Mississippi Corn Promotion Board 2012 Progress Report

Project Title: Corn and Soybean Crop Residue Impact on Soil Quality, Yield and Returns.

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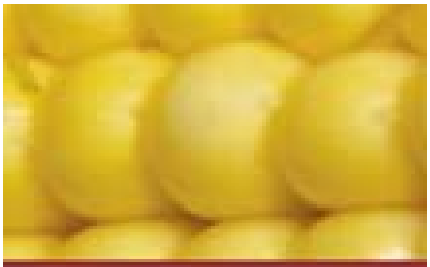


Project Summary (Issue/Response)

Since soil quality changes occur at a slow rate, a five year (2011-2015) study is being conducted at Verona (NMREC, non-irrigated) and Stoneville (DREC, irrigated) to evaluate the effects of corn and soybean crop residue management and tillage systems (in a corn-soybean rotation) on soil quality (soil physical, chemical and biological properties), grain yield, and the economic returns for these crop production systems.

Crop residue management [burn (corn only) and no-burn] and tillage treatments [no-tillage, bed-roller, disk (2x) + subsoil-bed-roll (TerraTill® one pass operation implement) and subsoil-bed-roll alone] will be on the same site for the duration of the study. Since the crop rotation (corn and soybean) plots had to be established in 2011, the year 2012 was the first year of data collection [bed height, ground cover, seedling emergence, early season seedling growth, yield and fall soil sampling]. Data and soil analysis has not been completed at the time of this report. Observation results indicated that at Stoneville (irrigation) tillage treatments only showed small yield differences with both corn and soybeans. Verona had a soil compacted root zone, and treatments with in-row subsoil had higher yield than the no-tillage and bed-roll treatments for both corn and soybean. A companion study was initiated at Verona this fall to evaluate the effect vegetative plants (European radish), subsoil followed by continuous no-tillage, or continuous no-tillage alone have on alleviation of soil compaction. Spring ground cover (old crop residue and winter vegetation) was higher with no tillage than the tillage systems. Corn emergence was 3 to 4 days later with no tillage differences in final populations (2 weeks after planting) for all tillage systems. Crop stover/residues yield showed minor differences between tillage systems for both corn and soybean.

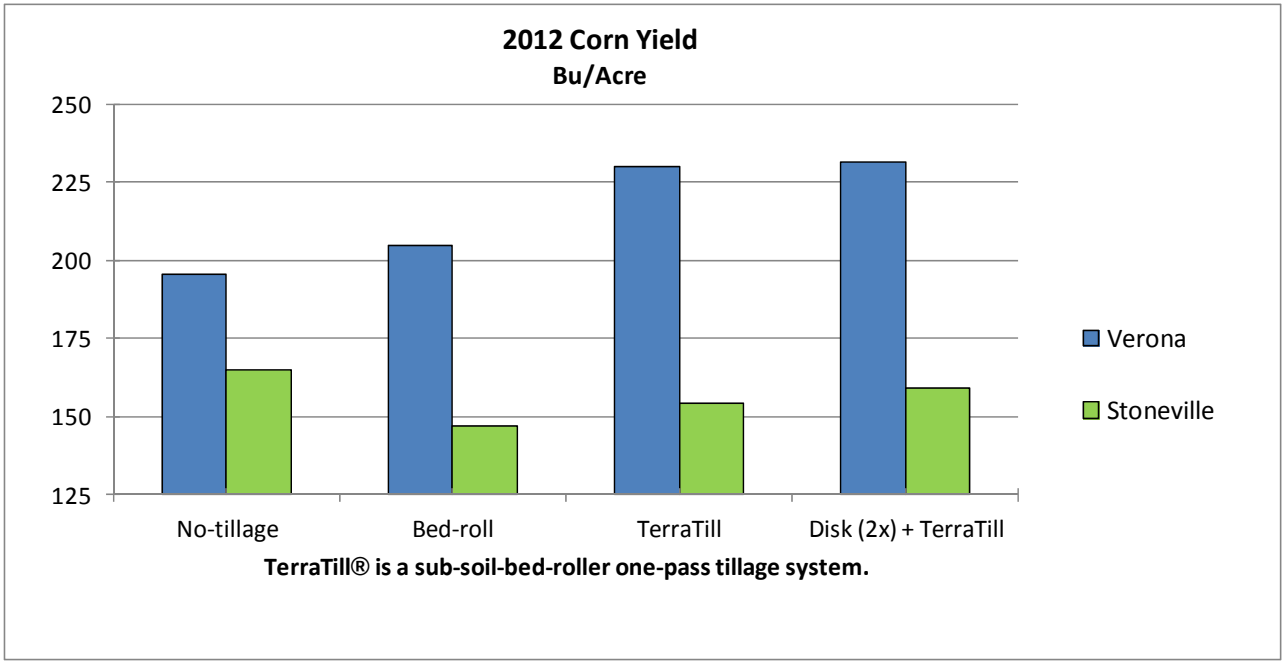
This is a joint funded project with Mississippi Soybean Promotion Board (50%) and Mississippi Corn Promotion Board (50%). Bigham Brothers, Lubbock, Texas supports this project with two TerraTill® [in-row subsoil-bed-roll (one pass operation)] implements. A proposal also has been sub-

