



Mississippi Corn Promotion Board 2025 Progress Report



Project Title: Beyond Cover Crops and No-Tillage: Profitable and Environmental Practices that fit the Predominant Production System

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Project Summary (Issue/Response)

Due to rising input costs, commodity price uncertainty, and the looming threat of increased government regulation, row crop growers are under constant pressure to produce more with less. Decades of experience have led growers to converge on a profitable and stable production system commonly used across the Mid-South: seeding corn, soybean, and cotton in single rows on top of 38-inch raised seedbeds and surface broadcasting P, K, and sometimes N (grower standard). Many organizations promote widespread adoption of a production system that employs no-tillage and cover crops as a wholesale solution to environmental challenges. However, there is a lack of supporting, replicated scientific research that demonstrates a no-tillage and cover crop production system provides consistent environmental or economic benefit over current production systems. Our preliminary research over multiple years suggests that converting from 38-inch row spacings to 20-inch row spacings may increase both irrigated and dryland corn grain yield up to 34 bu acre⁻¹ and 19 bu acre⁻¹, respectively. Negative environmental effects can be reduced by modifying row spacings, raised bed configurations, and fertility placement strategies in the current production system. Additionally, subsurface application of fertilizer can reduce nutrient runoff over 80%. Therefore, the objectives of this research are to determine if manipulating cultural practices and fertility applications can improve productivity and profitability while reducing adverse environmental impact. To evaluate these objectives, a site modeled after 21-Gun in Stoneville, MS has been constructed in Brooksville, MS. Each plot has been precision-leveled with pads and pipes and is outfitted for active and passive sampling. The effect of production system (1 – grower standard, 2 – no-tillage with cover crops, or 3 – ultra-narrow rows on wide beds with protected fertility applications) in a corn-soybean rotation on grain yield, net returns, water and fertilizer use efficiency, and runoff water quality will be investigated on a Brooksville silty clay at the Black Belt Experiment Station in Brooksville, MS.

Project Results/Outcomes

After the first season of a cash crop, there were no differences among any treatments in crop growth and development, including grain yield, plant height, ear size, stalk diameter, NDVI, or any other measured parameter. Corn grain yield was not different and averaged 100 bu acre⁻¹. Our hypothesis was that in a high-yield environment, solar radiation may be limiting crop growth and development; however, we were not in a high-yielding environment this year. The overhead irrigation system in Brooksville, MS was damaged and not operable in-season. Furthermore, the wet spring and geotechnical failure at the research location hindered planting and early season corn growth. Both the geotechnical failure and irrigation system have been repaired and are ready for the 2026 growing season, which will be a soybean year.

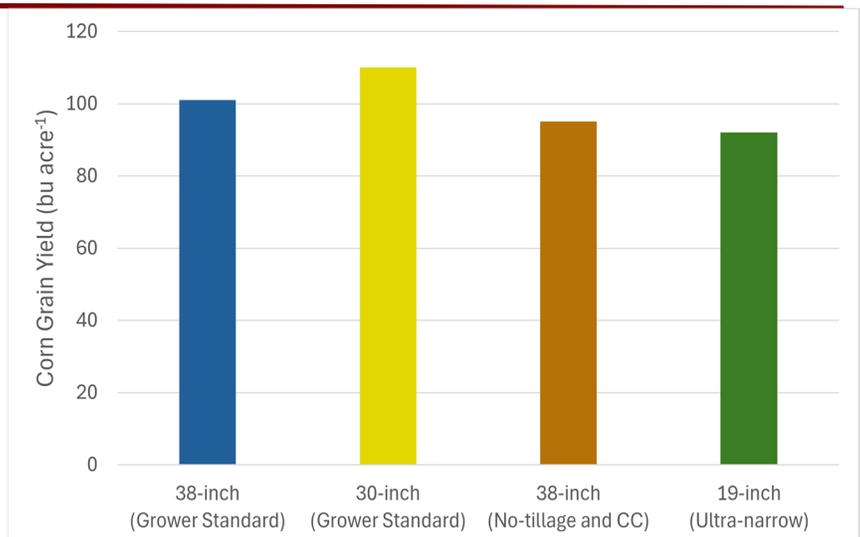


Figure 1. Corn grain yield as a function of production system in 2025.

