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

Study ID: 0742023201801
County: Butler
Soil Type: Aksarben silty clay loam; Yutan silty clay loam; Pohocco silty clay loam
Planting Date: 5/1/18
Harvest Date: 10/20/18, 10/21/18
Variety: Golden Harvest® GH3546X
Reps: 6
Previous Crop: Corn
Tillage: No-Till

Irrigation: None
Rainfall (in):

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. The impact of cover crops on the subsequent crop yield was also evaluated.

This report is for year two of the three year project. Treatments are located on the same plots 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, and post-harvest planted cereal rye cover crop. The pre-harvest planted cover crop was seeded in late September 2017 with a high clearance broadcast inter-seeder; the post-harvest planted cover crop was seeded on November 23, 2017, with a drill. Cover crop treatments were seeded at a rate of 50 lb/ac.

Cover crop biomass was measured and soil samples were collected to determine nitrate concentration change with depth. Nitrate and cover crop biomass samples were collected on April 31, 2018, one day prior to soybean planting. Aerial imagery was also used to evaluate cover crop biomass. Cover crops were terminated on May 10, 2018. Yield data was collected by hand harvesting one 17.5-foot-long soybean row in the center of each plot on October 20, 2018. The plants plus the beans were harvested, dried in a forced-air oven, and then threshed. Grain was corrected for moisture content.

Results:

	Cover Crop Biomass (lb/ac)	Soybean Yield† (bu/ac)	Marginal Net Return‡ ($/ac)
Check	N/A	58 A	429.39 A
Cover Crop – Pre-harvest Planting	389.00 A*	61 A	432.63 A
Cover Crop – Post-harvest Planting	27.99 B	58 A	402.23 A
P-Value	0.007	0.799	0.695

*Values with the same letter are not significantly different at a 90% confidence level.
†Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $7.40/bu soybean, $0.20/lb rye cover crop seed ($10/ac), $14.40/ac for drilling post-harvest treatments, and $8.25/ac for high clearance applicator for pre-harvest treatments.

Figure 1. Aerial imagery from April 28, 2018. True color imagery (top) and normalized difference vegetative index (NDVI) (bottom). For NDVI, orange indicates little or no vegetation and yellow indicates moderate vegetation.

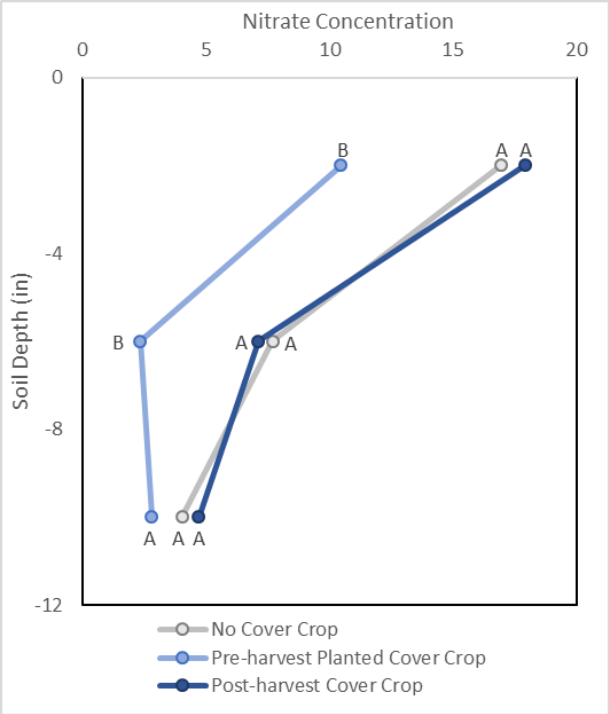

Figure 2. Cover crop effect on nitrate concentration measured on April 31, 2018.

Summary:

- Both the pre-harvest planted cover crop and post-harvest planted cover crop had low biomass production. The post-harvest planted cover crop had significantly lower biomass production than the pre-harvest planted cover crop. Imagery from April 28, 2018, also showed the pre-harvest planted cover crop had greater biomass production than the post-harvest planted cover crop.
- The pre-harvest planted cover crop had significantly lower nitrate concentration at both the 0-4" depth and 4-8" depth.
- There was no difference in yield as determined by hand harvesting samples.
- There was no difference in net return.

Summary of Previous Year (Year 1 of 3)

Cereal rye cover crops were seeded at a rate of 50 lb/ac. 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. In year one, soil biological activity was tested through the Solvita® CO2 Burst test (Figure 3).

	Corn Yield† (bu/ac)	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.

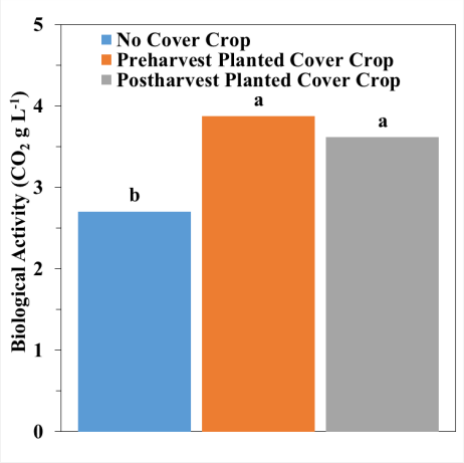

Figure 3. Rye cover crop planting date effect on soil biological activity in a sloping silty clay loam soil in Nebraska.

Complete year 1 report is available online at: http://resultsfinder.unl.edu/

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