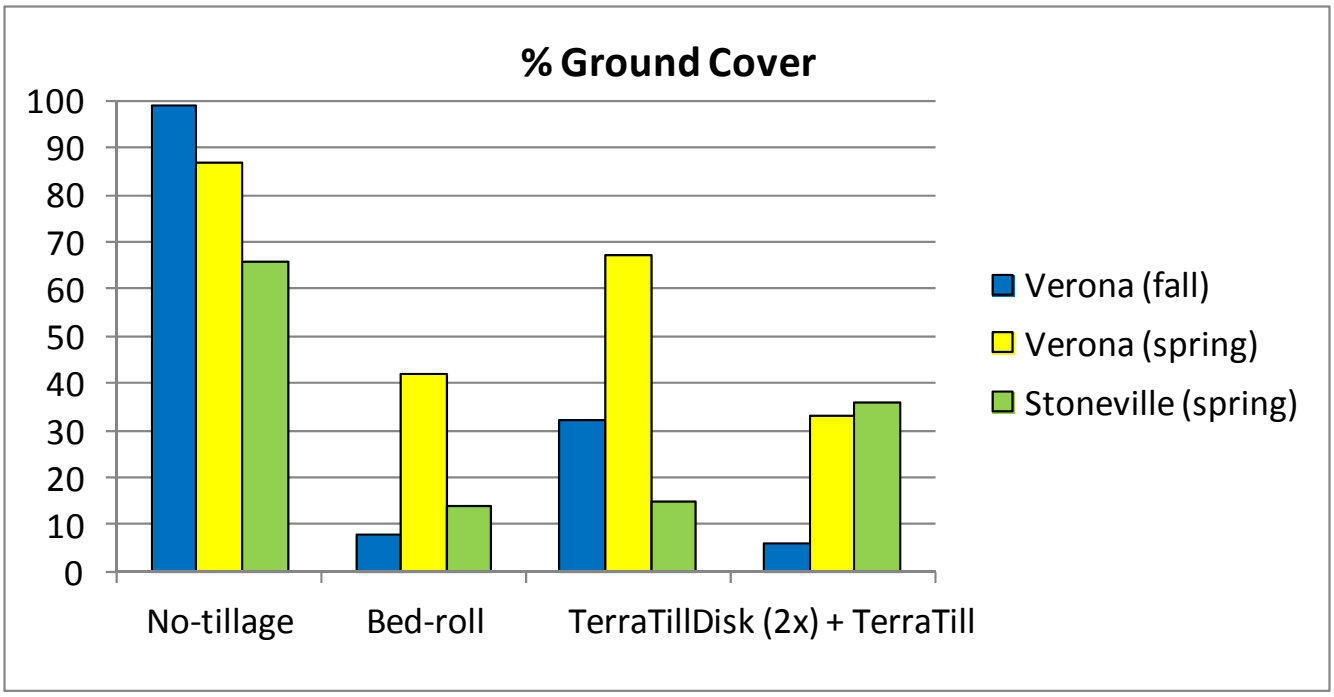
Project Results/Outcomes

mitted to the United Soybean Board in support of additional research on this project.The first year (2011) of the 5-year study, the corn and soybean rotation plots were established with conventional tillage. In the fall of 2011, the corn stubble burn treatments and the tillage systems treatments were applied. The year 2012 was the first year of data collection [bed height, ground cover, seedling emergence, seedling growth, yield and fall soil sampling] was completed. Laboratory soil analysis and statistical data analysis has not been completed at the time of this report. However, observations indicated no-tillage ground cover (old crop residue and winter vegetation) in January and March at both locations was higher than all treatments with some tillage. Fewer tillage trips and not burning crop residue resulted in more spring ground cover. The ground cover dissipates the raindrop's energy on impact and results in less soil erosion.

Corn emergence observations indicated no-tillage emergence was 3 to 4 days later than tillage plots, with no final plant populations (2 weeks after planting) differences between tillage treatments. Stoneville observations indicated tillage treatments only showed minor yield differences for both corn and soybean.
First year (2012) root resistance measurements at Verona indicated a compacted zone at the 6 to 8-inch depth in the no-tillage and bed-roller treatments with no compaction zone in the subsoil-bed-roll treatments. The subsoil-bed-roll treatments' 2012 yields were higher than bed-roller and no-tillage for both corn and soybean. Since the first year (2012) results indicated a soil compaction zone impacted yields, a companion study was initiated in the fall of 2012 at Verona to evaluate: 1) how many years after the initial subsoil (break compaction zone) followed by no tillage the succeeding years may occur before soil compaction re-occurs; 2) European radishes, as a fall-winter crop, for the destruction of the compaction zone; and 3) continuous no-tillage (no subsoil) impact on the disappearance of the soil compaction zone. Corn and soybean crop stover/residue yields at both locations ranged from 2 to 3 ton/ac for soybean and 3.5 to 5 tons/ac for corn at both locations. The crop stover/residue analysis for P and K content has not been completed.