Project Results

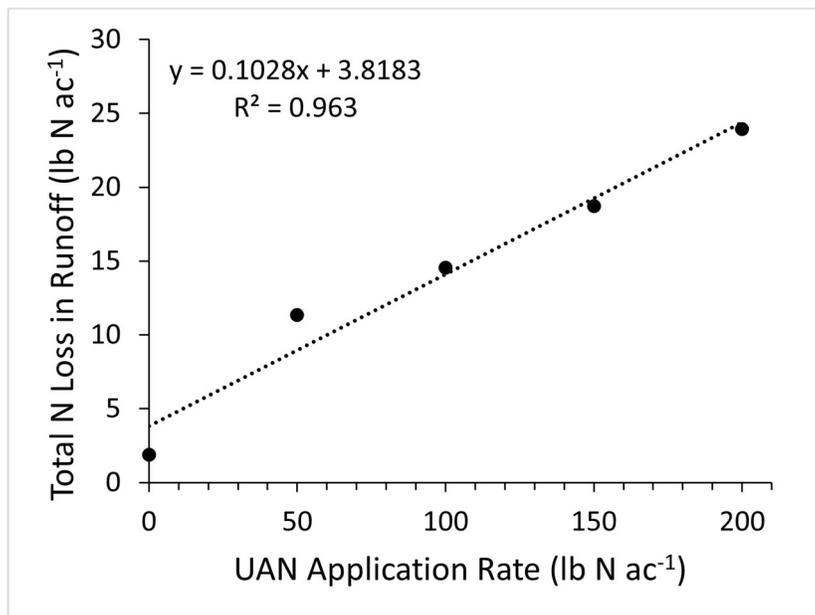


Figure 2. Total N loss in runoff as a function of UAN application rate under a simulated 30-minute, intense storm event conducted in Brooksville in 2025. Approximately 10% of applied UAN is lost in runoff.

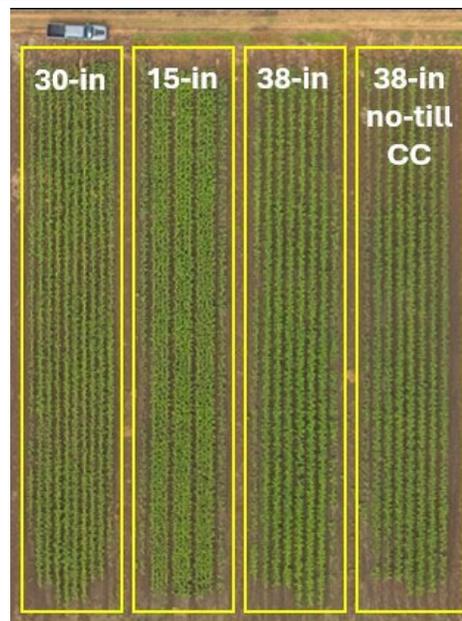


Figure 3. Plot plan demonstrating how the same plant population at different row spacings affect solar radiation capture and rainfall interception. Note that there are four 15-inch rows on a 76-inch wide raised bed for the 15-inch production system.

Project Impacts/Benefits

This research has the potential to demonstrate new techniques for corn production that could improve yield and reduce runoff sediment and nutrient losses across all corn acres currently seeded on 30-inch or greater row spacings. The principles under investigation are the same regardless of location, irrigation, or soil type; therefore, this research is applicable in some capacity to every acre of corn produced in Mississippi. Furthermore, we believe that increasing solar radiation interception is one of the final “big jumps” left in corn production and would represent a substantial across-the-board increase in yield. Per preliminary data, this research has the potential to increase yield up to 34 bu acre⁻¹, reduce N and P loss up to 50% by alternative fertilizer application strategies, and decrease erosion by protecting the soil surface during the season.

Project Deliverables

To date, there have been 3 graduate student presentations on this project, one at the Mississippi Water Resources Conference, one at the ASA, CSSA, SSSA Annual Conference in Salt Lake City, UT, and one at the Early Career Virtual Showcase in Fayetteville, AR. In addition, after we have more information to share, we expect to deliver several end products through various media. First, multiple written reports will be produced. After conclusion of the research, peer-reviewed publications will be created. Additionally, this research will be used to train graduate students and will result in a dissertation. Other written reports will include Extension publications. Second, results will continue to be presented at regional and national meetings via oral or poster presentations and at local grower meetings. Finally, we plan to invite producers to visit the project location in Brooksville for the summer of 2026.

Additional Questions

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

This project will quantify the effects on net returns of adopting ultra-narrow row production systems in Mississippi. At the conclusion of the project, we will complete a partial budget analysis that considers the costs of the different production systems under evaluation and the projected returns from that investment. For example, adopting an ultra-narrow row production system may require more planter units, more planter passes, a different header, or other logistical changes. We will determine if any potential yield increases from adopting a narrower row system justify the equipment investment and operational changes. Therefore, growers will be able to use these financial data to make decisions for their operations.

Further, quantifying nutrient runoff and erosion from these different production systems will provide value to growers who strive to be more efficient with their inputs and to reduce soil loss on their farms.

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

As stated in the project narrative, this proposal was jointly submitted to the Mississippi Soybean Promotion Board and the MCPB. In 2025, the first year of funding for this research, the MSPB provided \$39,098 and MCPB provided \$34,519.

For 2026, we are requesting \$39,300 from the MSPB and \$34,462 from MCPB.

Additionally, we received \$30,626 from USGS from September 1, 2024—August 31, 2025 for this experiment and a similar concurrent experiment (corn-cotton rotation). This funding was not renewed in 2025.