



Grants and Education to Advance Innovations in Sustainable Agriculture

Increasing Soil Health and Infiltration with Cover Crops

[FNC16-1063](#)

Project Type:

Farmer/Rancher Project

Projected End Date: 2018

Funds Awarded: \$7,398

Region: North Central

State: Minnesota

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2016 Annual Report (submitted)

Summary

This project includes two 35-acre fields, one field was seeded with cover crops and one was not. Both fields have the same cropping history of corn and soybeans; along with ridge till management practices. The cover crop seed included a mix of 23 pounds of Annual Rye, 4.8 pounds of Radish, and 19.6 pounds of Spring Wheat. This mix was chosen to prevent soil erosion and improve infiltration.

From each 35-acre field, two soil samples are being collected along with one grassed area control sample. The Haney Soil Test is being used to compare micro community activity in the soil over the duration of the grant.

Along with the Haney Soil Test, an infiltration test is conducted in the fall and spring. An infiltration rate is the velocity at which water enters the soil. Infiltration is measured by placing a six-inch (height) by eight-inch (diameter) ring in the soil three inches deep, then adding sixteen ounces of water to the inside of the ring. This test is ran continuously for an hour. The amount of times it takes the sixteen ounces of water to infiltrate into the soil is recorded as an infiltration rate of inches per hour.

Yield data is also being collected during crop harvest and a simple per acre economic analysis is completed for the two fields. Information includes cover crop seed, fertilizer, and crop seed costs, as well as crop yield and value, gross income, and net income.

Objectives/Performance Targets

The objective of this grant is to measure the benefits of cover crops using the Haney Soil Test and Infiltration Test. The Haney Soil Test is used to determine soil health year to year by using the "soil health calculation". Infiltration tests are completed in the spring and fall to determine if cover crops increase infiltration within the soil profile. A cover crop mix of Annual Rye, Tillage Radish, and Winter Wheat was chosen to prevent soil erosion and improve infiltration.

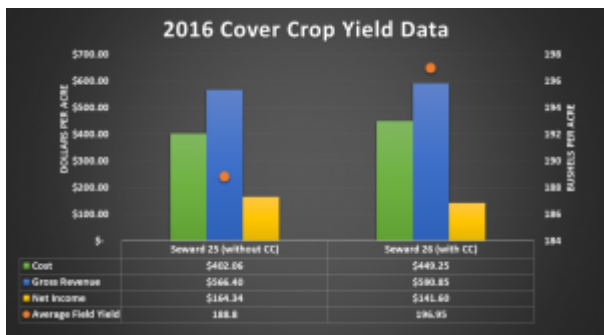
Accomplishments/Milestones

The cover crop mix was seeded in August. By November the cover crop seed was established in the corn residue.



Photo: Cover crops immersing in corn residue. Photo taken in Nobles County on November 3, 2016.

The 2016 infiltration rates were higher in the field with cover crops in the spring and fall. The 2016 Haney Soil Test resulted in a slightly higher average soil health calculation in the non-cover crop area. It is hard to draw any conclusions with only one year of sample results. The Haney Soil Test can be effected by a couple of different factors. The main factor being soil moisture and temperature. An increase in soil moisture can decrease microbial activity due to nutrient availability and lack of gas exchange. Comparing 2017 data will give a better understanding of the soil health benefits from using cover crops. In the field with cover crops, the corn yielded higher than in the field without cover crops. The cost analysis for 2016 is shown in the chart below:



Impacts and Contributions/Outcomes



Photo: Infiltration test being completed in corn residue.

Photo taken November 3, 2016 in Nobles County.

