# *Alliaria petiolata*

## GARLIC MUSTARD

Photo Credit: © JAMIE FENNEMAN/E-FLORA BC

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| **ENGLISH NAMES** | Garlic mustard, hedge garlic |
| **SCIENTIFIC NAME** | *Alliaria petiolata* (Bieb.) Cav. & Grande |
| **FAMILY** | Brassicaceae |

Garlic mustard gives off a distinct garlic smell when it is crushed.

## RANGE/KNOWN DISTRIBUTION

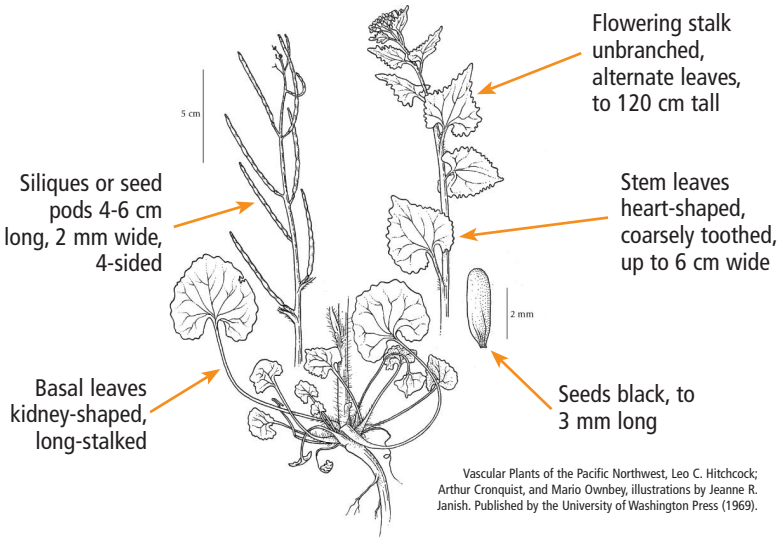
Garlic mustard is a native of Eurasia where it is widespread from Sweden south to the Mediterranean and east to India. It is now also found in New Zealand and in North America, where it was first recorded in 1868. In Canada, garlic mustard is found in Ontario, Quebec, and the Maritime provinces, as well as in British Columbia, where it has been reported on southern Vancouver Island and in the Okanagan Valley. Historically, garlic mustard was likely cultivated for food and medicine.

## IMPACTS ON GARRY OAK AND ASSOCIATED ECOSYSTEMS

The impact of garlic mustard on Garry oak and associated ecosystems is not yet fully known. However, as these ecosystems are often highly disturbed, they are susceptible to invasion by garlic mustard. In woodland ecosystems garlic mustard can become established in the shade and dominate the understorey. Once established, garlic mustard competes with native species for moisture, light, nutrients, and soil. It also interferes with the germination and growth of native species by releasing phytotoxic compounds and inhibiting the colonization of arbuscular mycorrhizal fungi in the soil on which many native plant species depend. This reduces herbaceous richness and diversity and suppresses animal species that depend on these native plants for food. It might also deter the larvae of rare butterflies associated with Garry oak ecosystems from feeding, as it does in parts of the US where the rare mustard white (*Pieris napi oleracea*) and West Virginia white (*Pieris virginiensis*) butterflies lay their eggs on garlic mustard instead of on their native food plants.

## FIELD DESCRIPTION

Garlic mustard is a biennial herb growing 20-120 cm in height. In its first year it consists of a basal rosette of dark green, kidney-shaped




Vascular Plants of the Pacific Northwest, Leo C. Hitchcock; Arthur Cronquist, and Mario Ownbey, illustrations by Jeanne R. Janish. Published by the University of Washington Press (1969).

leaves. These leaves stay green throughout the first winter until the plant flowers in its second spring. A thin stalk is produced having alternate, triangular, and sharply-toothed leaves. The small white flowers are numerous, 4-petalled and appear like crosses. Fruit capsules, or siliques, are long and slender. A garlic scent in crushed plants and a slender S-shaped taproot also distinguish garlic mustard.

