

## Websites

<http://tncweeds.ucdavis.edu/esadocs/allipeti.html> -- This is a very extensive summary of all that is known about garlic mustard. Also includes abstracts of many other weeds.

[www.dnr.state.wi.us/org/land/er](http://www.dnr.state.wi.us/org/land/er) -- Go to invasive species, species, garlic mustard (DNR's summary of garlic mustard.)

[www.nps.gov/plants/alien/](http://www.nps.gov/plants/alien/) -- Alien plant working group. Good overview of information. Garlic mustard factsheet found at --- [fact/alpel1.htm](http://fact/alpel1.htm).

[www.dnr.cornell.edu/bcontrol/garlic.htm](http://www.dnr.cornell.edu/bcontrol/garlic.htm)  
Cornell's page on garlic mustard biocontrol.

<http://webriver.com/tn-eppc/manual/alliar.htm> -- B.E. Exotic Pest Plant Council's fact sheet on garlic mustard.

<http://ext.agn.uiuc.edu/wssa/> -- Weed Science Society of America.

<http://wiscinfo.doit.wisc.edu/herbarium>  
-- Checklist of Wisconsin vascular plants.

## Printed Material

WI Manual of Control Recommendations for Ecologically Invasive Plants – Available for \$3 from the Bureau of Endangered Resources, WDNR, Box 7921, Madison, WI 53707, or (608) 266-7012, or [kearns@dnr.state.wi.us](mailto:kearns@dnr.state.wi.us).

Adams: 608-339-4237	Marathon: 715-261-1230
Ashland: 715-682-7017	Marinette: 715-732-7510
Barron: 715-537-6250	Marquette: 608-297-9153
Bayfield: 715-373-6104	Menominee: 715-799-4654
Brown: 920-391-4610	Milwaukee: 414-290-2400
Buffalo: 608-685-6256	Monroe: 608-269-8722
Burnett: 715-349-2151	Oconto: 920-834-6845
Calumet: 920-849-1450	Oneida: 715-365-2750
Chippewa: 715-726-7950	Outagamie: 920-832-5121
Clark: 715-743-5121	Ozaukee: 262-238-8288
Columbia: 608-742-9680	Pepin: 715-672-5214
Crawford: 608-326-0223	Pierce: 715-273-3531
Dane: 608-224-3700	Polk: 715-485-8600
Dodge: 920-386-3790	Portage: 715-346-1316
Door: 920-746-2260	Price: 715-339-2555
Douglas: 715-395-1363	Racine: 262-886-8460
Dunn: 715-232-1636	Richland: 608-647-6148
Eau Claire: 715-839-4712	Rock: 608-757-5696
Florence: 715-528-4480	Rusk: 715-532-2151
Fond du Lac: 920-929-3170	St. Croix: 715-684-3301
Forest: 715-478-2212	Sauk: 608-355-3250
Grant: 608-723-2125	Sawyer: 715-634-4839
Green: 608-328-9440	Shawano: 715-526-6136
Green Lake: 920-294-4032	Sheboygan: 920-467-5740
Iowa: 608-935-0391	Taylor: 715-748-3327
Iron: 715-561-2695	Trempealeau: 715-538-2311
Jackson: 715-284-4257	Vernon: 608-637-2165
Jefferson: 920-674-7295	Vilas: 715-479-3648
Juneau: 608-847-9329	Walworth: 262-741-3190
Kenosha: 262-857-1945	Washburn: 715-635-3192
Kewaunee: 920-388-7191	Washington: 262-335-4477
LaCrosse: 608-785-9593	Waukesha: 262-548-7770
Lafayette: 608-776-4820	Waupaca: 715-258-6230
Langlade: 715-627-6236	Wausara: 920-787-0416
Lincoln: 715-536-0304	Wood: 715-421-8440

Additional garlic mustard bulletins are available from your county Extension office. Pub. 2000

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The rosette photo was contributed by Laurie Weiss, Milwaukee County UW-Extension. All other photos were contributed by Elizabeth J. Czarapata. For additional photos of invasive weeds, see [INVADING WEEDS – A Growing Threat to Wisconsin's Biological Diversity](#), © 1999 by Elizabeth J. Czarapata, P.O. Box 565, Muskego, WI 53150; email: [lee4betty@aol.com](mailto:lee4betty@aol.com)

# Garlic Mustard

(*Alliaria petiolata*)



## A Major Threat to Wisconsin's Woodlands



## Garlic Mustard...

- Displaces native woodland vegetation.
- Degrades wildlife habitat.
- Displaces rare plants.
- Can cause long term degradation of forests by shading out tree and shrub seedlings.

