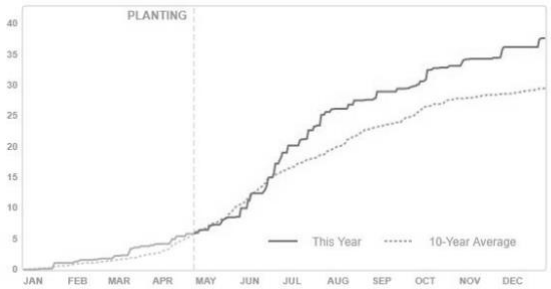
Integrating Cover Crops on Sandy Soils to Improve Water Quality and Soil Health

Study ID: 0737119201801
County: Madison
Soil Type: Boel sandy loam 0-1% slope
Planting Date: 4/30/18
Harvest Date: 9/24/18
Population: 32,000
Reps: 6
Previous Crop: Soybean
Tillage: No-Till
Irrigation: Pivot

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

This report includes data from 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. Cover crop treatments were seeded at a rate of 56 lb/ac. The pre-harvest planted cover crop was seeded in early September 2017 by hand seeding as a high clearance applicator was not available in year two. The post-harvest planted cover crop was seeded in late October 2017 with a drill.

Cover crop biomass was measured and soil samples were collected to determine nitrate concentration change with depth on May 6, 2018, the same day cover crops were terminated. Aerial imagery was also used to evaluate cover crop biomass. Yield data was collected by hand harvesting ears from a 17.5-foot-long corn row in the center of each plot on September 24, 2018. Ears were dried, shelled, and dried again. Grain weight was then determined and corrected to 15.5% moisture content. Aerial imagery was used to identify plots that had issues with treatment establishment; these plots were removed from the analysis of corn yield, net return, cover crop biomass production, and soil nitrate.

Results:

	Cover Crop Biomass (lb/ac)	Corn Yield† (bu/ac)	Marginal Net Return‡ ($/ac)
Check	N/A	173 A*	559.09 A
Cover Crop – Pre-harvest Planting	427.06 A	183 A	571.54 A
Cover Crop – Post-harvest Planting	330.04 A	164 A	505.22 A
P-Value	0.497	0.7837	0.728

*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 $3.23/bu corn, $0.20/lb cover crop seed ($11.20/ac), $14.40/ac for drilling for post-harvest treatment, and $8.25/ac for high-clearance applicator cost for pre-harvest treatment.

