Row Crop Irrigation Science Extension and Research (RISER) Program
13-2021
Annual Report (April 1, 2021 – March 31, 2022)

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Rationale/Justification for Research:
Declining aquifer levels, coupled with impending well monitoring, serve as a catalyst to improve water use efficiency. The RISER program has identified several technologies and management practices that have the potential to eliminate the 300,000 ac-ft/yr overdraft on the Mississippi Alluvial Aquifer while ensuring that producers stay within permitted irrigation limits. However, the adoption of Best Management Practices (BMPs) by producers in the Mississippi Delta is minimal. The RISER (Row Crop Irrigation Science Extension and Research) Program can serve as the primary means to facilitate widespread adoption of the latest irrigation management research findings across the Mississippi Delta. The project aims to evaluate, demonstrate, and transfer innovative and proven technologies that can result in water conservation by conducting coordinated extension activities throughout the Mississippi Delta.

Objective 1: Identify, evaluate, and demonstrate sensor-based automation technologies

Each site was equipped with a pump controller and automated actuated valves to allow the remote start of the irrigation set and a seamless transition from one set to the next by opening and closing valves through a preset length of time. During the automated valves' evaluation stage, personnel were present during the start of irrigation and transition of each irrigation set.

The evaluation includes the actuated valves' functionality and monitoring and recording failures of the actuated valves throughout the season. A couple of issues were observed this year. Control boxes must be working for the full irrigation to operate correctly. Issues observed with control boxes were cell connection issues and battery power failures. All issues were addressed and fixed by replacing a battery or switching from Verizon to AT&T or vice versa. The problems that occurred are easily fixed; however, they are important to determine prior to irrigation. For all five automation sites, each valve operated correctly in opening and closing when prompted. Predetermined templates set an irrigation time for each set and each field. These templates are programmed to the software, as well as, field observations, soil moisture sensor readings, and weather outlook. The irrigation "spin" was initiated through the user interface. At each site for all irrigations, a successful run was made by the automated system. Yield is currently being obtained from participating growers, and total water use for the well and the associated fields are being calculated.

Total water use and yield was obtained from the automated sites and the “control” non-automated, farmer irrigated sites. This results for 2 years with 7 total sites, and only show the average for the on-farm sites. Results are:

	Yield (bu/ac)	Water Use (acre-inches)	Water use efficiency (yield/irrigation applied)
Automated Fields	87.96	5.53	19.29
Non-automated Fields	88.00	9.00	13.95

Objective 2: Conduct hands-on training and other learning opportunities with producers that have yet to adopt proven irrigation water management practices.

Mississippi Crop Situation Blog Post:

1. How to Install Watermark Sensors. 05-14-21. https://www.mississippi-crops.com/2021/05/14/how-to-install-watermark-sensors/
2. Irrigation Season Approaching. 05-07-21. https://www.mississippi-crops.com/2021/05/07/irrigation-season-approaching/
3. How to Determine Where to Install Soil Moisture Sensors. 05-06-21. https://www.mississippi-crops.com/2021/05/06/how-to-determine-where-to-install-soil-moisture-sensors/
4. Irrigation Survey. 05-03-21. https://www.mississippi-crops.com/2021/05/03/irrigation-survey/
5. Maintenance time for Watermark Sensors. 04-29-21. https://www.mississippi-crops.com/2021/04/29/maintainance-time-for-watermark-sensors/
6. **Gholson, D.** MSU Row Cop Educational Programs – Irrigation Update. 04-02-21. https://www.mississippi-crops.com/2021/04/02/2021-msu-row-crop-educational-programs-irrigation-update/

Mississippi Crop Situation Podcast:

1. Mississippi Crop Situation Podcast. 08-17-21. Irrigation Termination. http://extension.msstate.edu/content/irrigation-termination
2. Mississippi Crop Situation Podcast. 05-18-21. 2021 Irrigation Technology. https://www.mississippi-crops.com/2021/05/18/2021-irrigation-technology-podcast/

Website:

Soil Moisture Sensor Showcase: https://www.ncaar.msstate.edu/outreach/general.php
Provides an opportunity for the Mississippi agricultural community to learn more about the soil moisture sensors and accompanying telemetry services currently on the market.