## LIFE HISTORY

Garlic mustard is an obligate biennial herb. It spends its first year as a vegetative basal rosette, remaining green throughout the winter. Early in its second spring it begins to develop flowering stalks which flower in late spring. Plants are self-pollinated or pollinated by insects. Seeds are produced by early summer and are dispersed by animals, including humans, and by water currents. A single plant can produce over 2700 seeds. By mid-summer of their second year the plants dry up and die.

## HABITAT

Garlic mustard typically occurs in the understorey layer of woodlands and deciduous forests. It is highly shade-tolerant, which allows it to readily invade wooded areas. However, it is also found in areas having full sun, such as forest edges, roadsides and disturbed areas. This species thrives in disturbed areas, which are most susceptible to invasion and dominance. Preferred soil conditions are moist to dry and nutrient rich.

## MANAGEMENT

The control of established garlic mustard infestations requires a long-term commitment of up to ten years. Management efforts should focus on preventing the plants from going to seed and should continue until the seed bank is exhausted. Infested sites should be monitored multiple times per year to catch both early and late bloomers before they set seed.

**Develop a long-term, realistic program for invasive species removal before undertaking any work. Before taking action, obtain expert advice. Please refer to the introductory section of this manual.**

**PHYSICAL CONTROL:** For smaller infestations of garlic mustard, or when valuable native species occur in the same area, plants can be hand-pulled. Care should be taken to minimize soil disturbance and to ensure that at least the top half of the tap-root is removed. This is best achieved when soils are moist by grabbing low down on the plant and gently tugging until the roots come loose. For larger infestations where hand-pulling is not feasible, 99% mortality can be achieved by repeatedly cutting flowering stalks at ground level, preventing them from producing seeds. Cutting up to 3 times per season may be necessary as it stimulates regrowth. Mowing is not recommended for the control of garlic mustard. Because of garlic mustard's phytochemical compounds and the possibility that seeds will develop even after cutting, all plant material should be bagged and removed from the site. Material should not be composted.

**BIOLOGICAL CONTROL:** No biological control agents are currently known for garlic mustard. Research on this topic is ongoing.

**CHEMICAL CONTROL:** Glyphosate controls garlic mustard well and will significantly reduce seedling numbers if applied after germination. As it is non-selective, any herbs that are green and growing at the time of its application will be damaged and extreme care must be used to prevent spraying or dripping onto desirable native species. Spot application should be done with a spray shield and should occur when non-target species are dormant (i.e. late fall to early spring for most Garry oak and associated species). The effectiveness of 2,4-D is questionable and Acifluorfen is not recommended for control of garlic mustard. *Herbicides should only be used with extreme caution, and under expert advice, in sensitive Garry oak ecosystems.*

**OTHER TECHNIQUES:** Prescribed burning can be an effective management option for larger infestations provided that the fire burns hot enough to kill the plant's crown. The most effective times to conduct burns are in spring, prior to the growth of native wildflowers, and in fall, when leaf litter provides ample fuel. Burning encourages garlic mustard seeds in the soil to germinate, and must therefore be followed by up to five years of consecutive burns or physical control as small patches reappear. Selective burning, using propane-fired hand torches, can also be effective if hot enough to kill the plant's crown.

**PREVENTATIVE MEASURES:** The best way to prevent infestations of garlic mustard is to monitor regularly and remove all individuals before they go to seed. The plant's biennial habit must be considered when monitoring as populations can appear to fluctuate greatly from one year to the next, even appearing to be non-existent one year and then being prolific the next.

**PERSISTENCE:** Garlic mustard seeds have been known to germinate after as many as six years.

## SELECT REFERENCES

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A comprehensive annotated bibliography of literature specific to garlic mustard is available at www.goert.ca.



**For more information contact the Garry Oak Ecosystems Recovery Team, or see the website at www.goert.ca**