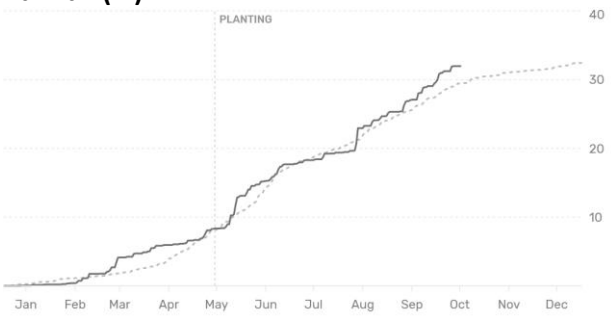
Non-irrigated Soybean Planted Following a Cover Crop Mix and No Cover Crop

Study ID: 0913037201901
County: Colfax
Soil Type: Moody silty clay loam, 0-2% slope; Moody silty clay loam 2-6% slopes
Planting Date: 5/14/19
Harvest Date: 10/14/19
Seeding Rate: 140,000
Row Spacing (in): 15
Variety: Legend®25X924N
Reps: 6
Previous Crop: Corn
Tillage: No-Till
Herbicides: ***Pre:*** 6 oz/ac Zidua® PRO, 40 oz/ac Roundup®, and 8 oz/ac Dicamba on 5/10/19 ***Post:*** 7.25 oz/ac Marvel™, 32 oz/ac Roundup®, and 6 oz/ac Select Max® on 6/28/19

Seed Treatment: fungicide, insecticide, inoculant
Foliar Insecticides: 2.8 oz/ac Leverage® on 7/30/19
Foliar Fungicides: 4 oz/ac Priaxor® on 7/30/19
Fertilizer: None
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 study compared the effects of a cover crop mix on soybean yield and soil health properties. The cover crop mix was 8 lb/ac winter wheat, 8 lb/ac winter rye, 8 lb/ac triticale, 1 lb/ac Dwarf Essex rapeseed, 5 lb/ac winter oats, 8 lb/ac winter barley, 1 lb/ac camelina, 1 lb/ac hairy vetch, 2.5 lb/ac winter Morton lentil and 1 lb/ac Dixie crimson clover. The cover crop was seeded after corn harvest on November 19, 2018. The cover crop was terminated with herbicides on May 10, 2019 at a height of 10-18". Soybeans were planted on May 14 in 15" row spacing. This is the second year of the study and second planting of cover crops on the same cover crop treatment strips; however, it is the first year reporting crop yields and soil health measurements.

Results:

Table 1. Soil physical, chemical, and biological properties for cover crop and no cover crop treatments. Samples were collected on 11/5/19 (1 sample per treatment replication, 6 samples per treatment).

Treatment	Infiltration (in/hr)	Soil moisture (%)	Bulk density (g/cm^3)	Soil temp. (F)	Soil respiration[1]
Check	2.09 A*	23.61 A	1.14 A	40.85 A	3.33 A
Cover Crop - Mix	6.47 A	24.60 A	1.13 A	40.93 A	2.67 A
P-Value	0.343	0.336	0.478	0.794	0.102

[1]Soil respiration (Modified Solvita burst).
*Values with the same letter are not significantly different at a 90% confidence level.

Table 2. NRCS field assessments of soil health. Samples were collected on 11/5/19 (1 sample per treatment replication, 6 samples per treatment).

	NRCS Field Assessment of Soil Health								
Treatment	Structure	Structure type	Surface condition	Mgmt	Soil pores	Earth worm	Biological activity	Soil smell	Overall indicator[2]
Check	1.83 A	1.92 A	2.08 A	1.67 B	2.5 A	2.50 A	2.25 A	2.67 A	2.18 A
Cover Crop - Mix	2.00 A	1.92 A	2.08 A	2.33 A	2.58 A	2.41 A	2.412 A	2.83 A	2.32 A
P-Value	0.465	1.00	1.00	0.0429	0.771	0.862	0.175	0.175	0.295

[2]Score based on field assessment. The overall indicator score is based on the sum of 8 indicators (averaged from 1-3; 1=degraded, 2=in transition, 3=healthy): soil structure, structure type, surface condition, soil management, soil pores, earthworms, biological activity, and smell.

Table 3. Soybean yield, moisture, and marginal net return for cover crop mix and no cover crop treatments.

	Moisture (%)	Soybean Yield (bu/ac)†	Marginal Net Return‡ ($/ac)
No Cover Crop	11.8 A*	68 A	549.30 A
Cover Crop - Mix	11.9 A	68 A	514.83 B
P-Value	0.607	0.994	0.002

*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 adjusted to 13% moisture.
‡Marginal net return based on $8.10/bu soybean, $20.11/ac cover crop seed, and $14.40 for cover crop drilling.

Summary:

- Soil physical, chemical, and biological properties measured did not show differences between the cover crop mix and no cover crop treatments in the second year of the study.
- There were no differences in soybean moisture or yield.
- Marginal net return was lower for the cover crop treatment due to the additional cost of seed and drilling.

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