Since soil and data analysis at the time of this report is incomplete, we do not have results/outcomes to report. However, our expected outcomes are: fewer tillage operations and not burning crop residue will have a greater positive impact on soil quality, yield and returns. Upon completion of the study, we will be able to provide information enabling growers to understand how they can promote or improve soil quality on their farm for increased input efficiency for tillage, fertilizer nutrients and irrigation (water).





Project Impacts/Benefits

This research will provide producers the necessary information to make an informed decision regarding the economic returns associated with these tillage-crop residue management systems in irrigated and non-irrigated environments. It will provide information regarding their positive or negative impact on yield, soil quality and fertilizer nutrient use efficiency. Results from these studies will also provide needed information on the level of soil quality enhancement or degradation (soil organic matter, soil aggregate stability, bulk density, etc.) from these practices on both alluvial delta and prairie coastal plain soils in Mississippi. The outcome of this research will provide Mississippi growers the information that will enable them to understand how they can develop "Soil Quality Enhancement Activities" meeting the requirements for NRCS's Conservation Stewardship Program. The economic analysis using current and/or projected production costs and grain pricing also will allow us to measure the direct benefit of these crop management systems in the near- and long term.

Project Deliverables

1) **Field Presentations.**

   NMREC, August 9, 2012

   DREC, July 19, 2012

2) **PowerPoint presentations** at regional and state professional meetings (expected)

3) **MAFES Bulletins** (expected)

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