Infiltration Test

Spring infiltration tests were completed on June 8, 2016. Originally, the Heron Lake Watershed District had planned to complete the test before May 15th. Due to weather conditions, the staff was unable to get to the sites. The results for both fields are as follows:

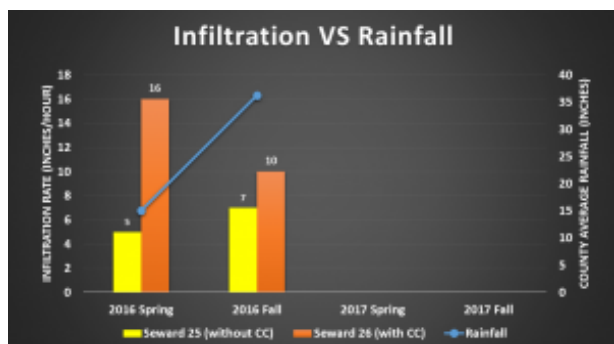
2016 Crop	Acres	County	Location	Soil Type	Tillage Practices and History	Date Test Completed	Result (Inches/Hour)	County Average Rainfall (Inches)*
Corn	35	Nobles	Seward 25 (without CC)	L141A	Ridge Till	6/8/16	5	15.05
Corn	35	Nobles	Seward 26 (with CC)	L83A	Ridge Till	6/8/16	16	15.05

*Rainfall amounts measured from Jan 1, 2016 to infiltration test completion date.

Fall infiltration tests were completed on November 3, 2016. The results for both fields are as follows:

2016 Crop	Acres	County	Location	Soil Type	Tillage Practices and History	Date Test Completed	Result (Inches/Hour)	County Average Rainfall (Inches)*
Corn	35	Nobles	Seward 25 (without CC)	L141A	Ridge Till	11/3/16	7	36.24
Corn	35	Nobles	Seward 26 (with CC)	L83A	Ridge Till	11/3/16	10	36.24

*Rainfall amounts measured from Jan 1, 2016 to infiltration test completion date.

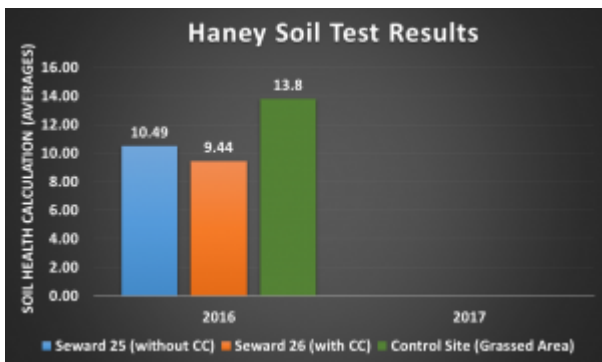


Infiltration rates were higher in the field with cover crops. The soil types are slightly different between the two fields. Seward 25 has a L141A and Seward 26 has a L83A. Both soil types have a sloped of 0-2 percent. L83A is a Webster clay loam and is classified as a poorly drained soil. L141A is a Spillville loam and is classified as

a somewhat poorly drained soil. L141A has a frequency of occasional flooding whereas L83A has no frequency of flooding. Available water storage is high in both soil profiles.

Haney Soil Test

Seward 25 (without CC)		Seward 26 (with CC)		Control Site (grassed area)	
Haney Soil Health Calculation		Haney Soil Health Calculation		Haney Soil Health Calculation	
Zone 1	12.4	Zone 1	7.68	Grassed Area	13.8
Zone 2	8.57	Zone 2	11.2		
Average	10.49	Average	9.44		



Soil samples were collected in each of the two fields. A total of two Haney Soil Tests were completed in each 35-acre plot. A control sample was collected in a grassed area along the field border. All sample results are shown in the table attached. Each Haney Soil Test result was compared using the soil health calculation. The field with cover crops had an average calculation of 9.44 in 2016. The field without cover crops had an average calculation of 10.49. The grassed area was at 13.8. The 2016 Haney Soil Test resulted in a slightly higher soil health calculation in the non-cover crop area. It is hard to draw any conclusions with only one year of sample results. 2017 will bring a better understanding.

Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture or SARE.

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