



Missouri Soybean Merchandising Council

Research Pre-Proposal

2018

Project Title:	
Principal Investigator Name:	
Principal Investigator Title, Employer:	
Mailing Address:	
City/State/Zip:	
Telephone Number:	Email Address:

Co-Investigator Name:
Co-Investigator Title, Employer:
Co-Investigator Name:
Co-Investigator Title, Employer:

New Project _____ Ongoing Project _____ MSMC Project No. _____	
Proposed Funding Start Date:	Proposed Funding End Date:
Total Funding Requested: approved \$73,150	Year 1 - \$ (2019/2020) Year 2 - \$ (2020/2021)
Description of Project: <i>(Limit to 150 characters. Expanded scope may be included in pre-proposal content.)</i>	
List of Project Partners, Institutions, Organizations, Businesses and Agencies: <i>(Use additional page if needed.)</i>	
Principal Investigator:	Authorized Organizational Representative:
Signature <i>John A. Long</i> Date 10/29/2018	<i>Michelle L. Leaton</i> 10/29/2018
Signature <i>John A. Long</i> Date 10/29/2018	Signature Michelle L. Leaton Date

Assistant Pre-Award Manager

For assistance, contact Ebby Neuner with the Missouri Soybean Merchandising Council at eneuner@mosoy.org.



**Missouri Soybean Merchandising Council Research Pre-Proposal:
“MU Certified” Strip Trial Initiative: Cover Crop Trials (Project 15-278)**

I. Summarize the planned research, education or demonstration project. Include project goals and an overview of the project timeline, as well as potential and actual impacts to MO soybean producers.

Strip Trial Program Mission

A signature Missouri program helping farmers validate management decisions on their farm and document efficiency and environmental stewardship.

Background

Strip trials are focused and easily implemented experimental tests that farmers can perform on their fields using existing equipment. The adoption of yield monitors and other precision agriculture tools and strategies on most grain crop operations has provided an opportunity for wide-spread adoption of strip trials on Missouri farms. Ideally most strip trials should have limited impact on farmer management of a field beyond leaving un-treated strips in their field.

Typically, strip trials provide side-by-side comparisons of an agronomic practice (Fig. 1). Strip trials addressing conservation practices such as cover crops can document yield impact of a cover crop and potentially provide qualitative water quality comparisons. Additionally, they offer the cooperating farmer the opportunity to test new ideas or evaluate current management on their farm.

