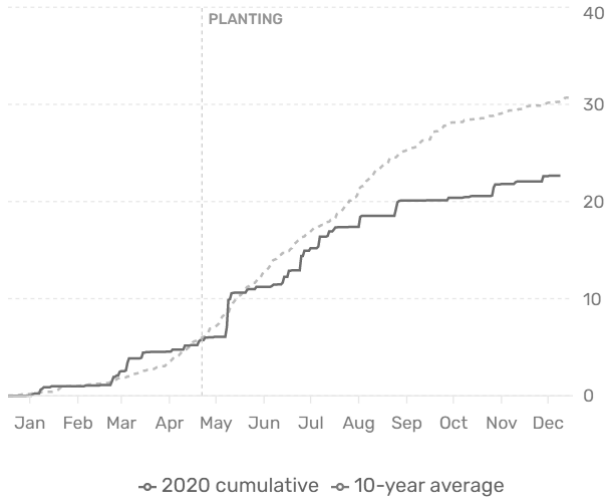
Impact of Interseeded Cover Crop at V4 on Irrigated Corn

Study ID: 0073081202001
County: Hamilton
Soil Type: Hastings silt loam 0-3% slope
Planting Date: 5/6/20
Harvest Date: 10/29/20
Seeding Rate: 32,000
Row Spacing (in): 30
Hybrid: Pioneer® P1639WAM
Reps: 7
Previous Crop: Soybean
Tillage: No-Till
Herbicides: ***Pre:*** 13 oz/ac Verdict®, 21 oz/ac FBN AMS Pro, and 9.5 gal/ac water on 5/8/20
Seed Treatment: None
Foliar Insecticides: 4 oz/ac Seize LFC and 3 gal/ac water on 5/6/20; 6 oz/ac Frenzy Veloz on 7/23/20
Foliar Fungicides: 10 oz/ac Headline AMP® on 7/23/20

Fertilizer: 150 lb/ac N as urea on 4/15/20; 1 gal/ac N-Cline on 7/23/20
Irrigation: Pivot, Total: 5"
Rainfall (in):



Introduction: This on-farm research study is in collaboration with The Nature Conservancy, Upper Big Blue NRD, NRCS, and Kellogg's. This 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 3, 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 23, 2020 (Table 2). Soil quality was also measured with the Haney test, PFLA tests, and standard soil tests (Tables 3 and 4).

Results:

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

	Stand Count (plants/ac)	Green snap (%)	Stalk Rot (%)	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
Check	30,700 A	7 A	12.50 A	15.5 A	175 A	614.51 A
Interseeded Cover Crop	29,600 A	9 A	20.00 A	15.3 B	166 B	549.33 B
P-Value	0.407	0.460	0.432	0.012	0.010	0.0002

†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 23, 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 - Forbs (lb/ac)	Cover Crop Biomass - Grass (lb/ac)	Total Biomass (lb/ac)
Check	1,435 A*	-	-	1,435 A
Interseeded Cover Crop	419 A	865	4	1,289 A
P-Value	0.133	N/A	N/A	0.694

*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	5.8	6.6	3.7	3.5	8	294	7.2	2.28	77.2	61.3	0.83	1727	204	18	15.5	28	5	55	11	1	7
Interseeded	6	6.6	3.4	1.6	4	286	3.8	1.57	58.4	53.3	0.68	1771	213	17	15.2	25	5	58	12	0	6

	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	52	54	0.22	0.29	2.33	39.97	17.87
Interseeded Cover Crop	50	52	0.22	0.3	2.36	39.27	16.92

Table 4. Phospholipid fatty acid (PLFA) and Haney tests for the check and interseeded cover crop at 0-8". Total microbial biomass and fungal species are used as indicators of soil quality. Solvita® is a measure of 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	2715	1.03	1418	103	72 A	11 A
Interseeded Cover Crop	1270	0.95	596	0	93 A	13 A
P-Value	N/A	N/A	N/A	N/A	0.187	0.176

Summary:

- The interseeded cover crop produced approximately 1289 lb/ac biomass, of which 419 lb/ac was weeds. The check did not have any cover crop biomass, but had 1435 lb/ac weeds.
- There were no differences in stand count or stalk quality between the corn with interseeded cover crop and the check.
- The corn in the interseeded cover crop yielded 8.6 bu/ac lower than the corn with no interseeded cover crop. The corn with interseeded cover crop resulted in a $65.18/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. The soil test taken in September did not show any increase in soil N for the interseeded treatment. 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 the 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