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| Please use this form to clearly and concisely report on project progress. The information included should reflect quantifiable results that can be used to evaluate and measure project success. Comments should be limited to the designated boxes. Technical reports, no longer than 4 pages, may be attached to this summary report. |
| Project Number: | 2022-47 |
| Project Title:  | Exploitation of weed species extracts as an effective and environmental friendly strategy to control insects and deer in soybean |
| Organization:  | Mississippi State University |
| Project Lead Name: | Te Ming (Paul) Tseng |
| Report Period: | March 15, 2024 |
| Progress Summary (in non-proprietary lay language suitable to be shared publicly): |
| In our research, the primary goal is to identify and develop a natural deer repellent that can be used in soybean crops. This repellent aims to protect soybean plants from damage caused by both deer and insects, ultimately safeguarding soybean yields and promoting more sustainable agriculture. We have extracted plant DNA to determine which genes are responsible for making these helpful compounds. We started with ten genetic markers, but we plan to look at more in the future. We have taken DNA from the leaves of the plants and used a special method called polymerase chain reaction (PCR) to make copies of the genes we're interested in. We have also run all the PCR products in the gel. We have completed the full analysis to see how these genes are linked to the compounds that keep herbivores away. |
| **Detailed Progress Status**: |
| The objectives proposed were (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.1. **Conduct quantitative trait loci analysis to identify molecular markers associated with anti-herbivory compounds in weeds**: Our analysis of wild soybean accessions showed some with high anthraquinone levels, particularly aloe-emodin and emodin, like WS 51, WS 77, and WS Y. These accessions had markers M1 and M2 linked to them. M1 correlated with rhein, while M2 correlated with aloe-emodin and emodin. These findings suggest genetic markers for anthraquinone production, which could help in breeding soybeans with better deer-repelling traits. It also allows us to understand how these compounds are synthesized in soybeans. This research paves the way for targeted breeding efforts to develop soybean varieties that effectively repel deer.
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