Row Crop Irrigation Science Extension and Research (RISER) Program
13-2022
Annual Report (April 1, 2022 – March 31, 2023)

Drew M. Gholson drew.gholson@msstate.edu 979-255-7018
J. Trenton Irby jti2@msstate.edu 662-325-8616
G. Dave Spencer dave.spencer@msstate.edu 662-769-7554
Alex Deason a.deason@msstate.edu 662-887-4601
Brian Mills b.mills@msstate.edu 662-686-3238

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 goal of the project is to evaluate, demonstrate, and transfer innovative and proven technologies that can result in water conservation by conducting coordinated extension activities throughout the Mississippi Delta.

Report of Progress/Activity:

Objective 1: Identify, evaluate, and demonstrate sensor-based automation technologies.
For 2022, Six collaborating producers agreed to participate in on-farm research sites. Sites were located in Sharkey, Coahoma, Washington, and Sunflower counties. Evaluations for each well system were conducted on functionality, reliability, flexibility, sustainability, and efficiency and compared to yield, water use efficiency, and economic analysis.

The evaluation included the actuated valves' functionality and monitoring and recording failures of the actuated valves throughout the season. After the 2021 season, researchers met with Valley Inc. to discuss feedback and increase usability of the product. After our meeting they decided to upgrade the user interface. The new software then required new hardware boxes. There were some programming issues found with the new hardware that were fixed immediately. The review of this new automated system is early in the stages of hardware systems. Programming and testing are still needed in order for this to be an easy and adaptable practice. Total water use and yield was obtained from the automated sites and the "control" non-automated, farmer irrigated sites. These results show the average for the on-farm sites. Results are:

Table 1. Seasonal irrigation, soybean yield, and irrigation water use efficiency (IWUE) for the fourteen sites in soybean from 2020 to 2022.

	Yield (bu/ac)	**Water Use (acre-inches)**	**Water use efficiency (yield/irrigation applied)**
Automated Fields	80.96	7.22	14.37
Non-automated Fields	81.57	10.13	11.35

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

Through the MSPB-funded RISER program, it was determined that the use of soil moisture sensors, computerized hole selection, and surge irrigation water use can be reduced by 21% and water use efficiency improved by 36%, increasing producer profitability by $13 per acre. In 2022, the RISER program installed moisture sensors and trained producers one-on-one to promote the adoption of these practices that cover over 55,000 acres potienally resulting in over $700,000 in increased profitability and saving of 14,000 acre-feet or 4.4 billion gallons of water.

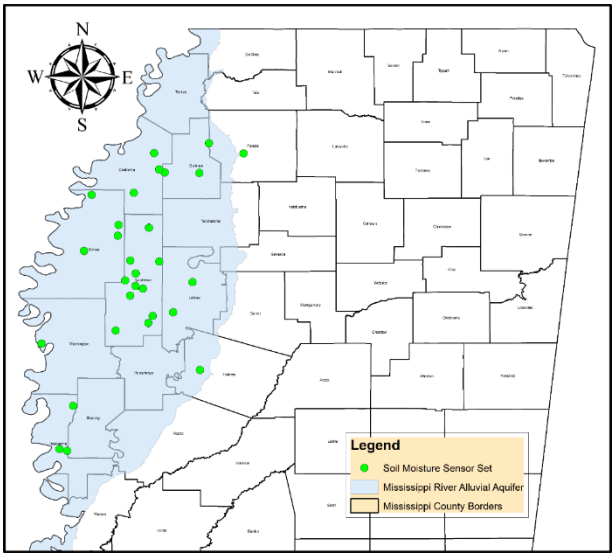

Figure 12022 soil moisture sensor sites in this statewide Extension program.

Sensor Training and Demonstration:

To empower farmers to take the big step of adopting sensors, we launched an agent-led and multi-year on-farm education program. Agents recruit farmer-participants from their respective counties and provide critical hands-on training in the field to give the producer the best user experience.

Two training sessions were held at the DREC and one on-farm in a participating grower's field. Individual meetings were conducted with participants in the soil moisture sensors on-farm demonstration program. The meetings covered a year-end review that included season-long soil moisture graphs, rainfall, and irrigation events. The review aided in discussions on how well the farmer did in irrigation scheduling, where they felt they could get better, and how we can help build knowledge about the sensors and understanding the moisture readings. We went over available resources. In addition, the growers completed a questionnaire about their experience with the program.

