

# Invasive Plants of Wisconsin

## Garlic mustard (*Alliaria petiolata*)

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Herbaceous biennial with stems 1-4' tall as flowering plant. First year plants form a basal rosette that remains green through the winter. Second-year plants produce one to several flowering stems.

**Legal Classification in WI:** Restricted

**Leaves:** First year plants are 2-4" tall rosettes with 3-4 heart shaped leaves, with a toothed margin. Second year plants produce a flowering stalk with 2-3" wide alternate, triangular leaves. Foliage emits a distinct onion/garlic smell when crushed.

**Flowers:** Late spring to early summer of second year, producing numerous small, white, four petaled flowers.

**Fruits & seeds:** Fruits are slender capsules (siliques) 1-2.5" long and contain a single row of oblong black seeds with a distinct ridge.

**Roots:** Taprooted plant that often has a distinctive S-shaped curve near the top of the root.

**Similar species:** Creeping charlie (*Glechoma hederacea*) is often confused with garlic mustard, but its prostrate growth with stolons allows for differentiation from garlic mustard.

**Ecological threat:**

- Invades upland forests, floodplain forests, savannas, yards, and roadsides. It is typically found in shaded areas, but can be found in full sun. Cannot tolerate acidic soils. Invasion of forests usually begins along the wood's edge, and progresses via streams and disturbed areas.
- Exudes antifungal chemicals into the soil that disrupt associations between mycorrhizal fungi and native plants, suppressing native plant growth.

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**CONTROL METHODS:**

**Non-Chemical control**

<p><b>Removal</b> – Pulling before flowering is an effective single plant control technique. Pulling second year plants is easier than pulling first year rosettes. If flowers are present, bag material and dispose of in a landfill or burn to avoid potential for seed spread.</p>
<p><b>Mowing</b> – Mowing flowering stems as low as possible before flowering can prevent seed production. Plants may re-sprout and still flower, so monitor populations and repeat mowing if re-sprouting plants flower. Plants can also be cut at ground level with a hand tool. If repeated for multiple years may reduce populations.</p>
<p><b>Prescribed burning</b> - Burn in spring before desirable vegetation begins growing, but after garlic mustard seedlings have emerged. Burning will control seedlings, but survival of second year plants is variable depending upon fire intensity. Burning can stimulate germination of seedlings, but intensive management of these seedlings after the burn can dramatically reduce garlic mustard seeds in the soil. A hand-held propane torch can be effective for treating seedlings.</p>
<p><b>Manipulation of the Environment</b> – Disturbed forest canopies with increased light penetration tend to experience increased invasion of garlic mustard. If the canopy of a forest becomes disturbed, plant or manage species present to increase light interception and restore the canopy as quickly as possible. Focus other management activities around these areas of canopy disturbance.</p>

**Chemical control<sup>2</sup>**

<p><b>Foliar</b> – Apply directly to individual plants or broadcast across an infested area. Broadcasted foliar applications are typically the most cost effective treatment in dense infestations. If infestations are mixed with desirable vegetation, applications of herbicides without soil activity in the early spring or late fall can reduce injury to desirable plants as garlic mustard emerges earlier and goes dormant later than most desirable vegetation. Use lower rates on smaller plants and less dense populations and higher rates on larger plants and denser populations.</p>	
<p>Active Ingredient (A.I.): bentazon</p>	<p><b>Rate</b> – <i>broadcast</i>: 16 - 32 fl oz/A (0.5 - 1.0 lb a.e./A) <i>spot</i>: Equivalent to broadcast rates.</p>
<p>Common product name: Basagran</p>	<p><b>Timing</b> – Apply to rosettes in the fall or spring or to bolting plants.</p> <p><b>Caution</b> - Has potential to leach through soil into ground water under certain conditions. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground-water contamination.</p>

<sup>2</sup> Herbicide information is based on label rates and reports by researchers and land managers. Products known to provide effective control or in common use are included. Those that do not provide sufficient control or lack information for effectiveness on target species have been omitted. References to pesticide products in this publication are for your convenience and not an endorsement of one product over a similar product. You are responsible for using pesticides in accordance with the label directions. *Read the label before any application.*

