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| Project Title | Exploitation of weed species extracts as an effective and environmentally friendly strategy to control insects and deer in soybean |
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| Additional PIsFor this project | Natraj Krishnan, Associate Professor of Insect Physiology, Mississippi State University, 662-325-2978, nk260@msstate.edu. |
| Research Locations  | Starkville, Mississippi. |
| **Timeline:** **Current Year - FY23** | **Multi-Year Project Information** (if applicable) |
| Year 1 | Year 2 | Year 3 |
| Start Date | 04/01/2023 |  |  |  |
| End Date | 03/31/2024 |  |  |  |
| Funds Requested | $40,062 | $ | $ | $ |
| **Program Area: Insect and Deer Management/Control** |
| Objectives | (1) conduct chromatography and mass spectrometry analysis to identify target anti-herbivore compounds in weeds; and, (2) conduct quantitative trait loci analysis to identify molecular markers associated with anti-herbivory compounds in weeds. |
| Justification | Soybean field trials conducted by us showed that our sicklepod weed formulation was most effective in repelling deer; better than Hinder (commercial deer repellent) and control (water). Moreover, the sicklepod extract had no adverse effect on the overall soybean yield. Preliminary results (on-going) show coffee senna treated soybean leaves to be significantly less defoliated (lesser leaf holes from insect feeding) than other treatments. |
| Exp Setup | (1) Fractions containing the anti-herbivore compound(s) will be collected using HPLC, followed by identifying the target compound(s) using GC/MS. (2) A total of 30 simple sequence repeat (SSR) and single nucleotide polymorphism (SNP) markers will be used to screen each of the weed species. Markers showing significant linkage with anti-herbivory traits will be summarized. |
| Summary  | The HPLC analysis will identify the target compound responsible for the anti-herbivore property. Also, the environmental sustainability of agriculture will increase dramatically with reductions in the need for pesticides and other synthetic chemicals. |
| Key Metrics | We anticipate confirming at least three of the four weed species to have deer repellent and insecticidal properties, identifying at least three anti-herbivore compounds, and identifying at least five anti-herbivory molecular markers. |
| Exp. Deliverables | PowerPoint and Poster presentations (4), publications (2), Ph.D. Dissertation (1) |
| Benefit to midsouth farmers | Using these molecular markers, we can screen soybean germplasm for the anti-herbivore trait or use it in molecular breeding to breed these traits into soybean. Soybean with significant anti-herbivore properties will prevent yield losses incurred due to herbivores, especially deer and insects. |
| Signature of Principle Investigator | Date: |
| A picture containing insect  Description automatically generated | 08/04/2022 |