Missouri Soybean Merchandising Council
Final Report Agreement No. 17-408

I. **Title of Grant:**

"MU Certified" Certified Strip Trial – Collaboration with ISA On-Farm Network ILeVO™ Test

II. **Period Covered (life of project for final report):** Funded Feb 15, 2017 to April 30, 2019
No-cost extension to January 30, 2020

III. **Project Leader and Co-Primary Investigators**

John A. Lory, Ph.D.; University of Missouri
Kaitlyn Bissonnette, Ph. D.; University of Missouri
Peter Scharf, Ph.D.; University of Missouri
Greg Luce; University of Missouri Extension and Missouri Soybean Association
Bill Wiebold, Ph.D.; University of Missouri
Kent Shannon; University of Missouri Extension
Wayne Flanary; University of Missouri Extension

IV. **Layman's Summary (limit to one page)**

Soybean cyst nematodes (SCN) are widespread throughout the Midwest and Missouri and considered the most damaging pathogen in soybean. A 2015-2016 survey of Missouri fields found SCN in 88% of the 393 samples analyzed and in all counties with significant soybean production. Soybean sudden death syndrome (SDS) is the second most damaging pathogen of soybean in the state of Missouri. SDS infects soybean seedlings early in the season through the roots and results in the yellowing and death of foliar tissue which can begin in the early flowering stages. Presence of SCN can increase the severity of SDS.

The seed treatment ILeVO™ is a fungicide labeled for control of both SDS and SCN when applied at the highest recommended rate of 1.18 to 1.97 ounces per 140,000 soybean seeds. ILeVO was first available to Missouri farmers in 2015 and was the first commercial seed treatment that suggested it could control SDS. In late 2016, the "MU Certified" Strip Trial farmer panel recommended prioritizing a strip trial testing ILeVO. In early 2107, Missouri Soybean Merchandizing Council (MSMC) funded a two-year project comparing the high rate of ILeVO with an untreated control.

The objectives of the project were:

1. Evaluate the effect of ILeVO on soybean yield.
2. Evaluate the effectiveness of ILeVO on reducing reproduction of SCN.
3. Compare results from Missouri farmer fields with similar trials in Iowa.

There were 29 Missouri trials initiated during this two-year project conducted in the 2017 and 2018 growing seasons; 20 trials qualified to be part of the final analysis. We also compared Missouri results to 23 Iowa ILeVO trials completed in the 2015 and 2016 growing seasons.

Strip trials are focused and easily implemented experimental tests that farmers can perform on their fields using their equipment. In all trials, farmers volunteered to compare their seed treatment (no ILeVO) with their seed treatment plus the high rate of ILeVO. All fields were soil sampled twice (at planting and just after harvest) at the same 20 to 40 georeferenced points for SCN. All fields were scouted for ILeVO in July and August. Farmers provided a yield map for evaluating treatment effects.

The key results of the trial were:

1. ILeVO increased yield in the Missouri trials. On sites with SDS there was a 50% chance of a response of 3.9 bushels per acre or more. On sites with no SDS, there was a 50% chance of a response of two bushels per acre or more.
2. There was evidence that the high ILeVO rate reduced the SCN reproductive factor; the effect of ILeVO was greater at locations with higher SCN reproduction.
3. In Iowa, there was no evidence that ILeVO increased yields on fields with SDS and the potential response on other fields was less than on Missouri fields.

This on-farm research documents the importance of testing management practices locally.

V. **State your objectives in question form and discuss how your results answer these objectives.**

1. What are the effects of ILeVO on soybean yield on farmer fields?
2. How effective is ILeVO at reducing reproduction of SCN in farmer fields?
3. How do results from Missouri farmer fields with similar trials in Iowa?

VI. **Please answer the following.**

A. How do your results benefit Missouri soybean growers?

The trial results provide Missouri farmers results from replicated strip trials across Missouri on how a seed treatment affects soybean yield and SCN reproduction. This independent on-farm research provides un-biased information about the management practice tested as well as documenting the status of SDS and SCN on soybean fields across Missouri.

