

Allelopathic Herbicide of Tree of Heaven Used Against Honeysuckle

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Introduction

Invasive species are a problem throughout the world. Invasive plants grow quickly if left without any form of management. Some species of plants are capable of exhibiting their own form of control on the plants around them through allelopathy, a phenomenon where plants synthesize biochemicals that can stunt the growth of plants within their vicinity. These allelopathic chemicals can be found in many parts of these plants like the roots, leaves, bark, and even fruits. An invasive plant in the Midwest produces its own chemicals, that plant is Tree-of-Heaven, or *Ailanthus altissima*. This chemical control of neighboring plants has been shown to kill herbaceous plants in lab conditions (Heisey 1990). Our experiment focuses on the application of this chemical against the woody plant Amur Honeysuckle, another major invasive in Ohio, under field conditions.



Methods

We extracted allelopathic toxins by crushing the bark of *Ailanthus* into a powder. It was then placed into a teabag and submerged in water for 24 hours at 4 degrees Celsius. There was a 1g to 20mL ratio of plant powder to distilled water. This solution was then placed into a dauber applicator for later use. Three experimental groups were created: control, Round-up (standard control method) and the final group getting treated with the previously made solution. This was done by mimicking effective control methods of lopping and then treating. The three experimental groups were made up of 12 Amur Honeysuckle plants, with 6 being smaller, up to 2.7 meters, and 6 being medium sized, up to 4.6 meters. These plants were then cut down to approximately 0.30 meters and treatment was applied to the stumps based on its grouping control, etc. The stumps were checked weekly throughout the course of this experiment to identify new buds and growth.

Results

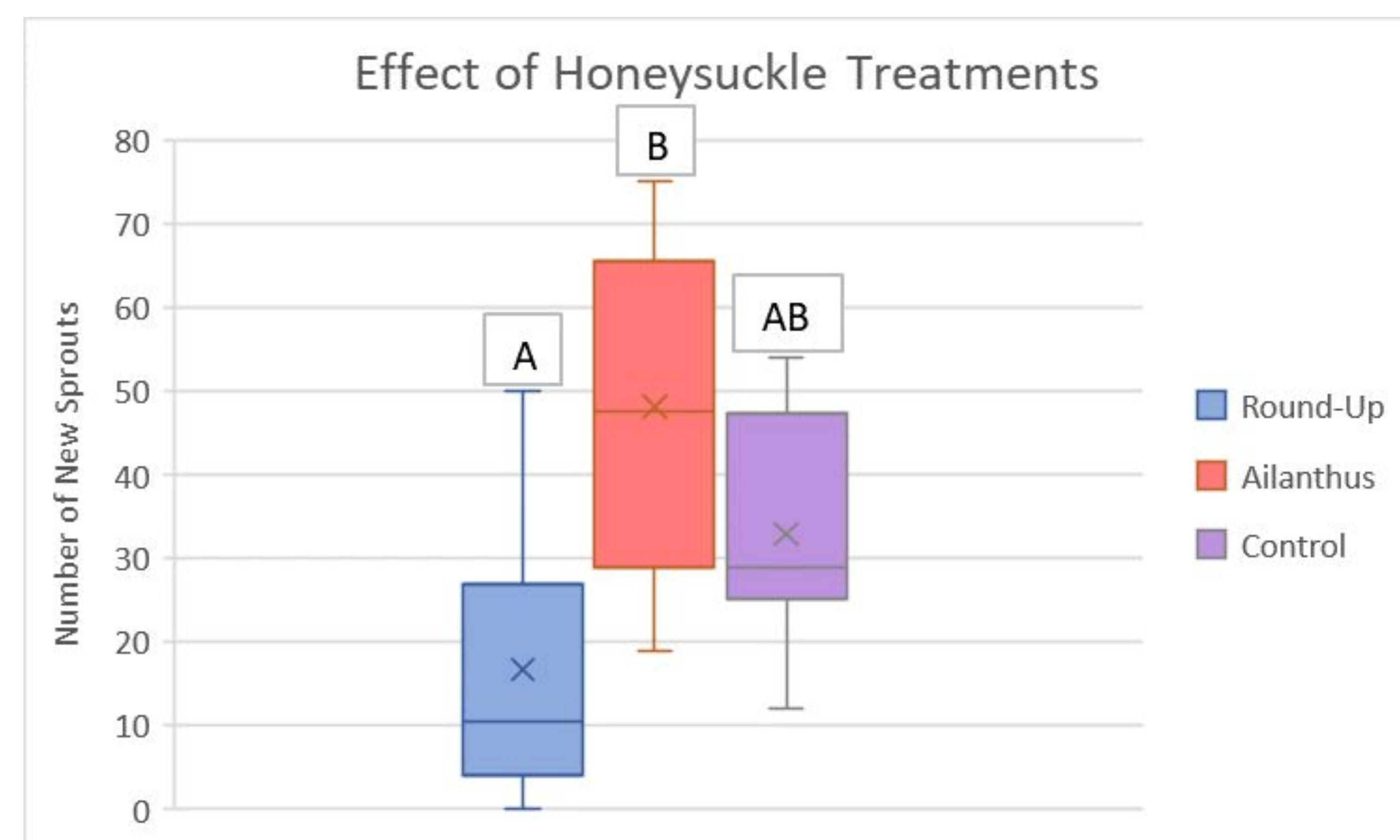


Figure 1: Using an ANOVA followed by a post hoc test, data analysis has provided a P-Value of <0.005 which displays a high significance and a degrees of freedom equal to 35. To show significance between specific groups, a post hoc test was performed between Round-Up to *Ailanthus*, *Ailanthus* to Control, and Control to Round-Up (Qcrit value of 17.228). *Ailanthus* has been proven to be significantly worse as a treatment type when compared to the Round-Up, although Control is not significantly different from either the Round-Up or the *Ailanthus*.



Discussion

The *Ailanthus* and Round-Up tests had significantly different effects, while the control had no significance in relation to either of the other two tests. The *Ailanthus* test displayed a positive effect on the honeysuckle growth post application, leading to a high amount of new growth. Whereas the Round-Up had a negative effect. One potential explanation for the accelerated growth could be a stress response by the plant in an attempt to resist the toxins or rather the extract acted as a fertilizer for the Amur Honeysuckle at this concentration of 1g to 20mL. We propose a follow up on this experiment over a longer time to test these hypotheses, observe the continued growth of these treated plants, and to test the effects of *Ailanthus* extract at higher concentrations.

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