

Forest Health



Invasive Plant Hit List: Garlic Mustard

by Jeff Stringer and Thomas Barnes

Garlic mustard (*Alliaria petiolata*) is a fast-growing (biennial) herbaceous broad-leaf weed from Europe, first reported from Long Island in 1868. This species is now a common invasive exotic. It is a habitat generalist occurring in agriculture, rights-of-way, and disturbed and undisturbed hardwood forests. It invades the understory of many woodland types and quickly carpets the forest floor.

The invasive nature of the species is characterized by self pollination and abundant seed production. Seeds are dispersed by water, wildlife, and humans through mowing, automobile tires, and muddy shoes. It can rapidly colonize any site resulting in the loss of native species including spring ephemerals, woodland flowers, and other important understory species. Typically, movement is enhanced by activities that scatter seed like mowing or clearing ground. It can grow on a wide range of soils and sites but does its best on highly productive soils. Most hardwood forests are at risk from invasion, particularly if they have rivers or streams running through them, are located next to roads or agricultural land, or have foot, horse, or vehicle trails/roads.

Identification and Life Cycle

Identifying garlic mustard and understanding its life cycle will help to develop a successful control plan. Garlic mustard is a cool season biennial herb and the first year vegetative plant is characterized by a rosette of triangular heart shaped coarsely toothed leaves growing close to the ground (Fig. 1). Rosettes remain green through the winter and are one of the few herbs with green leaves this time of year. During the second year the rosettes produce a two to three and a half foot tall green flower stalk in April into early May (Fig. 2). The flower stalks contain numerous small clusters of white cross-shaped flowers (typical of the mustard family) that ripen quickly into slender shiny black pods. Some native herbs also produce white flowers on similarly sized stalks such as cresses, toothworts and saxifrage and may grow in the same general area with garlic mustard but these native species have very different basal leaves. The plants die by late June and the brown seed stalks remain visible and will hold viable seed throughout the remainder of



Photos courtesy: Jeff Stringer

Figure 1: First year invasion of garlic mustard in a Kentucky woodland (above). Close-up of first year garlic mustard basal rosette in March (left).

the growing season. The seed can remain viable in the ground for two years and in some cases up to six years.

Woodlands at Risk

As with most invasive species, preventing or reacting quickly to invasion is critical. Once garlic mustard is well established it can harm native plants. Scout for garlic mustard in the fall or early winter when the basal rosettes are clearly visible. It is most probable that the invasion will occur along edges of the woodlands, woodland trails and roads, areas next to rights-of-way or fields and along rivers or streams and you should regularly scout these areas. However, it can quickly spread and you are likely to find plants far away from these sites. Ground that is highly productive is also most likely to be at risk for invasion.

Control

Effective control means reducing or hopefully eliminating garlic mustard plants with little impact to native co-occurring species. Because it is a biennial with seeds that remain viable for several years, control is required for a number of years. Hand pulling individual plants may be possible in the earliest stages of an invasion. If you pull individual plants, make sure to get the deep, straight, tap root fully removed and create as little disturbance to the surrounding area as possible.

Garlic Mustard

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If hand pulling is not possible, mowing or herbicide application at the correct time is critical to minimizing the loss of native species and to control this weed. If mowing is used, allow seed stalks to grow approximately one foot tall and mow BEFORE flowers mature and produce seed. Repeated (typically two or three years) of this type of mowing is required. However, mowing at this time of year can also result in the loss of native species.

Herbicides can be effective in killing garlic mustard but these herbicides will also kill native broadleaf herbs. Judicious use of a herbicide is recommended only when individual plants can be spot sprayed without contacting adjacent native plants or when garlic mustard plants fully cover the area. The best time to apply herbicide is during the dormant season (fall through very early spring) prior to the emergence of spring ephemeral wildflowers. Label rates state that foliar applications of broadleaf herbicides should be applied when temperatures are above 50 degrees during the day. Limited research and experience has shown glyphosate to be one of the best options. Other herbicides such as 2, 4-D that are somewhat less harmful to grasses or other native plants have been found to be somewhat effective. Because this is a biennial, any herbicide will need to be applied in successive years and always follow up any treatment by scouting the area and retreat if necessary.

The key to controlling this species is to stop seed production. By stopping seeding for several years the invasion can be slowed and potentially stopped.



Figure 2. Mature, two-year-old garlic mustard in bloom (May).

Photo courtesy: Chris Evans, River to River CWMA, Bugwood.org

Table 1. Control methods for garlic mustard (*Alliaria petiolata*)

| Method | Timing | Details and Cautions |
|--|--------------------------------------|---|
| Hand pulling | any time | Make sure entire long tap root is removed. If seeds are present, bag the flower/seed stalks. |
| Mowing weed eating | early to mid spring | Allow flower stalks to emerge 1 foot tall and cut prior to seed development. Do not mow after seeds have developed. Mowing rosettes in fall or winter will not kill the majority of the plants. |
| Herbicide ¹ glyphosate | fall to late winter and early spring | Foliar applications of 2% glyphosate. Accord is labeled for use in woodlands. Use other glyphosate products for other areas ² . For later winter or early spring applications make sure spraying is early enough or directed spray to avoid spring ephemerals. |
| Herbicide ¹ 2, 4-D /triclopyr | fall to winter | Foliar application 1 to 1.5% Crossbow. Avoid native plants. Can not be used in areas designated for timber production. |
| Herbicide ¹ 2, 4-D | fall, winter, early spring | Foliar application 1 to 1.5% of 2, 4-D herbicide. May require multiple applications. |

¹ Other herbicide brands can be used for garlic mustard. The herbicides that are listed are those that have been used regionally.
² There are a large number of brand names for glyphosate herbicides. Many are for use in fields or fence rows. Few such as Accord are labeled for use inside a forest (see Kentucky Woodland Magazine 1(1) for more information on glyphosate herbicides).

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