Mississippi Corn Promotion Board
2014 Progress Report

Project Title: Corn Hybrid Evaluation to Optimize Early Season Planting

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Project Summary (Issue/Response)

Excessive heat and drought during June and July often negatively influence corn yields for Mississippi producers. We now have two years of strong yield data that suggest early planting has potential benefit to producers. What is especially interesting is that we really haven't had the type of year (warm spring with hot/dry summer) that would really make this strategy look good. What we have learned in 2013 and 2014 is that so long as we plant into good soil with nice beds, there was no appreciable penalty with stand issues (even with emergence delayed up to 18 days) or yield reduction. Planting earlier reduces the risk of exposure to heat and drought, but increases the risk of wet soils, cold temperatures, and frost. The ultimate decision to plant early depends upon a producer's soil type, equipment, and especially upon personal risk/reward tolerance; however, little information is presently available for insurance companies to set policy or for producers to base their management decisions. We need a year of data that includes a warm spring coupled with a hot, dry summer. That combination of weather events would provide the largest benefit to our proposed early planting strategy and we have yet to experience that type of growing season.

Project Results/Outcomes

Farm sizes are increasing and because producers are faced with planting larger acreages, starting sooner and thereby covering more ground as quickly as possible is advantageous. Early planting will not be the best option across all soil types, especially heavy, poorly drained soils. However, if a producer can identify certain fields that are sandy, well drained, and more likely to warm up in the spring, these fields will be a logical target for early-planted corn acres. By increasing his planting window, a producer might be able to get his planting done with a single planter instead of having to buy a second planter with additional labor expenses. The sooner a producer completes corn planting, the sooner he can begin planting soybeans. By planting corn and other crops earlier, a producer increases the likelihood of avoiding the hottest and driest parts of the summer. Corn in the Mississippi Delta and the central region of Mississippi is typically planted between 15 March and 20 April (MSUCares). Planting is often based upon soil temperatures warming to between 50 and 55 deg F. Because the overall stress tolerance and germination at cool temperatures of newly available commercial corn hybrids has steadily improved over the past 5 to 10 years (Lloyd pers. comm., 2012), we propose research to investigate moving the planting window of corn by 2 to 3 weeks earlier than typical planting. It is possible that because of increases in corn hybrid stress tolerance and seedling vigor, uneven germination is less of a problem than it used to be as recently as 10 years ago. Corn hybrids typically grown in this region reach tasseling approximately 1400 GDD50 ~60 to 65 days after planting. Corn planted in early March may initiate tasseling in May. Temperatures during May are historically cooler than in June and July and more favorable to the reproductive phase of corn development. Rainfall in May is slightly greater in amount and less variable in frequency than June and July and this, coupled with lowered evaporative demands, results in increased moisture availability for corn production. More water available for corn production during this critical time should result in higher yields with less variability.

Project Impacts/Benefits

By adopting an early planting strategy for corn, a producer would be trading the certain risk of hot and/or probable risk of dry summer months for the risk of cool soils, uneven germination, and late frost. The ultimate decision to plant early depends upon a producer's soil type, equipment, and especially upon personal risk/reward tolerance; however, little information is presently available for insurance companies to set policy or for producers to base their decisions.

Our second year of data suggests that even when there is above average late season rainfall like this past season, there were still penalties associated with planting late. Early planting gives producers the opportunity to market grain in July at a premium, complete corn planting and then focus equipment and resources on planting beans, and additionally avoid late season disease that could potentially reduce yields.

Our 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.

Even though there was above average rainfall in June and July the trend was that earlier planting dates resulted in better yields. This trend appears to hold true across hybrids and locations for the 2014 growing season. This study needs to be replicated for an additional year across locations to determine the benefits that early planting would have on crop yield where the growing season is both wet and cold early but hot and dry later in the season. Both of which could favor early planting and increase our knowledge on the heat and drought stress capabilities being used in current hybrids. Additional funding requested will support a location at Stoneville.

In summary, for 2014, our earlier planted corn was less affected by reduced rainfall and disease exposure than our later planted corn. The 2014 growing season was atypical to say the least. The late season rainfall definitely favored later planted corn, but the yield advantages were negated by late season disease. The 2014 environmental conditions weren't what we hoped to see to fully appreciate the benefits associated with early planting, but the advantages overall continue to outweigh later planted corn. We thank MCPB for providing support.

Project Deliverables

Field Days at MSU NE MS Verona Research Station, SAAS Poster/Presentation @ Southern Regional Agronomy Meeting + 2 graduate students attending with me with both of them presenting research funded by MCPB; thank you.

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Graphics

Figure 1. 2014 planting-date corn yield at Starkville, MS and Verona, MS

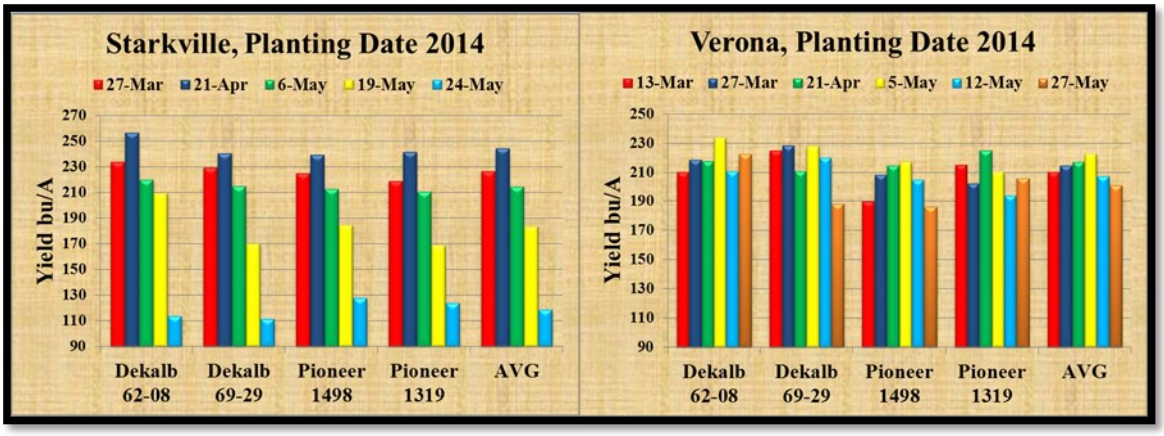

Figure 2. 2014 rainfall and temperatures at Starkville, MS and Verona, MS.