



Mississippi Corn Promotion Board 2025 Progress Report



Project Title: Wide-Skip Furrow Irrigation in Clay Soils—A Farmer-Led Revolution

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Project Summary (Issue/Response)

Mississippi farmers know that excessive water can be very harmful to corn and other row crops. In the Delta, irrigating every furrow can saturate buckshot (i.e., cracking clay) soils for days, especially when followed shortly by heavy rain. Lack of soil oxygen hinders plant functioning and accelerates nitrogen losses. Ultimately, the consequences are lower yield and lower income.

To tackle this problem, some Delta farmers have been concentrating irrigation water into one furrow every 10 feet or wider on buckshot. With this practice of wide-skip furrow irrigation, irrigation water reaches the bottom end of the field more quickly. At the same time, irrigation water spreads underground to non-irrigated furrows through soil cracks while leaving the topsoil unsaturated and oxygenated. Harmful effects of unexpected rain after irrigation are thus lessened.

Preliminary investigation in the Delta has affirmed the benefits of this farmer-driven innovation on buckshot. Yet before wide-skip furrow irrigation becomes an endorsed practice, its behavior, variables, and limitations should be better understood. Its performance should also be confirmed through further testing. To address these needs, we launched an integrated research-Extension project with three objectives: 1) determine the yield, water, and profit impact of wide-skip furrow irrigation on corn in buckshot; 2) distribute knowledge and recommendations associated with wide-skip furrow irrigation; and 3) develop one young agricultural professional through a graduate research assistantship. This progress report summarizes the second year of our multi-year project.

Project Results/Outcomes

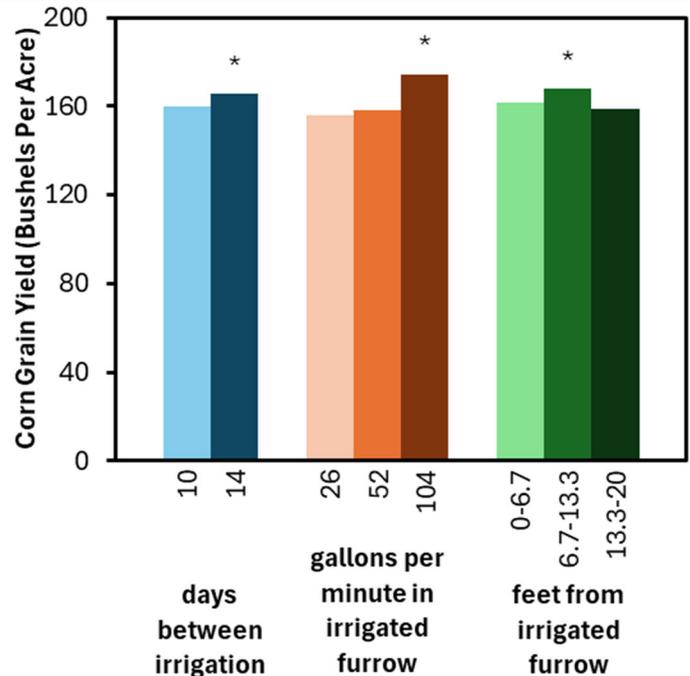
For the first objective, we continued two experiments on wide-skip furrow irrigation. Our on-station experiment focuses on investigating the influence of irrigation frequency and furrow inflow on the yield, water, and profit outcomes of wide-skip furrow irrigation. This experiment is being conducted on Dowling clay soil at Delta Research and Extension Center. We planted corn in 40-inch twin rows on March 27th, 2025, and supplied 256 pounds of nitrogen per acre over three applications. We then implemented 40-foot wide-skip furrow irrigation (applying water to only every twelfth furrow) in all six treatments. These treatments were the combinations of two irrigation frequencies (every ~10 days and every ~14 days) and three furrow inflows (26, 52, and 104 gallons per minute). The higher-frequency treatments were irrigated three times, whereas the lower-frequency treatments were irrigated two times. We harvested on August 11th, 2025. Just like Year 1, Year 2 was characterized by low rainfall during the reproductive period. Merely 1.5 inches of rain occurred between tasseling and maturity. Without much rainwater supplementing irrigation, such weather can help reveal whether irrigation water is spreading sufficiently across furrows. However, a long delay in repairs to the damaged underground pipeline postponed the first irrigation until the dough growth stage, which affected the on-station results in two ways. First, drought stress preceding the first irrigation increased kernel abortion and reduced yield potential throughout the field. Second, greater soil cracking prior to the first irrigation promoted the spread of water across furrows. Therefore, as compared with Year 1, Year 2 witnessed smaller yield differences among treatments. This example of unforeseen interference by a factor beyond our control highlighted the importance of sustained investment in multi-year agricultural research. We also conducted for the second year on-farm comparisons of wide-skip furrow irrigation against farmers' respective standard practices. The four participating farmers from Year 1 collaborated with us again in Year 2, while three farmers who had never tried wide-skip furrow irrigation joined as new participants. We are now waiting to receive the on-farm data for analysis. We look forward