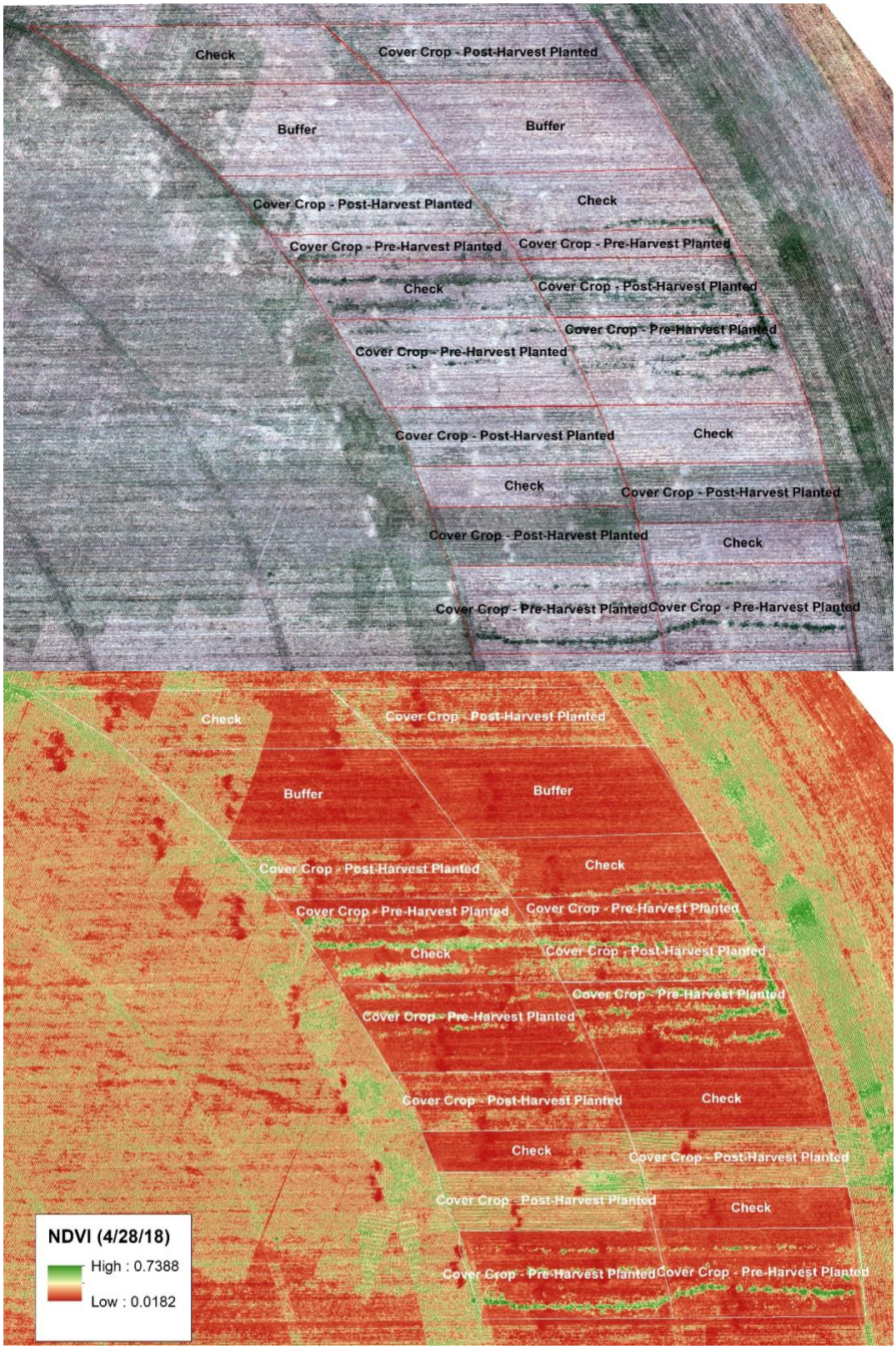


Figure 1. Aerial imagery from April 28, 2018. True color imagery (top) and normalized difference vegetative index (NDVI) (bottom). For NDVI, orange indicates little or no vegetation, green indicates greater vegetation.

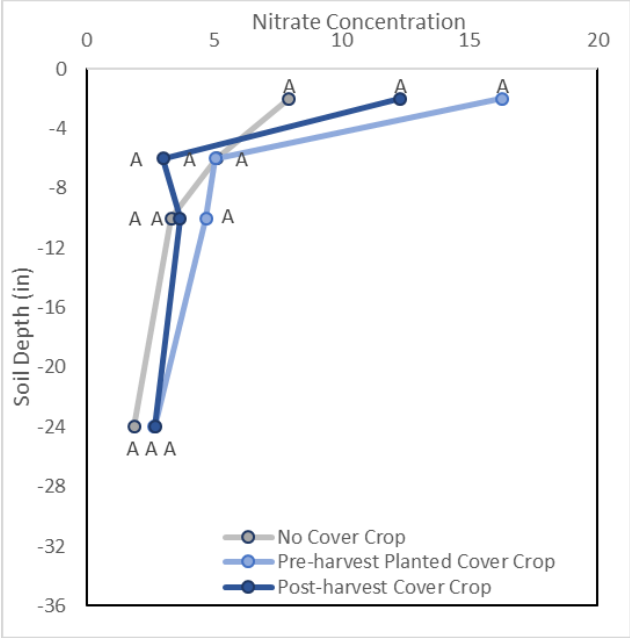


Figure 2. Cover crop effect on nitrate concentration measured on May 6, 2018.

Summary:

- Both the pre-harvest planted cover crop and post-harvest planted cover crop had low biomass production. There was no difference in biomass production between the two seeding approaches. Imagery from April 28, 2018 also showed low biomass production.
- There was no difference in nitrate concentration for any of the treatments at any of the depths evaluated.
- There was no difference between the three treatments for yield as determined by hand harvesting samples or net return.

Summary of Previous Year (Year 1 of 3)

Cereal rye cover crops were seeded at a rate of 56 lb/ac. The pre-harvest rye planting occurred on September 19, 2016, into standing corn using a high-clearance broadcast seeder. The post-harvest planted rye was drilled on November 3, 2016. In year one, soil biological activity was tested through the Solvita® CO2 Burst test (Figure 3). Nitrate concentration was also measured (Figure 4).

	Soybean Yield† (bu/ac)	Spring Cover Crop Biomass (lb/ac)	Marginal Net Return‡ ($/ac)
Check	82 A*	N/A	733.49 A
Cover Crop – Pre-harvest Planting	65 B	254.14 A	556.71 B
Cover Crop – Post-harvest Planting	66 AB	121.21 B	560.55 B
P-Value	0.0575	0.014	0.031

*Values with the same letter are not significantly different at a 90% confidence level.
†Yield values are from cleaned yield monitor data. Bushels per acre corrected to 13% moisture.
‡Marginal net return based on $8.90/bu soybeans, $0.16/lb cereal rye seed cost, $8.13/ac high clearance applicator cost, and $17.16/ac drill cost.

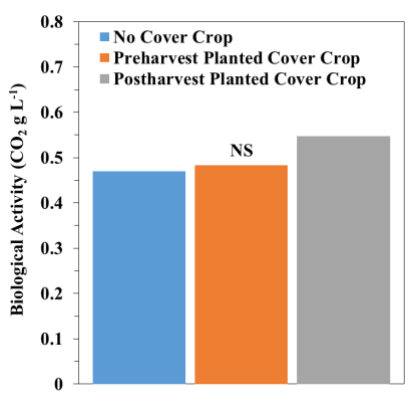


Figure 3. Rye cover crop planting date effect on soil biological activity. NS denotes no significant differences.

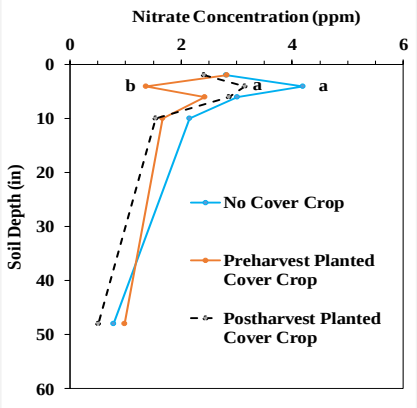


Figure 4. Cover crop planting date effect on nitrate concentration on a sandy site.

Sponsored by: University of Nebraska Lincoln

In Partnership with: Nebraska CornBoard; Nebraska Soybean Checkoff; Nebraska CornGrowers Association; Nebraska Dry Bean Commission