



# Mississippi Corn Promotion Board 2025 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 3 locations in 2025, at North Farm in Starkville, NMREC in Verona, and at the Brown Loam Research Station near Raymond, MS. Each location was applied with varying rates of N, P, K, and S fertilizer (including 0 lb ac<sup>-1</sup> checks) to see impacts of each application on both tissue content and yield.

Extremely poor growing conditions led to no yield and missing tissue samples collected from the North Farm location, but we did collect almost all timings at each location. Weather at Verona also did not cooperate with us, as these growing conditions led to ~100 bu ac<sup>-1</sup> yield on average.

Brown Loam was an extremely productive location, with average yields around 230 bu ac<sup>-1</sup>, with some plots reaching 300 bu ac<sup>-1</sup>. For this location, Nitrogen and Phosphorus both had a significant impact on yield. Figure 1 to the right displays the yields for each treatment combination, split out by nutrient application. We maximized yield at this location with 200 lb N ac<sup>-1</sup>, which was greater than both the 100 and 0 lb rate. For P, we maximized yield at 100 lb P<sub>2</sub>O<sub>5</sub> ac<sup>-1</sup>, was greater than 0 lb rate, but no different from

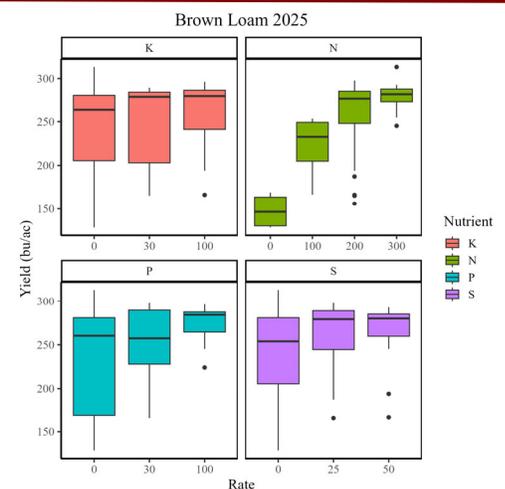


Figure 1. Treatment Yields at the Brown Loam Experiment Station near Raymond MS. There was a yield response to both Nitrogen and Phosphorus. No other yield responses were noted.

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## Project Results

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30 lb rate. Potassium and Sulfur were non-factors at this location.

Investigating further into the Brown Loam data, in Figure 2, we see the phosphorus concentration from both the standard tissue samples and from sap analysis. Again, we had a yield increase from the application of 30–100 lb  $P_2O_5$   $ac^{-1}$ . Therefore, we would want to see differences in the tissue concentrations based on these different rates. For conventional tissue analysis, we saw no difference between any treatments at V6 or V10, but did see difference at the R1 growth stage, noting that there was an application, and we could see the difference. Investigating the sap analysis, we were unable to see any differences between any treatments at any growth stage.

Further analysis is currently being done, investigating the relationship between Tissue concentration and Sap concentration at all locations (even those at low yielding locations), and other nutrients outside of Phosphorus, such as those shown.

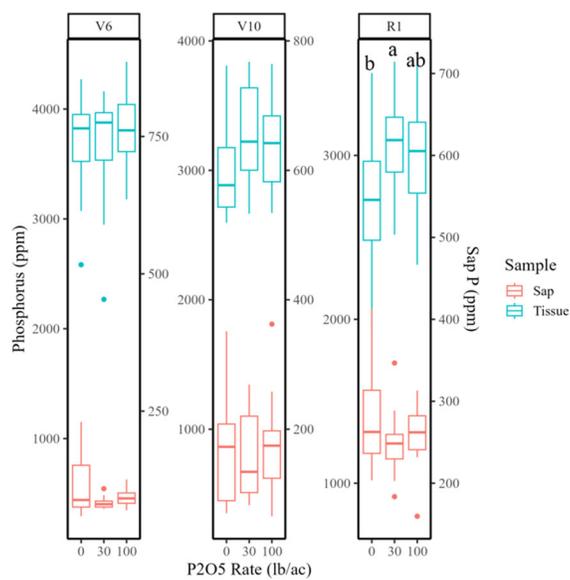


Figure 1. Tissue concentration analysis from both conventional tissue samples and sap analysis across 3 growth stages (V6, V10, R1) and 3  $P_2O_5$  rates.

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## Project Impacts/Benefits

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Currently, MSU does not offer nutrient recommendations based on tissue analysis. Previously work conducted by the PI's suggests that tissue concentration works well as a diagnostic tool, but not as a nutrient recommendation based on the concentrations themselves. This work would be vital to producers by validating current tools for nutrient management, as well as giving an insight into lesser known methods, such as sap analysis. This can help producers make more informed decisions in the future.

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## Project Deliverables

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This study was discussed at the 2025 NMREC Field Day. It was supposed to be discussed at the 2025 Tri-Societies Meeting in Salt Lake City, Utah, however, due to weather and travel problems, we were unable to attend. It is our goal that after the final year of this project (2026-2027), we will publish blogs, fact sheets, and refereed manuscripts denoting our findings.

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# Additional Questions

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

The findings from this work will provide producers with hard evidence on the viability of using tissue/sap analysis as a tool for nutrient management. Tissue sampling is time consuming and costly, so by validating or testing these tools, we will provide producers evidence for value of their inputs. While we will not dive into economic analyses within this study, this work is vital to the financial success of producers.

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

For corn studies, I have acquired funding from the following:

- OCP North America
- NRCS-CIG
- Fluid Fertilizer Foundation/The Fertilizer Institute
- Mississippi Corn Promotion Board
- Private industry