<p>Active Ingredient (A.I.): glyphosate</p> <p>Common product name: Roundup</p>	<p><b>Rate</b> – <i>broadcast</i>: 0.75 - 1.5 lb a.e./A <i>spot</i>: 1-3% (0.05 - 0.14 lb a.e./gal)</p> <p><b>Timing</b> – Apply to rosettes in fall or spring, bolting, or flowering plants. Use higher rates when air/soil temperatures drop below 40°F to maintain control.</p> <p><b>Remark</b>- Fall applications will only control rosettes and will not control seedlings that emerge in the spring.</p> <p><b>Caution</b> – Applications can result in bare ground as glyphosate is not selective. Use aquatically labeled product if potential exists for solution to contact open waters.</p>
<p>Active Ingredient (A.I.): imazapic</p> <p>Common product name: Plateau</p>	<p><b>Rate</b> – <i>broadcast</i>: 10 - 16 fl oz/A (0.15 - 0.24 lb a.e./A) <i>spot</i>: 0.25 - 1.0% (0.005 - 0.02 lb a.e./gal)</p> <p><b>Timing</b> – Apply to rosettes in the fall or spring or to bolting plants.</p> <p><b>Caution</b> – Has potential to leach through soil into ground water under certain conditions. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground-water contamination.</p>
<p>Active Ingredient (A.I.): imazapic + glyphosate</p> <p>Common product name: Journey</p>	<p><b>Rate</b> – <i>broadcast</i>: 8 fl oz/A (imazapic: 0.05 lb a.e./A + glyphosate: 0.9 lb a.e./A) <i>spot</i>: 0.6-2.4% (imazapic: 0.005-0.02 lb a.e./gal + glyphosate: 0.009-0.04 lb a.e./gal)</p> <p><b>Timing</b> – Apply to rosettes in the fall or spring or to bolting plants.</p> <p><b>Caution</b> - Has potential to leach through soil into ground water under certain conditions. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground-water contamination. Applications can result in bare ground as glyphosate is not selective.</p>
<p>Active Ingredient (A.I.): imazapyr</p> <p>Common product name: Arsenal</p>	<p><b>Rate</b> – <i>broadcast</i>: 8 - 16 fl oz/A (0.1 - 0.25 lb a.e./A) <i>spot</i>: 0.5 – 1.0% (0.01 - 0.02 lb a.e./gal)</p> <p><b>Timing</b> – Apply to rosettes in the fall or spring or to bolting plants.</p> <p><b>Caution</b> - Applications can result in bare ground as imazapyr is not selective and can remain active in the soil for several months to over a year depending on application rate. Use aquatically labeled product if potential exists for solution to contact open waters.</p>

<p>Active Ingredient (A.I.): metsulfuron</p> <p>Common product name: Escort</p>	<p><b>Rate</b> – <i>broadcast</i>: 0.25 - 1.0 oz/A (0.15 - 0.6 oz a.i./A) <i>spot</i>: 1 oz/100 gal (0.6 oz a.i./100 gal)</p> <p><b>Timing</b> – Apply to rosettes in the fall or spring or to bolting plants.</p> <p><b>Remark</b> - Use lowest rate in spring. In fall use 0.5-1.0 oz/A to provide residual control of seedlings the following spring. Use higher rates in high organic matter soils.</p> <p><b>Caution</b> - Metsulfuron can remain active in the soil for months depending on application rate. Has potential to leach through soil into ground water under certain conditions. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground-water contamination.</p>
<p>Active Ingredient (A.I.): sulfometuron</p> <p>Common product name: Oust</p>	<p><b>Rate</b> – <i>broadcast</i>: 0.25 - 1.0 oz/A (0.2 - 0.75 oz a.i./A) <i>spot</i>: Equivalent to broadcast rates.</p> <p><b>Timing</b> – Apply to rosettes in the fall or spring or to bolting plants.</p> <p><b>Remark</b> - Use 0.25 - 0.5 oz/A in spring. In fall use 0.5 - 1.0 oz/A to provide residual control of seedlings the following spring. Use higher rates in high organic matter soils.</p> <p><b>Caution</b> – Applications can result in bare ground as sulfometuron is not selective and can remain active in the soil for months depending on application rate and site conditions.</p>
<p>Active Ingredient (A.I.): sulfosulfuron</p> <p>Common product name: Certainty</p>	<p><b>Rate</b> – <i>broadcast</i>: 1.0 - 2.0 oz/A (0.2 - 1.5 oz a.i./A) <i>spot</i>: 0.01 - 0.02 oz/gal (0.008 - 0.02 oz a.i./gal)</p> <p><b>Timing</b> – Apply to rosettes in the fall or spring or to bolting plants.</p> <p><b>Remark</b> - In fall use higher rates provide residual control of seedlings the following spring. Use higher rates in high organic matter soils.</p> <p><b>Caution</b> - Has potential to leach through soil into ground water under certain conditions. Use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground-water contamination. Overspray or drift to desirable plants should be avoided, as even minute quantities of the spray may cause severe injury.</p>

Active Ingredient (A.I.): triclopyr	<b>Rate</b> – <i>broadcast</i> : 16 - 32 fl oz/A (1.5 - 3.0 lb a.e./A) <i>spot</i> : 1 - 2% (0.12 - 0.23 lb a.e./gal)
Common product name: Tahoe 4	<p><b>Timing</b> – Apply to actively growing rosettes in the fall or spring or to bolting plants.</p> <p><b>Remark</b>- Fall applications will only control rosettes and will not control seedlings that emerge in the spring.</p> <p><b>Caution</b> – Can volatilize, avoid application during high temperatures and low humidity, especially when the application contacts impervious surfaces. Overspray or drift to desirable plants should be avoided as even minute quantities of the spray may cause severe injury. Use aquatically labeled product if potential exists for solution to contact open waters.</p>

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