



## Mississippi Corn Promotion Board 2022 Progress Report

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### Project

Title: Providing Irrigation Vision, Optimization, and Training

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### Project Summary (Issue/Response)

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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 will provide Mississippi corn growers with research-driven recommendations to maximize the agronomic and economic benefit of overhead irrigation systems. The objectives of PIVOT are to 1) leverage big data from Mississippi irrigators to direct research and Extension efforts, 2) experimentally investigate and validate observations, and 3) educate overhead irrigators through demonstration and on-farm assistance. Analysis of large quantities of data from Mississippi overhead irrigators will be used to determine relationships between corn grain yield and various practices, techniques, or strategies. Concurrently, designed small-plot and on-farm experiments will be used to validate big data trends and investigate new technologies and strategies. Throughout all phases of the PIVOT program, the most up-to-date information will be transferred to Mississippi corn growers via traditional and innovative Extension methods. This project can quickly advance Mississippi corn producers that utilize overhead irrigation.



### Project Results/Outcomes

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Progress has been made toward all objectives after the first year of the project. Regarding objective 1, the collection, processing, and analysis of data from Mississippi irrigators is currently underway. Multiple pivot irrigators have supplied or agreed to supply data regarding their corn production. Based on this data, we anticipate being able to identify primary drivers of yield and economics in pivot-irrigated systems. In fulfillment of objective 2, an experiment was conducted to determine the optimal application volume and timing of pivot irrigation events. Results from 2022 indicate that pivot irrigators need to apply more water per irrigation than is the contemporary practice. Applying 1.2 inches per irrigation increased yield compared to applying 0.9 or 0.6 inches. Furthermore, pivot irrigations should be initiated at a much lower soil moisture threshold (-40 cbar), than is recommended for furrow irrigation. Finally, in execution of objective 3, overhead irrigators have been supported through on-farm site visits, producer presentations, field days, and phone calls.

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## Project Results

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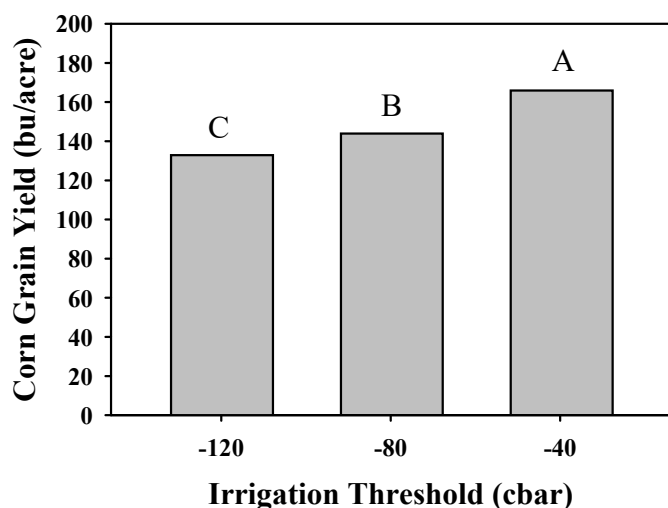


Figure 1. Initiating irrigation at -40 cbar improved yield relative to initiating irrigation at either a -80 or -120 cbar threshold.

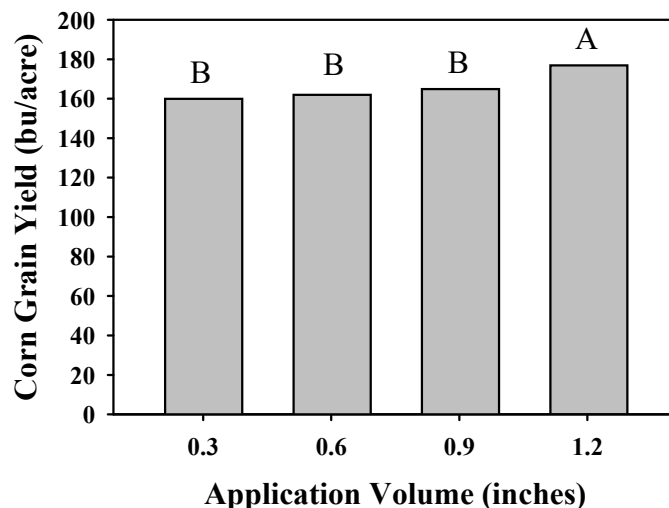


Figure 2. Applying 1.2 inches of water per irrigation improved yield relative to applying 0.9, 0.6, or 0.3 inches of water per irrigation.

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## Project Impacts/Benefits

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After one year of this research, multiple immediate implications have arisen. First, many corn pivot irrigators appear to be applying too little water per irrigation. From on-farm observations, several irrigators apply less than 1 inch per irrigation event, with approximately 0.7 inches a common application volume. Additionally, many of our pivot irrigation systems are under-designed. Numerous observed pivot irrigation systems lack the capacity to supply at least 0.3 inches/day, the peak water demand for corn according to Dr. Larson. For example, if a pivot system applying 0.7 inches takes 3.5 days to complete an irrigation, then by the time it gets back to the starting point, there is already a water deficit of 0.35 inches [0.7 inches applied minus 1.05 inches (0.3 inches/day x 3.5 days)]. An additional implication, particularly relevant to the Black Belt region, is that irrigation reservoirs may be too small. Continuing this research will reveal whether these results were heavily influenced by the extreme weather conditions of 2022 or if these trends are consistent across years.

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## Project Deliverables

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Presentations directly derived from this project were delivered at the Hamilton Mid-Season Crop Update in Hamilton, MS on 7/11/22, MAIC in Orange Beach, AL on 7/20/22, the Mississippi Row Crop Short Course in Starkville on 12/5/22, an online Master Irrigator Course on 12/6/22, and will be delivered at the Cotton and Rice Conservation Systems Conference in Baton Rouge on January 31 and February 1, 2023.

Farmers were also directly assisted through on-farm visits and personal communication (phone calls, texts).



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