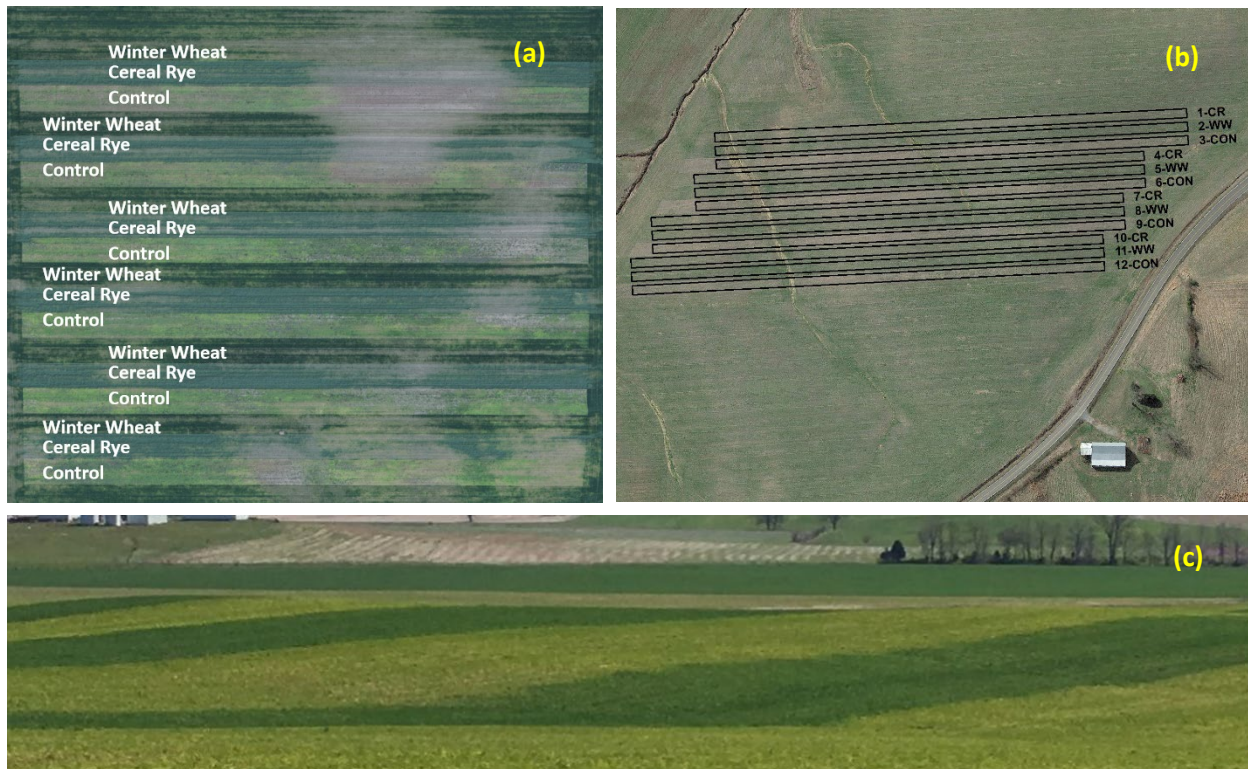


Figure 1. Some examples of typical cover crop strip trial design with side-by-side treatments and at least four replications. Several variations on this basic design are possible or appropriate for many different kinds of agronomic comparisons. Images (a) and (b) are comparisons of winter wheat, cereal rye, and a no-cover crop control. Image (c) is a termination date comparison.

A strip trial program has the potential to expand the delivery of unbiased best management recommendations for nutrient management, agronomic, and conservation management practices. This information will improve the efficiency and profitability of Missouri farmers. Equally as important, this program demonstrates proactive intent of Missouri’s grain producers to use agrochemicals and nutrients wisely and efficiently, documents the effective practices used by Missouri farmers, and promotes practical innovations in agronomic management.

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Extensive strip trial programs are common and successful in nearby states including Iowa, Illinois, and Indiana. Investment in the Missouri Strip Trial program is creating a team of experienced MU Specialists and support staff to ensure farmers have the technical support needed to implement a statistically valid test on their farm. It is also creating the framework that ensures results of individual trials are integrated to improve MU recommendations. The program also allows agricultural organizations to demonstrate crop farmers’ commitment to sustainable management.

The University of Missouri (MU), Missouri Soybean Merchandizing Council (MSMC) and the Missouri Corn Growers Association (MCGA) jointly funded a three-year project to develop and implement a strip trial program in Missouri; this funding was the genesis of the MU Certified Strip Trial Program. Key elements of the program include:

- Reliance on a farmer panel to annually identify and prioritize strip trial options offered.
- Statistically valid side-by-side comparisons of two or three management strategies in a trial, ideally tested on multiple Missouri farms for two or more years.
- Provide the farmer access to professional support to answer questions and facilitate implementation of the trial.
- Provide the cooperating farmer a comprehensive report of trial results for their trial.
- Integrate trial results across farms to improve MU recommendations and document what farmers are doing right and where there are opportunities for improvement.
- Regional meetings in January and February with farmers who had trials and farmers who are interested in trials to discuss trial results.

We are completing our third growing season of trials funded by this initial program. With each year, we are improving our ability to implement large numbers of trials across Missouri, collecting and organizing data, and improving methodology, all with the aim to provide Missouri Farmers answers to their agronomic questions on their fields. The program is on track to complete over 150 trials in the first three years. This proposal provides a bridge from our initial funding to a more comprehensive program addressing a broader array of questions.

Approach

A steering committee including farmer representation through Missouri Soybean Association, Missouri Corn Growers’ Association and other participating farmer organizations will provide leadership on types of trials available in a given year. In this proposal, the farmer panel will have two roles: i. prioritize the types of cover crop trials supported by all sources of cover crop strip trial funding; and ii. develop and prioritize ideas for new strip trial proposals. This will ensure that each year, participating farmers are selecting from a list of trials supporting the key priorities defined annually by the steering committee.