## Identification

**Growth:** Garlic mustard is a rapidly growing hardy biennial (two-year growth cycle). Its appearance changes dramatically from one year to the next (see pictures). With no controls, garlic mustard becomes so dense that it shades out native wildflowers within a few years of being introduced.

**Flowers:** White (not yellow), at the end of stems, four petals (mustard family),  $\frac{1}{4}$ " wide, only in second year plants.

**Seeds:** Small, black, 100 plus/plant.

**Leaves:** Rounded to kidney-shaped (1<sup>st</sup> year), larger toothed, heart-shaped leaves (2<sup>nd</sup> year).

**Roots:** Taproot is slender, white, S-shaped curve at the top of root.

**Blooming Period:** Late April to early June.

**Habitat:** Generally requires some shade; found in upland and floodplain forests, savannas, yards, along roadsides, stormwater entry points, along trails, and at the base of large trees. It is less tolerant of acidic soils. The invasion of forests usually begins along the wood's edge.

**Odor:** Garlic mustard has a distinct odor of garlic when its leaves are crushed (especially during the spring and early summer.

**First year plant:** (see photo right)  
Seeds germinate in early April.

Leaves: Clusters of 3-4  
Rounded to kidney-shaped  
Rise 2-6 inches from the ground  
Scalloped edges  
Dark green

Similar species: Violets (not 4-petaled)  
and ground ivy, also known as Creeping  
Charlie (purple flowers)



**Second year plant:** (see photo right)

Height: 1-4 feet tall

Flowers: White (not yellow)  
Four  $\frac{1}{4}$  inch petals  
Blooms late April to early June  
Occur on the end of the main  
stem and side branches

Leaves: Heart shaped to  
triangular, 2-3" across, large  
teeth, alternate on the stem

Seed capsules appear soon after  
flowering begins. Seeds within  
are small, turn black, 100 plus/plant,  
produced in a single row

Root: Taproot is slender, white  
s-shaped curve near the top

Plants die once seeds are dispersed  
in July or August





## Garlic Mustard (*Alliaria petiolata*)

Garlic mustard, native to Europe, was introduced to North America by early settlers for its supposed medicinal properties and use in cooking. Since it is free from natural enemies of its homeland, garlic mustard has a competitive edge over native vegetation. Garlic mustard invades woodlands displacing native wild flowers and tree seedlings. It spreads rapidly and can dominate the forest floor within ten years. It not only invades disturbed habitats, but readily spreads into high quality forests. Garlic mustard provides habitat and food for few wildlife species. Once canopy closure is complete, most native vegetation is lost.

## Life History

Garlic mustard is a biennial that produces hundreds of seeds per plant. In Wisconsin, seeds may germinate the following year, and may remain viable for seven years or more. Seeds germinate in early April. First-year plants appear as basal rosettes in the summer season. They remain green through the following winter, making it possible to check for the presence of this plant in woods throughout the year. Garlic mustard begins vegetative growth very early in the spring, and shoots up a flowering stalk that blooms from late April through early June. Seed capsules begin to form within days after flowering begins. Seeds become viable quickly and are disseminated in July and August when the plant dies.

## Spread

Garlic mustard spreads by seed carried on the fur of mammals such as deer, horses, and squirrels, by flowing water, and through human movement in pants cuffs, on shoes, via camping equipment, and by vehicles. It is likely that isolated infestations, especially in public places, have been carried in by people visiting from an infested area. Seeds in the soil are easily carried in the soles of most athletic shoes or hiking boots. Birds are likely carriers to places generally inaccessible to other animals or people.



