|  |
| --- |
| 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 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: |  March 16, 2023 to June 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 second year are to: 1) Continue the effort to fine-tune the conditions to effectively deliver dsRNA into soybean plants; 2) Examine the potential of nano-particles in enhancing dsRNA stability on leaf surface; and 3) Perform various greenhouse or field studies to determine the effectiveness of these dsRNAs in simultaneous management of CLB, FLS, and PSS through folia applications.In the past year, we have produced 4 different dsRNAs that can suppress FLS symptom development in our growth chamber studies. We began the study on using nanoparticles (objective 2) to enhance dsRNA stability in our last quarter report and so far we have not observed any clear advantage on using lignin-based nano particles. In the first quarter of the second year, our project has been focusing on repeating these dsRNA suppression of fungal disease development under greenhouse conditions (objective 3) and on exploring ways to enhance the effectiveness of applied dsRNA on disease reduction (objective 1). For objective 1, we have purchased different adjuvants and studies are underway to determine their potential in enhancing dsRNA delivery. For objective 3, we have conducted three rounds of greenhouse studies to examine the effect of different dsRNAs in reducing soybean rust and soybean FLS disease in greenhouse. Several dsRNAs performed better than others in suppressing soybean rust or FLS based on the preliminary studies. Also soybeans are being planted in Ben Hur for small scale field studies. Please see the attached technical report for more details. |
| **Non-technical project status:** |
| The objectives of this study in the second year were to examine the abilities of nucleic acids we previously produced in bacteria for reduce several major fungal diseases of soybean under greenhouse conditions, and to find ways to reduce the amount of nucleic acids we need to spray so it can be practical and economical to use this novel approach to manage soybean disease under greenhouse and field conditions to, such as cercospora leaf blight (CLB), purple seed stains (PPS) and frogeye leaf spot (FLS) diseases. These nucleic acids are non-toxic to none-targeted organism or environmentally safe. We have produced these nucleic acids in bacteria that have shown ability to reduce FLS and CLB in our previous growth chamber studies. We are now confirming their ability in reducing these diseases in greenhouse and field conditions. We are also trying to find ways to increase the uptake of these nucleic acids by either plants or the pathogens the use of various chemical formulations and application methods so we prolong the protection offered by these nucleic acids. A small scale study has also been planned this summer to determine the effect of these nucleic acids in reducing soybean fungal diseases under field conditions.  |