

Effects of Herbicide (Round-up®) on *Alliaria Petiolata* (Bieb.) Cavara & Grande (Garlic Mustard), an Invasive Biennial, and Subsequent Effects on the Native Plant Community in Hueston Woods State Nature Preserve, Ohio

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Abstract

Alliaria petiolata (Garlic Mustard) is invasive throughout the northeast U.S. and has become established in the Nature Preserve at Hueston Woods State Park in southwest Ohio. The Park is attempting eradication by spot-spraying Round-up® herbicide each fall.

We investigated the effects of Round-up® on *Alliaria petiolata* and the effects of *A. petiolata* decline on forest floor plants in two stands: an old-growth *Acer-Fagus* stand and a second-growth *Liriodendron-Quercus* stand. We established 50 1x1m plots in each stand in May 2000 and randomly assigned half to be sprayed (Nov. 1, 2000). All plots were censused for density of *A. petiolata* in May, June, Aug., Oct. 2000 and 2001. Densities of herbs in leaf at the time of spraying were also determined in all plots in Oct. 2000 and 2001. Three times each growing season, we determined the percent cover of each species using a point frame. Peak cover values were used to calculate species richness and Shannon-Weiner diversity index values for each plot. Detrended correspondence analysis (DCA) ordination was done using peak cover data to show patterns in forest floor community composition among plots and treatments.

Density of the 2000 *Alliaria petiolata* cohort was significantly lower in sprayed plots in May 2001 in both the old- and second-growth stands (ANOVA: $p=0.002$, $p=0.046$ respectively). However, there was no treatment effect on density of the spring 2001 *A. petiolata* cohort, nor on densities of the most common herb in leaf at the time of spraying, *Stellaria pubera*. Spraying did not affect species richness or diversity in either stand. However, ordination revealed a significant compositional difference between experimental and control plots in 2001 in the old-growth stand (ANOVA on DCA Axis 1 scores: $p=0.021$), but not in the second-growth stand.

In conclusion, the first Round-up® treatment reduced the density of the sprayed cohort of *Alliaria petiolata* without affecting the density of *A. petiolata* seedlings or other herbs. Decline in *A. petiolata* density has already affected the forest floor community composition in the more mature of the two stands.