

Weed Warfare: Investigating Allelopathy, Year Six

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Amaranthus palmeri is a highly invasive noxious weed that causes significant problems in agriculture because of its resistance to glyphosate (Round-up). This glyphosate resistant strain of *A. palmeri* is estimated to have infested millions of acres of farmland, particularly harming soybean, corn and cotton crops. The purpose of this study was to examine the effects of cold-extracted *Dioscorea bulbifera* leaf extract on corn and soybean root mass, shoot mass, root length, and shoot height in a field study scenario, to determine the effects of cold-extracted versus a mechanically agitated *Dioscorea bulbifera* leaf extract on *A. palmeri* seed germination, and to determine the specific metabolomic signature of a cold extracted leaf-extract treatment versus control. Corn and soybeans were both grown in a field trial setting and inoculated with cold extracted *Dioscorea bulbifera* leaf extract. Plants were grown for 3 weeks and then mass of the root, shoot, the length of the root and the height of the shoot were measured, which allows for a growth ratio analysis. A germination study was conducted by treating *Amaranthus palmeri* seeds with both cold extracted and mechanically extracted *Dioscorea bulbifera* extract. Seed vigor was determined through a speed of germination vigor test. Metabolomics testing was done on plants treated with cold extracted *Dioscorea bulbifera* extract. Additionally, *Amaranthus palmeri*'s germination rate is impeded by the *Dioscorea bulbifera* leaf extract. This study could lead to more environmentally friendly and efficient herbicides as well as alternatives to herbicides that are no longer effective due to herbicide resistance.

Awards Won:

Fourth Award of \$500