

## Following a Cover Crop Mix and No Cover Crop, NRCS Demo Farm Non-Irrigated Wheat Planted

**Study ID:** 0913037202001

**County:** Colfax

**Soil Type:** Moody silty clay loam 0-2% slope;  
Moody silty clay loam 2-6% slopes

**Planting Date:** 10/15/19

**Harvest Date:** 7/21/20

**Population:** 105 lb/ac

**Row Spacing (in):** 7.5

**Hybrid:** Valliant

**Reps:** 6

**Previous Crop:** Soybean

**Tillage:** No-Till

**Herbicides:** **Pre:** 0.5 pt/ac 2,4-D and 0.8 oz/ac  
Affinity® Broadspec on 5/6/20 **Post:** None

**Foliar Insecticides:** None

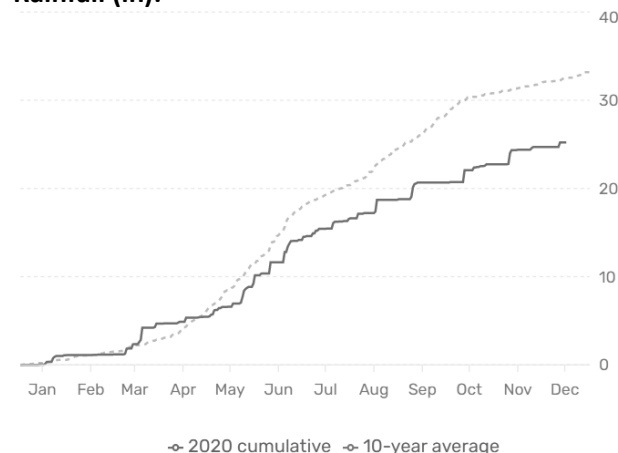
**Foliar Fungicides:** 6.8 oz/ac Prosaro®

**Fertilizer:** 100 lb/ac 11-52-0 on 10/24/19; 30

gal/ac 32% UAN on 4/8/20

**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. Two treatments are being evaluated in this five-year study: cover crop mix and no-cover crop check. These plots will be maintained throughout the project (2017-2021). 2020 was the third year of this study. In 2019, wheat was planted following soybean harvest on the cover crop and check strips. Following the wheat harvest, cover crops were drilled on August 6, 2020. Baseline and soil health measures were collected in 2017 and 2019 (Table 1).

### Results:

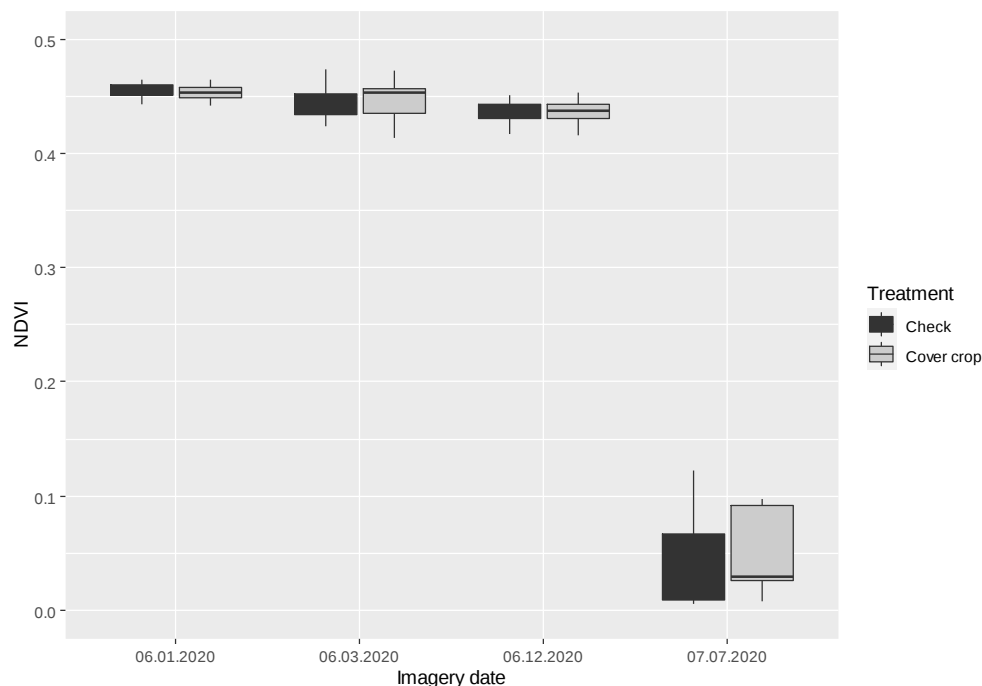
**Table 1.** Soil physical, chemical, and biological properties for cover crop and no cover crop treatments.

