

## Ebby Neuner

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**From:** Rice, Kevin <ricekev@missouri.edu>  
**Sent:** Tuesday, April 21, 2020 11:22 AM  
**To:** Greg Luce; Ebby Neuner  
**Subject:** RE: MSMC Soybean Research Quarterly Report PAST DUE  
**Attachments:** Final\_Report\_Kevin\_Rice.docx

Hi Ebby and Greg,

I have attached my final report for project #19-437-20: Monitoring system using sticky traps for multiple stink bug species.

Our results look promising for the potential to use clear sticky traps to estimate stink bug populations in soybean fields, but an additional field season would provide much stronger support. I spoke with Dr. Kelley Tilmon from Ohio State this morning. Based on our results, her lab plans to repeat this experiment this summer. Ohio has much higher stink bug pressure due to the invasive brown marmorated stink bug.

I'm now considering repeating this field trial in Missouri, but I have not looked for funding. I realize this is very short notice for a study that would be initiated in August, but are you aware of any small funding opportunities (~\$8,000) that might help with labor and materials?

Thanks you for your consideration and funding. I look forward to discussing the results at Missouri extension events,

Kevin

Kevin B. Rice  
Assistant Professor  
Division of Plant Sciences  
University of Missouri  
700 Hitt St, 1-33 Ag BLDG  
Columbia, Missouri 65211

Extension Specialist  
University of Missouri Extension  
<https://cafnr.missouri.edu/person/kevin-rice/>

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**From:** Greg Luce <gluce@mosoy.org>  
**Sent:** Monday, April 20, 2020 5:11 PM  
**To:** Rice, Kevin <ricekev@missouri.edu>; Ebby Neuner <eneuner@mosoy.org>  
**Subject:** Re: MSMC Soybean Research Quarterly Report PAST DUE

Thanks Kevin

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**From:** Rice, Kevin <[ricekev@missouri.edu](mailto:ricekev@missouri.edu)>  
**Sent:** Monday, April 20, 2020 4:39:01 PM

**To:** Ebby Neuner <[eneuner@mosoy.org](mailto:eneuner@mosoy.org)>  
**Cc:** Greg Luce <[gluce@mosoy.org](mailto:gluce@mosoy.org)>  
**Subject:** RE: MSMC Soybean Research Quarterly Report PAST DUE

Hi Ebby,

I just finished running the final stats and will have the report complete by tomorrow.

Exciting results!

Kevin B. Rice  
Assistant Professor  
Division of Plant Sciences  
University of Missouri  
700 Hitt St, 1-33 Ag BLDG  
Columbia, Missouri 65211

Extension Specialist  
University of Missouri Extension  
<https://cafnr.missouri.edu/person/kevin-rice/>

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**From:** Ebby Neuner <[eneuner@mosoy.org](mailto:eneuner@mosoy.org)>  
**Sent:** Thursday, April 16, 2020 2:22 PM  
**To:** Rice, Kevin <[ricekev@missouri.edu](mailto:ricekev@missouri.edu)>  
**Cc:** Greg Luce <[gluce@mosoy.org](mailto:gluce@mosoy.org)>  
**Subject:** MSMC Soybean Research Quarterly Report PAST DUE  
**Importance:** High

Please share a progress report on your soybean research project sharing activities from January 1-March 31, 2020.

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**From:** Ebby Neuner  
**Sent:** Thursday, April 9, 2020 4:38 PM  
**To:** Kevin Rice <[ricekev@missouri.edu](mailto:ricekev@missouri.edu)>  
**Cc:** Greg Luce <[gluce@mosoy.org](mailto:gluce@mosoy.org)>  
**Subject:** REMINDER: MSMC Soybean Research Report Due April 10, 2020  
**Importance:** High

**REMINDER:** Tomorrow is the quarterly report deadline for projects funded by Missouri soybean farmers and their checkoff. Instructions for report content show below. Please email to [gluce@mosoy.org](mailto:gluce@mosoy.org) and [eneuner@mosoy.org](mailto:eneuner@mosoy.org).

#19-437-20  
Monitoring System Using Sticky Traps for Multiple Stink Bug Species

Also, our records show this project ended March 31, 2020. A final report is due MSMC within 60 days after contract expiration. That final report is due by June 1<sup>st</sup>, and the guidelines are attached.

Thanks,  
Ebby

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**From:** Ebby Neuner

**Sent:** Thursday, March 19, 2020 12:04 PM

**To:** Pengyin Chen <[chenpe@missouri.edu](mailto:chenpe@missouri.edu)>; Andrew Scaboo <[scabooa@missouri.edu](mailto:scabooa@missouri.edu)>; Bilyeu, Kristin <[kristin.bilyeu@usda.gov](mailto:kristin.bilyeu@usda.gov)>; Kevin Bradley <[bradleyke@missouri.edu](mailto:bradleyke@missouri.edu)>; Kaitlyn Bissonnette <[bissonnettek@missouri.edu](mailto:bissonnettek@missouri.edu)>; Fritschi, Felix B. <[fritschif@missouri.edu](mailto:fritschif@missouri.edu)>; Derek Brake <[braked@missouri.edu](mailto:braked@missouri.edu)>; Peter Scharf <[ScharfP@missouri.edu](mailto:ScharfP@missouri.edu)>; Kevin Rice <[ricekev@missouri.edu](mailto:ricekev@missouri.edu)>

**Cc:** Greg Luce <[gluce@mosoy.org](mailto:gluce@mosoy.org)>

**Subject:** MSMC Soybean Research Report Due April 10, 2020

The Missouri Soybean Merchandising Council (MSMC) requires quarterly reports on contracted projects. The next report deadline is **April 10, 2020**. Your report should cover research efforts from date of your last report through March 31, 2020.

