PROJECT TITLE: Evaluating the potential off-target effects of imazapyr injection using the EZ-Ject lance

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Introduction:

Imazypyr is a non-selective herbicide that controls plant growth by preventing the synthesis of amino acids (Tu et al. 2001). At Wild Basin Wilderness Preserve, the EZ-Ject herbicide lance is being investigated as a minimally harmful herbicide application system for invasive trees greater than 3" in diameter that cannot be removed effectively with mechanical means. The EZ-Ject uses a dry form of herbicide and is considered to be an herbicide application method that minimizes risks of exposure to both humans and surrounding environments. Because the EZ-Ject lance uses a dry formulation of herbicide in capsules to treat invasive woody species, it is expected to minimize the potential for drift or spill risks or off-target effects on vegetation (Milbauer et al. 2003). However, some studies have indicated that vegetation near sites injected with imazapyr have experienced negative effects (Lewis & McCarthy 2008, USFS 2012), although few have explicitly used the EZ-Ject method of application. Here, we evaluated the potential non-target effects of EZ-Ject with imazapyr on surrounding vegetation and soils.

Research objective:

The goal of this project was to evaluate the potential non-target effects of imazapyr injection, using the EZ-Ject lance, on surrounding vegetation and soils.

Methods:

In this study, we evaluated neighboring plants and soils around invasive trees that were injected with imazapyr using the EZ-Ject lance. We evaluated both short-term (Part 1) and long-term effects (Part 2). To examine short-term effects (Part 1), we evaluated changes in plant health and soil microbial activity between pre-injection and 3 weeks post-injection. Samples were collected at distances of 1m, 2m, and 3m from the injected stem, including both uphill and downhill samples. To examine the long-term effects (Part 2), we evaluated soil health and leaf litter near invasive trees that were injected several months prior to the study (3 months and 12 months).

Results:

Our analysis of potential short-term effects (Part 1) demonstrated no statistically significant declines in the plant and soil response variables between pre- and post-injection. There were

declines in plant health and leaf area, but similar patterns were noted in control plants in the area over the same time interval. Furthermore, when we restricted the analysis to examine very close plants (within 1m of injected stem) and uphill vs downhill of injected, we still found no significant effects. In one case, we did find that a small Japanese privet <1m from an injected privet experienced mortality, suggesting some translocation through root grafting of same species. In our evaluation of the potential longer-term effects (Part 2), we did find a significant difference in cellulose-degradation activity in leaf litter when we included the previously injected sites in the analysis.

Project status:

Four St. Edward's University students presented the results of this research project at the NSF-CASAR/TG/Keck Summer 2015 Research Symposium in June 2015. This included Rhiannon Vargas, Diego Rivas, Elizabeth Nguyen, and Davina Reveles. No additional work on this project is anticipated at this time.

Literature cited:

Lewis, K. & B. McCarthy. (2008) Nontarget Tree Mortality after Tree-of-Heaven (*Ailanthus altissima*) Injection with Imazapyr. Northern Journal of Applied Forestry, 25(2), 66-77.

Milbauer M., Leach M.K. & Glass S. (2003) Comparing E-Z-Ject application of Roundup with foliar application of Krenite in the control of aspen (*Populus tremuloides* Michx.) in tallgrass prairie. *Natural Areas Journal*, 23, 284-287 (summary available at http://www.conservationevidence.com/individual-study/44)

Tu, M. C. Hurd, and J.M. Randall. (2001) Weed Control Methods Handbook: Tools & Techniques for Use in Natural Areas. The Nature Conservancy. Wildland Invasive Species Team. (available online at http://www.invasive.org/gist/handbook.html)

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