

## CURLY LEAF PONDWEED

(*Potamogeton crispus*)

**Description:** Curly leaf pondweed, also referred to as curled pondweed or curly pondweed, is a member of the Potamogetonaceae or pondweed family. Curly leaf pondweed is a submersed, perennial aquatic plant. Stems of the plant are simple or slightly branched, somewhat flattened, and averages 1/16 of an inch in diameter. Submersed leaves of spring and summer foliage are reddish-green in color, oblong to obovate, crisped, alternate, approximately two to three inches in length, half an inch wide, with a prominent midvein, rounded tips, and margins that are serrulate and wavy in appearance. Leaves of winter and early-spring foliage are narrower, flexuous, and flat-margined with an acute tip. Flowers of the plant are small, somewhat inconspicuous, and arranged in three to five whorls per spike. Curly leaf pondweed fruits are brown, ovoid and approximately 1/16 of inch in length.



Curly leaf pondweed

### Plant Images:



Leaves



Stems and leaves

**Distribution and Habitat:** Curly leaf pondweed is native to Eurasia and is now distributed across most of the continental United States and into Canada. The plant can tolerate a wide range of climatic conditions, including very low water temperatures and low light intensities. Curly leaf pondweed is restricted to alkaline calcareous waters and is tolerant of slightly brackish and polluted water. The plant is mainly rooted in silt or clay but can also be found in gravel or sand. Curly leaf pondweed occurs in submersed aquatic plant communities that include rivers, streams, ponds, and freshwater lakes.

**Life History/Ecology:** Curly leaf pondweed is an aquatic, submersed perennial plant that behaves as a “winter annual” through the production of apices or summer dormant stem structures. Apices, also known as turions, develop in early spring from axillary buds located along the stem and tend to drop off after the end of May. Apices begin to germinate in the fall and develop plants in the winter that are narrower, more acute, and have flat-margined leaves when compared to spring or summer foliage. After the ice melts in early April, spring-summer foliage becomes predominate over the winter form. Flowering usually occurs from May to June. Dormant apices and seed production are completed from late June to August dependent upon water temperature. A single dormant plant can produce over 900 apices in one year. Approximately 960 seeds can be produced during one growing season from a single plant, but seed germination rarely occurs. Therefore, vegetative reproduction through dormant apices is more critical to the plant’s survival than seed production.

**History of Introduction:** Curly leaf pondweed is native to Eurasia, Africa, and Australia. The most likely period of introduction into North America was in the mid-1800s. The earliest collection of the plant was recorded in 1841-1842 in Philadelphia with distribution limited to the northeastern portion of the United States and a small portion of California prior to 1900. Curly leaf pondweed was discovered in the Western Great Lakes region after 1900, and encompassed the United States and most of Canada by 1978. In North Dakota, curly leaf pondweed has been reported from the lower reaches of Lake Sakakawea, Lake Audubon, the Missouri River below the Garrison Dam and the McDowell Dam in Burleigh county.

**Effects of Invasion:** Curly leaf pondweed can grow in dense stands, thus covering large areas of the water surface. The ability of the plant to quickly develop by spring or early summer can result in a reduction of water flow through irrigation canals, cause a restriction of water-based recreation activities, and a nuisance in fisheries. Curly leaf pondweed displaces native plant communities by rapidly growing above native aquatic species, thus impeding and reducing desirable plant production.

#### **Control:**

Management objectives for curly leaf pondweed control should involve prevention and maintenance. Once established, curly leaf pondweed is difficult to completely eradicate. Management efforts should include keeping beaches free of plant growth, opening boat lanes from the shore to open water, maintaining favorable plant cover for fish populations and restoring the diversity of submersed plant communities. Established populations of curly leaf pondweed should also be maintained to prevent further spread by fragmentation. Control measures may need to be conducted early in the year before apices and seeds are produced.

*Mechanical* - Cutting, harvesting, and rotoation may be used as a means to control the plant, although many plants may reestablish from the remaining roots. Harvesting consists of cutting curly leaf pondweed approximately 5 feet below the surface of the water, collecting by conveyer, and storing until disposed on land. Harvesting creates open areas of water by removing surface mats. Harvesting should be repeated throughout the growing season. Under water rototilling dislodges curly leaf pondweed roots by churning up to 8 inches into the sediment. Floating roots are removed from the water. Cutting is similar to harvesting, but plants should be removed from the water to prevent regrowth. Cutting curly leaf pondweed early in the growing season may prevent apices or turions from being produced. Rakes, drags, or nets can also be used to suppress or remove the plant. Aquashade, a non-toxic dye or colorant, can reduce infestations of the plant by limiting sunlight penetration, which reduces aquatic plant growth.

Water level manipulation, such as overwatering or drawdown can be an effective control measure to reduce the growth of the curly leaf pondweed. Overwatering or raising the water level leads to plants

not having access to enough light. Drawdown or lowering the water level can expose curly leaf pondweed to below freezing temperatures or can lead to dehydration. Raising water levels during the most vigorous growth period of curly leaf pondweed could prevent later colonization of shallower areas by late summer and fall drawdown.

*Chemical* - Several herbicides are available for curly leaf pondweed control. Herbicides that include diquat, endothall, or fluridone as an active ingredient have been successful in reducing curly leaf pondweed infestation. Caution should be used when applying herbicides because dead and decaying plants may upset the oxygen and carbon dioxide balance of the water. As a result, the aquatic fauna may be adversely affected.

Contact your local county extension agent for recommended use rates, locations and timing.

*Biological* - No insect biological control agents are available for curly leaf pondweed control. Grass carp may consume the plant, but generally are not considered an effective control measure for established stands of curly leaf pondweed.

#### **References:**

- Catlin, P. M. and I. Dobson. 1985. The biology of Canadian weeds. 69. *Potamogeton crispus* L. Can. J. Plant Sci. 65:655-668.
- Great Plains Flora Association. 1986. Flora of the Great Plains. Lawrence, KS: Univ. Press of Kansas. 1392 pp.
- Schmidt, J. C. and J. R. Kannenberg. 1998. How to identify and control water weeds and algae 5<sup>th</sup> Ed. Applied Biochemists, Milwaukee, WI 53218. 129 pp.
- Wehrmeister, J. R. and R. L. Stuckey. 1992. Life history of *Potamogeton crispus*. Michigan Botanist. 31(1):3-16.
- Curly leaf pondweed photograph courtesy of J. C. Schou/Biopix.dk.
- Leaves photograph courtesy of Minnesota Department of Natural Resources.
- Stems and leaves photograph courtesy of North Dakota Game and Fish.