

Invasive Species Update for Land Managers

Garlic Mustard (*Alliaria petiolata*)

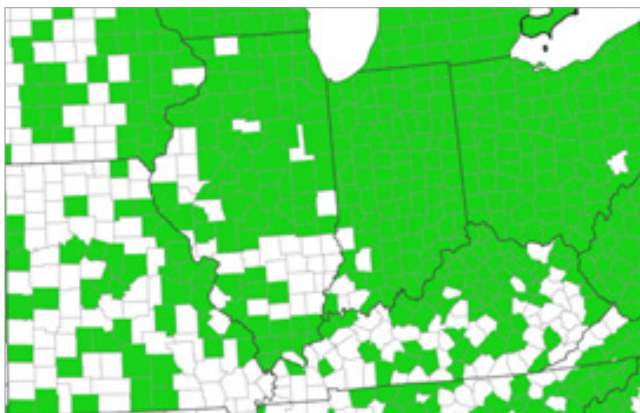
Garlic mustard (*Alliaria petiolata*) is a high priority invasive species for Illinois. Large infestations of this biennial forb on public and private lands limit the growth and productivity of native plants and threaten the long-term health of forests, restricting how we use and enjoy forests now and in the future.

- **Status: Highly invasive.**
- Family: Brassicaceae (Mustard family)
- Produces many seeds and spreads quickly.
- Grows densely and crowds out native plants.
- Monitor forests yearly to prevent infestations.
- Management options: Hand pulling, prescribed burns, herbicide.

Impact on Illinois forests

Garlic mustard's early spring growth can quickly cover the forest understory. Infestations form a monoculture that competes with native plants for light, water, and nutrients. This threatens wildflowers, tree seedlings, insects, wildlife, and future forests. Large populations reduce nutrients in the soil and release allelopathic compounds that slow the growth of other plants.

Infestations impact the ecosystem and reduce the ability to harvest timber, hunt, collect mushrooms, enjoy spring wildflowers, watch birds, and spend quality time in beautiful, healthy forests.



Garlic mustard distribution by counties. As of 2022, it has been reported in 70 of Illinois' 102 counties. Source: EDDMapS.



Garlic mustard seeds spread easily and plants are difficult to remove once established. Photo: Christopher Evans.

Garlic mustard is native to Europe and was first recorded in North America in 1868. This potherb was historically eaten in early spring when few greens were available. It was first reported in Illinois in 1918 and by the late 1980s was recognized as a problem species. As of 2022, garlic mustard has been reported in 70 of Illinois' 102 counties. Eight states have declared this invasive as a prohibited or noxious weed. Illinois does not currently mandate or regulate it.

Identification

In Illinois, garlic mustard is commonly found in shaded and semi-shaded woodlands. It has a biennial growth cycle, (Fig. 1). First- and second-year plants will grow together and in large infestations will rotate dominance in the landscape every other year. Garlic mustard is easiest to identify in spring when plants are flowering.

