



Impact of Winter-terminated vs Winter-hardy Cover Crop on Corn and Soybean Yields

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NEBRASKA EXTENSION PROGRAMS

- As part of the Nebraska On-Farm Research Network, Seventeen On-farm Research Projects were conducted to evaluate cover crops in cropping systems.
- These projects include research on:
 - impact of grazing cover crops on subsequent crop yields.
 - impact of cover crops on soil health and water quality.
 - cover crop seeding rates.
 - the impact of inter-seeding cover crops on crop yields
 - corn & soybean maturity studies and economics.
 - **impact of winter-killed vs winter-hardy cover crops on subsequent corn & soybean yields.**



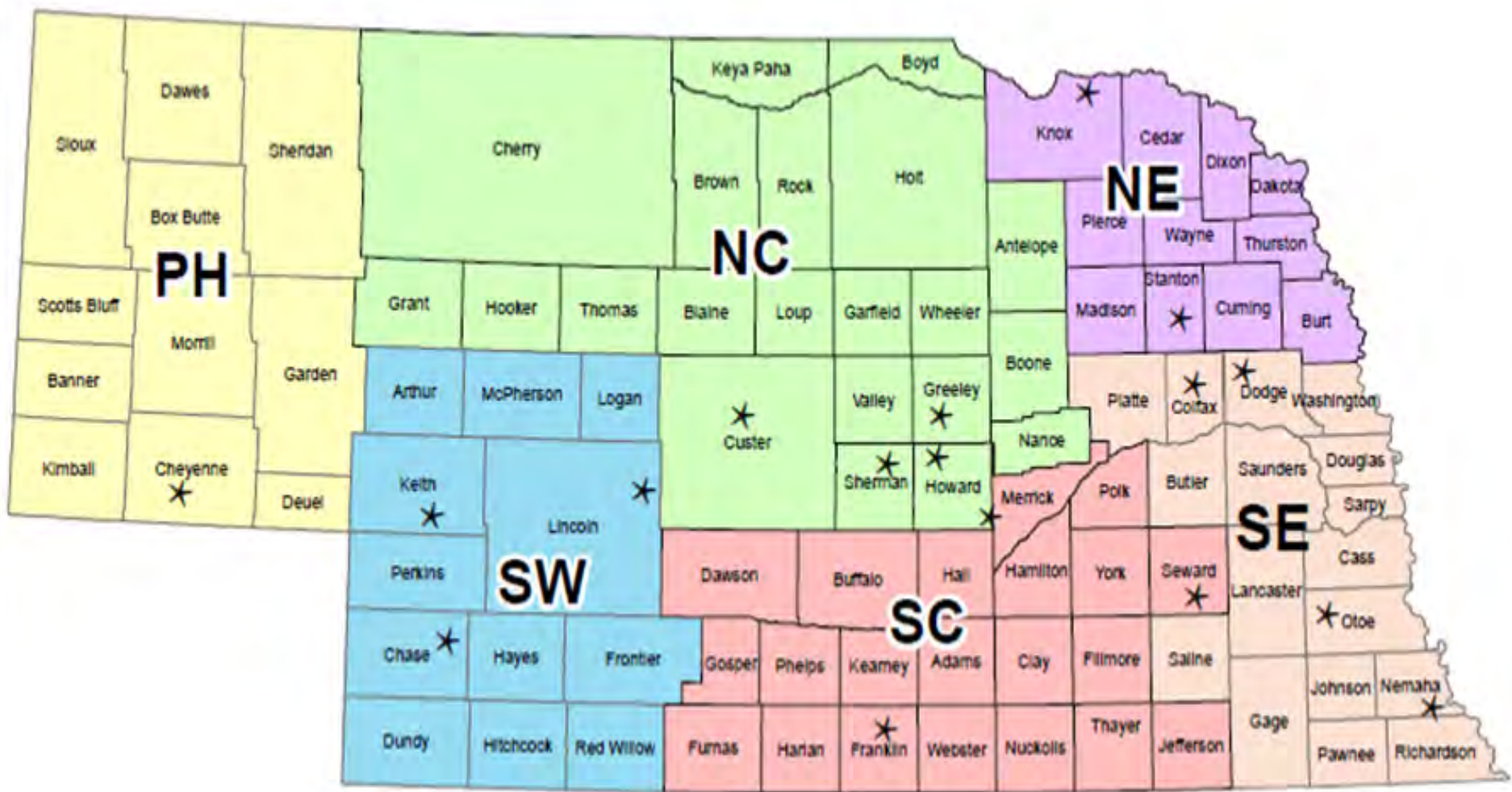




THE NEBRASKA SOIL HEALTH INITIATIVE

- Collaborative project partnering the UNL On-Farm Research Network and the NRCS with Nebraska producers.
- Field studies were assigned with cooperating growers in 2016/2017.
- A 5 years on farm-research and demonstration on soil health management systems.
- Initiative provides voluntary, incentive-based technical and financial assistance for soil conservation practices (e.g. cover cropping, no or reduced tillage, conservation crop rotation, prescribed grazing).

Soil Health Demonstration Fields



* 17 - Demonstration Fields

<https://cropwatch.unl.edu/soilhealth>

NEBRASKA EXTENSION AND NRCS PARTNERSHIP

- 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.





 United States Department of Agriculture
Natural Resources Conservation Service

**Soil Health Initiative
- Demonstration Field -**

Conservation Partners **unlock the**
Unlocking Soil Health **SECRETS**
- Potential **OF THE**
SOIL.

For more information, visit www.nrcs.usda.gov and click on "Soil Health."



