

Garlic Mustard (Allaria petiolata)

The bane of woodlands!!! This non-native plant can quickly overrun a woodland or savanna with a “take no prisoners” approach. When we purchased our land in 2005, the remnant oak-hickory woodland was a garlic mustard monoculture. We began in earnest to remove it.

Working smarter rather than harder, I use knowledge when I need workarounds. Determining the best answer for my goals and my unique piece of land requires a hybrid system of academic studies, biological sciences, and a dash of anecdotal evidence. I’m sharing in hopes it helps you, too.

Helpful Garlic Mustard Facts

- Can self pollinate (Anderson et al 1996, Chapman et al 2012)
- Seedbank persistence can be 3 years (Nuzzo 1991)
- Seeds dispersed via foot traffic, animal fur, and water movement and not by wind (Cavers et al 1978)

Management Requires a Combination of Tools

Garlic mustard greens up in spring early, before many of the native plants. This is convenient. Management can be timed so no collateral damage to spring ephemerals occur.

Herbicide

When we began controlling garlic mustard, we sprayed rosettes with 2% glyphosate in spring and again in the fall. Pulling those we missed was necessary follow up. In the first 6 years, we substantially decreased the infestation. But we began to notice deformed garlic mustard plants; they were growing, flowering, and appeared to be setting seed. I do not know if these seeds were viable. Were the plants becoming resistant to glyphosate? In 2011, we switched herbicides to Progeny® and are having better success. Whatever herbicide you choose, read and follow the label directions.

Hand pulling

There's good news! "Uprooting plants at the flowering stage prevented production of any viable seed, while early- and late-fruiting plants were still able to produce viable seed (Chapman et al 2012).

The study further demonstrated height and seed production were correlated; 13" or shorter plants had low seed viability and 16" or taller plants had high seed viability (Chapman et al 2012). The plant's phenological stage is also a significant "tell;" late-fruiting plants (silenes only) had significantly more viable seed than early-fruiting plants (silenes visible but flowers still attached) (Chapman et al 2012).

Mowing or weed whacking

Hand pulling is effective but may not be practical. Mowing is effective for 2 reasons. Cutting at the ground level "resulted in 99% mortality and reduced seed production to virtually zero" (Nuzzo 1991). Cutting around 4" high had 74% mortality and 98% seed reduction (Nuzzo 1991, Chapman et al 2012). Mowed plants late in the season typically do not regrow after mowing (Cavers et al 1978). Yet some may appear to resprout, but they lack the stored resources after bolting and will not produce

viable seed (Chapman et al 2012). Aside from this paper providing evidence that mowing is effective, reasoning out what we know about the flowering stages discussed above with hand pulling provides further corroboration.

We weed whack the larger patches as a triage method when we don't have time to pull the plants before they set seed.

Fire

There are a couple ways to use fire – prescribed burns and flame weeding.

Prescribed burns can be effective at the proper intensity. “Low-intensity fire did not affect the incidence of *A. petiolata* but mid-intensity reduced rosettes” (Nuzzo 1991). In a woodland setting where the fuels are leaf litter, a general way to think of fire intensity is to think of humidity. A low-intensity fire would occur when there was high humidity, either in the air or in the leaf litter – perhaps morning or evening.

Flame weeding uses a backpack flame weeder works similar to herbiciding – a particular plant is targeted and zapped. Fire wandering away from the target is something to be prepared for but if done when humidity is high or when morning dew remains.

