

Effect of Winter Cereal Cover Crop on Subsequent Grain Yields

Year 3 – 2014 Crop Year

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Rationale

- Cover crops may offer an opportunity to grow biomass to improve soil health and reduce soil erosion potential in central Kansas
- Winter cereal may be suited in central Kansas within the row-crop portion of the rotation (Milo>CC>Soybean>Wheat)
- Not fully understood are the potential impacts of growing a cover crop on the subsequent crop and cropping system

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Objectives

- Use on-farm research techniques to evaluate the effects of winter cereal on subsequent soybean and wheat yields
- Improve ability to efficiently and effectively carry out on-farm research
- Evaluate process of implementing on-farm research across multiple locations and farming operations

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2012 Materials and Methods

- Treatments
 - 1 – No-Till Fallow
 - 2 – Oat Cover Crop (65 lbs/ac)
 - 3 – Oat Cover Crop (65 lbs/ac) plus 25 lb/ac actual N in-furrow as dry urea at planting
- Each treatment replicated 3 times at each location

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2013 Materials and Methods

- Treatments

- 1 – No-Till Fallow
- 2 – Oat Cover Crop (65 lbs/ac)
- 3 – Oat Cover Crop (65 lbs/ac) plus 25 lb/ac actual N in-furrow as dry urea at planting
- 4 – Cover Crop Mix
 - spring oats and barley, winter barley, rapeseed, common and hairy vetch, buckwheat, turnip, radish, flax
 - only included at Rush Co location

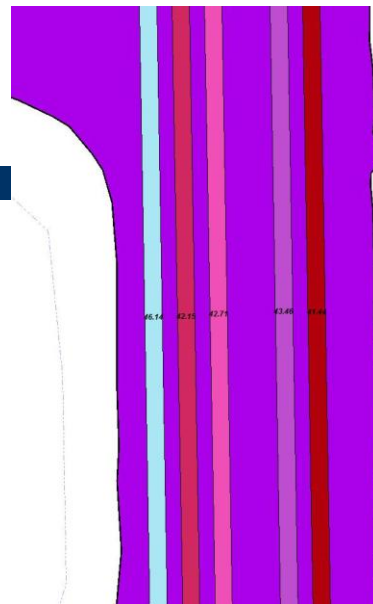
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Analysis

- Buffered treatment strips (plots) by $\frac{1}{2}$ header width to ensure that only full pass of treatment yield data was included
- Aggregated data to each plot and recorded yield into Excel spreadsheet



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Analysis

- Analysis of Variance was conducted with the MIXED procedure in SAS 9.2
- Each site was analyzed independently
- An across-sites analysis was conducted
- P-value of 0.05 criteria for significance

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2012 Soybean Yield Results

Treatment	Dickinson	Jewell	Mitchell	Across Locations
	bu ac ⁻¹			
NT Fallow	45.7 a	38.3 a	42.6 a	42.3 a
Oat Cover	42.6 b	24.7 b	36.3 b	34.5 b
Oat Cover w/Nitrogen	42.5 b	20.2 b	31.2 c	30.8 c
<u>ANOVA P>F</u>				
Source				
Treatment	0.0112	0.0013	0.0001	<0.0001
LSD = 0.05	1.8	6.6	3.6	3.2

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2013 Wheat Yields (on 2012 sites)

Treatment	Barton	Dickinson	Jewell	Mitchell	Across Locations
			bu ac ⁻¹		
NT Fallow	59.9 a	83.1	43.8	56.2	60.3
Oat Cover	47.8 b	83.1	45.1	54.3	57.6
Oat Cover w/Nitrogen	46.7 b	84.1	46.5	56.1	58.6
<u>ANOVA P>F</u>					
Source					
Treatment	0.0094	0.8877	0.1815	0.1787	0.1438
LSD = 0.05	6.7	ns	ns	ns	ns

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2013 Soybean Yields

Treatment	Rush	Saline
		bu ac ⁻¹
NT Fallow	12.9 a	43.8
Oat Cover	7.5 b	44.3
Oat Cover w/Nitrogen	7.9 b	42.3
Cover Crop Mix	5.2 b	-
<u>ANOVA P>F</u>		
Source		
Treatment	0.0014	0.5745
LSD = 0.05	2.9	ns



2014 Materials and Methods

- Treatments
 - 1 – No-Till Fallow
 - 2 – Rye Cover Crop (55 lbs/ac)
- Each treatment replicated three times at each location

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Materials and Methods - Rush

- Previous Crop – Grain Sorghum
- Cover Crop Seeded – Nov 4, 2013
- Cover Crop Terminated – May 3, 2014
- Soybeans Seeded – May 19, 2014
- Soybeans Harvested – Sept 25, 2014

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Materials and Methods – Rush 2014 Plot Plan



- Strip plot design
- 3 replications of 2 treatments
- 100ft wide strips
- Ensures at least 1 clean yield monitor pass

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Photos – Rush Co



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Materials and Methods - Mitchell

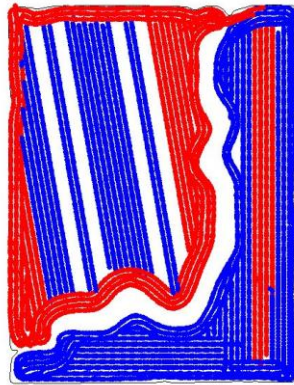
- Previous Crop – Grain Sorghum
- Cover Crop Seeded – Nov 13, 2013
- Cover Crop Terminated – May 6, 2014
- Soybeans Seeded – May 18, 2014
- Soybeans Harvested – Sept 29, 2014

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Materials and Methods – Mitchell 2014 Plot Plan



- Strip plot design
- 3 replications of 2 treatments
- 80ft wide strips
- Ensures at least 1 clean yield monitor pass

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Photos – Mitchell Co



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Materials and Methods - Jewell

- Previous Crop – Grain Sorghum
- Cover Crop Seeded – Nov 20, 2013
- Cover Crop Terminated – May 9, 2014
- Soybeans Seeded – May 27, 2014
- Soybeans Harvested – Oct 13, 2014

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Photos – Jewell Co



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Photos – Jewell Co



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Results - 2014 Soybean Yields

Treatment	Rush	Jewell	Mitchell	Across Locations
				bu ac ⁻¹
Rye Cover	34.3 b	47.3	45.2	42.4
Fallow	41.8 a	45.2	44.8	43.8
<u>ANOVA P>F</u>				
Source				
Treatment	0.0091	0.3283	0.7161	0.3401
LSD = 0.05	3.1	ns	ns	ns

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Conclusions

- Coordinated multi-site studies allows collection of multiple “site-years” in less time
- Oat cover crop had a negative effect on subsequent soybean yield in 4 out of 5 site years
- Oat cover crop had a negative effect on wheat yield following soybeans in 1 out of 4 site years
- Rye cover crop had a negative effect on subsequent soybean yield in 1 out of 3 site years

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Conclusions

- Risk of losing yield on subsequent soybean crop increases in drier environments
- Western site will not continue with management practice
- Other locations are more unclear – may implement management practice in certain situations
- Did not experience yield benefit from cover crop at any site year location

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Thank You

- KARTA for grant to support this research
- Lucas Haag
- Questions?

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