



Mississippi Corn Promotion Board 2024 Progress Report

Project

Title: Tissue Sampling as a tool for Nutrient Management in Corn in Mississippi

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Project Summary (Issue/Response)



With current input prices, producers are looking to become more efficient in their practices to stay profitable. Many universities and consulting firms offer tissue testing as a tool for estimating nutrient requirement and possible yield estimation, yet, very few peer-reviewed journal articles can agree on the accuracy of the practice. Stammer and Mallarino (2018) noted that early season P and K measurements can be fairly inconsistent, specifically in early season corn, with correlation to yield getting higher as you get to R1, and offer optimal nutrient concentrations for yield. Yet, other works suggest that nutrient concentrations in crops can easily fluctuate depending on time, weather, and environment, and are more apt to be used as a diagnostic tool than a nutrient recommendation (Mundorf et al., 2015; Reed et al., 2022). As producers of Mississippi look to be at the forefront of new technology and strategy to enhance their practice, it is imperative that they have the most up to date research to back them up.

Currently, Mississippi State University Soil Testing Laboratory does offer tissue testing, but we do not offer recommendations based upon the tissue testing. As we move to make more decisions in season for fertilizer applications, providing producers with information on a possible tool for crop monitoring is crucial to the MAFES mission.



Project Results/Outcomes

This study was implemented at 1 location in 2023, on North Farm in Starkville. This study was extensively sampled, at three different timings.

Due to lab breakdowns, we are still waiting on N and S analysis from all the tissue. However, we were able to run all P and K analysis across all timings. We were only able to ascertain differences between the K treatments at any timings, only the V10 and R1 timings had differences. We were only able to see differences between the 100 and 0 lb K_2O treatments, not the 0 from 30 or 30 and 100. We were not able to see any differences between the P treatments at all.

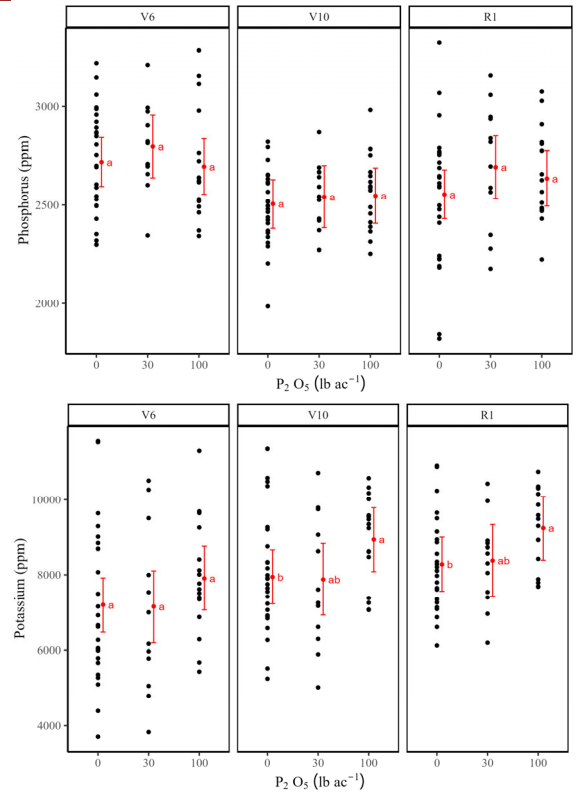
When we look at yields, we saw significant yield responses from ALL fertilizer treatments. For Nitrogen, each treatment was different from one another, as we maximized yield at 300 lb ac^{-1} at 181 bu ac^{-1} . For Phosphorus, we maximized yield at the 100 lb P_2O_5 rate, greater than both the 30 and 0. For Potassium and Sulfur, we only saw differences between yield if we made the application or not, and could not see differences between the rates.

This field was an excellent location to put this study in because we were able to see so many different treatment responses with yield. Until we have N and S tissue data to compare with, we cannot make any conclusions about the use of tissue testing in corn production. With Phosphorus, based on one year of data, I cannot recommend the use

Project Results

of tissue data at any timing. We were not able to see any differences in tissue, even though there was a yield response. For potassium, we could tell the difference between with and without a K application in yield (maximized yield at low K rate), but could only see the difference the 0 and high K rate. This suggests we can see differences, but those differences won't necessarily correspond to yield response.

We made plans to do sap analysis for this year, however, we were not able to easily press the samples. However, this coming year, I have made arrangements with Waters Ag Lab to do our sap analysis for next year.



Tissue Concentration of P and K to different rates of P and K, respectively, at 3 different timings.

Project Impacts/Benefits

The results of this study could be beneficial to producers in providing pertinent information on how to best utilize tissue data as a nutrient management tool. We hope at the conclusion of this study, Mississippi State University will offer some guidance on tissue sampling recommendations for corn.

Project Deliverables

This study was presented at the Nitrogen Use Efficiency Conference in Champaign, IL in 2024.

I am in the process of hiring a MS/PhD student to finish this study as their thesis/dissertation, with expected graduation date in May 2027/2028.