



Mississippi Corn Promotion Board 2021 Progress Report

Project Title: Row Crop Irrigation Science Extension and Research Program (RISER)

PI: Drew Gholson, Erick Larson, Dave Spencer, Brian Mills, Tsz Him Lo, Gurbir Singh

Department: Delta Research and Extension Center

Project Summary (Issue/Response)

Our research program has identified several technologies and irrigation water management (IWM) practices that can reduce the overdraft on the Mississippi Alluvial Aquifer while maintaining or increasing yield, increasing net returns, and ensuring that corn, cotton, soybean, and rice producers do not exceed permitted irrigation limits. However, the adoption of proven irrigation water management practices by Mississippi producers has been minimal. This project will have a two-pronged approach:

- 1) Conduct hands-on training and learning opportunities with producers that have yet to adopt proven irrigation water management practices.
- 2) Identify, evaluate, and demonstrate new irrigation automation technologies in furrow irrigation;

This project will evaluate whether or not the addition of automation to furrow irrigation practices would promote better management of those practices and, thereby, enable farmers to increase yields using less labor, water, and energy. Additionally, to encourage adoption, growers will receive assistance with design, installation of proven IWM practices on their farm, and irrigation timing decisions. This hands-on learning approach alongside the producer will provide maximum learning opportunities and remove possible barriers to technology adoption. This program will address the full spectrum of growers in Mississippi – from those who need to initiate IWM practices to those who have already adopted some or all of the proven technologies. We submit that the RISER (Row-crop Irrigation Science Extension and Research) Program can serve as the means to facilitate the widespread adoption of the latest irrigation water management practices across the Mississippi Delta as well as investigate new opportunities.

Project Results/Outcomes

Three collaborators agreed to participate in the 2021 RISER program to evaluate irrigation automation. Sites were in Coahoma, Washington and Bolivar counties. Each site was equipped with soil moisture sensors, pump controls and pump automation, and automated actuator valves for each well and its associated fields. The evaluation included the actuated valves' functionality and monitored and recorded failures of the actuated valves throughout the season. For all automation sites, each valve operated correctly in opening and closing when prompted. Low battery was noted to cause issues with valve opening and closing; batteries were replaced. Predetermined templates set an irrigation time for each set and each field. These templates were programmed to the software, and the decision to irrigate was determined through 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.



Project Results

Overall results for the 2021 growing season were:

	Yield (bu/ac)	Water Use (acre-inches)	Water use efficiency (yield/irrigation)
Automated Fields	213.15	7.10	30.02
Non-automated Fields	209.74	8.27	25.36

Objective 2:

The RISER program trains and assists county extension agents, who in turn, reach growers who have been hesitant to adopt soil moisture sensors. In 2021, twenty-five farms participated in the hands-on, season long soil moisture sensor demonstration education program. Working with county agents, RISER personnel installed sensors, set up telemetry with grower access, and worked through in-season irrigation triggers with the growers to build confidence in sensors. Numerous phone calls, texts, and site visits were conducted to assist in irrigation management. Listed below are some of the other training and educational opportunities, made possible through RISER, for growers in 2021.

Goals are to: 1) Develop an increased understanding of soil moisture sensors 2) Gain confidence in making irrigation decisions, and 3) Increase the adoption of soil moisture sensors and build confidence in sensors.

All twenty-five sites received, at minimum, a weekly report showing their soil moisture sensor weighted averages and recommendations based on sensor readings and site visits. Each grower was assisted individually to tailor the message based on "where they are" in using soil moisture sensors. Recommendations, one-on-one explanations of centibar readings, and troubleshooting techniques were made throughout the season to build confidence in soil moisture sensors and build the producer's competency in utilizing soil moisture sensors.

At the end of the year, a meeting was conducted where we sat one on one with the producer and went over their season-long graph of the moisture sensor readings, showing irrigations and rainfall events. The meeting allowed the producer to look back on the season and have questions answered in an informal setting. A questionnaire was used to track changes in knowledge, confidence, and barriers to adoption.

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.

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 **2** irrigations saved.

100% plan to adopt soil moisture sensors.