Soil Moisture Sensor Videos:

1. 2021 Sensor Showcase: August 17, 2021

https://www.youtube.com/watch?app=desktop&v=OQdqQ_wR0Og&t=7s

Popular Press Articles:

6 popular press articles discussing Irrigation water management practices.

Soil Moisture Sensors On-farm Demo:

The RISER program is training and assisting county extension agents to reach growers who have been hesitant to adopt soil moisture sensors. Twenty-five farms participated in the soil moisture demo with sensors installed in their fields. Working through the county extension agents, RISER installed sensors, set up telemetry with grower access, and worked through in-season irrigation triggers with the producers.

At the end of the year, a meeting will occur where we sit one-on-one with the producer and go over a season-long graph of the moisture sensors that shows irrigations and rainfall events. The meeting will allow the producers to look back on the season and have questions answered in an informal setting. A questionnaire will be used to track changes in knowledge, confidence, and barriers to adoption. Results will be available in the next report.

Season-long demo evaluation results.

100% were extremely satisfied with the program.
100% plan to adopt soil moisture sensors.
100% increase in knowledge on:

- How to read the soil moisture sensors.
- Confidence in soil moisture sensors to reflect accurate soil moisture readings.
- How soil moisture sensors can help me make better irrigation scheduling decisions.
- Understanding of soil moisture sensor telemetry options on the market.

When asked how many irrigations the sensors saved them in year 1: the Average was over **two** irrigations saved, resulting in about $16/acre. Over 50,000 acres were represented in the program, which results in a $800,000 saving per year for the reduction in irrigations. **100%** plan to adopt soil moisture sensors.

Trainings:

1. ANR Extension Agents Training. Advancing Adoption of Soil Moisture Sensors Through On-Farm Training and Demo. 03-08-22
2. MACAA Professional Improvement Conference for Extension Agents. Soil Moisture Sensors – Installation and Scheduling. 08-13-21

Presentations

1. On-Farm Irrigation Water Management Automation Evaluation. 25th Annual National Conservation Systems Conference. Jonesboro, AR 02-01-22
2. Roundtable - Using Soil Moisture Sensors Across the Entire Farming Enterprise: Lessons learned from Those Who are doing it. 25th Annual National Conservation Systems Conference. Jonesboro, AR 02-01-22
3. On-Farm Irrigation Water Management Automation Evaluation. 25th Annual National Conservation Systems Conference. Jonesboro, AR 02-01-22
4. 48th Annual Agricultural Consultants Association. Irrigation Management in Mississippi Row Crops. Starkville, MS 02-09-22
5. 2022 Arkansas Agricultural Consultants Association. Water Management Strategies. North Little Rock, AR 01-17-22
6. 2022 Tri-State Soybean Forum. Irrigation Efficiency and Technology. Stoneville, MS 01-07-22
7. Yazoo Mississippi Delta Joint Water Management District Board of Directors Meeting.NCAAR Update. Stoneville, MS 12-15-21
8. 2021 MSU Row Crop Short Course. Producer Panel: Water Management. Starkville, MS 12-07-2021
9. 2021 MSU Row Crop Short Course. Soil Moisture Sensors Can Save Time, Money and Water. Starkville, MS 12-07-2021
10. NRCS State Technical Committee Meeting. NCAAR Update. Virtual 11-16-2021
11. Mississippi Agriculture Consultants Association, Research Roundtable. Stoneville, MS 09-30-2021
12. MSU Vice Presidents' Tour of Delta Research and Extension Center. Stoneville, MS 07-29-2021
13. MAIC Row Crop Certified Crop Advisors Program. Strategies to Improve Irrigation Scheduling and Efficiency. Orange Beach, AL 07-21-2021
14. 2021 Virtual UCOWR/NIWR Annual Water Resources Conference. Special Session – Groundwater Sustainability: From Regional Practices to a National Agenda. NCAAR: A Multidisciplinary and Collaborative Consortium to Adress Groundwater Depletion in the Lower Mississippi River Basin. 06-08-21
15. 2021 Virtual UCOWR/NIWR Annual Water Resources Conference. Special Session – Extension Education. Adapting to a Changing Audience. Panel Discussion. 06-09-21
16. MS Senate Ag Committee Presentation. Stoneville, MS 05-14-21