



Mississippi Corn Promotion Board 2018 Progress Report

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

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Project Summary (Issue/Response)



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 their associated fees, reducing seed inputs can often be a way to reduce costs. Over time, corn populations have been increasing by 300 seed ac^{-1} every year. As planting population increases, this increases the inter-row spacing of plants, increasingly so for wider row spacing's. Narrower row spacing's increase inter-row plant-to-plant spacing, which has the potential to increase yield. This research will answer the question of if a grower should reduce their seed population or change row spacing and increase population as means to increase profitability.

Project Results/Outcomes



2018 was a challenging year for corn growers especially in North MS. Planting season at MSU began cold and wet as early planting dates of corn, i.e. March 28, were planted into favorable soil conditions, warm and moist, and plants emerged evenly. As corn entered the V2 growth stage, cold weather set in for four days producing two minor frosts. Seedlings would eventually grow out of this. Soil tests for the MSU field came back high in all macros but low in Zinc so made a foliar application of Zn at V2 at one pound per acre with our herbicide application of Lexar®. Fertilizer nitrogen was applied using a split application method with a third of the total N (100 lb N ac^{-1}) going out as preplant incorporated using 33-0-0, a 50/50 mixture of urea and ammonium sulfate and the other two thirds (200 lb N ac^{-1}) as dry urea 46-0-0 as a simulated aerial application at V6. Bagged fertilizer is purchased to make these applications.

A popup storm, with 40+ mph wind gusts, hours after terminating a furrow irrigation event caused significant root lodging at Mississippi State this year. Data were collected and suggests that, for the March 28 planting date, narrow-rows reduced root lodging and subsequently, greater plant populations increased lodging. For the April 12 planting date, row spacing did not affect root lodging but plant populations of 55K and 65K lodged significantly more than 25K, 35K, and 45K ranging from, on average, 58-70% at the higher populations. For MSU locations, on average, the first MSU location planted on March 28 yield four replication averages up to 247 bu/ac. Row spacing was statistically non-significant with respect to yield with 230 bu/ac for 19" rows and 233 for 38" rows. Populations of 35K, 45K, and 55K generated the greatest yield (Fig. 1). The second MSU location planted on April 12, generated four replication averages up to 227 bu/ac. Due to lodging issues, yields were variable resulting in insignificance for row spacing and population.

Project Results

In Verona, due to above normal rainfall, planting was severely delayed to May 8 resulting in below normal yields ranging from 115 to 153 bu ac⁻¹.

In conclusion, over all locations and years (six site-years), the maximum agronomic yield was the 45K plant population but optimum economic yield (above seed costs) @ \$3.50 corn is around the 35K to 38K plant population (Figs. 3 & 4). Ear width and ear length are significantly larger, two kernels longer and a half kernel wider, on narrow-row corn. Also, narrow-row corn has significantly larger stalks than does wide-row corn. One more year of data collection will solidify this dataset so that we could give a solid recommendation on whether or not row spacing affects yield and net returns and, if so, which plant population should be planted.

The second trial was set up as a dryland trial with five hybrids at three populations of 30, 40, and 50K located in Starkville and Verona. Lodging issues were present in Starkville resulting in variable data. Root lodging data were recorded and Armor 1414, followed by Pioneer 2089, hybrids lodged the most. Also, populations of 40K and 50K lodged more than 30K. The Verona yields ranged from 160-255 bu/ac. Hybrid DKC 70-27 at 50K generated the greatest yield at 255 bu/ac.