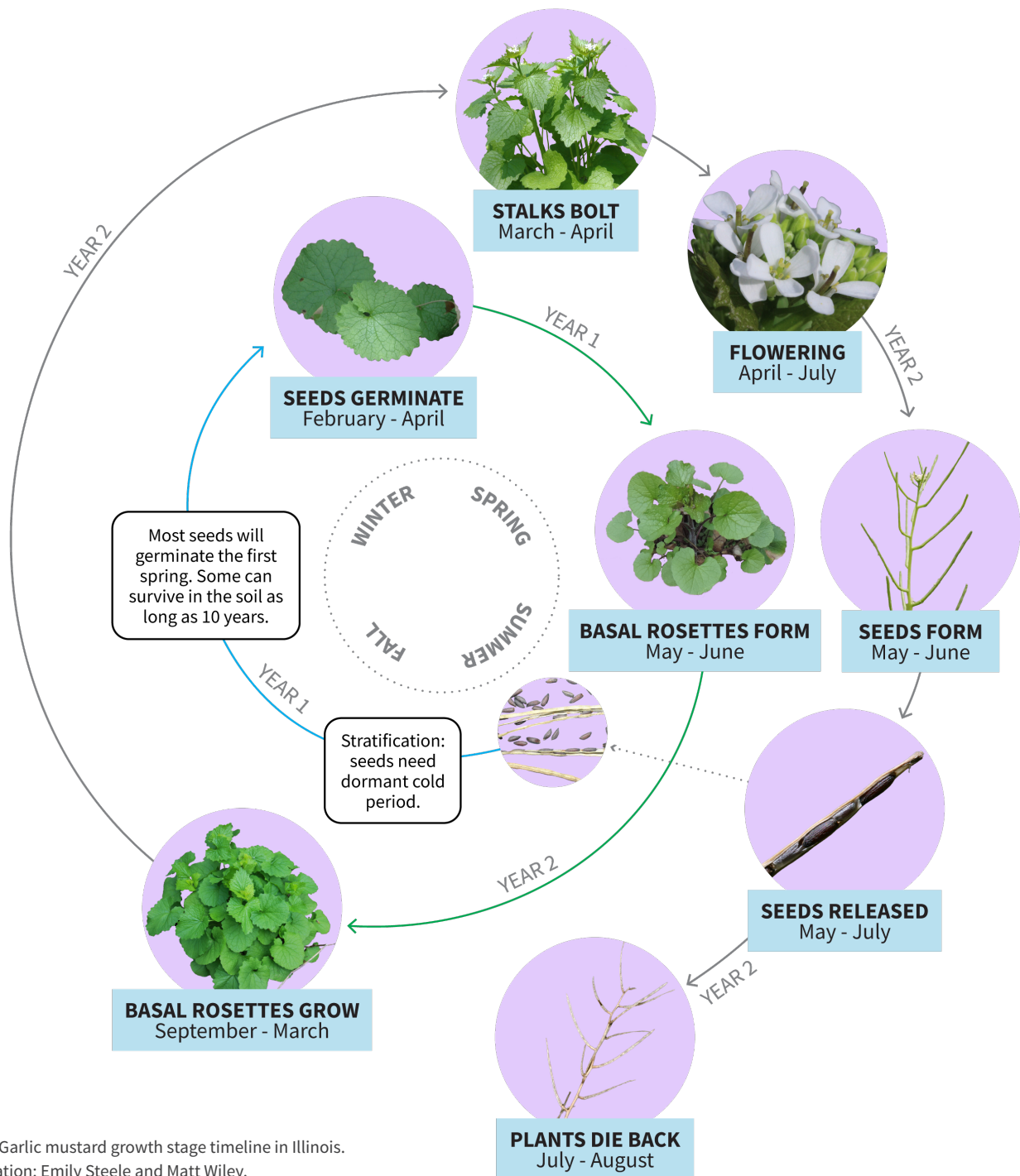


Fig. 1: Garlic mustard growth stage timeline in Illinois. Illustration: Emily Steele and Matt Wiley.

Year 1: Seeds require a stratification of at least 8 months. Most seeds germinate in spring, as early as February, with some continuing through fall. Seeds can survive in the soil up to 10 years. Plants grow into multi-stalked clusters of low-growing basal rosettes. Leaves are kidney-shaped with rounded scalloped edges that smell like garlic when crushed. The plant will overwinter as a basal rosette. First-year plants, can easily be overlooked at low levels.

Year 2: In the early spring, basal rosettes will have a surge of growth as they bolt and bloom. The flowering stalk is 1- to 4-feet tall with triangular, toothed edged leaves. Its flowers have four white petals. Seeds form in upright silique pods. As plants die, they dry and release an average of 360 black seeds in early summer. Large plants can produce more than 8,000 seeds. Clusters of dead dry stalks will likely have first-year germinates nearby.

Management strategies

Removing garlic mustard is a multi-year process that focuses on preventing at least 90% of plants from producing seeds to prevent spread (Pardini, 2009). Be prepared to manage annually for at least five years to deplete the seedbank and plan for long-term monitoring to prevent reinvasions. Sporadic management can make infestations worse.

No management method is entirely effective. Before treatment, develop a long-term strategy that considers available time and labor resources, as well as the infestation size and location. Land managers face competing obligations; prioritizing sites for management is important for success. Monitor for new or growing populations along pathways of spread and focus on treating manageable garlic mustard populations. Top priority sites are new invasions, satellite populations, plants near trails and streams, and the leading edge of infestations. To help prioritize sites, explore a management decision tree in the Midwest Invasive Plant Network's Garlic Mustard Guide at <https://bit.ly/3MNx4s0>.