Project Results

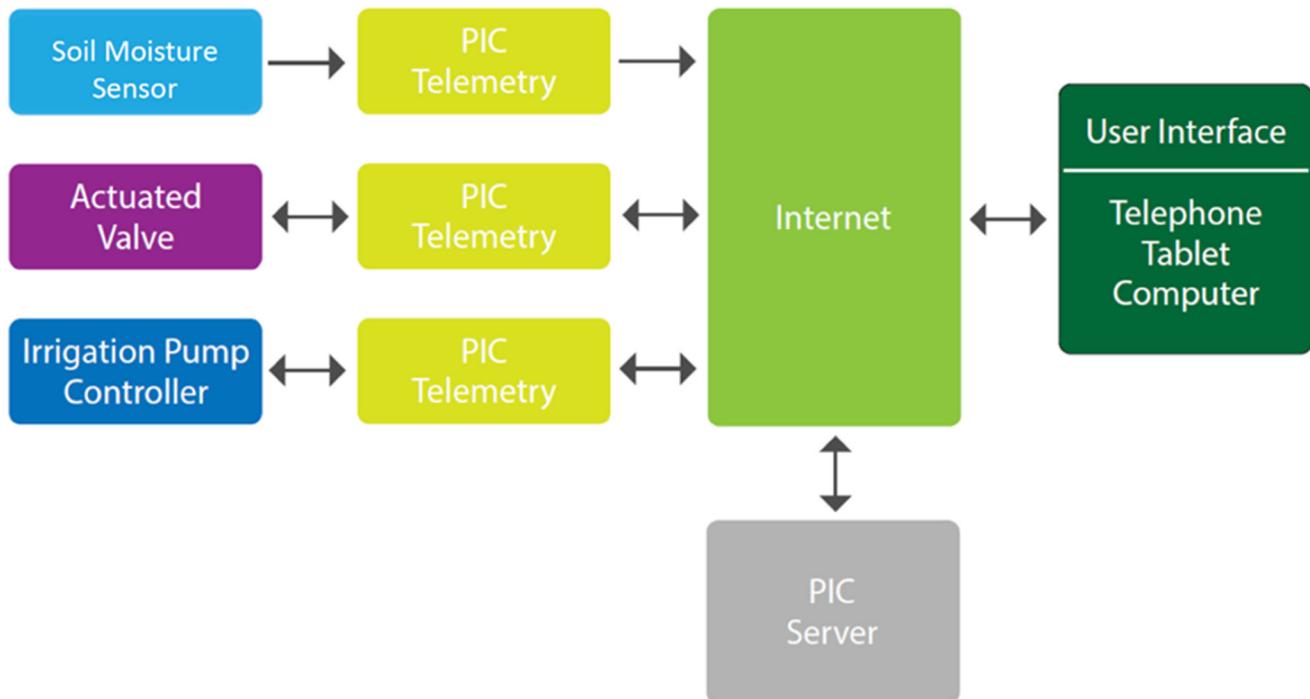


Figure 1. Diagram of automatic irrigation system

Project Impacts/Benefits

The RISER program is evaluating new technology that is focused on enhancing furrow irrigation and allowing for new automation. Automation can be used to save time, labor, and water and to increase water use efficiency.

The RISER has program demonstrates the potential for irrigation water management tools to improve on-farm profitability up to \$30/acre while reducing water use by 41%. Additionally, the RISER program serves as a catalyst for the adoption of IWM that will make Mississippi corn producers more profitable while reducing demand on the Mississippi Alluvial Aquifer. Through this project in 2021, RISER trained 25 farmers one-on-one in using soil moisture sensors that have saved millions of gallons of water and money in irrigation.

Project Deliverables

In-Service Training:

1. MACAA Professional Improvement Conference for Extension Agents. Soil Moisture Sensors – Installation and Scheduling. 08-13-21

2. Agent training soil moisture sensors, Stoneville, MS March 2021

Agent training soil moisture sensors, Columbus, MS April 2021

Presentations:

Gholson, D.M., L.J. Krutz, M. Henry, D. Roach. Year 1: Evaluating On-Farm Irrigation Automation 24th Annual National Conservation Systems Conferences. Virtual. February 10, 2021. <https://www.nctd.net/topic/irrigation-automation-year-1-evaluating-on-farm-irrigation-automation/>

Henry, C., D.M. Gholson. Using Soil Moisture Sensors Across the Entire Farming Enterprise: Lessons learned from those who are doing it. 24th Annual National Conservation Systems Conferences. February 10, 2021. Virtual. <https://www.nctd.net/topic/using-soil-moisture-sensors-across-the-entire-farming-enterprise-lessons-learned-from-those-who-are-doing-it/>

Mississippi Agriculture Consultants Association, Research Roundtable. Stoneville, MS September 30, 2021

MAIC Row Crop Certified Crop Advisors Program. Strategies to Improve Irrigation Scheduling and Efficiency. Orange Beach, AL 07-21-2021

Yazoo Mississippi Delta Joint Water Management District Board of Directors Meeting.

