



## Mississippi Corn Promotion Board 2019 Progress Report

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**Project Title:** Optimizing Yield Through Enhanced Fertilizer Inputs and Increased Populations

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### Project Summary (Issue/Response)

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Corn growers of Mississippi continue to seek out methods to increase profitability in tough times of decreased farm profitability. As seed costs continue to rise with the additions of new seed technology and associated fees, reducing inputs are often a tactic to reduce costs. Conversely, over time, corn seeding rates have been increasing by 300 seed/ac per year. As seeding rate increases, inter-row plant-to-plant spacing decreases. In addition, narrower row widths increase inter-row plant-to-plant spacing, which has the potential to increase yield. This research addressed increased seeding rates on narrow and wider row widths as means to increase profitability. Also, application of side-dress nitrogen was addressed in narrow row corn production.

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### Project Results/Outcomes

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2019 was a challenging year for corn growers particularly during planting. Planting season began cold and wet; however, our earliest planting dates (i.e. March 28) provided favorable soil conditions and plants emerged evenly. At emergence (i.e. April 5), most of the state received about 7 inches of rain that created over saturation and flooding issues. Soil tests for the Starkville location came back high in all macros but low in Zinc. As a result, a foliar application of one pound per acre Zn at V2 was made along with Lexar® herbicide. Fertilizer nitrogen was applied using a split application method with a third of the total N ( $100 \text{ lb N ac}^{-1}$ ) going out pre-plant incorporated using 33-0-0 (50/50 mixture of urea and ammonium sulfate) and the other two thirds ( $200 \text{ lb N ac}^{-1}$ ) as dry urea 46-0-0 as a simulated aerial application at V6.



The row spacing by population study was set up with two row widths which included 19" and 38" as well as five seeding rates ranging from 25,000 to 65,000 in 10,000 seed/ac increments. This study was conducted at three locations Tchula, Starkville, and Verona, MS. The Verona row spacing by population study was placed in flood prone field and was over saturated for several weeks.

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## Project Results

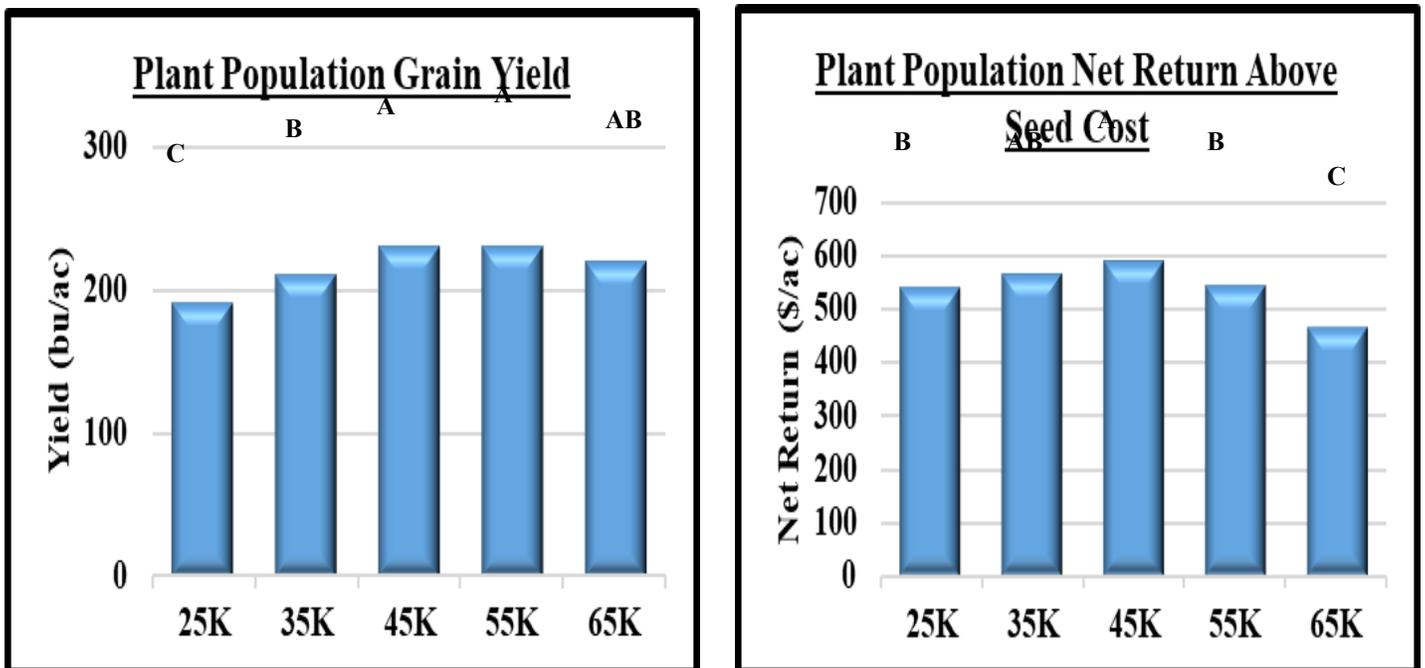
As a result, data from this location of the row spacing by population study was discarded. Planting dates at all locations ranged from March 28 to April 22. Maximum yield and economic return above seed costs was realized at 35,000 seeds/ac in Tchula and 45,000 seeds/ac in Starkville. Pooled over 8 site-years, yield was maximized at 50,000 seeds/ac and economical returns were maximized at 45,000 seed/ac. Row spacing affected yield in two instances. In 2017 Starkville, narrow (19") rows generated 10% greater yield than 38" rows and in Starkville 2019, due to the volume of water received shortly after planting, 38" rows increased yield compared to narrow rows by 17% (data not shown).

