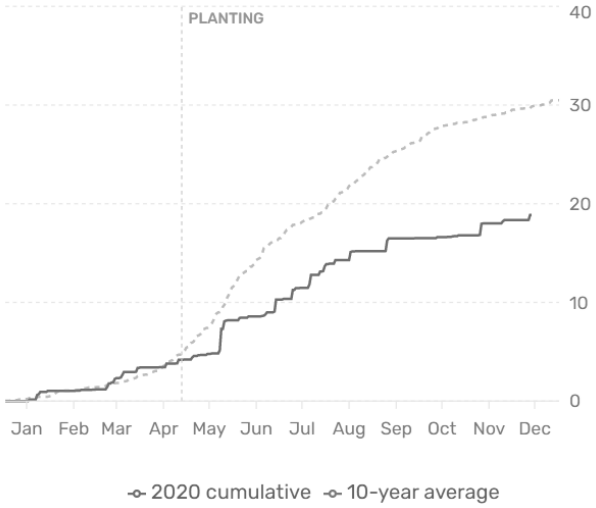
Impact of Interseeded Cover Crop at V4 on Irrigated Corn

Study ID: 0580035202001
County: Clay
Soil Type: Crete silt loam 0-1% slope; Hastings silt loam 1-3% slope; Holder silty clay 7-11% slopes, eroded
Planting Date: 4/27/20
Harvest Date: 10/20/20
Population: 32,000
Row Spacing (in): 30
Hybrid: Pioneer® P1082
Reps: 7
Previous Crop: Corn
Tillage: No-Till
Herbicides: ***Pre:*** 16 oz/ac atrazine, 16 oz/ac meolachlor, and 32 oz/ac Roundup® ***Post:*** 32 oz/ac Liberty®
Seed Treatment: None
Foliar Insecticides: 3.8 oz/ac lambda-cyhalothrin and 6.4 oz/ac Capture® at brown silk
Foliar Fungicides: 10.5 oz/ac Quilt Xcel® at brown silk

Fertilizer: 170 lb N/ac as Anhydrous Ammonia in April; 60 lb N/ac as 28-0-0-5 through fertigation in June
Irrigation: Pivot, Total: 8"
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 nitrogen mix. The nitrogen mix consisted of 4 lb/ac Laredo forage soybean, 2 lb/ac yellow blossom sweet clover, 1.5 lb/ac red clover, 4 lb/ac hairy vetch, 6 lb/ac Red Ripper cowpeas, 4 lb/ac Pinkeye cowpeas, 0.5 lb/ac Nitro radish, 0.5 lb/ac impact forage collards, and 4 lb/ac Mancan buckwheat. 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, PLFA (phospholipid fatty acid) 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 (%)	Test Weight (lb/bu)	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
Check	32,071 A	1 A	1.79 A	58 A	16.7 A	259 A	908.02 A
Interseeded Cover Crop	31,857 A	0 A	0.71 A	58 A	16.4 A	256 B	862.71 B
P-Value	0.639	0.289	0.356	0.561	0.280	0.090	0.0001

†Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $3.51/bu corn, $18.16/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 and interseeded forbs and recorded weights are on a dry matter basis.

	Weed Biomass (lb/ac)	Cover Crop Biomass - Forbs (lb/ac)	Total Biomass (lb/ac)
Check	73 A	-	73 B*
Interseeded Cover Crop	13 A	277	290 A
P-Value	0.283	N/A	0.005

*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	6.7	7.2	3.4	6.2	15	307	13.8	2.32	23.5	43.6	0.57	2050	201	41	12.9	0	6	79	13	1	21
Interseeded	6.7	7.2	3.4	4.3	10	273	10.9	1.96	41.3	30	0.47	1900	183	39	11.9	0	6	80	13	1	21

	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	36	36	0.19	0.25	2.04	36.81	17.53
Interseeded Cover Crop	38	38	0.18	0.24	1.89	36.64	18.7

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® CO2-C	Haney Soil Health Score
Check	1448	0.93	703	0	98.4 A	13.34 A
Interseeded Cover Crop	1213	1.05	582	7	103.6 A	13.95 A
P-Value	N/A	N/A	N/A	N/A	0.531	0.464

Summary:

- The interseeded cover crop produced approximately 290 lb/ac biomass, of which 12.7 lb/ac was weeds. The check did not have any cover crop biomass but had 72.5 lb/ac weeds.
- There were no differences in stand count, stalk quality, test weight, or moisture between the corn with interseeded cover crop and the check.
- The corn in the interseeded cover crop yielded 2.6 bu/ac lower than the corn with no interseeded cover crop. The corn with interseeded cover crop resulted in a $45.31/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