



Mississippi Corn Promotion Board 2024 Progress Report

Project

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

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Project Summary (Issue/Response)



While significant research and Extension efforts in Mississippi have been devoted to furrow irrigation, there is little information available for overhead irrigation, the second most prevalent delivery system in the state. Optimum production practices, delivery techniques, and irrigation management strategies may vary between surface and overhead irrigation due to intrinsic differences between the two systems. The PIVOT program aims to provide Mississippi corn growers with research-driven recommendations to maximize the agronomic and economic benefit of overhead irrigation systems. Over the past 3 years, we have 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. Now, we intend to expand outreach to overhead irrigators while refining recommendations and expanding investigations into maximizing yields 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.



Project Results/Outcomes

After 3 years of this project, we have made substantial progress in developing and validating overhead irrigation recommendations for the primary production areas of Mississippi and have begun demonstrating those recommendations on-farm. After 3 years of research in the Prairie and 2 years of research in the Delta, we are confident that the recommended irrigation threshold for pivot-irrigated corn should be about -40 cbar. In the Prairie, there was no difference between -40 and -60 cbar thresholds (Figure 1). However, because pivot irrigation systems are not designed to apply large amounts of water quickly, keeping the threshold near -40 cbar (a wetter threshold than -60 cbar) is the safest option. In the Delta experiment, a -40 cbar threshold resulted in the greatest corn grain yield (Figure 2). In fulfillment of the demonstration objectives, sensor-based scheduling was demonstrated on four corn growers, two in the Prairie and two in the Delta. Feedback from growers has been positive, and many thought that the recommended sensor-based approach was beneficial.

Project Results

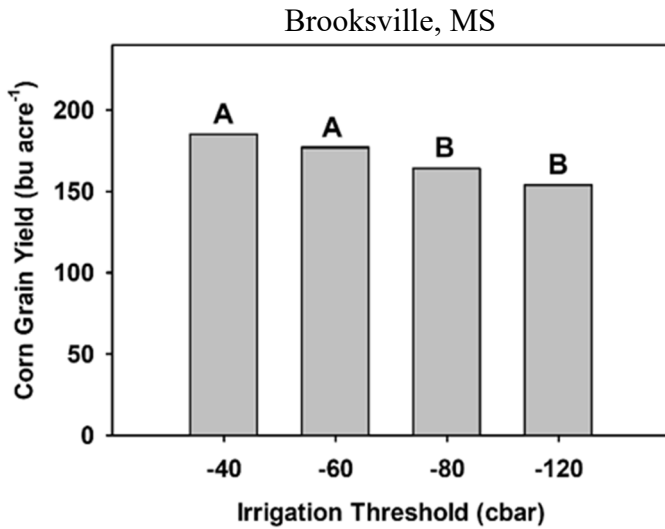


Figure 1. Corn grain yield response to season-long soil moisture thresholds for pivot irrigation in Brooksville, MS.

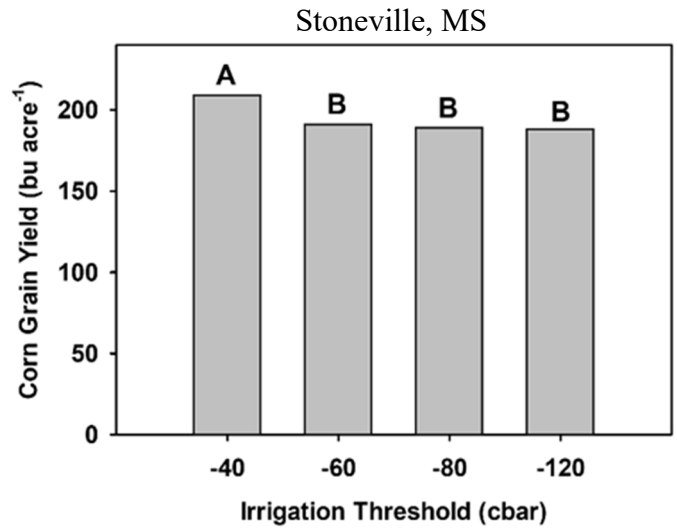


Figure 2. Corn grain yield response to season-long soil moisture thresholds for pivot irrigation in Stoneville, MS.

Furthermore, research has demonstrated that application volumes should approach one inch per irrigation. Irrigations volumes of 0.9 and 1.2 inches sufficiently recharge soil moisture. Conversely, irrigation volumes of 0.6 inches or less do not recharge rooting zone soil moisture, despite potentially eliciting a visual crop response. These principles lay the groundwork for overhead irrigation recommendations.

Project Impacts/Benefits

Project benefits include the development of irrigation recommendations for pivot-irrigated corn in Mississippi. These recommendations include soil moisture based irrigation thresholds, insights into appropriate irrigation volumes, and various management strategies. Other intangible items we are learning from this program are that the margin for error in managing a pivot is dependent on the pivot design and soils. Pivot capacity, water supply, and type of spin (windshield vs. full circle) all affect how well the irrigation system moderates potential yield loss due to drought risk. Additionally, soils have various water holding capacities, which affects the “reserve” moisture in the soil. Soils with lower water holding capacities require even more intensive irrigation management, especially when combined with other less than ideal designs

Project Deliverables

Deliverables for the PIVOT program in 2024 included development of pivot irrigation recommendations and assistance to stakeholders. As part of the PIVOT program, there were approximately 250 individual direct contacts through in-person meetings, phone calls, emails, texts, or small-group gatherings. Additionally, information was shared to another 500 people through state and regional meetings including the National Conservation Systems Cotton and Rice Conference, the Mississippi Agriculture Industry Council Annual Meeting, field days, county meetings, and the MSU Short Course. Contributions were also made to irrigation articles in popular press.