



Mississippi Corn Promotion Board 2020 Progress Report

Project Title: Irrigation and Soil Management Strategies that Improve Irrigation Application Efficiency, Soil Quality, Water quality and Corn Yield

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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 has a two-pronged approach: 1) Identify, evaluate, and demonstrate new irrigation automation technologies in furrow irrigation; 2) Conduct hands-on training and learning opportunities with producers that have yet to adopt proven irrigation water management practices. 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 wells were equipped with a pump controller and automated actuated valves to allow the remote start of the irrigation 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 was present during the start of irrigation and transition of each irrigation set. The evaluation included the actuated valves' functionality and monitoring and recording failures of the actuated valves throughout the season. For all three automation sites, each valve operated correctly in opening and closing when prompted. The predetermined templates set an irrigation time for each set and each field. This template was programmed to the software, and the decision to irrigate was determined through field observations, soil moisture sensor reading, 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.

Overall results for the 2020 growing season were:

	Yield (bu/ac)	Water Use (acre-inches)	Water use efficiency (yield/irrigation applied)
Automated Fields	230.56	3.94	58.51
Non-automated Fields	226.54	12.64	17.9

Objective 2: The RISER program is training and assisting county extension agents to reach growers who have been hesitant to adopt soil moisture sensors. Eight farms participated in the soil moisture demo with sensors installed in their fields. Working through the county extension agent, RISER installed sensors, set up telemetry with grower access, and worked through in-season irrigation triggers with the producers. 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

Project Results

moisture sensors and build confidence in sensors. All eight 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 producers 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.

