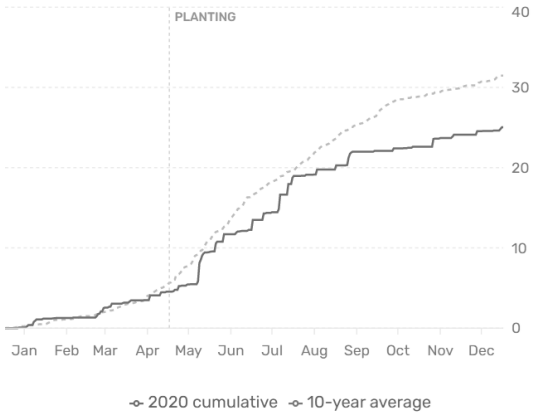
Impact of Interseeded Cover Crop at V4 on Irrigated Corn

Study ID: 0618159202001
County: Seward
Soil Type: Geary silty clay loam 3-7% slopes; Geary silty clay loam 7-11% slopes, eroded; Hastings silty clay loam 3-7% slopes; Hastings silty clay loam 7-11% slopes, eroded; Muir silt loam 1-3% slope
Planting Date: 5/1/20
Harvest Date: 10/14/20
Seeding Rate: 32,000
Row Spacing (in): 30
Hybrid: Channel® 213-19
Reps: 4
Previous Crop: Corn
Tillage: No-Till
Herbicides: ***Pre:*** 2.25 qt/ac Lexar® on 5/6/20
Post: 32 oz/ac glyphosate on 6/9/20

Fertilizer: 175 lb/ac N as 32% UAN on 5/6/20; 50 lb/ac N as 32% UAN pre-tassel
Note: 10% green snap
Irrigation: Pivot, Total: 3.75"
Rainfall (in):



Introduction: This on-farm study is in collaboration with The Nature Conservancy, Upper Big Blue NRD, NRCS, and Kellogg's. The study evaluated the impact of interseeded cover crops on corn yield and soil quality. There were three treatments: a check with no cover crops interseeded, an interseeeded diversity mix drilled with one drill unit between corn rows, and an interseeded diversity mix drilled with three drill units between corn rows. Each treatment was 8 rows wide. Seeding rates were adjusted so that the one drill unit and three drill units had similar per-acre seeding rates. The diversity mix consisted of 4 lb/ac hairy vetch, 4 lb/ac Pinkeye cowpeas, 1 lb/ac red clover, 1 lb/ac yellow blossom sweet clover, 4 lb/ac Red Ripper cowpeas, 3 lb/ac annual ryegrass, 1 lb/ac Italian ryegrass, 0.5 lb/ac smart radish, 0.5 lb/ac impact forage collards, 4 lb/ac Mancan buckwheat, 2 lb/ac golden flax, and 0.5 lb/ac mini pumpkins. A half rate of this mixture was used for a seeding rate of 13 lb/ac. The cover crops were interseeded on June 9, 2020, when corn was V4. Corn yield, stand counts, and stalk quality were measured (Table 1). Cover crop species and biomass were also measured by sampling 18.75 sq ft per treatment on September 24, 2020 (Table 2). Soil quality was also measured with the Haney test, PLFA tests, and standard soil tests taken September 3, 2020 (Tables 3 and 4). The field had approximately 10% green snap.

Results:

Table 1. Stand counts, yield, and net return for the check and interseeded cover crop treatments.

	Stand Count (plants/ac)	Stalk Rot (%)	Green snap (%)	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
Check	29,250 A	13.75 A	1 A	15.9 A	215 A	754.94 A
Interseeded (1 Drill Unit)	31,500 A	15.00 A	0 A	16.1 A	207 A	691.71 B
Interseeded (3 Drill Units)	31,500 A	12.50 A	0 A	16.1 A	213 A	713.84 B
P-Value	0.268	0.964	0.422	0.286	0.119	0.005

†Yield values are from cleaned yield monitor data. Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $3.51/bu corn, $16.86/ac for cover crop seed cost, and $18/ac for interseeding.

