

Soybean Research and Promotion Board
Project Status Report
(as of December 5th, 2007)

Project Title: Double-cropped soybean management alternatives and their long-term implications on crop production and soil quality

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Progress Report

Wheat was harvested approximately on time on May 29th, 2007 despite the several days of damaging, abnormally low temperatures and frost earlier this Spring. At wheat harvest, soil samples were collected for bulk density and soil chemical analyses. Wheat residue to mowed to the soil surface and residue samples were collected in all plots to determine the mass of wheat residue returned to the soil and into which soybean would be planted in each no-tillage (NT) plot. Due to lower above-ground wheat grain and biomass production this year from the low temperatures, we were not able to implement the residue burning treatment this year. However, the burned plots will have been burned in four (4) out of six (6) years. After residue sampling, the tillage treatment was implemented. About one week prior to soybean planting the entire study area was irrigated (i.e., flushed) to ensure adequate soil moisture at planting for optimal stand establishment. On June 12th, 2007, a glyphosate-resistant soybean cultivar (Armor 54-03) was drill-seeded at approximately 100 lbs seed per acre with a 7.5-inch (19-cm) row spacing. On June 21st, 2007, the soybean population in each plot was measured and water content reflectometers and soil thermocouples were installed in one plot representing each of the 16 treatment combinations to monitor near-surface soil moisture and temperature throughout the soybean growing season. A levee was established during the week of July 23rd, 2007 to separate the irrigated portion of this study from the dryland portion.

Soil bulk density samples were collected approximately 8 weeks after planting. Early- and late season weed assessments were conducted. Data from the moisture/temperature sensors was successfully collected throughout the entire soybean growing season with any problems. Soybean were harvested on 19 October, 2007 and post-harvest soil samples were collected at this time as well. Wheat was planted on a 19-cm row spacing at 2 bu/acre on 31 October, 2007. Soil and plant samples and data have not yet been fully processed or analyzed.

The proposed greenhouse soil incubation study was also initiated in early June 2007 to coincide with the actual soybean growing season in eastern Arkansas. To date, initial, 2-, 4, 8-, and 16-week soil samples have been collected and processed, but soil carbon data have not yet been fully analyzed. Preliminary results indicate that there will be some significant treatment differences as the incubation progresses.

Pertinent Results for 2007

- The low-residue treatment averaged 5806 [standard error (SE) = 155] kg dry residue ha⁻¹, while the high-residue treatment averaged 9381 (SE = 256) kg dry residue ha⁻¹; therefore it appears we achieved a rather substantial residue difference as we anticipated.
- The appears to be no difference in soybean population 9 days after planting between tillage treatments (9.1 and 9.2 plants/m for CT and NT, respectively). There appeared to be a residual burn effect on soybean population as well where the soybean population was almost a 1 plant per meter of row higher population in the burn than in the no-burn treatment (8.7 and 9.6 for the no-burn and burn treatments, respectively).

Importance of Results

The 2007 soybean season represents the sixth consecutive year of relatively consistent management in a wheat-soybean double-crop production system treatments including wheat residue level (low and high), tillage (no-tillage and conventional tillage), and residue burning (burning and no burning) and represents the third consecutive year of an irrigated versus dryland soybean comparison. The long-term results generated in this study will contribute to important on-farm decisions regarding management practices that are environmentally friendly, while still being competitively productive and economically profitable.