| Treatment                                                                                                      | Infiltration (in/hr) | Soil moisture (%) | Bulk density (g/cm <sup>3</sup> ) | Soil temp. (F) | Soil respiration <sup>1</sup> | Total soil health score <sup>2</sup> |
|----------------------------------------------------------------------------------------------------------------|----------------------|-------------------|-----------------------------------|----------------|-------------------------------|--------------------------------------|
| <b>2017</b> (1 sample per treatment replication, n=6 per treatment; samples collected on Oct. 30, 2017)        |                      |                   |                                   |                |                               |                                      |
| Check                                                                                                          | 15.58 A              | 25.5 A            | 1.04 A                            | 50.4 A         | 3.85 A                        | 16.2 A                               |
| Cover Crop - Mix                                                                                               | 6.87 B               | 25.5 A            | 1.03 A                            | 50.0 A         | 4.10 A                        | 18.1 A                               |
| P-Value                                                                                                        | 0.0808               | 0.986             | 0.785                             | 0.354          | 0.1817                        | 0.342                                |
| <b>2019</b> (1 sample per treatment replication, n=6 samples per treatment; samples collected on Nov. 5, 2019) |                      |                   |                                   |                |                               |                                      |
| Check                                                                                                          | 2.09 A*              | 23.61 A           | 1.14 A                            | 40.85 A        | 3.33 A                        | 17.4 A                               |
| Cover Crop - Mix                                                                                               | 4.93 A               | 24.60 A           | 1.13 A                            | 40.93 A        | 2.67 A                        | 18.6 A                               |
| P-Value                                                                                                        | 0.422                | 0.336             | 0.478                             | 0.794          | 0.102                         | 0.295                                |

<sup>1</sup>Soil respiration (Solvita® burst).

<sup>2</sup>Score based on field assessment. The overall indicator score is based on the sum of 8 indicators (1=degraded, 2=in transition, 3=healthy): soil structure, structure type, surface condition, soil management, soil pores, earthworms, biological activity, and smell. Soil assessment was not completed in 2018 and 2020 as it was originally planned for every other year interval.

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



**Figure 1.** Normalized difference vegetation index (NDVI) values from aerial imagery for the wheat crop following cover crop and no cover crop. Asterisk (\*) within each date indicates significant difference ( $p < 0.10$ ) between treatments at a 90% confidence level.

**Table 2.** 2020 wheat moisture, yield, and net return for the check and cover crop mix.

|                | Moisture (%) | Wheat Yield (bu/acre) <sup>†</sup> | Marginal Net Return <sup>‡</sup> (\$/acre) |
|----------------|--------------|------------------------------------|--------------------------------------------|
| Check          | 13.3 A*      | 82.4 A                             | 358 A                                      |
| Cover Crop Mix | 13.0 A       | 84.8 A                             | 369 A                                      |
| P-Value        | 0.1089       | 0.4397                             | 0.4397                                     |

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

<sup>†</sup>Bushels per acre corrected to 13.5% moisture.

<sup>‡</sup>Marginal net return based on \$4.35/bu wheat. Costs of cover crop drilled after wheat harvest were not included on the analysis.

### Summary:

- Aerial imagery normalized difference vegetation index (NDVI) analysis showed no differences in values for wheat following cover crops.
- There were no differences in soil health parameters between the treatments in 2017 and 2019.
- There were no differences in wheat moisture, yield, or marginal net return between the treatments. These observations are in agreement with the crop vigor (NDVI) calculated throughout the wheat growing season that showed no differences between the two cover crop treatments. Results from previous years follow.

## Summary of Previous Years

**YEAR ONE** | In year one, corn was planted on the cover crop and check strips. No measurements were made on corn yields in the cover crop and check strips.

**YEAR TWO** | In year two, cover crops were drilled on November 19, 2018. 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 terminated with herbicides on May 10, 2019, at a height of 10-18".

**Table 3.** 2019 soybean yield, moisture, and marginal net return for cover crop mix and no cover crop treatments.

|                  | Moisture (%) | Soybean Yield (bu/ac) <sup>†</sup> | Marginal Net Return <sup>‡</sup> (\$/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.

<sup>†</sup>Yield values are from cleaned yield monitor data. Bushels per acre adjusted to 13% moisture.

<sup>‡</sup>Marginal net return based on \$8.10/bu soybean, \$20.11/ac cover crop seed, and \$14.40 for cover crop drilling.

In 2019, there were no differences in soybean moisture or yield soybeans. Marginal net return was lower for the cover crop treatment due to the additional cost of seed and drilling.

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