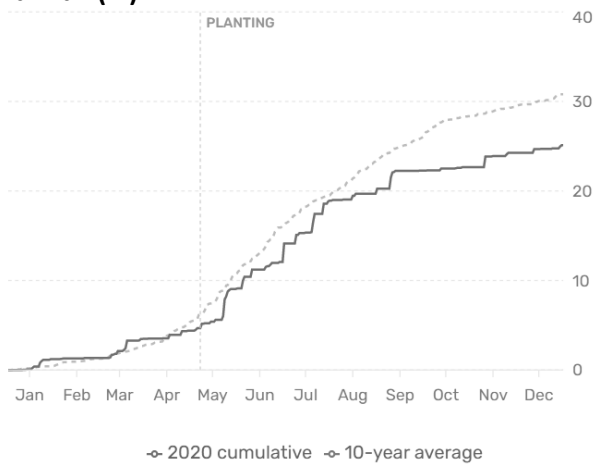
Impact of Interseeded Cover Crop at V4 on Irrigated Corn

Study ID: 0918159202001
County: Seward
Soil Type: Hastings silt loam 0-1% slope; Hastings silt loam 1-3% slope; Hastings silty clay loam 3-7% slopes
Planting Date: 5/7/20
Harvest Date: 10/24/20
Seeding Rate: 33,000 for irrigated, 26,500 for non-irrigated
Row Spacing (in): 30
Hybrid: CROPLAN® 5335
Reps: 4
Previous Crop: Corn
Tillage: Ridge-Till
Herbicides: ***Pre:*** 2 pt/ac Staunch® II ***Post:*** 32 oz/ac Roundup® and Cadet®
Seed Treatment: Acceleron®

Fertilizer: 99 lb/ac N as 32% UAN on 5/10/20 and 107 lb/ac N as 32% UAN on 6/8/20
Irrigation: Pivot, Total: 3"
Rainfall (in):



Introduction: This on-farm research 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 two treatments: a check with no cover crops interseeded and an interseeeded diversity mix. 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). A July 9, 2020, windstorm resulted in 45% green snap.

Results:

Table 1. Stand count, plant health, yield, and net return for no cover crop and interseeded cover crop.

	Harvest Stand Count (plants/ac)	Stalk Rot (%)	Green snap (%)	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
Check	16,375 A	1.25 A	46 A	9.5 A	131 A	459.05 A
Interseeded Cover Crop	17,750 A	1.25 A	40 A	9.5 A	126 B	407.30 B
P-Value	0.372	1	0.213	1	0.067	0.003

†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 collected on September 24, 2020. Plants were sorted into weeds, interseeded grasses, and interseeded forbs. Weights were recorded below 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	286 A*	N/A	N/A	285 B
Interseeded Cover Crop	328 A	7	732	1,067 A
P-Value	0.817	N/A	N/A	0.026

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

Table 3. Soil tests collected on September 3, 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	6.2	6.7	3.7	2	5	220	4.6	3.55	56.2	35.7	0.57	1904	209	18	15.1	21	4	62	12	1	23
Interseeded	6.5	6.7	3.7	1.4	3	193	7.2	3.5	39.3	37.7	0.57	2021	210	19	15.5	20	3	65	11	1	15

	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	51	53	0.19	0.25	2.01	37.64	18.66
Interseeded Cover Crop	49	51	0.2	0.26	2.11	37.63	17.68

Table 4. PLFA (phospholipid fatty acid) and Haney test at a 0-8" depth for the no cover crop check and interseeded cover crop. 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	1492.5	1.17	51.34	2.74	70.1 B	11.4 B
Interseeded Cover Crop	1351.5	0.93	47.75	0.49	95.1A	13.2 A
P-Value	N/A	N/A	N/A	N/A	0.066	0.080

Summary:

- The interseeded cover crop produced approximately 1067 lb/ac biomass, of which 328 lb/ac was weeds. The check did not have any cover crop biomass, but had 286 lb/ac weeds.
- 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 4.8 bu/ac lower than the corn with no interseeded cover crop. The corn with interseeded cover crop resulted in a $51.75/ac lower net return.
- The 45% green snap opened up the canopy to higher rates of both weeds and cover crop biomass in this field. The combination impacted the yield and stand counts on this field.
- 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. On average, the soil N from the interseeded treatment was not higher than the check. In future years tissue tests may be collected to evaluate N differences.
- Statistics are not available for many of the soil measurements from Tables 3 and 4 as samples were combined between replications. There was a statistically significant difference in Solvita® and Haney soil health score with the interseeded cover crop treatment having greater values than the no cover crop check.

Sponsored by: University of Nebraska Lincoln

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