

MISSISSIPPI SOYBEAN PROMOTION BOARD

Fertility and Agronomic Resource Management Extension and Research for soybean (FARMERS) **Program - 02-2023**

Annual Report

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Background and Objectives

Near record high fertilizer prices has placed increased strain on already small profit margins. For this reason, up to date non-biased research data is necessary to ensure that all soil fertility management decisions are creating not only maximum yield but profitability as well. An example of this would be ensuring the any yield increases associated with micronutrient applications are similarly increasing net returns. Many growers in Mississippi also face K deficiency on a regular basis. As K is mobile in plant tissue and early detection is critical, we must ensure that tissue samples are being collected from the correct location in the plant canopy. Due to relatively flat landscape of the Delta region of Mississippi, flooding is a problem that many soybean growers must deal with on a fairly regular basis. After flooding events growers are looking for ways to accelerate soybean recovery. With this, many growers will make a foliar application of N with the belief that it supplements what has been lost from root inactivity and hastens recovery time. It is also crucial that research personnel continually collect production field level data to stay abreast of ever-changing soil conditions and be able to proactively prepare for possible issues. Specific objectives are 1) Data collection; 2) Establishing optimum tissue sampling location within a plant canopy for early deficiency detection of plant-mobile nutrient potassium; 3) Establishing optimum boron fertilizer application rates and timings for soybean grown on soils ranging from clay to sandy loam; 4) Determine the effect of foliar N applications on soybeans subjected to flooding during the late vegetative to early reproductive growth stages; 5) Determine the effect of K fertilizer application timing on late season soybean K deficiency; and 6) Implement a self-existing soil fertility based extension program where information garnered through the research program is effectively and efficiently distributed to MS soybean growers along with providing on-site field diagnostic assistance for proper identification of nutrient deficiencies in soybean.

Report of Progress/Activity by Objective

Objective 1: Data Collection

Data collected through soil and tissue samples and conversations with MS producers indicated that sulfur deficiency is most prevalent on clay textured soils where soybean has not been rotated with high demand crops that would require sulfur fertilization. This data was utilized to design two independent studies to determine agronomically and economically optimum sulfur fertilizer rates and sources for soybean produced in MS. Site visits performed during 2023 also aided the MSU soil fertility team in selecting two producer sites with an increased likelihood of sulfur fertilizer response.

Objective 5: Determine the effect of K fertilizer application timing on late season soybean K deficiency.

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A single potash fertilizer rate (based on soil test values) was applied at 7 different timings during the soybean growing season. These timings included 0 potash fertilizer, fall applied, spring preplant, 10, 20, 30, and 40 days after emergence. In 2023, no yield differences were observed for any K fertilizer application timing. These preliminary data indicate that MS soybean producers may apply their K fertilizer as late as 40 days after emergence with no yield penalty provided, they have irrigation capabilities or there is a high percentage rain forecasted in the near future.

Objective 6: Implement a self-existing soil fertility based extension program where information garnered through the research program is effectively and efficiently distributed to MS soybean growers along with providing on-site field diagnostic assistance for proper identification of nutrient deficiencies in soybean..

In 2023, ten field visits were performed to aid in diagnosing fertility issues in soybean field along with numerous phone calls, emails, and texts. The soil fertility Extension program also performed two training courses where soybean plants with induced deficiencies were used to train approximately 20 personnel associated with the MS soybean industry on the proper identification of nutrient deficiency foliar symptoms.

Impacts and Benefits to Mississippi Soybean Producers

The benefits of these projects to date are the planning of sulfur fertility trials with an increased likelihood of success that will help answer MS soybean producers' questions directly. The knowledge that potash fertilizer applications can be made in-season. The direct contact with MSU soil fertility team members to answer questions and direct training on current and emerging soybean fertility issues.

End Products-Completed or Forthcoming

Results from this project were presented at five county level meetings, the Mississippi and Louisiana Agricultural Consultants meetings, two Extension trainings, and used to answer multiple soybean grower questions.