



## Mississippi Corn Promotion Board 2016 Progress Report

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Project Title: Drought Tolerant Hybrids and Short Season Hybrids to Mitigate Risk, Optimize Yield and Profit, While Reducing Supplemental Irrigation

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### Project Summary (Issue/Response)

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This project is a combination of optimizing irrigation and agronomics. Using agronomics (early planting and elevated populations), technology (DroughtGard) and shortened maturities (1-2 wk shorter season hybrids) to potentially limit the number of irrigations needed to make a crop could document the need to use all possible tools available to us to stabilize crop production, reduce risk, and use our water resource wisely. Water is limiting and as stewards of our resources we face the reality of declining aquifers and likely increased regulation. We can also approach this from a business standpoint that it is economically unsound to apply more water than is needed. If we can modify our agronomic practices to help producers and preserve our water resources this would be highly beneficial to corn producers.



### Project Results/Outcomes

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2016 was an outstanding growing season for us because at both Starkville and Verona because we got our first planting date in timely (early) in mid to late March. Few growers near us were so fortunate because weather was challenging early. Yields for the early March planted corn ranged from 210 to 250 bu/A and 140 to 210 bu/A for the April planted plots. These data support our previous research findings relating to planting date. On average, early planted corn was better. Full season hybrids were the best from among the ones we evaluated. Short season 103 and 105 RM hybrids had decent yield and required approximately 1 fewer irrigations than the full season hybrids, but in a high population (35,000 ppa), well fertilized, and irrigated environment, these hybrids did not yield sufficiently in comparison to the full season hybrids. In Verona moisture sensors on average across hybrids and planting dates saved us 3 supplemental irrigations. In Starkville moisture sensors saved us 4 to 5 irrigations. This summer had some very dry periods and the later plating dates in April required extra water late to complete the crop. This was especially the case at Starkville. Our outcome was that full season hybrids, planted early, and watered frequently resulted in the highest grain yields. Economically, and considering permitted irrigation limits, the limited irrigation treatment of 125 kPa was superior. We feel like with our work and the work of Dr. Jason Krutz that the optimal range for allowing the plant to dry down the soil should be around 90-100 kPa. This work is helping us to define the optimal corn water use for our environment.

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## Project Impacts/Benefits

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If we can determine the threshold for how far we can push a corn plant into droughty, moisture limiting conditions without negatively impacting yield, these data will give producers confidence to use soil moisture meters to hold off on irrigating corn that doesn't need it. By increasing the time between irrigations, we also increase the probability of receiving naturally occurring precipitation. This saves the producer money as well as helps to preserve our water resources. We have irrigation ponds in East MS that are sitting half empty, or half full depending upon how you look at it. Producers want to know exactly when and how much to use this valuable resource economically and environmentally sustainable manner possible. These data help us establish a baseline of what a corn plant can effectively tolerate regarding drought pressure without negatively impacting yield. Also, showing producers how to use these moisture sensors provides them another tool to manage their crop and remove guess-work from an important decision like when to irrigate.

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## Project Deliverables

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MS ASA Grenada, MS Nov. 2016 *Invited*

MS ASA Agronomy Field Day Black Belt Experiment Station, Brooksville, MS July 2016 *Invited*

Graduate Students and undergraduate workers attended and **Dr. W. Brien Henry** presented our data to a group of local producers and industry representatives.

Planting Date, Hybrid Selection, and Irrigation Frequency to Optimize Profitability in a Mid-South Corn Production System. 2016 MSU Graduate Student Poster Competition. J. Williams, W. Brien Henry, L. J. Krutz, N. Buehring, D. Reynolds and B. Whittenton.

Henry, W.B. & Krutz, L.J. Water in Agriculture: Improving Corn Production Practices to Minimize Climate Risk and Optimize Profitability. *Curr Clim Change Rep* (2016) 2: 49. doi:10.1007/s40641-016-0035-9

Ward, J. W. B. Henry, M. W. Hock. Variability in Harvest Moisture and Dry-Down in Multi-Hybrid Planting Systems. *Transactions of the ASABE*. 59(5): 1111-1115. (2016) (doi: 10.13031/trans.59.11572)

Henry, W. B. Precision Agriculture Central to Corn Production. *MAFES Discovers Winter 2016*.



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**EXTENSION**

# Graphics

**Figure 1.** Graduate student Mr. Joey Williams supported by MCPB setting up our 2016 Agro-Irrigation trial at the Starkville, MS location.



**Figure 2.** 2016 Irrigation trial demonstrated to producers at Verona, MS.



**Figure 3.** Yield and profitability of hybrid treatment combinations of planting date, maturity, and drought tolerance.