Project Results

to continuing our on-station experiment and to including more on-farm research sites in the coming years.

For the second objective, we shared our research findings with stakeholders through various presentations (see the Project Deliverables section below). We look forward to continuing to distribute new knowledge and new recommendations associated with wide-skip furrow irrigation as they are generated gradually from the experiments in our project.

For the third objective, our graduate research assistant started in January 2025 as a master's degree student in biosystems engineering at Mississippi State University. He was heavily involved in both on-station and on-farm research during Year 2. He is now preparing his thesis proposal based on this project. He is expected to be heavily involved in this project again during Year 3 and to graduate in December 2026. We look forward to continuing to mentor this young professional and to provide hands-on research experience through this project.



Preliminary results from the 2025 on-station experiment with 40-foot wide-skip furrow irrigation; an asterisk marks a level whose yield was significantly different from the others at $\alpha = 0.1$ according to Fisher's test.

Project Impacts/Benefits

Our project is discovering and disseminating how to best manage wide-skip furrow irrigation on buckshot. As compared with every-furrow irrigation, wide-skip furrow irrigation on buckshot is currently estimated to increase corn yield by 8 bushels per acre, to decrease corn irrigation by 2 inches, and to increase corn profit by 40 dollars per acre. All these immediate benefits to farmers and to their water resources do not involve adding costs or complexity. By alleviating waterlogging, wide-skip furrow irrigation will encourage more diverse and more flexible crop rotations on buckshot to support thriving and resilient Mississippi farms. Additionally, reductions in groundwater withdrawal as a consequence of adopting wide-skip furrow irrigation will contribute to slowing down the depletion of the Mississippi River Valley Alluvial Aquifer, supporting the future of the Mississippi corn industry and rural communities across the Delta.

Project Deliverables

We delivered oral presentations on our project to members of the Mississippi corn industry at the 2025 Mississippi Master Irrigator program, the 2025 National Center for Alluvial Aquifer Research field day, and the 2025 Mississippi Row Crop Short Course. We also delivered presentations on our project to members of the scientific community at the 2025 Mississippi Water and Energy Conference and the 2025 Soil Science Society of American annual meeting.

Additional Questions

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

Our project is generating value for growers in two primary ways. First, our project is contributing to the development of best practices for corn production in buckshot soils. Many growers avoid planting corn on these soils because of water management challenges. If our project succeeds in creating optimal recommendations on using wide-skip furrow irrigation, we would be able to help growers overcome some of those key challenges. Supporting growers in raising profitable corn crops on buckshot soils will be especially valuable as growers seek to diversify crop rotations on buckshot soils amid concerns about commodity prices and pesticide resistance. Second, our project is also contributing to the conservation of natural resources without sacrificing current profitability. Preliminary evidence suggests that wide-skip furrow irrigation can achieve similar corn yield but with less irrigation water as compared with conventional irrigation techniques. Additionally, corn tends to demand less irrigation water in Mississippi than the crops that are most common on the buckshot soils of our state. By empowering growers to shift not only to a water-saving irrigation practice but also to a water-saving crop, our project is assisting growers in sustaining the valuable water supplies that will continue to benefit growers for generations to come. Though we do not presently plan to devise any financial decision-making tools for our project, we will analyze the financial implications of our results. Those findings will be shared with growers through presentations and multimedia resources to guide growers in choosing a profitable choice for their situation.

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

In the past two calendar years, the only successful acquisition of new funding I led was MCPB's support of this project under award numbers 30-2024 and 15-2025.