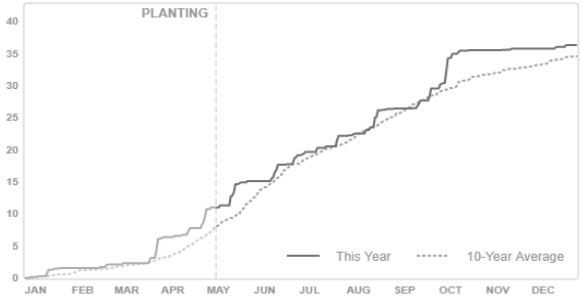
Impact of a Cover Crop Mix with One Cereal Grain versus Cover Crop Mix with Multiple Cereal Grains on Soil Quality, Moisture, and the Subsequent Corn Yield

Study ID: 388131201701
County: Otoe
Soil Type: Wymore silty clay loam 2-6% slopes; Pawnee clay loam 4-8% slopes, eroded; Judson silt loam 2-6% slopes
Planting Date: 5/7/17
Harvest Date: 11/16-18/17
Population: 26,500
Row Spacing (in): 30
Hybrid: Rob-See-Co RC6435-GTA
Reps: 4
Previous Crop: Soybean
Tillage: No-Till
Herbicides: ***Pre:*** 12 oz Verdict®, 16 oz Atrazine, 16 oz MSO™, 2.5 lbs AMS, 44 oz Glyphosate, and 5.4 oz/ac 2,4-D 6# on 4/16/17
Post: 4.5 oz/ac Outlook®, 8 oz/ac Atrazine 4L, 9.6 oz/ac MSO™, 1.5 lb/ac AMS, 26 oz/ac Glyphosate, 0.85 oz/ac Armezon, and 0.5# Thrust on 6/14/17
Seed Treatment: Insecticide

Foliar Insecticides: 1 pint Lorsban® on 7/29/17
Foliar Fungicides: 10.5 oz Quilt Excel® with .25 gal Brandt Smart Trio™ and 2 oz surfactant on 7/29/17
Fertilizer: 120 lb N/ac as 32-0-0, one week pre-plant. 5 gal/acre 8-21-5-5(S)-0.5(Zn) at planting. Note: There was green snap in mid-June that appeared to affect approximately 3-5% of field. A windstorm on Oct. 20 appeared to cause damage to 2-3% of stalks.
Irrigation: None
Rainfall (in):



Introduction: This study is being conducted on a soil health demonstration farm as part of the Nebraska USDA/Natural Resources Conservation Service's (NRCS) Soil Health Initiative, and involves the farmer, the Nebraska On-Farm Research Network and the USDA/NRCS. The purpose of this study is to compare the impact of a cover crop mixture with one cereal grain and a cover crop mix with multiple cereal grains on soil quality, soil moisture, and subsequent crop yield. Cover crops were drilled in the fall of 2016. Both mixtures included annual rye, canola, balansa clover, camelina, vetch, crimson clover, winter lentils, alfalfa, and northern annual field peas. The cover crop mix with one cereal grain included cereal rye as a base while the cover crop mix with multiple cereal grains included winter oats, spring barley, winter barley, triticale, wheat, and cereal rye. The cover crops were terminated with glyphosate herbicide on 4/16/17. This is an early termination date relative to the corn planting date of May 7 for the area (NRCS Zone 3). A baseline Haney soil test is available from fall 2016. A representative sample was taken from each treatment for Haney soil tests in fall 2017. The study did not have a no cover crop control.

Soil Tests:

Treatment	Solvita CO2 Burst (ppm)	Total Nitrogen (ppm)	Organic Nitrogen (ppm)	Total Organic Carbon (ppm)	Nitrate (ppm)	Ammonium (ppm)	Inorganic Nitrogen (ppm)	Organic C : N	Organic Nitrogen Release (ppm)	Organic Nitrogen Reserve (ppm)	Soil Health Calculation
2016 Baseline	118.0	27.3	17.9	184	9.3	1.0	10.2	10.3	17.9	0.0	15.05
2017 Cover Crop Mix with One Cereal Grain	71.8	16.3	12.5	180	2.7	0.1	2.8	14.4	12.5	0.0	12.02
2017 Cover Crop Mix with Multiple Cereal Grains	119.2	20.1	13.5	194	4.7	1.5	6.2	14.4	13.5	0.0	15.17

Soil Moisture:

Watermark Sensors were installed at two locations in the field. Daily readings (kPa) were recorded at each depth from June 7 to October 15, 2017. The higher the reading the more depleted the soil moisture, while a reading of zero represents full soil water capacity.

Northeast Sample Location	Cover Crop Mix with One Cereal Grain				Cover Crop Mix with Multiple Cereal Grains			
Depth	1'	2'	3'	4'	1'	2'	3'	4'
Avg. Reading (kPa)	25.76	20.28	22.68	11.63	51.63	55.38	86.1	47.73
Mid-South Sample Location	Cover Crop Mix with One Cereal Grain				Cover Crop Mix with Multiple Cereal Grains			
Depth	1'	2'	3'	4'	1'	2'	3'	4'
Avg. Reading (kPa)	47.08	30.18	90.88	39.47	35.44	45.51	55.46	15.95

Results:

	Corn Moisture (%)	**Corn Yield (bu/acre)†**	**Marginal Net Return‡ ($/ac)**
Cover Crop Mix with One Cereal Grain	14.6 A*	157 A	421.56 A
Cover Crop Mix with Multiple Cereal Grains	14.8 A	159 A	432.92 A
P-Value	0.209	0.708	0.588

*Values with the same letter are not significantly different at a 90% confidence level.
†Yield values are from cleaned yield monitor data. Bushels per acre corrected to 15.5% moisture.
‡Marginal net return based on $3.15/bu corn, $53.84/acre for cover crop mix with one cereal grain, $50.21/acre for cover crop mix with multiple cereal grains.

Summary: There was no significant difference in yield, moisture, or marginal net return for the two treatments. This is a five-year study and will continue to be evaluated through 2021.

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