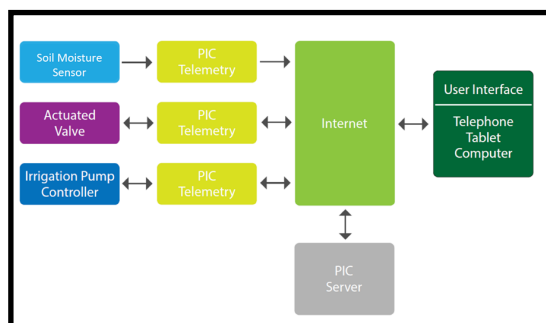


Figure 1. Diagram of automatic irrigation system

Project Impacts/Benefits

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

Project Deliverables

- Presentations:** 1. MS Chapter of the American Society of Agronomy Annual Meeting. Soil and Water Relations Utilizing Moisture Sensors in Row Crops. Grenada, MS 11-11-2020
2. Nutrien eKonomics Webinar. Irrigation Termination in Corn Based on Crop Maturity and Moisture Sensors. 07-24-2020 <https://nutrien-ekonomics.com/agronomics/irrigation-termination-in-corn-based-on-crop-maturity-and-moisture-sensors/>
- Extension Publications:** 1. Rix, J., H. Lo, D. Gholson and M. Henry. 12/2020. Irrrometer Watermark Series: Construction Guide. Mississippi State University Extension Service Publication 3538. <http://extension.msstate.edu/publications/irrometer-watermark-series-construction-guide>
2. Rix, J., H. Lo, D. Gholson and M. Henry. 11/2020. Irrrometer Watermark Series: Location Selection. Mississippi State University Extension Service Publication 3539. <http://extension.msstate.edu/publications/irrometer-watermark-series-location-selection>
3. Rix, J., H. Lo, D. Gholson and M. Henry. 10/2020. Irrrometer Watermark Series: Irrigation Triggers. Mississippi State University Extension Service Publication 3541. <https://extension.msstate.edu/publications/irrometer-watermark-series-irrigation-triggers>
- 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>
- Online Videos:** 1. 2020 Sensor Showcase: CropX. August 20, 2020. <https://www.youtube.com/watch?v=2FcEy7lRrNg&t=24s>, 2. 2020 Sensor Showcase: AquaSpy. August 17, 2020. <https://www.youtube.com/watch?v=Jlc7a4ay0s>, 3. 2020 Sensor Showcase: Sentek. August 14, 2020. <https://www.youtube.com/watch?v=EbMnQwBUG5w>, 4. 2020 Sensor Showcase: Valley Scheduling. August 11, 2020. <https://www.youtube.com/watch?v=06V5gu-FE4>, 5. 2020 Sensor Showcase: High Yield Ag Solutions. August 7, 2020. <https://www.youtube.com/watch?v=DtIMWNGkKa8>, 6. 2020 Sensor Showcase: Trellis. August 5, 2020. <https://www.youtube.com/watch?v=7E6n75BJ6Zc>, 7. 2020 Sensor Showcase: PrecisionKing. August 3, 2020. https://www.youtube.com/watch?v=OxCm93D_Jbs, 8. 2020 Sensor Showcase: Irrrometer. July 31, 2020. <https://www.youtube.com/watch?v=9fjt6KdMNAU>, 9. 2020 Sensor Showcase: AgSense. July 29, 2020. https://www.youtube.com/watch?v=nYekp_a6Oiu&t=19s, 11. Nutrien eKonomics Webinar. Irrigation Termination in Corn Based on Crop Maturity and Moisture Sensors. July 24, 2020. <https://nutrien-ekonomics.com/agronomics/irrigation-termination-in-corn-based-on-crop-maturity-and-moisture-sensors/>
- Mississippi Crop Situation Podcast:** Mississippi Crop Situation Podcast. 1. Irrigation Thresholds, Triggers, and Automation. 7-28-2020 <http://extension.msstate.edu/mississippi-crop-situation/audio/2020/irrigation-thresholds-triggers-and-automation>, Mississippi Crop Situation Podcast. 2. Talking Irrigation with Drew. 06-24-2020 <http://extension.msstate.edu/mississippi-crop-situation/audio/2020/talking-irrigation-drew>
- Blog Articles:** 1. Gholson, D. and D. Roach. Polypipe Pickup by Request Only. 12-12-2020. <https://www.mississippi-crops.com/2020/12/12/polypipe-pickup-by-request-only/>
2. Larson, E. and D. Gholson. When to Terminate Irrigation in Corn. 07-18-2020. <https://www.mississippi-crops.com/2020/07/18/when-to-terminate-irrigation-in-corn/>, 3. Gholson, D. Sealing Soils Confusion. 06-25-2020. <https://www.mississippi-crops.com/2020/06/25/sealing-soils-confusion/>, 4. Gholson, D. Soil Moisture Monitoring Showcase. 06-22-2020. <https://www.mississippi-crops.com/2020/06/22/soil-moisture-monitoring-showcase/>, 5. Gholson, D. Surge Valves Update. 06-19-2020. <https://www.mississippi-crops.com/2020/06/19/surge-valves-update/>, 6. Gholson, D. Irrigation After Cristobal. 06-08-2020. <https://www.mississippi-crops.com/2020/06/08/irrigation-after-cristobal/>, 7. Gholson, D. Irrigation Season Approaching. 05-28-2020. <https://www.mississippi-crops.com/2020/05/28/irrigation-season-approaching/>, 8. Gholson, D. Pipe Planner Trainings for April. 03-31-2020. <https://www.mississippi-crops.com/2020/03/31/pipe-planner-trainings-for-april-2020/>, 9. Gholson, D. Maintenance Time for Watermark Sensors. 03-20-2020. <https://www.mississippi-crops.com/2020/03/20/maintenance-time-for-watermark-sensors/>, 10. Gholson, D. Pipe Planner Webinars. 03-09-2020. <https://www.mississippi-crops.com/2020/03/09/pipe-planner-webinars-2020/>, 11. Gholson, D. MSU Extension Offers Come and Go Pipe Planner Help. 02-28-2020. <https://www.mississippi-crops.com/2020/02/28/msu-extension-offers-come-and-go-pipe-planner-help/>, 12. Gholson, D. Irrigation Training. 02-19-2020. <https://www.mississippi-crops.com/2020/02/19/irrigation-training/>



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