



Mississippi Corn Promotion Board 2024 Progress Report

Project

Title: Delayed Timing for Spring Application of N in corn

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Project Summary (Issue/Response)



One of the main limiting factors for planting season in the spring is how soon can you get into the field to plant. For this reason, many producers may look to apply nutrients early (fall or early spring applied) in order to stay on time for planting season. Dr. Erick Larson reports that optimum grain yields are produced in corn planted up to May 1, then yields start declining. In years where we would have late springs, producers aren't always able to get all fields planted and with some baseline of N fertilizer applied in a timely manner. Studies in other crops such as wheat have shown that by delaying N on into the season, we can produce just as much yield, or even increase yield, while also increasing nitrogen use efficiency (NUE) (Souza et al., 2022). Other works have also suggested that the majority of N uptake doesn't occur until after V6, while peak uptake occurs from V10-V18 (Bender et al., 2013). Applying the N at the most optimum time, even delaying the side-dress application later into the season, could lead to less N being used to maximize yield, which could be beneficial for both financial and environmental purposes, while also leaving more time focusing on getting the seed in the ground.

Currently MSU recommendations suggest split application of N to reduce losses, with the bulk of application occurring prior to peak uptake. In a perfect situation, all corn would be fertilized in a timely fashion, but many times, rainfall and the environment could delay application of N.



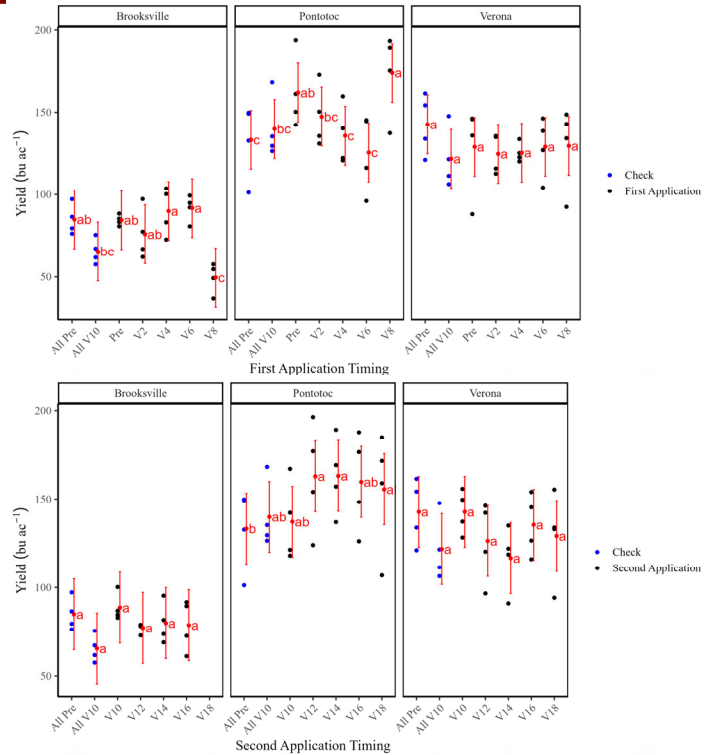
Project Results/Outcomes

This study was implemented over 3 locations in 2023, at Verona, Brooksville, and Pontotoc Research Stations. Unfortunately, as many corn producers in the state understand as well, this was not the best year for dryland corn, and all of these locations were established as dryland locations. This meant average to poor yields at locations. Brooksville in particular had a very poor year, with average yields across the study around 80 bu/ac. Pontotoc, where is not normally where I have the greatest yield in my research studies actually had the highest average yield, averaging around 150 bu/ac, due to more precipitation they received than other locations. Poor yielding years limit the conclusions and prospective findings from a year, but that's why we do additional years of data collection.

While yields were not great, we can still glean some thoughts. Both Brooksville and Pontotoc had good variability across treatments. When looking at the timing of the first N application (the second application was constant at V10 growth stage), Brooksville did not seem to have much change among treatments until N was delayed up to V8, suggesting something needed to be applied earlier than that point. At Pontotoc, yields decreased as the first application was delayed, but we saw yields on par with preplant application at V8 timing. We believe that is most likely due to timely rainfall applications around that timing, which we plan to investigate further.

Project Results

Verona was a little harder to discern, due to lack of treatment differences across all timings. At this location, as long as you had SOME N out at preplant (there was no difference between 100 lbs N ac vs. 200), we maximized yield. We believe, again, the low yielding environment led to negligible differences.



Yield Response to different timing in First application, and second application of N

Project Impacts/Benefits

The results of this study could be beneficial to producers in providing pertinent information on how soon N must be applied to corn at the beginning of the season, as well as the second application, to maximize yield and efficiencies. Our goal is at the end of next year, we collect enough data that we can 1) confirm current recommendations of splitting N is most efficient in maximizing yield, but also 2) determine pivotal timings that can be used to investigate rates and additional splits in the future.

Project Deliverables

This study was presented at the North Mississippi Research and Extension Center Field Day in Verona, MS, as well as discussed at the Nitrogen Use Efficiency Conference in Champaign, IL.

The graduate student assigned to this project, Elizabeth Worley, is currently working on a proposal for her MS degree, and is anticipated to finish her thesis on this project in May 2026.