Missouri soybean farmers are also benefiting from the investment in people and the organizational ability to run an effective strip trial program in Missouri. A strip trial program also promotes the use of on-farm trials as an effective way to assess management practices.

B. Estimate financial return for the average Missouri soybean producer.

The results of this trial provide estimates of the expected yield benefit of this management so farmers can determine if it is in their financial interest to adopt the practice.

C. Do your results benefit the environment?

Optimizing the use of inputs improves the efficiency of Missouri agriculture reducing potential negative environmental outcomes.

D. What products or processes can be commercialized from this research?

None.

E. How would you commercialize these products or processes?
Not applicable.

F. If no specific products or processes were produced, how do you plan to make your results available to producers or industry?
First, each year multiple reports were sent to all cooperating farmers summarizing the results of scouting, aerial imagery and yield results from the trial on their farm.

These reports (removing farmer-identifying information) plus annual summaries have been posted to the Strip Trial website (striptrial.missouri.edu or https://extension2.missouri.edu/programs/strip-trial-program) through MU Extension.

Additionally, we organized regional meetings in early 2019 to share results with farmers who participated in trials and/or are interested in doing trials; similar meetings will be organized early 2020. Results have been and will continue to be incorporated in MU Extension events and Soybean Association events.

During this project, Dr. Kaitlyn Bissonnette was hired by MU Extension as a Field Crop Plant Pathologist. On her arrival she was added to the team. She will continue to integrate lessons learned from this project into her Extension program.

A final report and a summary PowerPoint presentation (both included as a supplement to this report) will be shared with all farmers who participated in the trial and the members of the farmer panel that oversee the Strip Trial program. These documents will also be shared with all MU Extension regional specialists so they can incorporate parts of it into their programming. The final report will also be posted on the website and shared at farmer meetings.

G. Is additional time or research required before your results can be used by producers and industry?
No.

H. Where does this research go from here? What are the next steps?
There continues to be a need to test applied management practices on Missouri farmer fields. This project documented how results from Iowa did not match results on Missouri farmer fields. Our farmer panel typically prefers strip trials that test management strategies, as opposed to specific products. An exception was made in this case because of the unique capabilities of this product.

An important contribution of the strip trial program is building the infrastructure needed to support a strip trial program in Missouri.

- This includes working with regional MU Extension Specialists to identify farmers who have an interest in running trials on their farm.

- It also includes developing staff and regional Extension faculty skills so they can work with farmers to insure easily implemented trial designs unique to each farmer's needs.
- Finally, it includes the extensive effort to develop the infrastructure to organize data from many trials and analyze it accurately and effectively.

Moving to the future, we need to continue to work with programs in other states to keep improving how we implement trials and to share results across state boundaries to increase the impact of trial results. Additionally, it is important to maintain core funding for the strip trial program so progress made to date is not lost.

VII. **List publications by type (popular press, thesis, journals, other) written or planned.**
We anticipate submitting the results from this trial to an applied peer-reviewed journal.

We have attached the final report that will be extensively shared and a PowerPoint presentation that will serve as a resource to people who want to integrate these trial results into their outreach programming.

The strip trial program and the trials it supports have been the subject multiple radio segments and MU news stories. We will work to have the specific results of this trial integrated into an MU news story, which typically is picked up by multiple outlets. In all of our outreach we credit MSMC for their support that made this project possible.

VIII. **List cost of original project and actual expenditures.** *The U.S. Department of Agriculture requires that we ask for budget information, including the number of hours spent on the project, the number of dollars remaining on account, as well as a breakdown of expenses. You are required to provide this information in your report.* Please also include names and titles/positions of those whose time has been charged to this project.

University of Missouri has provided full accounting of all budget information for this project.

The following individuals received support from project funds.
Theresa Musket, Strip Trial Project Manager and Research Specialist
David Kleinsorge, Field Research Specialist
Vicki Hubbard, GIS analyst/research specialist
Larry Mueller, Field Research Specialist
Dan Sjarpe, Field Research Specialist

IX. **List equipment purchased with MSMC funds, identifying inventory and serial number.** (It is not considered equipment unless it costs $500 or more and has a life expectancy of at least 2 years.) Indicate current and future use of this equipment in support of soybean research.
None purchased.