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VEGETATION MANAGEMENT GUIDELINE

Garlic Mustard (*Alliaria petiolata* (Bieb.) Cavara & Grande)



Photo by Kenneth R. Robertson, INHS

SPECIES CHARACTER

Description

Garlic mustard produces a characteristic fragrance of garlic from all parts of the plant. Adult plants grow 2-48 inches (5-125 cm) high. Basal rosettes have dark green, kidney-shaped leaves that differ somewhat in shape from the sharply-toothed, triangular, alternate, petioled leaves on the stems. In Illinois, garlic mustard usually blooms in May. Numerous small white flowers, 0.25 inches (6-7 mm) across, are borne in a terminal raceme at the apex of the stem, and also at some leaf axils. Plants usually produce 1 flowering stem, but may have as many as 10 stems from a single root. Each flower is composed of 4 white petals that narrow abruptly at the base. Black seeds are produced in 1-4.7 inch (3-12 cm) long, narrow, linear capsules called siliques.

Similar Species

Garlic mustard is easily distinguished from all other woodland mustard plants by its characteristic odor of garlic and the 2-4 foot (0.6-1.2 m) tall flower stalks covered with numerous small white flowers in May. In northern Illinois, garlic mustard is the only tall, white-flowered, four-petaled plant that blooms in May. The alternate, coarsely toothed, broadly triangular stem leaves with a distinct petiole are also characteristic. The garlic odor gradually dissipates by autumn, and garlic mustard rosettes may then be mistaken for violets (*Viola* spp.) or immature white avens (*Geum canadense*). Garlic mustard can be

distinguished from these species by examining the roots. Garlic mustard has a white slender taproot, with a characteristic crook or "s" shape at the top of the root, just below the base of the stem. Garlic mustard should be accurately identified before attempting any control measures. If identification of the species is in doubt, the plant's identity should be confirmed by a knowledgeable individual and/or by consulting appropriate books.

Distribution

Garlic mustard is native to Europe, and also occurs in northern Africa, Sri Lanka, and India. In North America, garlic mustard is now distributed from Quebec and Ontario, south to North Carolina and Kentucky, and west to Kansas and North Dakota. In Illinois it occurs in at least 41 counties. It is abundant and widespread in the northern half of Illinois, and occurs south to a line from Calhoun to Clark County, with a local occurrence in Jackson County in southwestern Illinois.

Habitat

This species occurs most frequently in upland and floodplain forests, savannas, and along roadsides. It invades shaded areas, especially disturbed sites, and open woodland. It is capable of growing in dense shade and occasionally occurs in areas receiving full sun.

Life History

Garlic mustard is a biennial herb. Seeds germinate in early spring, young plants overwinter as basal rosettes, and adults bloom from May-June the following year. Each plant dies after producing seed. Seeds disperse when the siliques burst at maturity in August. Seeds have a 20 month dormancy period and do not germinate until the second spring after ripening. The species reproduces readily from the numerous seeds produced.

Effects Upon Natural Areas

Garlic mustard aggressively has invaded numerous forested natural areas and is capable of dominating the ground layer in many areas. It is a severe threat to many natural areas where it occurs because of its ability to grow to the exclusion of other herbaceous species.

CONTROL RECOMMENDATIONS

RECOMMENDED PRACTICES IN NATURAL COMMUNITIES OF HIGH QUALITY

Initial effort in areas of heavy infestation

Fall or early spring burning is an effective control treatment in oak woods. Repeated burns over several years may be necessary to achieve adequate control and to eliminate plants produced from the seed bank. Prescribed fires should be of sufficient intensity to burn the affected site thoroughly. Low intensity fires that leave unburned areas will not control garlic mustard effectively. Any isolated plants that are not burned should be removed by hand prior to flower production.

Research by Victoria Nuzzo indicates that cutting flowering stems at ground level results in 99% mortality, while cutting at 4 inches (10 cm) above ground level produces 71% mortality and reduces total seed production by 98%. Plants cut near ground level when in full flower usually do not resprout. Viable seed may be produced after stems are cut: pending further research, cut stems should be removed from the site when possible.

The Nature Conservancy has successfully controlled or eliminated this plant from several sites by a combination of spring burning, hand-pulling, and cutting flowering stems with a scythe. When garlic mustard occurs in nearly pure populations with few other plants, scything is advantageous in that large areas can be covered quickly and the soil is not disturbed.

Spot application of 2% Roundup (a formulation of glyphosate) to the foliage of individual plants is effective during spring and fall when most native vegetation is dormant but garlic mustard remains green. Herbicide should be applied when air temperatures are above 32o F (0o C). Managers should exercise caution when applying herbicide to garlic mustard to avoid contacting nontarget plants. Roundup is a nonselective herbicide (kills all vegetation) and should not be used during the growing season in high-quality areas because of the possibility of harming nontarget plants. **Do not spray so heavily that herbicide drips off the target species.** The herbicide should be applied while backing away from the treated areas to avoid contacting the wet herbicide. By law, herbicides only may be applied as per label instructions and by licensed herbicide applicators or operators when working on public properties.

Initial effort in areas of light infestation

Removal of plants by hand-pulling is effective if the root is removed. If the stem snaps off from the root crown of a non-flowering plant, the plant may resprout. When hand-pulling, disturb the soil as little as possible, and tamp the soil firmly after removing the plant. Soil disturbance can bring garlic mustard seed to the surface and create a favorable environment for garlic mustard germination and growth.

Maintenance control

Vigilant monitoring and hand removal of first- and second-year plants prior to flower production can be effective.

A regular burning regime in oak woods can control garlic mustard.

RECOMMENDED PRACTICES ON BUFFER AND SEVERELY DISTURBED SITES

Fall or early spring burning in oak woods can control this species. Repeated burns may be necessary over several years. Spot application of 2% Roundup to individual plants as described above can be used in severely disturbed woods. Cutting or scything flowering stems, as described above, is effective.

Maintenance control is the same as given above.

In addition, hand spraying individual plants with an amine formulation of 2,4-D is an effective control when applied according to label instructions. To reduce vapor drift, use an amine formulation of 2,4-D rather than an ester formulation. A 1% solution of Mecamine (2,4-D plus Dicamba) applied to the foliage of young plants is also effective. Either herbicide should be applied only during spring or fall when most native vegetation is dormant but garlic mustard remains green. The herbicide 2,4-D amine is selective for broadleaf plants. As with Roundup, managers should exercise caution when applying these herbicides to garlic mustard to avoid contacting nontarget plants. **Do not spray so heavily that herbicide drips off the target species.**

FAILED OR INEFFECTIVE PRACTICES

Low intensity fires that do not burn through the leaf litter have no effect on garlic mustard.

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