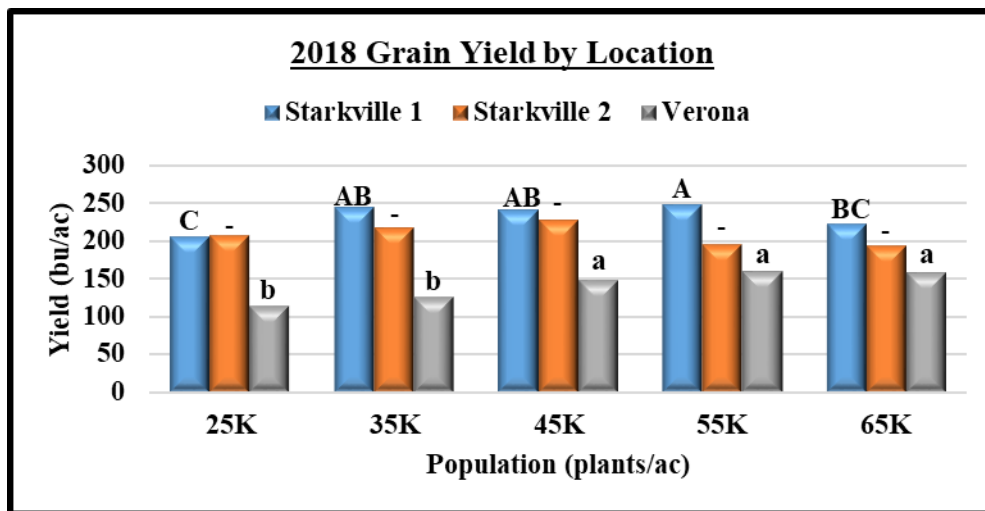
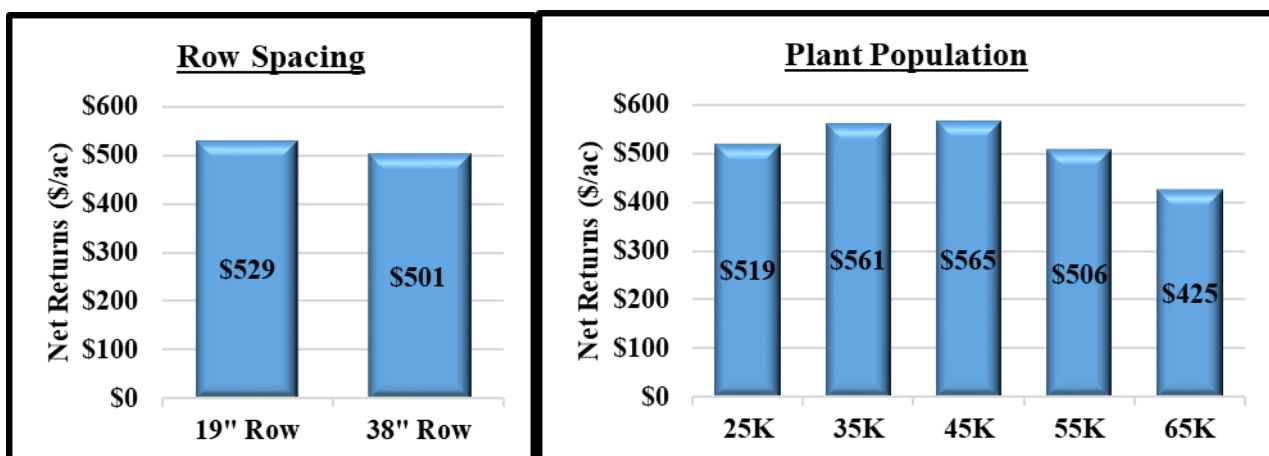


Fig. 1. Grain yield by testing location for the 2018 growing season.



Figs. 2 & 3. 2018 row spacing and population net returns above seed costs at \$3.50 corn pooled over six site-years.

Project Impacts/Benefits

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, this data will allow them to decide on how much of an increase in plant population will pay for itself.

Project Deliverables

Professional Presentations and Outreach

W. Brien Henry, Normie W. Buehring, John J. Williams, John M. Orlowski, and M. Wayne Ebelhar. 2018. Assessment of Narrow-Row Corn Production in the Mid-South. Southern ASA. Jacksonville, FL. Feb. 4, 2019.

Normie W. Buehring, Brien Henry, John J. Williams, Mark P. Harrison and Andy R. Taylor. Flex Ear Corn Hybrid Population Yield Response to Narrow Rows. Southern ASA Meeting. Jacksonville, FL. Feb. 4, 2018.

W. Brien Henry, 2018. Evaluation of Narrow-Row Corn Production with Various Hybrids Increased Population. North Mississippi Row Crops Field Day. Verona, MS. Aug. 9, 2018.

W. Brien Henry, 2018. Optimizing Narrow-Row Corn in a Mid-South Environment. MS Chapter ASA. Nov. 14, 2018.

J. J. Williams and W. Brien Henry. 2018. Assessment of Narrow-Row Corn Production in the Mid-South. Southern ASA. Jacksonville, FL. Feb. 4, 2019.

Educational Training

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