Integrating Cover Crops on Sloping Soils to Improve Water Quality and Soil Health

Study ID: 742023201701
County: Butler
Crop: Corn
Soil Type: Aksarben silty clay loam; Yutan silty clay loam; Pohocco silty clay loam
Planting Date: 5/8/17
Harvest Date: 10/28-29/17

Population: 29,500
Hybrid: Dekalb DKC60-88RIB
Reps: 6
Previous Crop: Soybean
Tillage: No-Till
Irrigation: None
Rainfall: 38.04"

Figure 1. Pre-harvest planted cover crop.

Figure 2. Cover crop just before termination.

Introduction: The objective of this study was to evaluate the potential for cover crops to reduce water erosion of nutrients, improve water quality by reducing nitrate leaching, and enhance soil health in Nebraska corn/soybean production systems on sloping soils. Impact of cover crops on the subsequent corn yield was also evaluated. This report includes data from year one of the three-year project. Treatments are held on the same plot during each year of the study to monitor changes in soil erosion, water quality, and soil health over time. This study includes three treatments with six replications: check (no cover crop), pre-harvest planted cereal rye cover crop *(Figure 1)*, and post-harvest planted cereal rye cover crop *(Figure 2)*. The pre-harvest rye planting occurred on October 3, 2016, into standing soybean using a high-clearance broadcast seeder. The post-harvest planted rye was drilled on October 24, 2016. Rye cover crop was planted at 50 lb/ac. Plots are 40-foot wide for check and the post-harvest planted cover crop; 60-foot wide strips were used for the pre-harvest planted cover crop. In the spring of 2017, cover crop biomass was measured and soil samples were collected to determine nitrate concentration change with depth and to test soil biological activity through the Solvita® 24-hour CO_2 Burst test. In the fall of 2017, we hand harvested ears from a 17.5-foot-long corn row in the center of each plot to determine grain yield. Ears were dried, shelled, and dried again. Grain weight was then determined and corrected to 15.5 percent moisture content. Additional data on water erosion and quality will be collected in 2018.

Results:

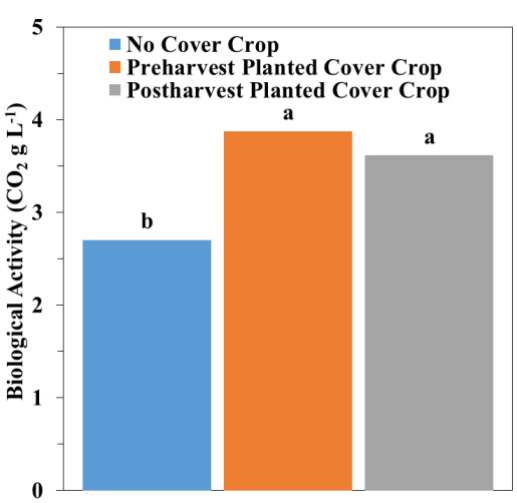

Figure 3. Rye cover crop planting date effect on soil biological activity in a sloping silty clay loam soil in Nebraska. Different lowercase letters above bars denote statistical differences among treatments.

	Corn Yield† (bu/acre)	Cover Crop Biomass (lb/ac)	Marginal Net Return‡ ($/ac)
Check	251 A*	N/A	789.24 A
Cover Crop - Pre-harvest Planting	241 A	2,727 A	741.54 A
Cover Crop - Post-harvest Planting	257 A	2,318 A	781.81 A
P-Value	0.8745	0.3159	0.867

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $3.15/bu corn, $0.19/lb cover crop seed cost, $8.13/ac high clearance applicator cost, and $17.16/ac drill cost.

Summary:

- No differences in cover crop biomass occurred between pre- and post-harvest planted cover crops.
- There was no significant difference in yield across the three treatments.
- Marginal net return was not impacted by the cover crop treatments.
- Biological activity was significantly greater in the cover crop treatments, indicating increased soil activity from cover crop treatments *(Figure 3)*.

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