Weed Warfare: Investigating Allelopathy, Year Five

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Amaranthus palmeri (Palmer's amaranth) is a highly invasive noxious weed that causes significant problems in agriculture as it is becoming resistant to glycine (Round-up). This glycine-resistant strain of A. palmeri is estimated to have infested 1-2 million acres of farmland, particularly harming soybeans and cotton crops. The purpose of this study was to examine the effects of Discorea bulbifera (Air Potato) bulbil extract on A. palmeri plants, to determine the effects of D. bulbifera leaf extract on A. palmeri seed germination, and to determine the specific metabolomic signature of a bulbil-extract treated versus control Amaranthus palmeri plants via mass spectrometry analysis. Grown in controlled lab conditions, nine trials of A. palmeri plants were inoculated with Diascoria bulbifera bulbil extract. Plants were grown for six weeks and then harvested. The lab-grown plants were then treated using methylene chloride and sonic disruption and evaporated from 30 ml to I ml of liquid. A GC Mass spectrometer was used to determine the specific chemical fingerprint of treatment versus control plants, allowing the specific chemical differences between the two groups to be compared and contrasted. The results of this study demonstrate that this method shows promise for future discovery of new plant compounds. Chemicals were identified using the retention time as a marker of comparable composition. Several chemicals were indicated, including oxazolidinethione and gamma-Sitosterol. Additionally, A. palmeri's germination rate is impeded by the D. bulbifera leaf extract. This study could lead to more environmentally friendly and efficient herbicides as well as new alternatives to herbicides that are no longer effective due to herbicide resistance.

Awards Won:
Fourth Award of $500