VEGETATION MANAGMENT GUIDELINE: GARLIC MUSTARD, *Alliaria petiolata* (Bieb.) Cavara & Grande

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Garlic mustard (*Alliaria petiolata* [Bieb.] Cavara & Grande) occurs most frequently in upland and floodplain forests, savannas, and along roadsides in the upper Midwest, northeast United States, and southeast Canada (Cavers et al. 1979, Nuzzo 1990). It invades shaded areas, especially disturbed sites, and open woodland, and occasionally occurs in areas receiving full sun or dense shade.

Garlic mustard has invaded aggressively 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.

Garlic mustard is a biennial herb (Cavers et al. 1979). Seeds germinate in early spring, young plants overwinter as basal rosettes, and adults bloom from May through June the following spring. Each plant dies after producing seed. Seeds disperse when the siliques burst at maturity in August. Seeds have a 20-month dormancy period, and germinate the second spring after ripening. Plants appear to spread rapidly.

Recommended practices for controlling garlic mustard in high quality natural communities include the use of fire, cutting, and herbicides. Fall or early spring burning is an effective control treatment in oak woods (Nuzzo 1990). 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.

Cutting flowering stems at ground level results in 99% mortality, while cutting at 10 cm above ground level produces 71% mortality and reduces total seed production by 98% (Nuzzo 1990). Plants cut near ground level when in full flower usually do not resprout (Nuzzo 1990). 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 (S. Packard, pers. comm.). 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% or 3% 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 (Nuzzo 1990; J. Schwegman, pers. comm.). Herbicide should be applied when air temperatures are above 0°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 potential for harming nontarget plants. Applicators should avoid spraying so heavily that herbicide drips off the target species and should apply herbicide while backing away from the treated areas to avoid contacting the wet herbicide. By law, herbicides must be applied according to label instructions by licensed herbicide applicators or operators when working on public properties.

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 nonflowering 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.

Once garlic mustard is controlled, continued control can be maintained by vigilant monitoring and hand removal of first- and second-year plants prior to flower production. A regular burning regime in oak woods can control garlic mustard also.

On buffer and severely disturbed sites, suitable control practices include burning, cutting, and herbicide use as described above.

In addition, hand-spraying individual plants with an amine formulation of 2,4-D (selective for broadleaf plants) appears to be an effective control method (Heim 1987) 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 also appears to be effective (B. McClain, pers. comm.). Either herbicide should be applied only during spring or fall when most native vegetation is dormant but garlic mustard remains green.

LITERATURE CITED

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