



Mississippi Corn Promotion Board 2014 Progress Report

Project Title: Corn Verification Program

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Department: Plant & Soil Sciences, Delta R&E Center,
Biochemistry, Molecular Biology, 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 potential to substantially 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 scientific merit and ultimately be unprofitable. We seek to accomplish these goals through the gracious cooperation of producers who grant us an opportunity to execute management practices in one field on their farm, to evaluate compared to their normal production system. Thus, we develop a management plan uniquely tailored for each individual field and cooperator. We also thoroughly evaluate Verification fields on a weekly basis to monitor crop response, potential limitations and ensure timely and prudent implementation of in-season practices.

Project Results/Outcomes

Our teamwork with Dr. Jason Krutz, MSU Extension Service Regional Irrigation Specialist, is revealing substantial opportunity to improve corn profitability through adoption of better irrigation practices. Our surveys of producers and consultants indicate limited use of fundamental irrigation scheduling techniques. Implementation of soil moisture sensors in Corn Verification Program fields confirmed several key findings. As the crop developed through vegetative stages and spring soil moisture reserves declined, corn roots developed much deeper than anticipated ($> 36''$), when soil compaction or saturation did not impede growth. Often growers tend to initiate irrigation well before our soil moisture sensors and crop water demand indicate as necessary. This exacerbates issues when abundant rainfall saturates fields, as happened last June, during the critical early reproductive stages, reducing corn yield potential. Likewise, the soil moisture sensors help quantify appropriate irrigation as the crop nears maturity, and water demand falls. The soil moisture sensors also reveal water infiltration is restricted on many of our "sealing" silt loam soils. Our cooperative efforts with growers increased corn yields to record levels, while reducing



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Project Results

irrigation water usage nearly 50%. Therefore, we believe the utilization of scientific soil moisture sensors and irrigation management tools have tremendous possibility to improve crop response to irrigation, as well as greatly enhance efficiency of this valuable resource critical for sustainable corn production in Mississippi and the Mid-South region.

Verification fields have been closely evaluated for the past several years to document stand variability and identify causal factors. Uneven plant spacing as well as delayed seedling emergence are common corn yield limitations. These issues sometimes develop 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 preliminary research shows irregular seedling emergence will reduce corn yield about 30% for each leaf stage delay. This may result in substantial yield loss, which can be just as harmful as poor plant population. Thus, we intend to focus research and educational efforts on 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 population of resistant ryegrass, followed by two separate spring-applied postemergence herbicides with different modes of action to completely control ryegrass before corn emergence. Thus, 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 Entomological research investigating these issues. Our research has 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 better direct research efforts and develop strategies or implement new technologies pertinent to our region and specific systems. Each of the issues identified in the previous section have developed into major research projects conducted by Mississippi State researchers training graduate students. Of course, an on-farm verification program also is a tremendous method to demonstrate value associated with adoption of improved strategies and new technology. For example, our irrigation efforts increased corn yield to record levels, while reducing irrigation water usage nearly 50%. We believe the cumulative adoption of improved practices addressing multiple issues identified through this program offer tremendous possibility to improve production systems and reduce risks which influence profitability and sustainability of growing corn in Mississippi.



Project Deliverables

Professional Presentations and Outreach

National Conservation Systems Corn and Soybean Conference, 2 presentations, Baton Rouge, LA 1/15-16/2015.
Delta Agricultural Exposition, Cleveland, MS 1/21/2015.
Farm Journal Corn College in the South, 2 presentations, Murfreesboro, TN 1/7/2014.
National Conservation Systems Corn and Soybean Conference, 2 presentations, Robertsedale, MS 1/15-16/2014.
Delta Agricultural Exposition, 2 presentations, Cleveland, MS 1/23-24/2014.
Mississippi Farm Bureau Winter Commodity Conference, Jackson, MS 1/27/2014.
Mississippi Agricultural Consultants Association, Mississippi State, MS. 2/5/14
MSU Extension Service Delta Regional Irrigation Symposium, Tunica, MS. 2/10/14.
Tri-State Extension Irrigation Training, Delta Research and Extension Center, Stoneville, MS. 2/24/14.
National Corn Growers Assoc. Commodity Classic, Extension Specialists Roundtable, San Antonio, TX. 2/27/14
Black Prairie Equipment Row Crop Irrigation Summit, Columbus, MS 3/3/14.
MSU Delta Research and Extension Center Row Crop Field Day, Stoneville, MS. 6/17/14.
Dee River Ranch Grain Crops and Irrigation Field Day and Exchange Forum. Aliceville, AL. 6/24/14.
Mississippi Farm Bureau Corn/Soybean/Small Grains Commodity Conference, Scott, MS. 7/16/14.
Mississippi Agricultural Industry Council Certified Crop Advisor Training Session, Orange Beach, AL 7/30/2014
MSU North Mississippi Research and Extension Center Row Crops Field Day, Verona, MS. 8/7/14.
MSU Delta Research and Extension Center Row Crop Field Day, Stoneville, MS. 8/13/14
MSU Row Crop Short Course, Mississippi State, MS. 12/2/2014.
Alabama Corn and Wheat Short Course, 2 presentations, Auburn, AL 12/16/2013.
Farm Journal Corn College in the South, Vicksburg, MS 1/8/2013.
Arkansas Crop Management College, 2 presentations, Little Rock, AR 1/22/2013.
National Conservation Systems Corn and Soybean Conference, 2 presentations, Baton Rouge, LA 1/31-2/1/2013.
National Corn Growers Association Commodity Classic – University Extension Specialists’ Roundtable, Kissimmee, FA 2/28/2013
National Corn Growers Association – Corn Utilization and Technology Conference, Indianapolis, IN 6/4-6/2012
Mississippi State University Row Crops Field Day, MSU, MS 7/19/2012
Louisiana Agricultural Consultants Association Certified Crop Advisors Program, Alexandria, LA 10/10/2012.

Published Materials

Published regularly on the Mississippi Crop Situation Blog: www.Mississippi-Crops.com

Educational Training

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

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



Caption: The Corn Verification Program offers tremendous opportunity to identify limitations and demonstrate more productive management practices.



Caption: Ryegrass can be a very troublesome issue for corn producers and successful demonstration of effective control will greatly enhance adoption of new weed control systems.