In Illinois, there is a 6- to 8-week window in spring to control second-year plants before they produce seed. Do not attempt removal if plants are dry and seeds are falling out; this will further its spread.

Mechanical removal

Remove plants after they bolt and before flowering.

Hand pulling: These shallow-rooted plants are easy to pull from the soil once they bolt. Pulling is labor intensive and may only be practical for small

infestations or if a lot of people are available. Grasp the stalks at the base and gently tug to remove the S-shaped root. Plants with flowers or fruit should be put in bags. Leave tied bags in the sun for several days to kill the seeds before throwing bags away.

Consider hosting a garlic mustard pull volunteer event for sites that would otherwise be damaged by herbicide or prescribed burn control.

Mowing/Cutting: This method works for large populations of bolting plants. Cut stalks at ground level to eliminate seed production. Stalks with siliques can still form viable seed.

Prescribed fire

In forest communities adapted to fire, a prescribed burn can help control large infestations and stimulate native plant growth. Always follow state and local regulations and safety protocols. Managers need an approved plan and a permit from the Illinois EPA. Explore resources for implementing a prescribed fire at go.illinois.edu/PrescribedFire.

A mid-intensity burn in the spring is most effective. A handheld propane torch can also be used for spot treatments. Fire will remove leaf litter and prompt seeds to germinate. You can treat the new seedlings with herbicide to deplete the seedbank faster.

- **Early spring burns** target basal rosettes and bolting plants but can harm early wildflowers.
- **Late spring burns** target new seedlings and basal rosettes but can damage actively growing plants.
- **Fall burns** can reduce basal rosettes.

Research Update

Midwestern researchers recently explored the time frame needed to apply herbicides in order to prevent seed production (Roth, 2021).

Results: Applying Glyphosate and Triclopyr during the flowering stage reduces viable seed production. This was not 100% effective, so do not use this as a primary method to control garlic mustard. This gives land managers an extra 2 to 3 weeks to apply herbicide to garlic mustard in the spring.



Chemical control

Herbicide can be a low-cost, low-labor option for large infestations. Always read and follow product labels before use. Avoid impacting desirable plants with herbicide overspray. Apply enough herbicide to wet foliage, but not so much that it drips off. Anyone who applies pesticide on public lands must be licensed. Learn more at extension.illinois.edu/PSEP.

Use Glyphosate or Triclopyr to treat basal rosettes and bolting plants. Apply in early spring or fall. Late applications, during or after flowering, can reduce viable seed production but are not entirely effective.

Concentrations

- **Glyphosate**, 1% to 3% v/v diluted in water.
- **Triclopyr**, 1.5% v/v diluted in water.

Deer exclusion

White-tailed deer move seed and avoid eating garlic mustard, so infestations can increase herbivory pressure on native plants. This can reduce native plant abundance and allow garlic mustard to increase in dominance. Exclude or manage large deer populations when removing garlic mustard (Garlic Mustard in the Midwest, 2021).

Biological control

Researchers continue to explore if European aphids that feed on garlic mustard can be used for control.

No management

Long-term monitoring has provided some evidence that long-standing garlic mustard populations, at least 50 years old, may be self limiting and could decline without management (Blossey, 2021). These findings are not well supported (Garlic Mustard in the Midwest, 2021).

Stop the spread of invasive species

Keep garlic mustard out of your forest: If visiting other properties, stay on established roads and trails and clean boots, tires, and horse hooves before returning to your property.

Monitor for invasive species regularly: Actively survey for invasive species whenever in the woods. Monitor along edges, creeks, trails, and in disturbed areas. Mark plant locations with a map app or flags.

Work with neighboring property owners: Discuss concerns about invasives with neighboring property owners and plan to work together to manage them.

Report sightings: Stay up to date on invasive species in your area. Report sightings through the EDDMaps app or online at www.eddmaps.org.

More resources

Explore garlic mustard videos, guides, and handouts, and get in touch with an Extension educator at go.illinois.edu/GarlicMustard.



Related organizations

- [Midwest Invasive Plant Network](#)
- [Illinois Department of Natural Resources](#)
- [Illinois Forestry Association](#)

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