SOIL HEALTH INITIATIVE DEMONSTRATIONS

1. Nemaha County - winter hardy vs winter terminated cover crop with grazing component.
2. Merrick County - interseeded vs drilled cover crop
3. Howard County – multi-species cover crop vs no cover crop



SOIL HEALTH INITIATIVE OBJECTIVES

- Maintain or enhance soil health by addressing the four soil health management principles (maximize continuous living roots, biodiversity, and soil cover while minimizing soil disturbance)
- Collect necessary data to validate the use of soil health management systems
- Provide farmers the opportunity to research conservation practices in the environment where they possibly would be implemented.

Comparisons of soil health assessments between different transitions to Soil Health management systems in Nebraska

County	Fallow (no:1, yes:0)	Cover crop (yes:1, no:0)	CC multispecies (yes:1, no:0)	3+ cash crop rotation (yes:1, no:0)	Grazing (yes:1, no:0)	Manure (yes:1, no:0)	Tillage (no:1, yes:0)	Composite rank
Greeley	0	0	0	0	0	0	1	1
Greeley	1	1	1	0	0	0	1	4
Howard	0	0	0	0	0	0	0	0
Howard	1	1	1	0	0	0	1	4
Howard	0	0	0	0	0	0	1	1
Merrick	0	0	0	0	1	0	0	1
Merrick	1	1	0	0	1	0	0	3
Colfax	0	0	0	1	1	1	1	4
Colfax	1	1	1	1	1	1	1	7
Otoe	1	1	0	1	0	1	1	5
Otoe	1	1	1	1	0	1	1	6
Nemaha	1	1	1	1	1	1	1	7
Nemaha	1	1	1	1	1	1	1	7
Knox	1	1	1	1	1	0	1	6
Knox	1	1	1	1	0	0	1	5
Stanton	1	1	0	1	0	0	1	4
Stanton	1	1	1	1	0	0	1	5
Dodge	1	1	0	0	0	0	1	3
Dodge	1	1	1	1	0	0	1	5

Farmers whose composite scores **were higher or equal to 4** were considered practicing **soil health management systems (SHMS)**, whereas those with rank scores **lower than 4** were considered in the **conventional practice** category.

Cover Crop On-Farm Research Plot

Cover Crops will be repeated a minimum of four replications for each of the two types, Frost kill and winter hardy. Strips are 30 foot wide. Rotation will be Wheat, Soybeans, Corn, starting from the south. Test is to see if frost kill (or) winter hardy provide more grazing and maintain organic matter in effect lack of spring growth. Areas in fields not included in the replications will be seeded to a variety of cover crop mixes for observation on site suitability.

Cover crops will be repeated over eight 30 foot wide strips planted to full season and short season crops. Crop rotation is Corn/Soybean. Remaining area will be planted to various cover crops to determine suitability for use. Test is show whether yield loss from shorter season can be made up in increased cover crop for grazing, and increase in organic matter.

Soybeans
Wheat
Corn

Cover Crop mix
 Cover Crop Winter Hardy
 Cover Crop Winter Killed

Soybeans

Cover Crop Long Season
 Cover Crop Short Season

- Winter-killed (frost kill) cover crop mix includes oats, turnips, and common rape seed.
- Winter-hardy (survives the winter) cover crop mix includes cereal rye, turnips, and common rape seed.

2017 SOYBEAN YIELDS BU/AC

Treatments	Yield	Marg. Net Return \$/ac
Winter Hardy CC	61 A	516.42 A
Winter Term. CC	62 A	518.84 A

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

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

2018 CORN YIELDS BU/AC

Treatments	Yield	Marg. Net Return \$/ac
Winter Hardy CC	243 A	759.43 A
Winter Term. CC	240 A	748.71 A

2019 SOYBEAN YIELDS BU/AC

Treatment	Yield	Marg.	Net Return \$/ac
Winter Hardy CC	86	A	670.35 A
Winter Terminated CC	84	A	652.21 A

2019 CORN YIELDS (BU/AC)

Treatments	Yield	Marg.	Net Return \$/ac
Winter Hardy CC	214 A		792.55 A
Winter Term. CC	217 A		805.04 A

2020 SOYBEAN YIELDS (BU/AC)

Treatments	Yield	Marg.	Net Return \$/ac
Winter Hardy CC	73A		669.34A
Winter Term. CC	76A		694.02A

2020 CORN YIELDS (BU/AC)

Treatments	Yield	Marg.	Net Return \$/ac
Winter Hardy CC	207.8A		701.16A
Winter Term. CC	212.6A		719.79A







COVER CROP YIELD-DRY MATTER TONS/AC (LBS/AC) 2018-2019

Treatment	Yield				
		tons	(lbs.)	tons	(lbs.)
Winter Hardy	fall	.91	(1820)	spring	.37 740
Winter Terminated		1.46	(2920)		- -

	Total Tonnage
Winter Hardy	.91 + .37 = 1.28 tons
Winter Terminated	1.46 = 1.46 tons

COVER CROP YIELD-DRY MATTER TONS/AC & NUTRIENTS LBS/AC FALL 2020

Treatment	Yield Biomass tons	C (lbs.)	N	C/N Ratio
Winter Hardy (Rye/Brassicas)	1.08	900	33	27.27
Winter Terminated (Oats/Brassicas)	1.55	1311	45	29.13

COVER CROP DRY MATTER TONS/AC (LBS/AC) & FEED VALUE FALL 2020

- Treatment (Rye) Yield

Fall CC Yld	tons(lbs)	% CP	TDN
Winter Hardy			
Rye/Brassicas	1.08 (2160)	8.2 (1771lbs)	75.3 (1626lbs)
Winter Term.			
Oats/Brassicas	1.55 (3100)	7.5 (2331lbs)	72.3 (2241lbs)

















Cover Crop/SB



COVER CROP EFFECT ON SOIL TEMPERATURE



Link to Cover Crop Resources

<http://cropwatch.unl.edu/covercrops>