrot feather is native to Central and South America and has been introduced into Southeast Asia, Australia, New Zealand, South Africa, Japan and North America. It was first introduced in the United States due to its attractiveness as an aquarium or water garden plant. In the United States it has spread to 26 states including Hawaii, as far north as New York, west to Washington State, and all southern states but widely distributed in Alabama, Arizona, Louisiana, Mississippi and Tennessee.

Habitat

Parrot feather is found in slow-moving freshwater lakes, ponds, streams and ditches and responds well to a high nutrient environment. It will grow in shallow water and on wet soil along a shoreline, so is well-adapted to moderate water fluctuations. It tolerates some salinity and is able to colonize brackish coastal waterways. The plant grows best in an environment where light can penetrate to the bottom but can occur as a floating plant in the deep waters of nutrient rich lakes. The perennial rhizomes exhibit an annual growth pattern and shoots begin to grow rapidly after overwintering. In the fall, plants typically die back to the rhizomes. Parrot feather appears to prefer warmer, milder climates but is not seriously affected by frost; although in northern latitudes emergent shoots and leaves have been killed by a hard frost. Once established, Parrot feather usually persists despite variations in the environment.

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Impacts to the Aquatic Ecosystem

Parrot feather has escaped cultivation and has spread into water bodies through intentional plantings and growth of plant fragments. The brittle nature of stems results in many fragments that root easily in moist soils to establish new colonies. Plant fragments with their robust leaves and stems, and thick waxy cuticle, can survive periods out of water. Fragments can spread by currents, water fowl, and by boats. Parrot feather is present year round and may provide cover but has very little food value for wildlife. It can form dense, monotypic stands that clog waterways, irrigation and drainage canals and can alter the physical and chemical characteristics of a water body through shading and by slowing the water flow. This dense growth leads to competition with native vegetation, potential flooding problems, and impedes recreational activities including boating, fishing, and swimming. Parrot feather has also been shown to provide excellent habitat for mosquito larvae.

Prevention and Control

While prevention of Parrot feather infestation is the best line of attack, in many cases it is too late as the species is already present. To help stop the spread of aquatic invasive plants including Parrot feather, some steps to follow include:

- Remove all plant fragments from the boat, propeller, and boat trailer to prevent introduction into new lakes and rivers.
- Rinse mud and debris from equipment and wading gear and drain all water from boat before leaving access area.
- Allow all equipment to dry for at least five days before transporting it to a new water body.
- Do not release aquarium or water garden plants into the wild; seal them in a plastic bag and dispose in trash.

Protecting water quality can help control overabundant aquatic plants and is best accomplished by limiting, reducing, or redirecting the input of external nutrients (primarily nitrogen and phosphorous) into waterways. Potential nutrient sources include runoff from lawns and golf courses, barnyards, agricultural fields, waste from livestock, pets and wildlife, and poorly functioning septic systems. Reductions can be achieved by planting low maintenance lawns, applying less fertilizer near waterways, using phosphorous free fertilizer, maintaining vegetated riparian buffers to absorb nutrients, increasing bank stability to reduce soil erosion, and maintaining proper aeration and good water flow. Not addressing the nutrient issues will lead to a perpetual need to control plant growth. The two challenges of Parrot feather control are to minimize damage to native plants and to develop a long term control.

Mechanical and Physical Control

Physical removal of Parrot feather is limited due to the plant's ability to rapidly spread through fragmentation. Mechanical controls such as cutting, raking, and underwater rototilling tend to increase the rate of infestation. Hand-pulling small areas may be effective, but care must be taken to remove the entire plant including emergent shoots, submersed shoots, roots and rhizomes, as well as all fragments or regrowth will occur. Dredging is expensive and usually not feasible for management. Physical barriers prevent growth by shading the bottom but will inhibit native aquatic growth.

Lake water lowering (drawdown) is sometimes used in cold winter climates to control Parrot feather. In this method, the lake water surface is lowered by several feet to expose the bottom sediments and Parrot feather plants to freezing conditions. Drawdown has been shown to be effective in the winter when the exposed plants are frozen (Wersal et al., 2013). In New Jersey, any drawdown of a waterbody may be subject to permitting from the New Jersey Division of Fish and Wildlife: state.nj.us/dep/fgw/fishperms.htm#lowering.

Biological Control

Introduced biological organisms have had limited success in the control of Parrot feather. Triploid sterile Grass Carp (White Amur) are herbivores that consume aquatic plants, but find the tough woody stems and high tannin content of Parrot feather to be unpalatable, so they are not a control option. In South Africa and Argentina, native leaf-eating beetles like *Lysathia* spp. have shown some promise in significantly reducing shoot biomass (Cordo and DeLoach, 1982; Cilliers, 1999). There have also been instances of native fauna like the North American beaver reducing Parrot feather biomass through herbivory (Parker et. al., 2007).

Chemical Control

Herbicides are the most common and effective means of controlling Parrot feather, but it is difficult to achieve complete control. Due to the waxy cuticle of the emergent leaves and stems which repels many

herbicides, a surfactant mixed with the herbicide may be required that can penetrate this cuticle. Care should be taken when applying herbicide spray. Researchers have found that the weight of the spray can cause the plant to collapse into the water, allowing the herbicide to be washed off before the chemical can be absorbed into the plant (Washington State, 1994). Herbicide formulations that can be used to control Parrot feather include: 2,4-D and imazpyr (Excellent result; broad spectrum systemic); diquat and glyphosate (Good result; broad spectrum contact); triclopyr (Fair result; selective systemic); and endothall (Fair result; broad spectrum contact) (Wetherdahl and Getsinger, 1988; Madsen et. al. 2007). A more detailed review of aquatic pesticide use can be found in Rutgers Cooperative Extension Fact Sheet FS386, "Aquatic Weed Control" (Hart, 2001). Treatment is most effective when applied to young actively growing plants, and no herbicide has been shown to be totally effective without repeat applications. The most appropriate means of selecting a specific treatment plan is to consult a licensed aquatic herbicide applicator that can provide treatment options and associated cost. When using chemical controls remember the following guidelines:

- The algae must be properly identified. Most herbicides control only certain plant types as indicated on the product label. You should contact an herbicide applicator to determine the appropriate method.
- Consider the use of the waterway to be treated. Most herbicides restrict the use of water until the herbicide has been degraded, inactivated, or dissipated.
- In New Jersey, the Department of Environmental Protection administers the regulations regarding application of chemicals to waterways. Applications require a permit and certified applicator that can be found at nj.gov/dep/enforcement/pcp.
- Calculation of water area/volume to be treated is needed for proper dosage.
- Method of application may affect your choice if a certain type of equipment is needed for treatment to be effective.
- Timing is important when deciding which herbicide to use. It is best to treat early in the season when just beginning to grow and not firmly established. This will reduce the amount of algae needed to be killed and reduce the chance of fish kills due to low dissolved oxygen caused by decaying plants.
- Water temperature affects the efficacy of some herbicides. Apply herbidcide when algae is actively growing with a compatible temperature. Label recommendations should be followed.

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Figure 1. (Left): Parrot feather showing growth form. Courtesy of University of Florda Center for Aquatic and Invasive Plants.

Figure 2. (Center): Growth of parrot feather, Myriophyllum aquaticum. Courtesy of Vic Ramey, University of Florda Center for Aquatic and Invasive Plants.

Figure 3. (Right): Photo courtesy of Mike Haberland.

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