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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. | |
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| Project Title: | Spray Application of Double Stranded RNA for Simultaneous Management of Multiple Soybean Fungal and Insect Diseases |
| Organization: | Louisiana State University Agricultural Center |
| Project Lead Name: | Zhi-Yuan Chen |
| Report Period: | Dec 16, 2022 to March 15, 2023 |
| **National Soybean Checkoff Research Database** [**https://www.soybeanresearchdata.com/**](https://www.soybeanresearchdata.com/) **(public website funded by USB). Please include a non-technical project status along with your project status. The non-technical project status will be published to the website. If a non-technical project status is not provided, the contents of this entire report will be published.** | |
| Project Status: | |
| The objectives of this proposed study in the first year are to: 1) produce dsRNAs in *E. coli* of 4 different genes from Cercospora species that are important for their infection, growth or toxin production; 2) develop an effective method to deliver the dsRNAs into soybean leaves; and 3) perform various greenhouse and field studies (in Louisiana first, and other states later) to determine the effectiveness of these dsRNAs in simultaneous management of cercospora leaf blight (CLB) and purple seed stains (PSS), which are caused by *C.* cf. *flagellaris* or *C. kikuchii*, and frogeye leaf spot (FLS), which is caused by *C. sojina*, through spray applications.  In the fourth quarter, we mainly focused our research on objectives 2 and 3. For objective 2, we have been testing different ways to enhance the efficacy of dsRNA delivery into or absorbance by soybean leaves. One of the study was to examine the effect of coating our dsRNA onto lignin based nano-particles on reducing soybean fungal diseases and the other study we are conducting is to examine the effect of different adjuvants on helping dsRNA delivery or absorption in order to develop an effective approach to deliver dsRNA for disease suppression. For objective 3, we have conducted two rounds of greenhouse studies to examine the effect of different dsRNAs in reducing soybean rust and soybean FLS disease in greenhouse. We have observed some encouraging results from these preliminary studies. For further details, please see the attached technical report. | |
| **Non-technical project status:** | |
| The objectives of this study in the first year were to produce double stranded RNA (dsRNA) molecules in a bacterial expression system, use the purified dsRNAs to spray on soybean plants under greenhouse and field conditions to see whether they can reduce soybean cercospora leaf blight (CLB), purple seed stains (PPS) and frogeye leaf spot (FLS) diseases. We have cloned and produced dsRNAs targeting four the genes from Cercospora species. Soybean plants grown in greenhouse have been recently treated repeatedly with all four of the dsRNAs and showed clear effect in reducing FLS. In addition, we have also been exploring different ways (nanoparticles, adjuvants) to enhance the effectiveness of dsRNA in protecting the soybeans against CLB and FLS. We will conduct small scale studies to determine the effect of these dsRNA in reducing soybean fungal diseases under field conditions. We have requested the field plot space at Ben Hur research station and have ordered the soybean seeds for the field. | |