NCAAR Update. Stoneville, MS 12-15-21

2021 MSU Row Crop Short Course. Producer Panel: Water Management. Starkville, MS 12-07-2021

2021 MSU Row Crop Short Course. Soil Moisture Sensors Can Save Time, Money and Water. Starkville, MS 12-07-2021

NRCS State Technical Committee Meeting. NCAAR Update. Virtual 11-16-2021

Extension Publications:

Rix, J., H. Lo, **D. Gholson** and M. Henry. 2021. Irrrometer Watermark Series. Mississippi State University Extension Service Publication M2400.

Rix, J., H. Lo, **D. Gholson** and M. Henry. 2021. Irrrometer Watermark Series: Scientific Background. Mississippi State University Extension Service Publication 3536. <http://extension.msstate.edu/publications/irrometer-watermark-series-scientific-background>

[Rix, J., H. Lo, **D. Gholson** and M. Henry. 2021. Irrrometer Watermark Series:](#)

Measurement Devices. Mississippi State University Extension Service Publication 3537. <http://extension.msstate.edu/publications/irrometer-watermark-series-measurement-devices>

Rix, J., H. Lo, **D. Gholson** and M. Henry. 2021. Irrrometer Watermark Series:

Installation Procedures. Mississippi State University Extension Service Publication 3540. <http://extension.msstate.edu/publications/irrometer-watermark-series-installation-procedures>

Website:

Soil Moisture Sensor Showcase:

Provides an opportunity for the Mississippi agricultural community to learn more about the soil moisture sensors and accompanying telemetry services currently on the market.

<https://www.ncaar.msstate.edu/outreach/general.php>



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Project Deliverables

Popular Press:

A Conversation with Drew Gholson. Valley Pivot Point Magazine. Spring/Summer 2021. pgs 12-13.

https://az276020.vo.msecnd.net/valmontproduction/docs/librariesprovider129/pivotpoint-magazine-2021/11017-val-cr3-pivot-point-special-edition.pdf?sfvrsn=c538d639_6

New Website Streamlines Flood Irrigation Resources. Mid America Farmer Grower.

June 4, 2021. Issue 23. <http://www.mafg.net/NewsDetail.aspx?NewsID=8968>

New Website Streamlines Flood Irrigation Resources. MSU Extension. <http://extension.msstate.edu/news/feature-story/2021/new-website-streamlines-flood-irrigation-resources>

New Techniques Tweak Efficiencies. p.16. <https://www.sare.org/wp-content/uploads/Smart-Water-Use-on-Your-Farm-or-Ranch.pdf>

Irrigation Tools Can Increase Profitability, Improve Sustainability. April 5, 2021. https://www.farmprogress.com/irrigation-systems/irrigation-tools-can-increase-profitability-improve-sustainability?NL=DFP-01&Issue=DFP-01_20210405_DFP-01_979&sfvc4enews=42&cl=article_2_b&utm_rid=CPG0200000750733&utm_campaign=58307&utm_medium=email&elq2=4e7fcec42cde4ff8aefefe2fcc46da61

Improving Furrow Irrigation Systems During the Winter Months. Delta Farm Press. December 3, 2020.

<https://www.farmprogress.com/irrigation-systems/improving-furrow-irrigation-systems-during-winter-months>

Online Videos:

YouTube video created to highlight different soil moisture telemetry services.

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

Mississippi Crop Situation Podcast:

Mississippi Crop Situation Podcast. 05-18-21. 2021 Irrigation Technology. <https://www.mississippi-crops.com/2021/05/18/2021-irrigation-technology-podcast/>

Mississippi Crop Situation Podcast. 08-17-21. Irrigation Termination. <http://extension.msstate.edu/content/irrigation-termination>

Blog Articles

Larson, E. and D. Gholson. When to Terminate Irrigation in Corn. 07-21-21. <https://www.mississippi-crops.com/2021/07/21/when-to-terminate-irrigation-in-corn/>

Larson, E. and D. Gholson. Improving Corn Yields by Better Timing Your First Irrigation. 05-29-2021. <https://www.mississippi-crops.com/2021/05/29/improving-corn-yields-by-better-timing-your-first-irrigation/>

Gholson, D. and D. Roach. How to Install Watermark Sensors. 05-14-21. <https://www.mississippi-crops.com/2021/05/14/how-to-install-watermark-sensors/>

Gholson, D. and D. Roach. Irrigation Season Approaching. 05-07-21. <https://www.mississippi-crops.com/2021/05/07/irrigation-season-approaching/>

Gholson, D. and D. Roach. 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/>

Gholson, D. Irrigation Survey. 05-03-21. <https://www.mississippi-crops.com/2021/05/03/irrigation-survey/>

[Gholson, D. and D. Roach. Maintenance time for Watermark Sensors. 04-29-21. https://www.mississippi-crops.com/2021/04/29/maintenance-time-for-watermark-sensors/](https://www.mississippi-crops.com/2021/04/29/maintenance-time-for-watermark-sensors/)



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