Mississippi Corn Promotion Board
2015 Progress Report

Project Title: Corn Hybrid Evaluation to Optimize Early-season Planting

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Project Summary (Issue/Response)

In summary, for our 2013 and 2014 trials the planting dates ranged from March to May with the lowest yields associated with the latest planting dates and minor yield penalties with the earliest planting dates. We need a warm spring and hot summer like 2012 to identify how well this strategy could help producers minimize risk and improve profitability; we did not get this in any of the locations or years of our trial, and especially not it 2015. Our 2015 season started wet and cool and remained so until midway through the summer when it effectively stopped raining and did get hot. Most of the corn was mature by this time. Planting early is a risk avoidance strategy, but we need to experience both a hot dry summer as well as an intense late frost (to date we have experienced neither in the first two years of this study) in order to fully understand the pros/cons of this strategy.

Project Results/Outcomes

Planting early on the correct soil type is a risk avoidance strategy for producers. We have generated multiple years of data from multiple locations suggesting that there is a significant penalty associated with late planting. We knew that going in to this trial, but what we didn't really know is what is the penalty, if any, associated with planting early? This penalty appears to be minimal according to our data. Our 2014 dryland yields at Starkville, MS ranged from approximately 111 to 256 bu/A. At Verona, MS, yields ranged from 188 to 233 bu/A. Both locations received 200 lb of N applied in split applications. Starkville and Verona experienced some unexpected weather environments for the 2014 cropping season. March temperatures were slightly cooler and dryer than the 30 year average; however our early planted studies did not suffer stand reductions.

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 Impacts/Benefits

We have determined that if the producer prepares beds in the fall, selects a well-drained soil type, and plants early, the risk associated with early planting appears to outweigh the risk associated with delayed/late planting. The reality is that we would all like to plant our crop on the single, optimal day of the year, likely mid to late March (15 – 20th) for much of our Delta region, but the reality is that farms are getting bigger and planting equipment costs money and it is financially prohibitive to keep enough planting equipment on hand to plant every acre in a single day. More likely it takes a producer 7-10 days to plant his acres if the weather is favorable, which is rarely the case as evidenced over the past couple of years. Our data suggests there is benefit associated with early planting to avoid the heat and drought (even though the summers in our study years of 2013 and 2014 were relatively cool and wet). On the right soil type, with the right vigorous hybrids, with the right soil prep in the fall, this early planting strategy will help producers cover more acres effectively, reduce risk and improve the likelihood of profit in a corn production system.

Project Deliverables

Wijewardana, C., M. Hock, ***W.B. Henry****, and K.R. Reddy. Screening Corn Hybrids for Cold Tolerance using Morphological Traits for Early-Season Seeding. Crop Sci. 55:851-867. 2015.*

Chathurika Wijewardana, **W. Brien Henry**, Matthew Hock, and K. Raja Reddy. Growth and Physiological Trait Variation among Corn Hybrids for Cold Tolerance. CJPS-2015-286. Canadian Journal of Plant Science. *In review*

Chathurika Wijewardana, **W. Brien Henry**, and K. Raja Reddy. Interactive Effects on CO2, Drought, and Ultraviolet-B Radiation on Maize Growth and Development JPHOTOBIOL_2016_5. Journal of Photochemistry & Photobiology, B: Biology. *In review*

Wijewardana, C., M. Hock, **W.B. Henry**, and K.R. Reddy. Screening Corn Hybrids for Cold Tolerance Using Morphological Traits for Early-Season Seeding. CSA News 60:10. 2015.

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

Research Presented in MidAmerica Farmer Grower Magazine,
Early Planting Research, front page AUG 2014

Project Deliverables (continued)

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.)

Screening corn hybrids for cold tolerance using morpho-physiological traits for early season planting system. C Wijewardana, August 2015. (1 manuscript published Crop Sci., 1 manuscript *in review* Agron. J., and 1 manuscript in preparation to Crop Sci).

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

Corn Evaluation for Early Season Planting System by Morphological Traits. Chathurika Wijewardana, **William Brien Henry**, K. Raja Reddy and Matthew Hock, Mississippi State University, Mississippi State, MS

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

SAAS, Atlanta, GA Feb. 1-4 2015

Interactive Effects on CO_2, Drought, and Ultraviolet-B Radiation on Corn (Zea mays) Growth and Development. Chathurika Wijewardana*, **W. Brien Henry**, K. Raja Reddy and Matthew Hock, Mississippi State University

Evaluation of Drought Tolerant Maize Germplasm in a Controlled, Moisture Limited Environment. **W. Brien Henry***, Chathurika Wijewardana, Matthew W. Hock and K. Raja Reddy, Mississippi State University

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

Corn Evaluation for Early Planting Production System by Physiological Traits. Chathurika Wijewardana*, **W. Brien Henry**, K. Raja Reddy and Matthew Hock, 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

20th **International** Congress on Biometeorology. Sept. 28 through Oct. 2, 2014. (Invited) Early corn planting as a water conservation strategy in the Southeastern USA. **W. Brien Henry**, P. Grady Dixon, T. Graham.

Graphics

Figure 1. Planting early increases the likelihood of cooler temperatures during critical growth phases of corn development around tasseling. It also increases the probability of receiving the most available solar radiation during late phases of corn development from VT to R5. Yield winners from the NCGA speak of light received during specific days during the growing season to determine success of failure of their crop, but few have noted the average light received and matching their planting strategies to maximize that light during critical corn growth stages. The figures below include data from *Energies* **2015**, *8*, 278-303; doi:10.3390/en8010278.