Project Title: Planting Density and the Effect on Dryland Yield Stability

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Project Summary (Issue/Response)

Optimal plant population depends upon rainfall amount and timing, hybrid, soil type, and fertility. We investigated several of the most promising commercial hybrids at three locations with population densities ranging from 20- to 40-thousand plants per acre. We conducted this research at three locations in 2013 and two location in 2014, all of which we included a planting-date component (except at Brooksville 2013). In summary, we think that by planting corn earlier and at higher populations than producers currently use dryland, we can stabilize and likely improve corn yields. Because for corn planted early, moisture during May (the reproductive phase) is more plentiful and temperatures cooler, raising plant populations might improve yields even further. Like 2013, the 2014 growing season was wet and cool, and raising the dryland populations at or above 30K plants per acre produced favorable results worth further investigation. In fact, at Verona in 2013, yield for DKC67-57 at 35K ppa fertilized with 200 lbs N generated 230 bu/A in this replicated trial, the largest dryland corn yield ever produced at this research station. At Mississippi State in 2014, we recorded yields at or above 250 bu/A for several of the high plant population treatments. These were exceptional dryland yields, especially considering we only applied 200 lbs N.

Project Results/Outcomes

In practical terms, we would be evaluating if a producer could reduce plant populations to save seed costs without being penalized in years with above average rainfall and potential for high yields. Conversely, we would also be testing if a producer could increase plant populations and benefit with higher yield, so long as he were not penalized by a hot, dry year which would result in higher stress and low yield. Somewhere between these two alternative strategies lies the optimum plant population which we hope to determine through this research project.

April was extremely wet, but didn't seem to harm the earliest planted experiments. However, decreased rainfall in May likely affected early planted yields, but the advantage of cooler day and night time temperatures minimized yield loss. The reduced rainfall and normal temperatures produced a yield reduction of only 7% for Starkville and 1% for Verona. Late April and May planted experiments benefited tremendously from the abnormally wet June we encountered. Both Starkville and Verona received more than double the normal amount of rainfall for the month of June.

July rains were also higher than normal at Verona which further benefitted later planted experiments. In summary, the below normal early season rainfall did likely reduce yields, but was minimal compared to the latest planting date yield reduction, even with above average June/July rainfall. The benefits associated with planting early were also seen later in the season when disease (rust) occurred likely from the ideal growing conditions (cool & wet). Our early planted corn wasn't affected by late season disease because the crop was already made; whereas, the later planted corn was severely injured by disease resulting in decreased yields.

Project Results

Research Focused in 2014 MAFES Discovers Magazine.
Stand counts, UAV & Precision AG work.

Project Impacts/Benefits

The impact/benefit of this trial is that these newer stress-tolerant varieties appeared to tolerate high populations quite well; however, **we must note that 2015 was again a wet growing season**, especially early.

We also need to consider the risk associated with increasing the population, because we haven't seen a really dry year in the first two years of this study. We finally observed yield decline associated with planting too high of a population, but because our planting date was so late in May, this was expected. We saw significant yield declines associated with high populations of Agrisure hybrid N79. It did not do well on the Brooksville clay soils. Conversely the Dekalb hybrid DKC67-57 held up far better at that location across populations. Matching the right hybrid to the right soil type is critical as evidenced by this particular year.

On the right soil type, with the right vigorous hybrids, (timely) planting at populations around 30K ppa or slightly higher for rainfed production will help producers hit economically favorable yields, reduce risk and improve the likelihood of profit in a corn production system.

Project Deliverables

Evaluation of hybrids, planting dates and planting densities on corn growth and yield in under rainfed systems in Mississippi. M. Hock, August 2015. (2 manuscripts in prep to Agron. J.)

SAAS, Dallas, TX Feb. 1-4, 2014

- Corn (*Zea mays* L.) Planting Density and the Effect on Dryland Yield in Mississippi. **W. Brien Henry**, Matthew W. Hock, Chathurika Wijewardana, Normie Buehring, and K. Raja Reddy, Mississippi State University, Mississippi State, MS

SAAS, Atlanta, GA Feb. 1-4 2015

- Evaluation of Hybrids and Planting Dates on Corn Growth and Yield Under Rainfed Systems in Mississippi. Matthew Hock*, Godakande Wijewardana, **W. Brien Henry**, K. Raja Reddy and Normie Buehring, Mississippi State University

MS ASA Grenada, MS Nov. 13, 2014 (Invited)

- Early corn planting to avoid heat and drought. **W. Brien Henry***, M. Hock, C. Wijewardana, N. Buehring, R. Reddy, and E. Larson