If you are a farmer interested in having a strip trial on your farm, you will work with an MU specialist or trained crop consultant to implement a statistically valid trial on your field (similar to Fig. 1). This specialist will work with the MU Campus team to ensure that you, the farmer, have the information you need to implement the trial on your farm. Typically, this means leaving untreated or treated strips in your field at known locations. They will also work with you to ensure data such as herbicide as-applied

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maps and yield maps collected by your equipment or your service provider’s equipment is transferred to the project team.

As part of a trial, the campus team will collect additional information about a field. For cover crop trials, up to three aerial photographs will be taken of all trials to document stand quality of cover crops and the subsequent grain crop. We are also developing methods to use high resolution images from a drone to assess residue cover and weed pressure both during cover crop growth and before canopy closure of the grain crop. We also assess crop color, which can be useful in crops such as corn and milo to indicate if the cover crop has affected nitrogen status of the growing grain crop. All trials include a scouting component.

For cover crop trials initiated the previous fall, farmers will receive a spring report documenting the location of the treatments including aerial imagery of the cover crops. At the end of the all trials, the farmer will receive a report including a statistically valid comparison of the impact of the managements tested on their farm. For example, where did the cover crop affect yield compared to the no-cover control? Or, for a termination study, did the timing of termination affect yield?

The campus team will take farm-specific results and integrate those results across locations and years while protecting the identity of participating farmers. Typically, reaching conclusions on “lessons learned” will be limited until there are at least two years of data to capture year-to-year effects. This information can then contribute to improvements in MU recommendations and provide all partners information on the efficiency of Missouri farmers.

This proposal provides funding for at least 14 cover crop trials per year. Costs are estimated based on the more extensive model trial with treatment applied in fall and assessed through fall, spring, and the next growing season. If less intensive trials are selected by the panel, more trials are possible. We will also seek matching support from other organizations to expand funding for cover crop trials.

Project Timeline

Year two of this project is seeking funding for strip trials that will be initiated between fall 2019 and spring 2020 for the 2020 growing season. Below is a timeline for the whole project.

Project Timeline based on a start date in Oct. 1 2018 and a finish date in Feb. 2021. Year-two activities will start in Q4 of 2019.

	2018	2019				2020				2021
Project Activities	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Farmer Panel prioritization & review		X		X		X		X		X
Recruit Farmers for trails (≥ 14 /year)	X	X	X	X	X	X	X			
Farmer reports of their results			X		X	X	X		X	X
Regional farmer meetings		X				X				X
MSMC Quarterly Reports	X	X	X	X	X	X	X	X	X	X

II. Briefly address the need for the project, including an explanation of the specific challenge or commercialization opportunity driving the project. If appropriate, include a brief literature review and citations.

The MU Certified Strip Trial Program is uniquely focused on identifying and answering practical management questions on Missouri farms. For cover crops specifically, there are other programs supporting trials in Missouri. The Soil Health Partnership has sponsored six trials in Missouri looking at long-term effects (five years) on a wide array of soil properties.

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In contrast, this program is focused on management questions and challenges associated with cover crops and other agronomic practices. In the first two years of the program, two types of trials were offered. There have been 29 trials comparing cereal rye, winter wheat, and a no-cover control effects on yield with methods being developed to look at ground cover and weed pressure. The second trial type compared farmer-selected termination dates on a cover crop of the farmer’s choice. Challenges with selecting a termination strategy is fraught with uncertainty. There is pressure by cost-share programs to delay termination to increase biomass accumulation. We are building an inventory of case studies documenting challenges and outcomes in a wide range of situations.

In August, 2018, in the fourth meeting of our farmer panel, cover crop trials focused on management questions continued to rank high. These included trials focused on cover crop options after soybean before corn; impact of longer term cover crop trials, and trials evaluating the potential of cover crops to reduce nematode survival.

The MU Certified strip-trial system provides an ideal basis for the development and implementation of these types of experiments while providing valuable analytical information about current, on-farm management practices. Our capacity to work directly with farmers and the farmer panel to annually consider new ideas for trials provides a unique program that can improve and expand trial options over time. We can work with farmers to identify key questions; our network of MU specialists can then work with farmers to provide practical solutions to the challenges of implementing trials on-farm trials.

