

You Ain't From around Here! Exotic Invasive of the Quarter: Garlic Mustard (*Alliaria petiolata*)

By: Jennifer Gagnon, Virginia Tech

The other day I was in the garden, looking at my 5-foot-tall horseradish plant, wondering when I should don goggles and rubber gloves and attempt a root harvest (I'm a little intimidated by the whole thing!). Horseradish is an invasive plant, so I always check carefully to make sure it hasn't spread outside the garden. Which got me to thinking about other edible invasives, namely garlic mustard, an exotic invasive so prolific, I can't believe I've gone 7 years without writing about it. This bugger is everywhere! In fact, in many woodland and floodplain environments in the Northeastern US, it is the dominant understory species.

Garlic mustard, which is indeed in the mustard family (along with cabbage and broccoli), has a lot of nicknames, such as garlic root, hedge garlic, Jack-in-the-bush, penny hedge, poor man's mustard, and my personal favorite, sauce-alone. This plant, native to Europe, western and central Asia, NW Africa, Scandinavia, and India, was first found in the US on Long Island, NY in 1868. Garlic mustard has been considered widespread and invasive since 2000 and is listed as noxious or restricted in AL, CT, MA, MN, NH, OR, VT, WV, and WA.

Like many of our invasive plants, garlic mustard was brought to the US intentionally – for culinary or medicinal purposes. The first-year leaves, flowers, and fruits have a mild garlic flavor and can be chopped up and used in salads and sauces (hence the nickname sauce-alone?). Unlike many of our invasive plants, which tend to reproduce in a variety of ways (recall our toothy friend hydrilla, with its 4 methods of reproduction!), garlic mustard only reproduces by seed, but it produces copious amounts of them (up to 7900 per plant). And it is capable of both cross and self-pollination (the self-pollinated plants produce clones).

But garlic mustard's success really lies in the fact that these plants are fierce competitors. Garlic mustard is the Ryan Lochte of the invasive world (without the grill).

First, garlic mustard produces secondary metabolites (such as glucosinolates, flavonoid glycosides and cyanide) which make the plants less palatable to herbivores, like deer. Deer browse on nearby native plants, essentially releasing the garlic mustard. Additionally, some studies link these metabolites to declines in mycorrhizal fungi in garlic mustard-infested soils. Mycorrhizae are present in healthy forest soils and form beneficial associations with the roots of native plants. These associations help increase root growth,

reproductive success and competitiveness. Without them, many native species are at a strong disadvantage. And, there is some evidence that these metabolites may have an additional allelopathic effect, resulting in the exclusion of certain native species in close proximity to garlic mustard; however, the evidence is not conclusive.



***A forest understory dominated by garlic mustard.
Photo by: Daniel Herms, The Ohio State University.***

Second, garlic mustard seeds remain viable (able to germinate) in the soil for up to 5 years, creating a large seed bank. Once plants are removed from a site, annual follow-up is necessary until the seedbank is depleted.

Third, although there are 69 species of insects and 7 species of fungi which keep garlic mustard under control in its native lands, these are not present in North American forests.

Finally, garlic mustard is one of the first bloomers in the spring, and second-year plants can get quite tall, allowing them to shade out slower and/or lower growing natives. Many native wildflowers (including spring beauty, wild ginger, bloodroot, Dutchman's breeches, hepatica, toothworts and trilliums) which are important sources of forage, pollen, nectar, fruits, seeds and roots, complete their lifecycles in the spring, and are being excluded from habitats with garlic mustard. These declines can have widespread ecological impacts. For example, declines in toothworts, the primary food for the West Virginia white butterfly larvae, are resulting in a decline of this already rare native butterfly.



How to identify garlic mustard:

Form - In the first year, this biennial plant forms a rosette of leaves close to the ground which radiate out, spoke-like, from the central root stock. In the second year, the plants mature and reach 2–3.5’ tall.

Leaves -The triangular to heart-shaped, strongly-veined, and slightly-wrinkled leaves grow from stalks, and have coarsely-toothed edges. First-year leaves can be up to 7” wide and will turn dark green to purple in the fall and overwinter in the snow. Second-year leaves are smaller (up to 2.5” wide) and grow from shorter stalks.

Flowers - Occur in dense button-like clusters on tall flower stalks (1-3.5’). The white flowers have 4 petals, are approximately 0.25” in diameter, and open in April-May.

Fruits - Seedpods grow on erect stalks formed from the flower clusters. The slender, 4-sided seed pods are 1–2.5” long, and are called siliques (how’s that for a vocabulary word!). They start out green and turn tan when mature in June. Each pod contains 2 rows of shiny black seeds. The seeds do not float well and are probably not carried by wind, meaning long-distance dispersal is most likely a result of humans and wildlife.

Roots - Garlic mustard has a kinked taproot.

How to get rid of garlic mustard

For small infestations, hand-pulling is effective, as long as all the root stock is removed. Second-year plants are easier to pull. Hand-pull, when the soil is moist, by grabbing the plant low on the stem. Ideally, plants should be pulled prior to flowering. Bag and remove all plants from the site, especially if they are in bloom, as they may have enough energy to produce ripe seeds. There are numerous native look-alikes (e.g., toothworts, trilliums, early saxifrage, and sweet cicely) so check to see if the taproot is kinked before pulling all the plants up. If hand-

pulling isn’t possible, wait until the plants bloom and cut the flower stalks (and bag and remove them from the site). This process will need to be repeated every year for at least 5 years to deplete the seed bank.

For widespread infestations, a foliar application of the herbicide glyphosate (the active ingredient in Roundup) is effective. Glyphosate is not a selective chemical, so it will kill any other

Images of garlic mustard first-year leaves, and flowers, seed stalks, and seedpods, formed in the second-year. Photos by: Tom Heutte, USDA Forest Service, Leslie J. Mehrhoff, University of Connecticut, Bruce Ackley, The Ohio State University, and Steve Hurst, USDA NRCS PLANTS Database.

species it comes into contact with. To minimize damage to desirable species, spray garlic mustard in early spring or late fall, when most native species are dormant.

To deplete the seedbank, monitor and repeat control measures annually. Reclaiming sites may require planting of native species.

And, as always, walk your property frequently to look for invasive problems. Anyone who has tried to clear 5 acres of kudzu (or multiflora rose or tree of heaven or any other species) knows it is far easier to control small infestations.

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