DEVELOPING SEED PODS

## Hand Pulling

For smaller infestations or where large groups of people are involved, hand pulling garlic mustard can be effective. Tamp the soil down after pulling to limit further seed germination. If plants are pulled before budding begins, they may be scattered about the area to dry. Do not put pulled plants in piles where roots may stay moist and development can continue. Once flowering has begun, all plants must be bagged. Garlic mustard can set seed just days after flowering begins, even after it is pulled! Pulled plants may be put in plastic bags or large paper bags used for composting. (Do not compost garlic mustard! Few compost piles produce enough heat throughout to destroy all garlic mustard seeds.) Bagged plants should be disposed of by burning, burying deeply in an area that will not be disturbed, or landfilling. (Do not burn plastic bags!) Call the Bureau of Endangered Resources (608-266-7012) if you have difficulty getting permission to landfill garlic mustard. Let garlic mustard collected in paper bags dry thoroughly before burning. Leaving the top of the bag open. Poking holes in the sides to allow air to circulate will speed the drying process. Protect bags from rain.

## Cutting

Research has had conflicting results thus far. Some sources indicate that cutting garlic mustard plants as near to the soil surface as possible just after the flower stalks have elongated but before the flowers have opened has been very effective in killing garlic mustard plants, preventing seed production, and avoiding soil disturbance. Others say that garlic mustard resprouted several times when they used this technique, making it more labor intensive. Additional research is needed to establish adequate data.





IN FLOWER

## Distribution and Habitat

Garlic mustard is a problem plant from the Northeast to the Midwest, north to lower Canada and south to the Carolinas, from the east coast west to Utah. In Wisconsin, invasions are most severe in the eastern and southern regions of the state, although scattered populations have been noted statewide.

Garlic mustard grows best in the shade, but will occasionally grow in full sun along roadsides. It generally avoids sunny, hot locations. Look for it along stream banks, forest edges and at the base of trees.

## Preventing Further Spread

Prevention is the best way to stop the continued spread of garlic mustard. To prevent further spread, follow the steps below:

1. Clean clothing and shoes thoroughly after walking or working in an infested area. (Seeds lodge in cracks of hiking boots and athletic shoes.)
2. Survey your area for garlic mustard plants. Plants can be located any time they are not covered by fallen leaves or snow.
3. When you find an infestation, determine the outer edges of the population and remove plants working from the least infested area to the most infested area.
4. Monitor woodlands carefully and frequently that are not infested. Removing one or two plants (before they go to seed) is much easier than removing many.
5. Alert land managers where there are infestations on public property and seek their support and assistance for control efforts. Alert neighbors. Seek help, if necessary, to control spread. (Use local newspapers, cable access channels, fliers, speak to civic organizations, Scouts, etc.).

## Control Methods

Any control method selected must be repeated for several years until the garlic mustard seed bank is depleted. Vulnerable areas, especially woodlands, should be monitored annually in the spring to detect new invasions early and/or to prevent re-occurrence. More research is needed to determine longevity and the most effective control techniques.

## Herbicides

Do not use herbicides unless absolutely necessary. For toxicology information on pesticides, check the Web site: <http://ace.orst.edu/cgi-bin/mfs/01/>. Severe infestations can be controlled by applying a 1 to 2% solution of Roundup or Touchdown (glyphosate) to the foliage of individual plants and dense patches in October or early spring. At these times most native plants are dormant, but garlic mustard is green and vulnerable. Glyphosate is a nonselective herbicide that will kill or injure all green nontarget plants if it comes into contact with them. Use caution during application, and spray so that herbicide neither drips from the garlic mustard leaves nor drifts onto adjacent desired vegetation. Other herbicides that control mustards are expected to also control garlic mustard. This includes 2,4-D, triclopyr (Garlon) and the combination of these products (sold as Crossbow). Herbicide use is safest for native plants if done during their dormant season. Read and follow all label directions.

## Biological Control

Scientists are conducting research on biological control of garlic mustard, but at this time, biological control agents are not available in the U.S. to suppress this weed.



INFESTED WOODS