

Effects of Grazing Cover Crops in a Three-year Non-Irrigated Rotation

Study ID: 0720129201801

County: Nuckolls

Soil Type: Hastings silt loam 0-1% slope; Hastings silt loam 1-3% slope

Planting Date: 4/29/18

Harvest Date: 10/22/18

Population: 140,000

Row Spacing (in): 15

Variety: Asgrow® 28X7

Reps: 4

Previous Crop: Corn

Tillage: No-Till

Herbicides: *Pre:* Fierce® and Roundup® *Post:* XtendiMax® and Roundup®

Seed Treatment: Inoculant and fungicide

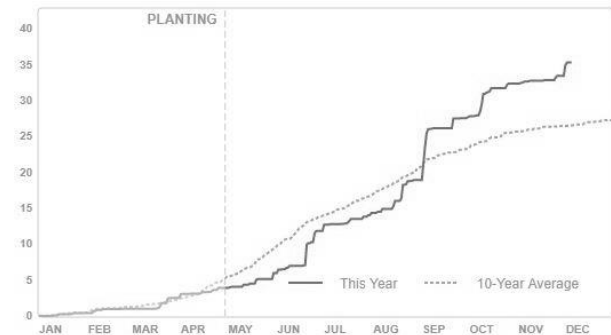
Foliar Insecticides: None

Foliar Fungicides: None

Fertilizer: None

Irrigation: None

Rainfall (in):



Introduction: This is the second year of this study. In rainfed systems with limited precipitation, adding cover crops into the rotation can decrease yields; however the use of these cover crops for forage may offset the costs while retaining soil benefits. This study evaluated three treatments: grazed cover crop (or stubble depending on year of rotation), non-grazed cover crop, and non-grazed stubble. In 2016, cover crops were planted and the grazed treatment was grazed in the fall of 2016. Baseline soil samples were taken in April 2017, prior to planting corn (Table 1). Stand counts, yield, grain moisture and marginal net return were collected for each cash crop. Following corn harvest in 2017, no cover crops were planted. In the previously established grazed cover crop treatment, cattle grazed on the corn stalks. The two previously established non-grazed treatments remained non-grazed. Soybeans were planted in 2018 across all treatments. In August, the grazed treatment showed greater moisture stress than the non-grazed treatments (Figure 1).

Table 1. Soil analysis taken prior to corn planting in April 2017.

	-----0 to 8 inches-----				
	Soil pH	OM %	Nitrate-N ppm	Nitrogen lb N/A	
Cover Crop – Non-grazed	5.52 A	3.1 A	5.4 B	9.3 B	
Cover Crop/Stubble – Grazed	5.68 A	3.1 A	7.3 B	12.6 B	
Stubble – Non-grazed	5.40 A	3.1 A	12.9 A	24.5 A	
P-Value	0.38	0.90	0.01	<0.01	
	-----0 to 4 inches-----				
	Solvita CO2-C (ppm)	Total Biomass (ng/g)	Total Bacteria Biomass (ng/g)	Total Fungi Biomass (ng/g)	Diversity Index
Cover Crop – Non-grazed	133 A	4,225 A	2,187 A	351 A	1.44 A
Cover Crop/Stubble – Grazed	161 A	3,927 AB	2,142 A	333 A	1.44 A
Stubble – Non-grazed	128 A	3,046 B	1,605 A	306 A	1.5 A
P-Value	0.19	0.09	0.12	0.90	0.90

*Values with the same letter are not significantly different at a 90% confidence level.



Figure 1. August 3, 2018 image with grazed treatment (cover crop in 2016 and stubble in 2017) showing greater moisture stress.

2018 Results:

	Stand Count (plants/ac)	Test Weight	Moisture (%)	Soybean Yield† (bu/ac)
Cover Crop—Non-grazed	120,750 A*	55 A	10.7 B	50 A
Cover Crop/Stubble—Grazed	120,500 A	55 A	11.0 A	40 B
Stubble—Non-grazed	117,750 A	55 A	10.6 C	52 A
P-Value	0.629	0.397	0.0002	0.0004

*Values with the same letter are not significantly different at a 90% confidence level.

†Bushels per acre corrected to 13% moisture for soybeans.

Summary:

- For the 2018 soybean crop, there were no differences in test weight or stand counts between the three treatments. Grain moisture was significantly higher for the grazed cover crop treatment, followed by the non-grazed cover crop treatment, then the non-grazed wheat stubble. Yield of the non-grazed treatments was 10-12 bu/ac higher than for the grazed cover crop treatment.
- The study will continue in 2019, with the cash crop rotating back to wheat. A three-year economic analysis will be conducted after the completion of the third year.

Summary of Previous Year (Year 1)

In year one of the study, cover crop treatments were planted on August 14, 2016, following wheat harvest and consisted of a mix of winter peas, spring triticale, oats, collards, and purple top turnip. Cover crop biomass measured on October 19, 2016, was 3,401 lb/ac and consisted mainly of grass and turnip (Table 1). The grazed treatment was grazed in the fall of 2016. Starting in November 2016, twenty-eight (1,100 lb) first-calf heifers grazed 9.6 acres for 22 days, resulting in the cover crop carrying 2.4 animal unit month (AUM)/ac. Post-grazing 2,177 lb/ac of biomass was still present.

Table 1. Cover crop composition (% of biomass on DM basis).

Grass	53.5%
Winter Pea	1.5%
Collards	8.7%
Turnip Tops	20.9%
Turnip Bottoms	14.5%
Other	0.9%

During March through May 2017, prior to planting corn, the cover crop treatments were around 35% depletion (the typical trigger point for irrigation on these soil types) while the wheat stubble treatments remained near field capacity (full soil moisture profile). Corn was planted in 2017 across all treatments. In May 2017, 8" of rain recharged the soil profile and all treatments had a full 4' soil moisture profile at the beginning of June. Therefore, the cover crop treatments did not result in lower beginning moisture, which could limit yield potential. The grazed treatments began to show greater soil moisture depletion than the ungrazed treatments as time progressed. In June 2017, it was observed that the grazed treatments had concentrations of palmer amaranth where the cattle created trails walking the electric fence.

2017 Results:

	Stand Count (plants/ac)	Moisture (%)	Test Weight	Corn Yield (bu/ac)†
Cover Crop—Non-grazed	22,500 A	15.0 A	61 A	213 A
Cover Crop/Stubble—Grazed	22,167 A	14.9 A	61 A	211 A
Stubble—Non-grazed	22,500 A	15.2 A	61 A	218 A
P-Value	0.952	0.129	0.267	0.141

*Values with the same letter are not significantly different at a 90% confidence level.

†Bushels per acre corrected to 15.5% moisture for corn.

For the 2017 corn crop, no significant yield differences occurred among treatments. Corn yield where the cover crop was planted and not grazed (213 bu/ac) did not differ from where it was grazed (211 bu/ac).

Sponsored by:



In Partnership with:



Extension is a Division of the Institute of Agriculture and Natural Resources at the University of Nebraska–Lincoln cooperating with the Counties and the United States Department of Agriculture. University of Nebraska–Lincoln Extension educational programs abide with the nondiscrimination policies of the University of Nebraska–Lincoln and the United States Department of Agriculture.