The second trial was conducted in Starkville and Verona, MS and evaluated five hybrids at three populations of 30,000; 40,000; and 50,000 seeds/ac. Hybrid affected yield at Verona but not Starkville. DKC 70-27 provided greatest yields in Verona. Seeding rate affected yield similarly at Starkville and Verona with greatest yields occurring at seeding rates of 40,000 and 50,000 plants/ac. Pooled over 5 site-years, these data suggest that seeding rates of 40,000 seeds/ac are most economical and hybrids DKC 70-27 and P-2089, 120-day relative maturity, are the best hybrids for narrow-row corn production in our region.

The third trial evaluated nitrogen application method and rate specifically for narrow row corn. The trial was designed for 19" row corn with nitrogen rates of 0 to 240 lbs of N per acre with two application methods 1) simulated aerial application of NBPT-coated urea and 2) knifed with a modified liquid knife rig with a narrow-row tractor. The trial was planted on April 30, and Canadian geese destroyed 95% of the stand. We propose to conduct the study in multiple locations, including the Delta in 2020.

Funding for this project will evaluate agronomics and fertility in a high population system and cover the final year of Joey William's PhD.

## Graphics



Figs 1 and 2. Grain yield and net returns above seed cost as affected by plant population across 8 site-years.

## Project Impacts/Benefits

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Corn growers face many decisions on their operation pertaining to hybrid selection and plant population. This research assesses the impact of increased population as a method of increasing yield and profitability. If producers choose to increase their fertility inputs, these data will assist when making seeding rate decisions.

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## Project Deliverables

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### Professional Presentations and Outreach

W. Brien Henry, Normie W. Buehring, John J. Williams, John M. Orłowski, and M. Wayne Ebelhar. 2018. Assessment of Narrow-Row Corn Production in the Mid-South. Southern ASA. Jacksonville, FL. Feb. 2019.

W. Brien Henry, 2019. Evaluation of Narrow-Row Corn Production with Various Hybrids Increased Population. North Mississippi Row Crops Field Day. Verona, MS. Aug. 2019.

John J. Williams and W. Brien Henry. 2018. Assessment of Narrow-Row Corn Production in the Mid-South. Southern ASA. Jacksonville, FL. Feb. 2019.

### Educational Training

Graduate Student John J. Williams is conducting this research project while pursuing his Ph.D. in Agronomy at MSU.