Table 2. Biomass measurements from September 24, 2020. Plants were sorted in the field into weeds, interseeded forbs, and interseeded grasses and recorded weights are on a dry matter basis.

	Weed Biomass (lb/ac)	Cover Crop Biomass - Grass (lb/ac)	Cover Crop Biomass - Forbs (lb/ac)	Total Biomass (lb/ac)
Check	0	N/A	N/A	0 B
Interseeded (1 Drill Unit)	0	4 A*	1,224 A	1,227 A
Interseeded (3 Drill Units)	0	13 A	857 A	870 AB
P-Value	N/A	0.277	0.560	0.097

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

Table 3. Soil tests from September 2020 for check and interseeded cover crop at 0-8" depth.

	pH	Buffer pH	OM LOI %	Nitrate-N ppm N	lbs N/A	K ppm	Sulfate-S ppm	Zn ppm	Fe ppm	Mn ppm	Cu ppm	Ca ppm	Mg ppm	Na ppm	CEC me/100g	%H Sat	%K Sat	%Ca Sat	%Mg Sat	%Na Sat	Mehlich P-III ppm P
Check	7.5	7.2	2.5	2.2	5	277	11.8	3.51	31.5	12.8	0.87	3513	334	18	21.1	0	3	83	13	0	38
Interseeded (1 Unit)	7.3	7.2	2.5	2.2	5	218	19.5	4.37	29.1	16.7	0.73	2501	335	19	15.9	0	4	77	18	1	33
Interseeded (3 Units)	7.1	7.2	3.2	4.5	11	423	10.8	2.79	90	19.4	1.1	2175	334	18	14.8	0	7	73	19	1	70

	Aggregate Stability 1-2 mm (%)	Aggregate Stability 1-2 mm in bulk soil (%)	Available Water (g H_2O/g soil)	Available Water (in H_2O/in soil)	Total Available Water (in H_2O/samples)	Field Capacity % (wt.)	Permanent Wilting Point % (wt.)
Check	45	43	0.21	0.28	2.21	32.82	11.84
Interseeded (1 Unit)	43	41	0.21	0.28	2.25	33.87	12.61
Interseeded (3 Units)	39	38	0.23	0.3	2.42	36.45	13.52

Table 4. Phospholipid fatty acid (PLFA) and Haney tests for the check and interseeded cover crop at 0-8" depth. Total microbial biomass and fungal species are used as indicators of soil quality. Solvita® measures carbon dioxide emitted from microbes. The Haney soil health score is an aggregated indicator of soil health.

	Total Biomass (ng/g)	Diversity Index	Total Bacteria Biomass (ng/g)	Total Fungi Biomass (ng/g)	Solvita® (ppm C)	Haney Soil Health Score
Check	1138	1.01	528	7	83	12
Interseeded (1 Drill Unit)	800	1.06	428	8	65	10
Interseeded (3 Drill Units)	1568	1.07	795	19	68	13
P-Value	N/A	N/A	N/A	N/A	0.718	0.262

Summary:

- The interseeded cover crop with 1 drill unit configuration produced 1,227 lb/ac of biomass and the 3 drill unit configuration produced 870 lb/ac of biomass. The check did not have any cover crop biomass or weed biomass.
- There was no difference in stand count or stalk quality between the corn with interseeded cover crop and the check.
- The corn in the interseeded cover crop yielded the same as the corn with no interseeded cover crop. The corn with interseeded cover crop resulted in a $41.10/ac to $63.23/ac lower net return.
- Several legume species in the cover crop mix have the ability to fix nitrogen. The goal of the soil tests was to determine if there were differences in available soil N due to the cover crop. Because the samples from the replications were combined, no statistics are available. In future years tissue tests may be collected to evaluate N differences.
- There were no differences in the Solvita® or Haney soil health scores between the corn with interseeded cover crop and the check. Because samples from the replications were combined, no statistics are available for the PLFA tests. These beginning numbers will serve as a reference for future years of the study.

Sponsored by: University of Nebraska Lincoln

In Partnership with: Nebraska Corn Board; Nebraska Soybean Checkoff; Nebraska Corn Growers Association; Nebraska Dry Bean Commission