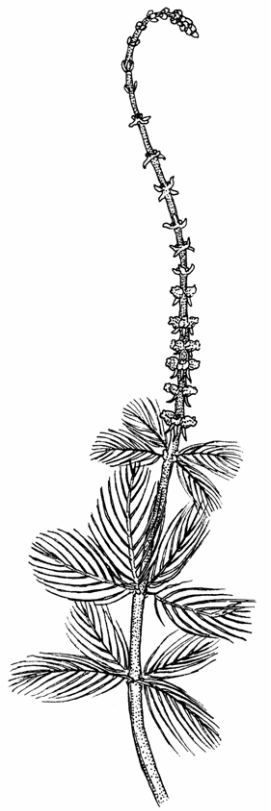
Eurasian Water-milfoil

Myriophyllum spicatum L.

Water-milfoil Family (Haloragaceae)



DESCRIPTION

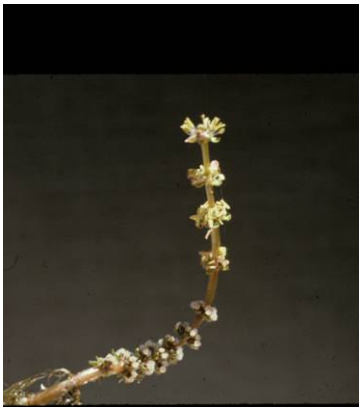
Eurasian water-milfoil is a non-native, perennial, rooted, aquatic plant with long stems that branch near the water surface to create a canopy of floating foliage. The leaves are in whorls of four on the stem; each leaf has 14–20 pairs of feathery leaf divisions. A spike of pinkish flowers produced at the stem tip emerges above the water surface and then falls horizontally when in fruit.

Eurasian water-milfoil closely resembles several native species of water-milfoil: Northern water-milfoil, *M. sibiricum* (also known as *M. exalbescens), M. humile, and M. farwellii*. The upper leaves of *Myriophyllum humile* and *M. farwellii* are alternately arranged on the stem, and flowers and fruits are borne in the leaf axils. Northern water-milfoil, which most closely resembles the Eurasian water-milfoil may be distinguished by the number of leaf divisions; northern water-milfoil has fewer (5–12) than the non-native species.

Stems - Eurasian water-milfoil has slender, smooth, 6–20 foot-long stems that are reddish-brown to whitish-pink. The stems are produced in clusters from a rooted base and float upward to just below the surface; they branch several times near the water surface. Broken stem segments, which are frequently found floating freely or washed up along the shoreline, can continue to grow and flower and also serve as dispersal units.

Leaves - Leaves are olive-green, about 2 inches long, soft, deeply divided, and feather-like. Each leaf has a central axis (midrib) and 14–24 very slender (filiform) segments on each side of the axis. The leaves are arranged in whorls of 3–6 (usually 4) at the nodes.

Flowers - The small flowers are clustered at the tips of the stems, which project above the surface of the water. The flowering spike is up to 8 inches long; the flowers are reddish and arranged in 4-flowered whorls along spike. Each flower has 4 tiny (⅛ inch-long) petals, 4 sepals, and 8 stamens.



Eurasian water milfoil flowers

Fruit - The 4-lobed fruit splits into 4 nutlets.

Roots - The roots are fibrous; floating stem fragments frequently develop adventitious roots which will take hold if they sink to the bottom.

DISTRIBUTION AND HABITAT

Eurasian water-milfoil can grow in a variety of aquatic habitats, but it prefers fertile, fine-textured, inorganic sediments in water 1–8 feet deep. It is an opportunistic species that invades disturbed lake beds, recreational waterways, and slow-moving streams. Optimal growth occurs in alkaline systems with high concentrations of dissolved inorganic carbon.

Native to Europe, Asia, and northern Africa, this plant was introduced to the United States around 1940, and has spread throughout much of North America from Florida to Quebec in the east, and California to British Columbia in the west.

Eurasian water-milfoil is common in lakes, ponds, and rivers throughout Pennsylvania. It grows best in mesotrophic to eutrophic situations and is much less likely to become a serious problem in low nutrient (oligotrophic) lakes.

EFFECTS OF INVASION

Dense canopies of Eurasian water-milfoil shade out native vegetation, alter the species composition of aquatic invertebrates and may impair the ability of some fish species to spawn. Due to the plant's ability to form dense stands, water recreation activities such as swimming, boating and fishing are impaired. The sheer mass of plants can also cause flooding and the stagnant mats that can create good habitat for mosquitoes. Milfoil mats can rob oxygen from the water by preventing the wind from mixing the oxygenated surface waters with deeper water. The dense mats of vegetation can also increase the sedimentation rate by trapping sediments.

REPRODUCTION AND METHODS OF DISPERSAL

Milfoil reproduces extremely rapidly and can infest an entire lake within two years of introduction. Although milfoil produces many seeds, most increase and spread of the species is apparently the result of fragmentation. In the late summer and fall the plants become brittle and naturally break apart. These fragments can float to other areas, sink, and start new plants. Milfoil also grows from fragments created by boaters or other disturbances during any time of year. Stem segments are easily transported from lake to lake on boat trailers or fishing gear.

CONTROL

Prevention should be a major goal of any control program since once milfoil becomes well-established within a water body, it is difficult or impossible to remove. Programs

should target recreational lake users and educate them on how to avoid transporting Eurasian water-milfoil from site to site. In addition, every effort should be made to maintain the low nutrient status of naturally oligotrophic lakes as a way of reducing problems with this and other invasive species.

Mechanical - Rotovation (underwater rototilling), installation of bottom barriers, hand pulling by divers, and dredging harvesters are the most common methods of Eurasian water-milfoil control. To be effective, all fragments must be collected and removed from the site. Manipulations of the water level, where feasible, may have an effect on the plant. Low water levels can desiccate populations and high levels will cause plants to decline by not giving them access to enough light.

Chemical - In smaller water bodies (350 acres or less), there has been some success using fluridone to control Eurasian water-milfoil and other aquatic weeds.

Biological - A native North American weevil (*Eurhychipsis lecontei*) has been found to feed and reproduce on Eurasian water-milfoil. This insect may be a useful biocontrol agent; however, although it seems to prefer Eurasian water-milfoil, it also feeds on native water-milfoils including *M. exalbescens* and *M. verticillatum*, both of which are state endangered species.

Other biological control methods, including a fungus (*Mycoleptidiscus terrestris*), are currently being studied. In some very limited situations triploid (sterile) grass carp may be useful. Stocking with grass carp is regulated by the Pennsylvania Fish and Boat Commission.

REFERENCES

Solarz, Susan, and Raymond M. Newman. 2001. Variation in host plant preference and performance by the milfoil weevil, *Euhrychiopsis lecontei* Dietz, exposed to native and exotic milfoils. Oecologia 126: 66-75.

Rhoads, Ann Fowler and Timothy A. Block. 2000. The Plants of Pennsylvania: An Illustrated Manual. University of Pennsylvania Press, Philadelphia, PA.

Rhoads, Ann Fowler and William McKinley Klein. 1993. The Vascular Flora of Pennsylvania: Annotated Checklist and Atlas. American Philosophical Society, Philadelphia, PA.

Internet resources - http://www.upenn.edu/paflora, http://www.invasivespecies.gov, http://tncweeds.ucdavis.edu

Invasive species fact sheet prepared by:
Ann F. Rhoads and Timothy A. Block
Morris Arboretum of the University of Pennsylvania
100 Northwestern Ave., Philadelphia, PA 19118
April 2000