



Mississippi Corn Promotion Board 2016 Progress Report

Project Title: Corn Verification Program

PI: Erick Larson, Jason Krutz, Angus Catchot, Tom Allen

Department: Plant & Soil Sciences and Biochemistry,
Entomology and Plant Pathology

Project Summary (Issue/Response)

Corn is an integral component of Mississippi's agricultural production systems. During the last few years, corn has become the second most popular Mississippi row crop based upon planted acreage and value. Although corn productivity has increased more than any other Mississippi row crop during the past twenty years, we believe there is tremendous potential to improve our production systems. Thus, the Mississippi State University Extension Service has established a Corn Verification Program supported by the Mississippi Corn Promotion Board using your checkoff funds designed to assist with the implementation of better management practices and technology and to identify limitations in our corn production systems. We do so while keeping the foremost objective of increasing profitability of Mississippi's corn production systems – not just trying any and all methods, some of which may have little practical merit and ultimately be unprofitable. We seek to accomplish these goals through the gracious cooperation of producers who grant us the opportunity to provide guidance and implement improved practices in one field on their farm. We develop a management plan uniquely tailored for each field and cooperator. Verification fields are scouted on a weekly basis to monitor crop response, potential limitations and ensure timely and prudent implementation of in-season practices. This process allows us to demonstrate value of new or improved management practices that are currently not being utilized.



Project Results/Outcomes

Our Corn Verification team continues to focus efforts to improve corn water and irrigation management and work cooperatively with our Irrigation Specialist, Dr. Jason Krutz. Crop productivity often suffers considerably when our climate dramatically shifts from abundant rainfall to drought. We recognize that soil saturation, as well as moisture deficit, has negative impacts on corn growth and development. Implementation of soil moisture sensors in Corn Verification fields have confirmed that soil saturation resulting from abundant rainfall or poorly timed irrigation severely limits corn root activity and depth, particularly during the early part of the season. This substantially restricts the water and nutrient availability required to support optimal corn growth and tolerance of adverse environmental conditions. Therefore, we are integrating soil moisture information with corn physiological needs to significantly improve irrigation scheduling for our corn production systems. For example, corn is very tolerant to water deficit during vegetative stages, when crop water needs are relatively low and soil moisture reserves are normally plentiful. Therefore, we recommend a very conservative irrigation schedule until just prior to tassel. Implementation of this strategy also encourages much deeper root growth, documented at least 36" deep in our Verification fields. Similarly, as corn progresses through late reproductive stages, water demand falls while stress tolerance improves substantially, so a moderate irrigation schedule will address demand. In summary, we are developing and demonstrating progressive methods to use soil moisture sensors and other technology for corn production. The corn irrigation strategies we implement in Verification fields are improving crop yields, as well as reducing irrigation water usage and associated expenses about 40 percent. Grower adoption of this technology and methods is rapid due to the efforts and results of our cooperative programs.

Verification fields have been closely evaluated for several years to document stand variability and identify causal factors. Uneven plant spacing as well as variable seedling emergence are common corn yield limitations. These issues often develop

Project Results

when planting extremely early or during adverse environmental conditions. Thus, we developed corn planting guidelines based upon soil temperature and moisture, rather than relying solely on calendar date for initiating planting. Corn Verification Program research evaluated crop response to planter speeds ranging from 3 to 6 mph and type of seed metering system. Results showed corn grain yield was reduced 4.2 bu/a for each mph increase in ground speed of a John Deere planter. Retrofitting a John Deere planter with a Precision Planting e-Set metering system increased corn yields an average of 5.9 bu/a and improved crop response to increasing ground speed by 17%. Furthermore, we are also evaluating the effect of delayed seedling emergence on productivity. Our other MCPB sponsored research shows irregular seedling emergence will reduce corn yield up to 22%, compared to a uniform corn stand. This substantial yield loss and needs to be accounted for when assessing corn stands. Thus, we intend to focus research and educational efforts to improve the likelihood of uniform stand development.

Glyphosate and ALS resistant ryegrass populations initially developed in the Delta have now rapidly encompassed nearly the entire state, presenting significant challenges for corn production. The Corn Verification Program has documented that emerged ryegrass is extremely competitive with young corn, and our ryegrass populations, which are often resistant to both glyphosate and ALS herbicides, cannot be reliably controlled after corn plants emerge. Therefore, MSU scientists have developed a specific management plan for controlling ryegrass competition in Mississippi's corn production systems. The three-part system includes the use of a fall-applied residual herbicide designed to limit the population of resistant ryegrass, followed by two separate spring-applied postemergence herbicides with different modes of action to completely control ryegrass before corn emergence. Our successful implementation and demonstration of this specific plan has proven to be imperative to successful control, and has greatly enhanced widespread adoption of this plan.

The Corn Verification team often finds substantial insect damage during early corn vegetative stages. Plant damage has occurred, despite the presence of insecticide seed treatments designed to limit seedling injury. One of the pests identified causing damage is the Sugarcane beetle, which is a unique pest found in our region. Awareness created from the Corn Verification Program has led to considerable MSU research investigating these issues. We have evaluated enhanced levels of seed treatment insecticides and documented merit in many cases. We have also identified an alternative and potentially more viable pest control alternative (liquid in-furrow insecticide) and improved our understanding of Mississippi's corn seedling insect pests. The Corn Verification Program fields are being used to evaluate and build a data base documenting the value of liquid in-furrow insecticides for use in Mississippi corn production systems.

Project Impacts/Benefits

The Corn Verification Program provides first-hand opportunity to identify many factors limiting corn productivity in Mississippi, so that we can develop educational programs and research better directed to address pertinent limitations in our region. Each of the issues identified in the previous section have developed into major Mississippi State University research projects, which train graduate students and thoroughly investigate these limitations. Furthermore, this on-farm verification program also is a tremendous method to demonstrate how to successfully implement cutting-edge strategies and new technology. For example, our efforts have helped increase corn yields, while reducing irrigation water consumption and expense over 40%. We believe the cumulative adoption of progressive practices addressing multiple issues identified through this program offer tremendous possibility to improve systems and reduce risks which hamper profitability and sustainability of Mississippi corn production.

Project Deliverables

31 Professional Presentations and Outreach

Published Materials

Mississippi Crop Situation Blog, www.Mississippi-Crops.com (12)

Delta Farm Press (6)

Mississippi State University Extension Crop Reports (3)

Educational Training

Research Associate Jenny Bibb assists with the Corn Verification Program in conjunction with her training associated with pursuing a Doctoral degree at Mississippi State University.

Three undergraduate students at Mississippi State University work part time to assist activities in the Corn Verification Program.



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EXTENSION



Caption: The Corn Verification Program offers tremendous opportunity to identify limitations and develop educational programs and research better directed to address pertinent limitations in our region.



Caption: The Corn Verification Program team provides the insight and direction needed to successfully implement new strategies and technology in our production systems.