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Selected web sites:  
[www.iowadnr.com/forestry/invasive.html](http://www.iowadnr.com/forestry/invasive.html)  
[www.invasivespecies.gov/](http://www.invasivespecies.gov/)  
[www.nps.gov/plants/alien](http://www.nps.gov/plants/alien)  
[www.ipm.msu.edu/garlicMge.htm](http://www.ipm.msu.edu/garlicMge.htm)  
[www.driftlesslandstewardship.com/id74.htm](http://www.driftlesslandstewardship.com/id74.htm)  
[www.mipn.org/](http://www.mipn.org/)

**CREDITS**

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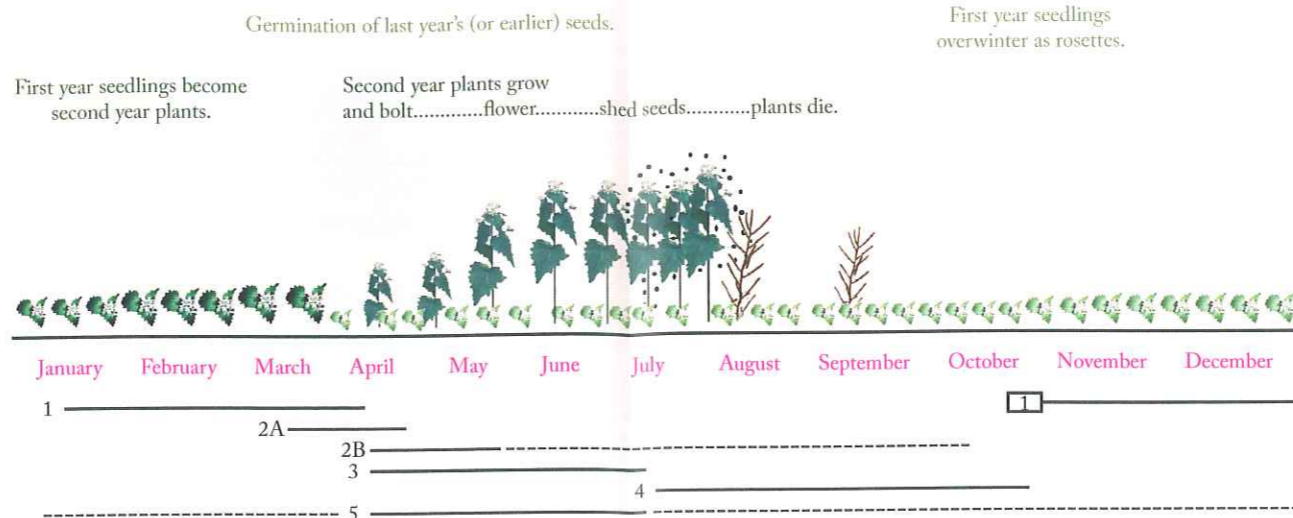
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**A YEAR'S CYCLE OF GARLIC MUSTARD GROWTH AND CONTROL TECHNIQUES**



**1. Herbicides**

**November through March:** Spray with 1% to 2% glyphosate (e.g. Roundup) from late fall until early spring, whenever temperatures are above freezing and native plants are dormant. Garlic Mustard photosynthesizes through the winter; dormant native plants will not be injured. Garlic Mustard may die very slowly during these cold months; be patient. Spraying is most effective in early spring, when plants are actively growing.

**Other seasons:** Glyphosate may be used on large infestations in low-quality sites throughout the year. Other faster acting broadleaf herbicides will be more effective once plants start flowering (Mid-late spring). Spraying during the growing season will kill non-target plants.

**2. Prescribed Fire and Torching**

**2A: Early Spring:** Spring burns may be useful in attacking large infestations. Burns ideally are timed to kill newly-emerged seedlings and simultaneously set back bolting second-year plants; April is often ideal. Follow-up is imperative to remove resprouts and unburned Garlic Mustard. Continue with annual burns. NOTE: Fire produces a bared seedbed that stimulates germination of Garlic Mustard seeds; do not be fooled if infestations appear to worsen - the seedbank is being rapidly depleted.

**2B: April-May, into October (if germination continues):** Propane torches with a long wand rapidly kill blankets of newly emerged seedlings. Such torching is not effective on older plants.