This proposal also seeks to preserve the ability of the strip trial panel to continue to set priorities for cover crop trials and to solicit other organizations to contribute to a program focused on expanding Missouri farmer’s understanding of cover crop management.

III. Provide a project budget, detailed by project year, including: salaries and wages, fringe benefits, equipment, supplies, travel and other identified expenses. Please note that the principle investigator’s salary, indirect costs and student tuition may not be charged to the grant.

Budget. This budget includes at least 14 strip trials per year; the number may increase based on the complexity of the trials selected. If the board supports more or fewer trials they can increase or reduce the number of trials supported at the cost of \$5,225 per trial.

Category	Current Year	Requested Year 2
Personnel and Benefits	\$52,969	\$54,737
Equipment	-	-
Travel	\$10,231	\$9,243
Other Direct Costs	\$9,950	\$9,170
Total Direct Costs	\$73,150	\$73,150
Indirect Costs	-	-
Total Costs	\$73,150	\$73,150

Budget Narrative

Personnel, for each year, includes 0.20 FTE (\$61,893 salary) for a Project Manager/Research Specialist and 0.45 FTE support for Research Technicians (based on \$40,664 salary) for coordinating and implementing trial, data coordination and analysis, communication to the farmer, development of reports and other reporting strategies. Personnel also includes \$11,150 per year for partial support of a

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Master's student assistantship (0.5 of a 0.5 12-month appointment, \$22,300/year) to work on data analysis and methods. Total salary is \$41,827 per year. Benefits are calculated as 36.69% of salaries excepting graduate student. Total benefits is \$12,911 and total personnel costs are \$54,737 per year.

For each year, domestic travel includes 1,500 miles per trial for travel by regional faculty and state staff to the location for two scouting activities, three aerial surveys, and travel by regional and state faculty and staff to facilitate implementation of the trial and to support the program. Mileage costs are based on a charge of \$0.37 per mile. The budget includes 7 overnight travel trips per year for travel by state staff to the trials and regional staff to attend activities supporting the trials such as meeting with the farmer panel. Overnight travel expenses per trip are \$210 (\$106.23 hotel + 2 days of per diem (\$52/day)). Total domestic travel in year one is \$9,243 per year.

Other direct funds includes \$4,550 per year (\$325/location X 14 locations) for supplies such as flags and field equipment repair. Materials and supplies also includes \$4,620 per year (\$330 X 14 locations) for software license and user fees and for Wi-Fi hotspot devices with a data plan needed for GPS equipment and iPads for data collection at field locations. Total other costs are \$9,170 per year.

No indirect cost is allowed by the sponsor. Total direct costs for the project are \$73,150 in year 1 and in year 2. Expenses charged to the grant for one trial are \$5,096 with the expectation of 14 trials per year supported by the project. Additional trials can be added or removed at the board's discretion for a per-trial cost of \$5,100.

A key component of this project is to leverage funds from multiple partners to initiate and sustain strip trials that allow Missouri farmers evaluate and improve management of cover crops on their farm. We will reach out to Missouri Corn Grower Association to continue matching funds from Missouri Soybean Merchandising Council. We also plan on approaching other organizations to increase the number of cover crop trials supported by the MU Certified Strip Trial program.

IV. Identify any individual or entity which may have rights or ownership to the information or processes expected to be developed as a result of this research, education or demonstration project, and explain the extent of those rights or ownership. If this project has been submitted for funding consideration to another source, please disclose that relationship as well.

None.

V. Briefly describe the uniqueness of this project and identify related work that has been conducted in this area by you or other researchers.

A stable successful strip trial program requires over 70 trials per year. In 2019:

- We anticipate at least 25 trials funded by the fourth year of the MU/MSMC/MCGA environmental efficiency fund focused on cover crops;
- We have requested at least 12 trials based on continuation of the ILeVO trials for a third year.
- We have requested a second year of support for at least 10 trials testing foliar fungicides in soybean.
- We have requested support for at least 10 trials testing seed treatments in soybean.
- We have requested for first year funding for 8 trials focused on nitrogen management in corn.

If all these requests are successful, we will have support for at approximately 65 strip trials on Missouri farms in 2019. This proposal starts to build the bridge to trials that will be supported in 2020 and beyond.