Soil Moisture Demo evaluation results:
100% were extremely satisfied with the program.
100% increase in knowledge when asked:

- How to read the soil moisture sensors.
- Confidence in soil moisture sensors to reflect accurate soil moisture readings.
- Where to get information for guidance on soil moisture sensors.

Farmer assistance in computerized hole selection:

Over 10,000 acres were designed together with growers through the RISER program in 2022.
Flow rates and elevations were taken by the MSU irrigation team to develop the computerized hole selection plans.

Presentations:

1. **21** presentations on results from RISER program throughout Mississippi, surrounding states and national meetings.

Producer Meetings

1. Grenada County Grower Meeting. Grenada, MS 02/23/22
2. Coahoma County Grower Meeting. Clarksdale, MS 02/16/22
3. Tunica County Grower Meeting, Tunica, MS 02/16/22
4. Humphreys County Grower Meeting. Belzoni, MS 02/15/22

5. Yazoo County Grower Meeting. Yazoo City, MS 02/15/22
6. 48th Annual Delta Ag Expo. Panel on Irrigation and Late Season Agronomic Considerations. Cleveland, MS 01/29/2022
7. Leflore County Grower Meeting. Greenwood, MS 01/18/22
8. Sharkey County Producer Meeting. Rolling Fork, MS 01/18/22
9. Hinds County Producer Meeting. Raymond, MS 01/10/22

Podcasts:

1. Mississippi Crop Situation Podcast. 09-22-22. 2022 Recap and Look Ahead to 2023. http://extension.msstate.edu/content/%E2%80%9822-recap-and-look-ahead-%E2%80%9823
2. Mississippi Crop Situation Podcast. 06-28-22. Soybean Irrigation…Timing and Sensor Use. http://extension.msstate.edu/content/soybean-irrigation%E2%80%A6timing-and-sensor-use
3. Mississippi Crop Situation Podcast. 05-20-22. Soil Moisture Status and Irrigation Initiation. https://www.mississippi-crops.com/2022/05/20/soil-moisture-status-and-irrigation-initiation-podcast/

Popular Press Articles

10 popular press articles discussing Irrigation Water Management practices.

Blog Articles:

1. **Gholson, D.** MSU Extension Survey Seeks Farmer Feedback. 02-23-23
2. Irby, T., **D. Gholson**, et al. Upcoming Row Crop Extension Meetings. 02-10-23
3. Irby, T. and **D. Gholson**. Soybean Irrigation Termination. 08-13-22.
4. Irby, T. and **D. Gholson.** Soybean Irrigation. 06-18-22
5. **Gholson, D.** How do I install Watermark moisture sensors? 05-28-22.
6. **Gholson, D.** Where do I install my soil moisture sensor? 05-28-22.
7. **Gholson, D.** Pipe Planner Training Opportunities. 05-03-22
8. **Gholson, D.** How to Build Watermark Sensors. 03-25-22.
9. Irby, T., T. Allen, J. Bond, A. Catchot, D. Cook, W. Crow, **D. Gholson**, J. Gore, E. Larson, W. Maples, B. Mills, B. Pieralisi, T. Wilkerson, B. Zurweller, and L. Harvey. 01-06-22.

Field Days:

1. LTAR Leadership Field Day. LTAR Collaboration. Stoneville, MS 12/02/22
2. Land Stewardship Field Day: Buckeye Farms. Row-Crop Operation and Stewardship – Cover Crops, Soil Health, Soil Carbon Research. Como, MS 09/29/22
3. Mississippi Farm Bureau and US EPA Personnel Field Day. Environmentally Sustainable and Economically Sound Irrigation Water Management Technologies: Water Quality, Runoff, and Cover Crops. Stoneville, MS 09/01/22
4. Soil and Water Stewardship in Row-Crop Systems Field Day. Shaw, MS 07/13/22
5. NRCS Regional Soil Health Personnel Field Day. Practice and System Implementation to Improve Water Quality via Tillage Reduction or Cover Crop Planting. Stoneville, MS 06/28/22

Webinars

2 Webinars with a National Audience.

Online Web Tools and Apps:

1. Flow Measurment Series: Flow Meter Calculator. The Flow Meter Calculator can be accessed at **https://www.ncaar.msstate.edu/outreach/fmcalc.php** .
2. How to Calculate Irrigation Pumping Costs with MITOOL. The online tool can be accessed at https://www.ncaar.msstate.edu/outreach/mitool.php.