

Midwest Cover Crop Council

Nebraska Report 2019

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Research:

• As part of the Nebraska On-Farm Research Network, fifteen On-farm Research Projects were conducted across Nebraska to evaluate different issues of cover crops in cropping systems. These projects include research that evaluates the impact of grazing cover crops on subsequent crop yields, impact of cover crops to improve soil health and water quality and evaluating yields of corn and soybean with different relative maturities to be used in combination with cover crops for earlier Cover Crop Establishment. Below are the results of the relative maturity studies. There are two years of data for the corn relative maturity study, 2017-2018 and one year of the soybean relative maturity study, 2018. In 2017, there was not a significant difference between 102, 111, and 115 day corn. Under these circumstances, a farmer could plant a corn hybrid that matures 10 days earlier and then a cover crop could be planted sooner following harvest in the fall to increase cover crop growth and provide more benefits to the soil. In 2018 there were totally different results. The 115 day corn yielded significantly higher than all other shorter season corn hybrids. These results indicate each year and environment are different and results are not always consistent. For the soybean relative maturity study in 2018, there were no significant differences between the Group 2, 3 or 4 maturity groups. In this situation a farmer could plant a Group 2 soybean variety without a yield penalty, harvest the soybeans earlier and plant a cover crop sooner in the fall to increase cover crop growth and soil benefits. This experiment needs to be replicated under different environments to determine the repeatability of yield results.

Corn Relative Maturity Study 2017

Corn Relative Maturity	Yield	Marg. Net Ret. \$/ac
95 Day CRM	178 B	561.58 B
105 Day CRM	204 A	642.80 A
111 Day CRM	216 A	680.06 A
115 Day CRM	202 A	635.35 A

Corn Relative Maturity Study 2018

Corn Relative Maturity	Yield	Marg. Net Ret. \$/ac
95 Day CRM	179 D	482.25 D
99 Day CRM	176 D	475.57 D
105 Day CRM	198 C	544.56 C
111 Day CRM	209 B	594.57 B
115 Day CRM	226 A	655.82 A

Soybean Relative Maturity Study 2018

Soybean Relative Maturity	Yield	Marg. Net Ret. \$/ac
Group 1 (1.1 Maturity)	47 B	279.91 B
Group 2 (2.4 Maturity)	58 A	358.22 A
Group 3 (3.3 Maturity)	52 AB	309.34 AB
Group 4 (4.1 Maturity)	54 AB	326.02 AB

- The NRCS Soil Health Initiative is a collaboration with University of Nebraska researchers and extension as well as 17 farmer collaborators across Nebraska. Farmers are conducting strip trials of various cover crops, crop rotations and/or management techniques. Of these fifteen On-farm Research Projects, six of the studies involve NRCS Demonstration Farms. Experiments were established in both 2016 and 2017 and soil measurements are being taken annually by NRCS field staff and University of Nebraska Extension. NRCS' Environmental Quality Incentive Program (EQIP) is funding these demonstration projects, and the funding is for five years per demonstration site. As part of participating in the farm and ranch demonstration initiative, producers will host field days to share with their neighbors what they have been learning and experiencing on their farms during their five-year demonstration period. The University of Nebraska team is beginning to collect additional crop and soil measurements in 2019 to support the project and its understanding of economic and agronomic impacts of cover crops, crop rotations, and other management changes such as grazing.

- Results from an example of an NRCS Soil Health Site is listed below. This site located in southeast Nebraska is evaluating a three-year rotation of Corn-Soybeans-Wheat with a cover crop planted following wheat and corn. A winter hardy cover crop of cereal rye with brassicas is being compared to a winter-terminated cover crop of oats and brassicas to determine if these different cover crop treatments will have an effect on subsequent crop yields. In 2018 soybean yields following the winter hardy cover crop yielded significantly less and had a significantly lower marginal net return than soybeans following the winter terminated cover crop (Table 1.) In 2017 similar results were reported when corn following winter hardy cover crops yielded significantly less and had a significantly lower marginal net return than corn following the winter terminated cover crop (Table 2.) This site is located on the upland soils of this project. In both years the site on the bottomland of the project that was soybeans in 2017 and corn in 2018, had similar non-significant yields, respectively. Table 3. shows the dry matter yield of winter hardy and winter terminated cover crops from harvested plots following a

hard frost in October of 2018. The brassicas suppressed growth of the cereal rye in the fall, but there may be some more spring growth on the winter hardy cover crop, depending on the weather.

