



Mississippi Corn Promotion Board 2025 Progress Report



Project Title: Providing Irrigation Vision, Optimization, and Training (PIVOT)

PI: Dave Spencer

Department: MWRRI/PSS

Project Summary (Issue/Response)

Over the past few years, the PIVOT program has laid the foundation for overhead irrigation recommendations for corn growers in Mississippi by investigating and validating irrigation thresholds and delivery techniques, then transferring this information to irrigators. In this second phase of the PIVOT program, we are expanding outreach to overhead irrigators while refining recommendations and investigating how to maximize yield for overhead-irrigated corn. Thus, in the subsequent phase of the PIVOT program, the objectives are to 1) expand Extension programming and outreach efforts to overhead irrigators through demonstration and on-farm assistance, 2) investigate whether overhead irrigation systems can be leveraged to economically supply fertilizer to corn via fertigation, and 3) develop irrigation initiation recommendations. The procedure for Objective 1 will be to employ Extension programming and on-farm assistance to facilitate familiarity and adoption of irrigation scheduling techniques. Our own project team or Extension agents will assist in the installation and operation of soil moisture sensors, as well as the interpretation of sensor readings. For Objective 2, we will evaluate whether applying N fertilizer through the pivot is agronomically or economically superior to traditional N strategies, such as sidedress UAN or topdress urea applications. In Objective 3, we will investigate if irrigation thresholds can be adjusted during the vegetative growth stages to reduce water use without affecting yield. This project is expected to result in strategies and techniques that improve overhead irrigation efficiency, corn grain yield, and profitability. These objectives are consistent with our long-term plan to provide research-driven recommendations to increase the agronomic and economic benefit of overhead irrigation systems.

Project Results/Outcomes

In 2025, the PIVOT program expanded its support for overhead irrigation management in Mississippi through increased on-farm demonstrations and new research initiatives. We provided irrigation scheduling assistance on 15 pivots across six growers in the Prairie and Delta regions, helping producers implement sensor-based scheduling tailored to their systems and soils. Grower feedback remains positive, with many reporting improved confidence in irrigation decisions. We initiated research on overhead irrigation termination in corn. However, abundant rainfall during the late season in Stoneville, MS, masked differences in yield across termination timings. In Brooksville, MS, irrigation experiments were not conducted due to damage sustained in a storm in January 2025. All systems are expected to be fully operational for the 2026 growing season.

These efforts build on prior PIVOT results showing that a -40 cbar threshold is optimal for pivot-irrigated corn. At Brooksville, yields increased with wetter thresholds, peaking at -40 cbar. At Stoneville, maintaining -40 or -60 cbar improved yields by up to 11% over the furrow irrigation standard of -80 cbar. Application volume per irrigation did not affect yield when using soil moisture sensors. System type—environment—appears to drive threshold differences. Furrow irrigation applies 3–3.5 inches per event, risking saturation stress, especially on clay soils. Overhead systems apply smaller volumes (0.75–0.9 inches), reducing saturation risk and improving rainfall capture.



Project Results

Additionally, moderate application volumes and increased system capacity may reduce water use. At both Brooksville and Stoneville, greater volumes (> 1 inch) at -40 cbar increased water use. Application volumes from 0.75 to 0.9 inches reduced water use without sacrificing yield. At -40 cbar, decreasing application depth by 0.1 inches reduces seasonal water use 0.5 and 1.0 inches in Brooksville and Stoneville, respectively. Similarly, increasing system capacity from 3.5 to 5.5 gpm/acre reduces pivot runtime by 11 to 20 days per season, which creates additional opportunities to capture rainfall events.

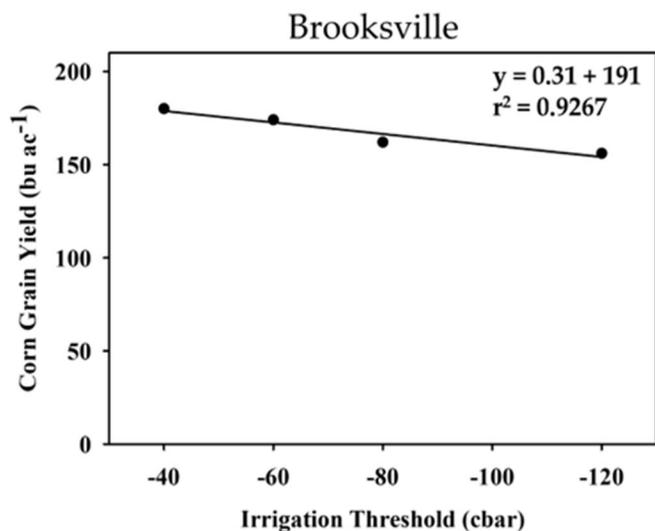


Figure 1. Corn grain yield as a function of irrigation threshold in Brooksville, MS

