



Mississippi Corn Promotion Board 2022 Progress Report

Project

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

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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

Objective 1:

Three collaborators agreed to participate in the 2022 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.

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 for 2022 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 still in the early stages of hardware systems and programming. Further diagnostic testing is needed in order for this to become an easy and adaptable practice.



Project Results

Average for 3 years in the 2020-2022 growing season were:

	Yield (bu/ac)	Water Use (acre-inches)	Water use efficiency (yield/irrigation)
Automated Fields	219.80	6.87	31.96
Non-automated Fields	220.39	10.25	21.50

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 2022, thirty-four 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 2022.

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.

Participating growers received 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.

Individual meetings were conducted with 14 of the 35 participants in the soil moisture sensors on-farm demonstration program. The remaining meetings will be held during the fourth quarter. 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.

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.



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EXTENSION

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 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. 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 resulting in over \$700,000 in increased profitability and saving of 14,000 acre-feet or 4.4 billion gallons of water. Pipe Planner assistance conducted in each Delta County Extension office. Over 10,000 acres were designed in Pipe Planner for 2022.

Project Deliverables

In-Service Training: 3

Blog articles: 7

Presentations:

- 15 Presentations to growers, state representatives, consultants, NRCS and federal agencies, and scientists
- 6 Field days presenting to farmers, EPA representatives, and NRCS personnel

Online Web Tools and Apps:

Flow Measurement Series: Flow Meter Calculator. The Flow Meter Calculator can be accessed at <https://www.ncaar.msstate.edu/outreach/fmcalc.php>.

How to Calculate Irrigation Pumping Costs with MITOOL. The online tool can be accessed at <https://www.ncaar.msstate.edu/outreach/mitool.php>.

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>

Popular Press:

Increasing Water Use Efficiency. Farm Progress. December 12, 2022. <https://www.farmprogress.com/irrigation-systems/increasing-water-use-efficiency/>

Preserving the Mississippi River Valley Aquifer for the Future. Washington County Welcome. Pgs. 71-72.

The Delta Water Man – Dr. Drew Gholson. Delta Ag Journal. Volume 5 Number 3. Pgs. 14-15. November 2022.

Investment in Agricultural Research and Extension Pays Big Dividends. Mississippi Landmarks. Volume 18 Number 2. Pgs. 4-6. October 2022. https://www.dafvm.msstate.edu/sites/default/files/2022-10/Landmarks_v18n2_web.pdf

Irrigation Methods: Water Resource Management is Vital. Delta Ag Journal. Volume 5 Number 2. Pgs. 54-56. July 2022. <https://deltaagjournal.com/irrigation-methods/>

Improving Profits: Soil sensor program helps growers moderate irrigation. Extension Matters. Volume 8 Number 2. Pgs.21-25. July 2022. <https://extension.msstate.edu/extension-matters/improving-profits>

When to Terminate Irrigation in Corn. Farm Progress. July 29, 2022. <https://www.farmprogress.com/irrigation-systems/when-terminate-irrigation-corn>

Liquid Gold: Improving water quality in pastures and irrigation efficiency in row crops. MAFES Discovers. July 19, 2022. <https://www.mafes.msstate.edu/discovers/article.asp?id=247>

Irrrometer Watermark Series: Construction Guide. Rice Farming. Pgs 12-13. May 2022. <https://www.ricefarming.com/digital-issue/>

MSU, Farmers Evaluate Surface Irrigation Automation. Farm Progress. May 6, 2022.

<https://www.farmprogress.com/irrigation-systems/msu-farmers-evaluate-surface-irrigation-automation>

2022 Irrigation Researcher of the Year. Mid America Farmer Grower. March 25, 2022. Issue 12.

<https://www.flipsnack.com/mafnet/2212.html>

Online Videos:

YouTube video created to highlight different soil moisture telemetry services.

https://www.youtube.com/watch?app=desktop&v=OOdqQ_wR0Og&t=7s

Graphics

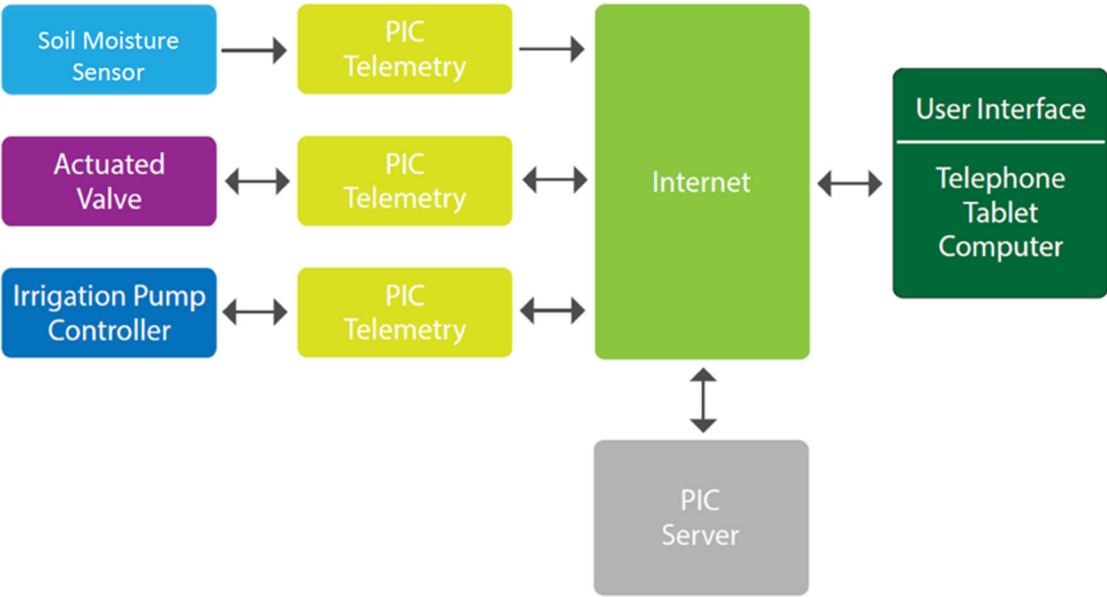


Figure 1. Diagram of automatic irrigation system