Grazing

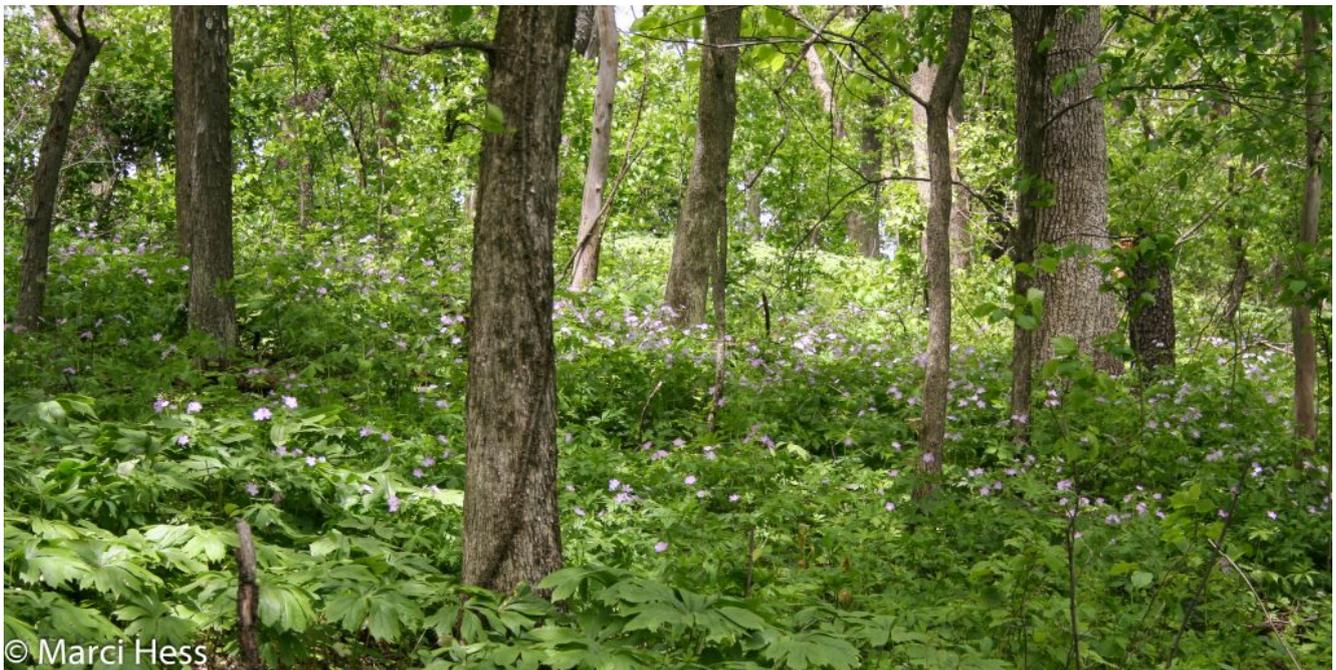
Grazing isn't an effective tool for garlic mustard control. The plant contains a chemical that deters herbivory (Chapman et al 2012) and can add an unpleasant flavor to milk from animals grazing this (Cavers et al 1978). Unfortunately, we can't depend on deer to graze it either; they find it “completely inedible” (Kalisz et al 2014). And more unfortunate, where deer are abundant so is garlic mustard because they depress native plants with their grazing.

Combine Management Tools

Using different management techniques and tools ensures biodiversity and can save resources! As much as we all want a single “magic bullet” there isn’t one. Mix and match these management tools and planning follow up ensures success.

The native plants returned once we controlled the garlic mustard. Plants that we now enjoy that were suppressed include shooting star, Indian pipe, bellwort, wild geranium, wood anemone, solomon’s seal, false Solomon seal, and yellow pimpernel to name a few. Diversity is the key to a good healthy environment.

Below is a picture of our “purple carpet” of wild geranium. When these bloom, the woods have a wonderful light perfumely aroma!



The wild geraniums carpet the woods as the spring ephemerals senesce.

References

Anderson, Roger C., Dhillon, Shivcharn S. and Kelley, Timothy M. (1996), Aspects of the Ecology of an Invasive Plant, Garlic

Mustard (*Alliaria petiolata*), in Central Illinois. *Restoration Ecology*, 4: 181-191.

Cavers, Paul B., Heagy, Muriel I., & Kokron, Robert F. (1979). The biology of canadian weeds.: 35. *Alliaria petiolata* (M. Bieb.) Cavara and Grande. *Canadian Journal of Plant Science*, 59(1), 217-229.

Chapman, Julia I, Philip D. Cantino, Brian C. McCarthy. 2012. Seed Production in Garlic Mustard (*Alliaria petiolata*) Prevented by Some Methods of Manual Removal." *Natural Areas Journal* 32(3): 305-315.

Kalish, Susan & Spigler, Rachel & Horvitz, Carol. (2014). In a long-term experimental demography study, excluding ungulates reversed invader's explosive population growth rate and restored natives. *Proceedings of the National Academy of Sciences of the United States of America*. 111. 10.1073/pnas.1310121111.

Nuzzo V. 1991. Experimental control of garlic mustard [*Alliaria petiolata* (Bieb.) Cavara & Grande] in northern Illinois using fire, herbicide, and cutting. *Natural Areas Journal* 11: 158-167.