Mid-Cycle Report Template
Submit: research@indianasoybean.com

Project Title:	**Develop and implement a marker-assisted molecular diagnostic assay to effectively guide soybean cyst nematode management**
Principle Investigator(s):	Lei Zhang
ISA Project Number:	SU3-SFY23016
Date:	02/13/2023
Current Project Period:	October 1, 2022 to September 30, 2023
Date Final Report Due:	09/30/2023

1. Outputs - Explain what you did, what was discovered, and what was learned because of the research project.

- **Be specific about which KPIs from your proposal are met/unmet and why**
- Report outputs completed during the reporting period that contribute to the goals and objectives of the project (**DO NOT** include publications here, they are to be reported separately in Item 2 below).
- For a project just initiated, please note the status.
- Narrative is limited to 3,200 characters and spaces.

Explanation:

Soybean yield losses caused by soybean cyst nematode (SCN) in Indiana were estimated at $73 million annually from 2020 to 2021. SCN is very difficult to control because its cysts and eggs can stay dormant and survive in soil for more than ten years when there are no roots of host soybean plants around. One of the management strategies frequently used is rotation with non-host crops, e.g., corn, to reduce SCN populations. The rationale of non-host rotation to control SCN is that SCN juveniles (J2s) hatching from eggs can not feed on corn roots and eventually die in the soil, so SCN populations decline. It is hence necessary to evaluate hatch potential of SCN populations on a field before a non-host rotation is planned. Here we proposal to develop a fast marker gene-assisted molecular assay to evaluate SCN hatch potential.

The project has been conducted according to the proposed timeline, and the Aim 1 has been completed. By taking advantage of the RNA-sequencing (RNA-seq) technology, we have identified 23 genes of SCN which were present at higher abundance in SCN eggs treated with low temperature (4^{o}C), and these candidate genes may indicate the dormant state of SCN eggs. In addition, we identified 32 SCN genes which were highly expressed in SCN eggs treated with soybean root exudates, and these candidate genes indicate higher hatch potential of SCN eggs. These candidate genes will be further confirmed for their association with SCN hatch potential. We will continue to work on the project as planned to identify 2-3 SCN genes reliably associated with SCN hatch potential and develop a molecular method to quickly evaluate SCN hatch potential based on the selected SCN genes. The molecular diagnostic assay for SCN hatch potential developed here can be completed within 8 hours and less expressive in comparison to the three-week time needed by a regular SCN hatch assay.

2. Publications/Extension/Outreach - Describe how findings and results were shared. Report number of website hits, number of meetings where results shared, number of people attending meetings, etc.

- List publications, documents, meetings, or events that are specific to the project during this reporting period.
- Include only those publications, documented meetings not previously reported.
- Include research and extension publications, handouts, electronic publications, websites, etc.
- If there are no publications, documents, or meetings to report for the period, leave this field blank.
- Include a description of how the results have been disseminated to communities of interest or how the product is being shared. This report narrative is required of all projects.

Narrative is limited to 3,200 characters and spaces.

Explanation:

This project started in October of 2022. At current stage there is no publication or documents shared yet. As planed in the proposal, we will contact 50 growers in Indiana to get soil samples in the spring of 2023. Soil samples will be assayed for SCN egg density and hatch potential, the egg counts and recommendations will be returned to growers. The SCN eggs collected from field samples will be evaluated for hatch potential using the marker-gene assisted method we proposal to develop here. We plan to present the research data in a meeting at Purdue in September of 2023.

3. Project Modifications - Describe any significant changes to project content from original funded project proposal.

Select one of the following options:

__√__ Not applicable for this period, nothing significant to report.

_____Report narrative entered in the box below.

Explanation:

4. Completion Date - Describe any foreseen possibility of a no cost extension request. Be specific as possible as to why a no cost extension might be requested. Please note a No Cost Extension request must be sent to ISA no later than 90 days before end of project.

Select one of the following options:

__√__ Project expected to be completed on schedule.

_____Project delay expected, report narrative entered in box below.

Explanation:
5. Attachments: Attach any copies of graphs, charts, publications, reports, field day flyers, etc. regarding project.