**3. Hand Pulling and Mechanical Control**

**April through June (or until seeds start shedding):** Any remaining second-year plants must be removed to prevent seeding and further spread. Hand pulling is labor intensive but very effective. Try to pull the entire root. Once flowers have opened, flowering spikes (or the entire plant) must be removed from the site; seedpods will continue to mature and spread seeds from pulled plants. Burn, bury or landfill removed plants and torch first-year seedlings.

An alternative is to use a powerful weed whip before seeds mature, and to shred the plants from the top down, through the base, to remove the root crown. First-year seedlings can be pulverized at the same time.

**4. Avoid Spreading Seeds**

**July to autumn leaf-fall:** Once seeds start shedding, stay away from Garlic Mustard; keep hikers and vehicles away. All are likely to spread seeds and worsen infestations.

**5. Monitor Sites**

**April until seeds start shedding:** Return to treated sites every few weeks to catch resprouting plants and new growth.  
**Throughout the year:** Walk deer trails, streams, and other paths to locate and treat new infestations. Flag, map or GPS infestations and monitor them annually.

# Garlic Mustard

## *Alliaria petiolata*



A SERIOUS THREAT  
TO  
Iowa's Woodlands



### What is Garlic Mustard?

- A rapidly spreading, highly invasive non-native plant.
- Introduced from Europe in mid-1800s for medicinal and herbal uses.
- Came to U.S. without predatory beetles or other natural controls.
- Threatens to rob us of healthy, diverse native woodlands.

### What is Garlic Mustard's Threat to Iowa?

- Has no natural growth controls.
- Spreads rapidly, grows tall, becomes extremely dense.
- Within a few years, dominates woodland understory.
- Crowds out understory wildflowers, ferns and tree seedlings.
- Seriously degrades or destroys high quality woodlands.
- Destroys wildlife habitat.
- Single plant produces hundreds of seeds, which remain viable 5 years or more.



### What does Garlic Mustard Look Like?

Identifying traits include *white flowers with four petals*; plant parts have *garlic-like odor* when crushed. Young plants may resemble creeping charlie or violets.

Garlic mustard, a biennial, completes its life cycle in two years.



**First-year plants:** Seedlings appear late spring to early summer, and throughout growing season as weather permits, either as scattered individuals or as dense ground layer. Rounded or heart-shaped leaves with scalloped edges form low rosettes that stay green through the following winter.

### Where is Garlic Mustard Found?

- Prefers shaded or semi-shaded areas (upland and floodplain forests, shrublands, shaded yards...).
- Spreads rapidly along trails, streams, forest edges, and roadsides, and from these sites enters interior woodlands.
- By 2004, had spread to 30 states and 80 Iowa counties.
- Especially heavy concentrations in eastern Iowa forests.



**Second-year plants:** April into June, rosettes become more robust and send up flowering stalks with triangular to heart-shaped, coarsely toothed leaves. Stems 1' to 3' tall. Clusters of small, white, four-petaled flowers at tips of stems.



**Seed pods** begin forming soon after the plant starts flowering. Green, thin, elongated pods enlarge and turn grayish-brown. Seeds are shed mid-summer. Plants die.

### Seeds Are Spread By:

- Deer and other animals (on fur, feet)
- Flowing water
- People (on shoes, clothing, gear)
- Bicycle and car tires, mowers, ORVs

*Limit spread* by staying out of Garlic Mustard in mid-summer when seeds are shedding. Rigorously clean tires, shoes, clothing, and mowing machinery that may carry seeds.



### How Can Garlic Mustard be Controlled?

Successful control depends on:

- Routine monitoring, early detection.
- Removing new infestations immediately and thoroughly.
- Attacking established invasions with multiple techniques.
- Careful, continued follow-up.

By doing the *right thing* at the *right time*, this aggressive invader **CAN** be controlled. Delaying control efforts will lead to rapidly expanding invasions that are far more difficult to control.

Infestations are likely to require multiple control techniques. Control may begin with any of the recommended techniques (see opposite page), and at any time of year. In general, the younger the plants, the easier the treatment. Work from the outer edges of infestation inward. (For more details see back side.)

Once control commences, continued efforts are required for several years while seedbank is depleted; skipping a year will create a new crop of seeds, setting efforts back significantly.

Control techniques must be correctly executed. Search the web, or talk with experienced land managers for more information.

**DON'T GIVE UP!** Continued efforts bring success. Biological controls are now in the testing state.