Your report should be submitted electronically to [gluce@mosoy.org](mailto:gluce@mosoy.org) and [eneuner@mosoy.org](mailto:eneuner@mosoy.org), and include the following:

1. MSMC project number
2. Time period covered
3. Activities conducted/Progress to date
4. Is your project on schedule? If not, how much are you behind?
5. Is your project on budget? If not, how much over OR under budget?
6. Names and positions/titles of those whose time is being charged to this research project

If you encounter any delay with the project (i.e., timing of funds made available, staffing issues, weather setbacks, etc.), please relay as soon as known to both the University's grants office as well as MSMC. We want to be proactive vs. reactive.

MSMC also depends on quarterly invoices to show research progress. Please make sure you submit timely expense details to the University's accounting office, as expenses need to be reported in correct fiscal year.

Reminder about contract language on publication:

The results of any work or research performed may be published, however MSMC shall be notified at least 30 days prior to its release and given opportunity to review and comment on content.

Please also remember to acknowledge MSMC's financial investment in your research.

Thank you for your cooperation, and please relay any questions.

Greg Luce  
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**Final report #19-437-20**

- I. Title: Monitoring system using sticky traps for multiple stink bug species**
- II. Period Covered: April 1, 2019- March 30, 202**
- III. Project Leader: Kevin Rice**
- IV. Summary**

### **Background**

Native stink bugs have emerged as a key pest species in field crops in the Midwestern United States during the last decade. In a recent survey, Missouri soybean growers report stink bugs as a key insect management issue (Rice unpublished). Furthermore, the invasive brown marmorated stink bug has recently established throughout Missouri and has the potential to create severe economic injury in Missouri soybean. Stink bugs are typically a late season pest in soybean, although economic thresholds have been developed using sweep sampling, this method is difficult and laborious especially towards the end of the season. Previous studies have observed both native and invasive stink bug species are attracted towards and captured clear sticky traps baited with aggregation pheromones. We investigate if clear sticky traps deployed along outside borders of soybean can estimate field level abundance of stink bugs in soybean.

### **Methods**

During 2019, we deployed a single clear sticky card baited with stink bug aggregation pheromone three meters from center of each edge in soybean fields located at Bradford Research Center. Traps were monitored each week and the number of stink bug adults and nymphs recorded. Each sticky trap was replaced every other week. At each field edge, ten sweep samples were collected from the first row of soybean directly in front of the sticky trap. An additional 10 sweeps were collected from the interior of the field (~ 50 meters from trap). This study was replicated across 7 fields from August 25 through September 18, 2019. Pearson's correlation (SAS 9.4) was used to compare stink bug trap captures with sweep samples from the field edge and interior sweep samples. An additional seven sets of sweeps (10 sweeps per set) were collected from the interior of the field each week, and the average number of stink bug from sweeps were compared to the average of stink bug captures from the four traps along the field edge using Pearson's correlation.

### **Results**

Stink bugs collected in sweep samples along field edges were positively correlated with adjacent sticky card captures on clear sticky traps  $r(56) = 0.32$ ,  $p = 0.018$ . However, sweep samples collected 50 meters from traps were not correlated with the single field edge trap  $r(56) = 0.033$ ,  $p = 0.81$ . When stink bug captures from all four sticky traps per field were averaged, they were positively correlated with the average interior sweep samples  $r(14) = 0.67$ ,  $p = 0.011$ .

Our results suggest clear sticky traps deployed on the outside border of soybean fields have potential to estimate field abundance of stink bugs. Overall stink bug abundance were low during 2019, and future experiments should quantify trap captures and sweep collections under

high population pressure. Furthermore, we only detected native stink bugs in both sticky traps and sweep samples. The relationship of brown marmorated stink bugs will need to be investigated, as its populations increase in Missouri. However, we formed a collaboration with Kelley Tilmon at Ohio State during this study. Dr. Tilmon repeated this experiment under high brown marmorated stink bug population pressure (results expected in May 2020). To assess the potential of increased stink bug damage to soybeans near sticky traps baited with aggregation pheromone, we collected 10 soybean plants from edge rows adjacent to traps and 10 plants from interior rows (~50 meters from traps). All pods from each plant were split and seeds investigated for stink bug damage. We are currently in the process on analyzing this data.

- V. Can stink bug abundance in soybean fields be estimated using clear sticky traps along outside borders?

Our results suggest clear sticky traps have potential to estimate stink bug abundance in soybean fields. Additional field trials will need to quantify captures at higher population pressure and determine trap capture thresholds associated with economic injury.

- VI. A. We hope future field trials will determine trap capture thresholds associated with injury and provide growers with a quick and accurate assessment of a key late season pest.

B. Financial returns will be determined by future experiments including trap threshold levels for economic injury. However, checking traps deployed along field borders will dramatically reduce time and labor associated with traditional scouting measures.

c. Our results may provide environmental benefits if growers who currently use calendar-based insecticide applications adopt trap thresholds due to their rapid, and easy assessment.

d. no products were commercialized from this research. The lures and clear sticky traps are commercially available, but have not been used to estimate stink bug abundance in field crops.

e. N/A

f. Our results will be discussed at Missouri and Ohio extension meetings. If we secure additional funding, we will repeat the experiment and publish results in a peer-reviewed journal.

**g. We strongly believe an additional years funding (2 years of data from 2 states with different population pressures) will provide adequate results to determine if sticky traps can estimate in field stink bug populations.**

H. We hope to secure additional funding to repeat the field experiments in Missouri and Ohio. Eventually, we aim to develop thresholds based on trap captures to aid growers in management decisions.

**VII.** We require additional field trials prior to publishing our results.

**VIII.** Cost of project \$9,752

**IX.** No equipment over \$500 was purchased with these funds.