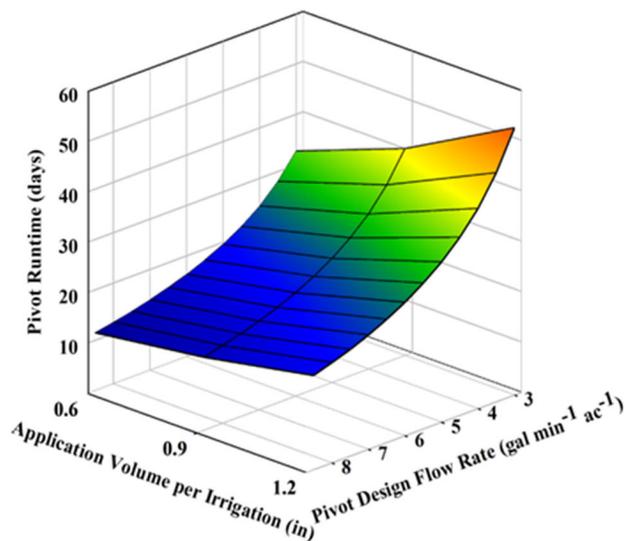


Figure 2. Pivot runtime as a function of application volume and design flow rate in Brooksville, MS

Project Impacts/Benefits

Through this project, multiple growers have reported that they appreciate the additional information from a soil moisture sensor and the assistance in interpreting its data and making irrigation decisions. In general, growers on lighter-textured soils are surprised that the sensors show very little infiltration past 6 inches from irrigations, while growers on all soil textures may have been overestimating the plant available water in the soil when sensors are not used. The irrigation initiation data provides growers concrete thresholds at which they know yield is protected or lost. The recommendations developed for irrigation depth demonstrate that growers applying 1 inch per irrigation can moderately reduce application depth and expect savings in water use. The data generated from this project also provides information on how upgrading pumping capacity can actually reduce water use and save seasonal irrigation costs due to greater capture of rainfall. Future benefits will be clarity on whether irrigation, and thus costs and water, can be saved by delaying irrigation or increasing the irrigation threshold until tassle.

Project Deliverables

Deliverables for the PIVOT program in 2025 included refinement of pivot irrigation recommendations, assistance to growers, and information dissemination through several outlets. Pivot irrigation scheduling assistance was provided to six corn growers in the Prairie and Delta Regions of Mississippi. We deployed telemetry-enabled soil moisture sensors across 15 pivots, provided data access to the growers, and assisted with irrigation management decisions. Additionally, assistance was provided to other growers regarding overhead irrigation management. We made approximately 400 individual, direct contacts through in-person meetings, phone calls, and texts. A further 400 contacts were made through other presentations, including county meetings, Extension Agent trainings, Master Irrigator training, the National Conservation Systems Cotton and Rice Conference, NCAAR Field day, and the Mississippi Agricultural Industry Council annual meeting.

Additional Questions

1. What value does this research give the grower? Describe any financial decision-making tools your project provides.

This project provides tangible value to the corn grower. This project has provided research-based recommendations for irrigation timing, irrigation application depth, and has assisted growers with implementing these recommendations on-farm. First, irrigating at the appropriate time maximizes corn grain yield. All recommendations from this project are developed with the goal to maximize yield and profitability first, then to accomplish this with as little water as possible. This research has demonstrated that irrigating at the wrong time can easily reduce corn grain yield up to 20 bu/acre, which is about \$85/acre at current prices. Second, this research provides value in determining when to spend the money to irrigate. Per MSU's Ag Econ Planning Budgets, applying one inch through a 1/4-mile pivot costs approximately \$5.20/acre. Assuming an average application depth of 0.75 inches, these irrigation recommendations can influence a \$3.90/acre decision every time the pivot is turned on. Further, if growers typically apply 0.9 inches per irrigation and adjust to an application depth of 0.75 inches, they will save 0.75 inches for every 5 irrigations, which is approximately \$3.90 and \$7.80/acre in the Blackland Prairie and Stoneville, respectively. In the Blackland Prairie, the potential value may be even greater, as most growers have a finite supply of water, thus saving an irrigation could substantially affect yield versus if they ran out of water. As we continue to refine irrigation recommendations through the PIVOT program, all of these values remain the same.

2. List other sources of funding you have acquired over the past 2 calendar years.

We have no other funding to report that is related to this funding. I.e., we have not received any other grants for this particular project in the past 2 years.