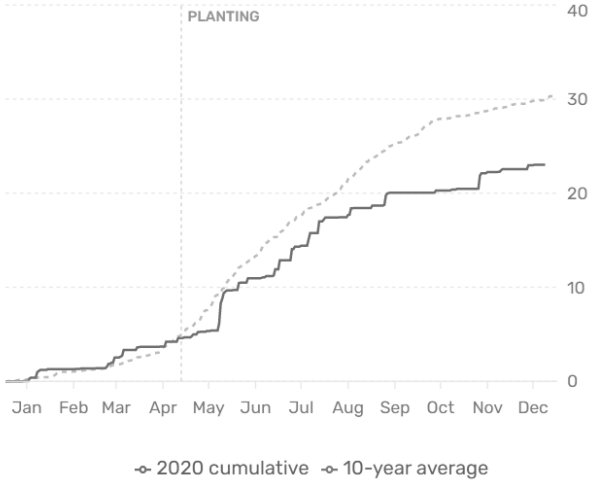
Impact of Interseeded Cover Crop at V4 on Irrigated Corn

Study ID: 0916185202002
County: York
Soil Type: Hastings silt loam 0-1% slope
Planting Date: 4/27/20
Harvest Date: 10/2/20
Seeding Rate: 31,000
Row Spacing (in): 36
Hybrid: Big Cob 11-45 VT Double PRO® RIB
Reps: 4
Previous Crop: Corn
Tillage: Ridge-Till and Cultivate
Herbicides: ***Pre:*** Banded 1.25 qt/ac Stalwart® 3W at planting; 36 oz/ac GlyStar® 5 Extra and 1 pt/ac generic buctril 1 day prior to interseeding
Seed Treatment: Acceleron® 250
Foliar Insecticides: 7 oz/ac bifenthrin in-furrow at planting
Foliar Fungicides: 10.5 oz/ac Propaz at R3

Fertilizer: 190 lb/ac N spring applied as anhydrous ammonia
Irrigation: Pivot, Total: 10"
Rainfall (in):



Introduction: This on-farm research study is in collaboration with The Nature Conservancy, Upper Big Blue NRD, NRCS, and Kellogg's. The goal was to determine any impacts of corn population on interseeded cover crop biomass and corn yield and economics. There were three treatments: a check with no cover crops interseeded and corn planted at 31,000 seeds/ac, corn planted at 27,000 seeds/ac with a cover crop interseeeded, and corn planted at 31,000 seeds/ac with a cover crop interseeded. The check was cultivated for weed control. The cover crop mix consisted of 2 lb/ac hairy vetch, 4 lb/ac cowpeas, 1 lb/ac red clover, 0.3 lb/ac rapeseed, 1 lb/ac radish, 2 lb/ac buckwheat, and 2 lb/ac flax. The cover crops were interseeded on June 1, 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 27 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 2, 2020 (Tables 3 and 4). Wind in early July caused 2-5% breakage and damaged leaves. This allowed more light infiltration than normal and the interseeded cover crops took advantage of the light.

Results:

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

	Stand Count (plants/ac)	Stalk Rot (%)	Moisture (%)	Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
Check (31,000 seeds/ac)	29,375	13.75	22.3 A	239 A	768.49 A
Cover Crop Interseeded into 27,000 seeds/ac Corn	27,000	3.75	22.2 A	217 B	716.66 B
Cover Crop Interseeded into 31,000 seeds/ac Corn	29,500	3.75	21.9 A	227 B	738.23 AB
P-Value	N/A	N/A	0.582	0.007	0.039

†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, $217/bag 80,000 seeds, $13/ac cultivation on the check, $10/ac for interseeding, and $16.70/ac for cover crop seed for the interseeded treatments.

Table 2. Biomass measurements from September 24, 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	39 B*	-	39 B
Interseeded Cover Crop	205 A	1199	1404 A
P-Value	0.080	N/A	0.036

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

Table 3. Soil tests from September 2, 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	6.45	6.75	2.65	3.68	8.8	441	7.8	1.3	29	7.5	0.5	2108	250	33	16.4	14.5	7	65	13	1	12
Interseeded	6.2	6.68	2.65	2.4	5.8	411	7.5	1.4	34	9.3	0.5	1943	222	40	16.0	19.8	6.5	61	12	1	11.5
P-Value	0.14	0.32	1	0.32	0.30	0.12	0.72	0.60	0.04	0.18	1	0.03	0.06	0.06	0.43	0.29	0.18	0.34	0.25	-	0.79

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	2479 A	1.37 A	1081 A	177 A	47.9 A	11.4
Interseeded Cover Crop	2691 A	1.40 A	1172 A	194 A	50.9 A	11.8
P-Value	0.291	0.844	0.173	0.829	0.689	0.619

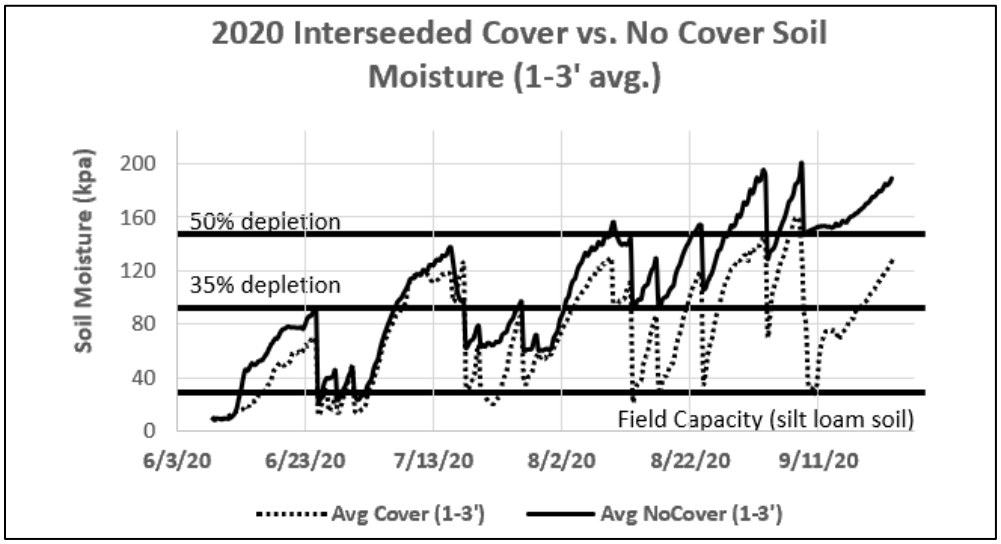


Figure 1. WATERMARK™ Soil Moisture Sensors were installed at 1', 2', 3' depths in the corn that was interseeded (Cover) and the check (No Cover). The No Cover was consistently drier than the corn with the cover crop interseeded.

Summary:

- The interseeded cover crop produced approximately 1404 lb/ac biomass, of which 205 lb/ac was weeds. The check did not have cover crop biomass, but had 39 lb/ac weeds.
- The check (corn planted at 31,000 seeds/ac without the interseeded cover crop) yielded 12.5 bu/ac more than the corn with interseeded cover crop and seeded at 31,000 seeds/ac. The check yielded 21.8 bu/ac more than the corn with interseeded cover crop and seeded at 27,000 seeds/ac.
- There were no differences in total microbial biomass, diversity index, bacterial or fungal biomass, Solivta®, or Haney soil health score between the interseeded cover crops and the check.
- 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. Results of the test showed no differences in the soil N levels between the check and interseeded cover crop.

Sponsored by: University of Nebraska Lincoln

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