Table 1. 2018 Soybean Yields (bu/ac)

Treatment	Yield	Marg. Net Return \$/ac
Winter Hardy CC	59 B	410.75 B
Winter Terminated CC	65 A	452.80 A

Table 2. 2017 Corn Yields (bu/ac)

Treatments	Yield	Marg. Net Return \$/ac
Winter Hardy CC	168 B	498.00 B
Winter Term. CC	183 A	546.97 A

Table 3. 2018 Cover Crop Yield-dry matter tons/ac (lbs/ac)

Treatment	Yield tons (lbs.)	Carbon/Nitrogen ratio
Winter Hardy	.91 (1820)	21.58
Winter Terminated	1.46 (2920)	23.47

Cover Crop Research at University of Nebraska Rogers Memorial farm

- Corn Stover Removal and Cover Crop Effects on Soil Carbon in Continuous Corn Production
Humberto Blanco (Agronomy and Horticulture) and Paul Jasa (Started Fall 2013)
- Carbon Cocktail vs Legume Cocktail vs Diverse Cocktail in Corn/Soybean/Wheat Rotation
Paul Jasa (Started Fall 2013)
- Cereal Rye/Winter Pea Cover Crop in No-till and Tilled Corn/Soybean Rotation
Paul Jasa (Fall 2007 to present)
- Carbon Cover Crop vs Legume Cover Crop in Corn/Soybean/Wheat Rotation
Paul Jasa (Fall 2005 to present)
- Cover Crop Biomass Production in Wheat/Corn/Soybean Rotation (Started Summer 2017)
Humberto Blanco and Sabrina Ruis (both Agronomy and Horticulture)
- Implementation of cover crops in no-till corn and soybean systems in Nebraska
Project developed in cooperation with NE Corn and Soybean Boards.

- State-specific recommendations on which cover crop species, planting times work best in standard NE no-till corn-soybean systems

Six cover crops, planted at two times

Early planted cover crops (broadcast into corn and soybean in mid-September)

Late-planted cover crops (drilled after harvest)

Cereal rye, vetch, Winter pea, radish

Summary cover crop productivity

With rye and mix, we can meet 1,000 lb/ac threshold in most cases

- Early planting doubled biomass production compared to late planting
- Extending growing season by two weeks in spring doubles biomass production
- If goal is biomass production, let rye grow until early May
- Legumes productivity was low

Extension:

- A partnership has developed between Nebraska Extension and Nebraska Grazing Lands Coalition where cover crops/annual forages are being introduced in cropping/grazing systems research projects across Nebraska. A project in southeast Nebraska is evaluating a continuous cover crop/annual forage system to determine impact on soil health over time. Row crop production was not profitable so this continuous cover crop/annual forage system is being evaluated on improving soil health & economics of the farm.
- As part of Nebraska Extension's Crop Diagnostic Clinic Series, A Soil Health Clinic evaluated how cover crops can be used to improve soil health with **45 ag professionals** participating. As a result of this educational experience, 94% of the participants noted moderate to significant improvement in knowledge gained for reasons to use cover crops.

Nebraska Extension, NCR SARE Partner with Farmer Peer Groups Several On-Farm Soil Health Workshops held in 2018 across Nebraska.

- In June Christine Jones and Jay Fuhrer came to a Soil Health workshop at Green Cover Seeds with over **100** participants.
- In September Jimmy Emmons conducted 3 soil health/cover crop workshops across Nebraska with **178** producers and advisors participating.

Nebraska Extension and NCR SARE Partner with other organizations

- In September Allen Williams presented a program on soil health/grazing cover crops in central Nebraska with approximately **150** participants
- In January 2019 Dwane Beck presented a program on no-till/cover crops and soil health in east central Nebraska with **83** participants.

- On February 14th 2019 the Nebraska Cover Crop Conference hosted **265** participants as David Montgomery, Jay Fuhrer, Ray Ward on several producers discussed Soil Health & Cover Crops.

Take Home Message & Future Plans

- Cover crops improved soil health, reduced nitrate loss and supported pollinators in Nebraska agroecosystems
- Greater resilience and stability of Nebraska cropping systems
- More benefits may be possible if we change current rotations/management
- Explore cropping systems that allow for greater cover crop growth
- Combine soil health goals with other ecosystem services
- Learn from successful cover crop farmers!