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2011 Cover Crop Planting Date By Seeding Rate Trial

Dr. Heather Darby
Chantel Cline, Erica Cummings, Rosalie Madden, and Hannah Harwood

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802-524-6501

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2011 Cover Crop Planting Date x Seeding Rate Trial

Heather Darby, University of Vermont Extension
Heather. Darby[at]uvm.edu

When corn silage is harvested, the entire plant is removed, leaving the soil exposed throughout the winter. Many farmers have started planting cover crops following corn harvest because of increased soil health and fertility. The cover crop protects the soil from erosion and adds organic matter, it also scavenges excess soil nitrogen (N), releasing it again after being terminated in the spring. This keeps the nitrogen from potentially being lost through leaching and brings farmers financial benefits as less nitrogen loss means less fertilizer is needed in the spring. Farmers have asked about best methods for growing cover crops to increase benefits to soil health while still protecting corn silage yield and quality. For this region where the growing season is short and common adverse fall weather can delay planting. This study was intended to determine which planting dates and seeding rates provide the best winter rye cover crop performance.

MATERIALS AND METHODS

The experiment was initiated at Borderview Farm in Alburgh, VT in the fall of 2010. The experimental design was a randomized complete block in a split plot design. The winter rye cover crop was planted on four dates (5-Oct, 14-Oct, 21-Oct, and 29-Oct) and at five seeding rates (50, 75, 100, 125, and 150 pounds per acre). The winter rye was seeded by broadcasting and lightly harrowing the seed into the soil. The research plots were 5' by 10'. The previous crop was corn and the seedbed was prepared by disking. The soil was a silty loam. The ground coverage provided by the cover crop and soil temperature was measured on 12-April and the 2-May. On May 24th 2011 the cover crop was harvested by clipping the plant material from a 18" by 18" quadrat. The sample was then dried and weighed to determine dry matter yield. Agronomic information for the experiment is in table 1.

Table 1. Agronomic information for cover crop planting date by seeding rate.

Trial information	Borderview Farm, Alburgh, VT
Soil type	Benson rocky silt loam
Previous crop	Corn
Plot size (ft.)	5 X 10
Fertilizer	None applied
Replicates	4
Seeding rates(lbs/acre)	50, 75, 100, 125, 150
Planting date	10/5/10, 10/14/10, 10/21/10, 10,29/10
Harvest date	24-May-11

RESULTS

In October, there were higher than average temperatures and precipitation allowing for adequate and germination during the experiment. The month of November and December also brought warm temperatures allowing the winter rye to grow throughout the fall months.

Table 2. Summarized weather data for Borderview Farm Alburgh, VT, 2010 and 2011

South Hero (Alburgh)	Oct. 2010	Nov. 2010	Dec. 2010	Jan. 2011	Feb. 2011	Mar. 2011	Apr. 2011l	May 2011
Average Temperature (°F)	50.6	39.9	27.7	22.8	20.8	32.9	46.6	58.7
Departure from Normal*	1.8	2.2	2.3	4.6	0.5	2.1	3.1	2.1
Precipitation (inches)	6.73	2.93	3.39	0.90	3.12	3.39	7.88	8.67
Departure from Normal	3.75	0.00	1.52	-1.05	1.71	1.07	5.00	5.35
Growing Degree Days (base 32°F)	578	243	17.1	0.0	0.0	144.2	465	826
Departure from Normal	57.4	63.4	12.4	0.0	0.0	27.9	120	63.6

*Based on 30 year historical averages.

Impact of Planting Date

April measurements of ground cover indicated that the 5-October planting date provided the most soil coverage (Table 3). As the spring progressed the winter rye produced more biomass allowing for significant soil coverage by early May. The 5 and 14 of October planting dates still yielded the best soil coverage well over 80%. Soil temperature was only slightly impacted by winter rye planting date. Interestingly in early April the soil temperature was warmest where there was more ground coverage. The 5 and 14 of October planting dates yield the most dry matter per acre (Table 4; Figure 1). The late October planting date yielded 63% less than the early October date. The 5 and 14 of October planting dates also produced the most plant biomass nitrogen per acre. More than 70 lbs of plant biomass N per acre would be recycled into the soil for the subsequent crop. Increased biomass allows for great soil coverage and also nitrogen scavenging potential both beneficial to the farmer and the environment.

Table 3. Impact of winter rye planting date on ground cover and soil temperature in spring 2011.

Planting date	**Ground cover**		**Soil temperature**	
	4-12-11	**5-2-11**	**4-12-11**	**5-2-11**
	%		**°F**	
5-October	**34.0***	**88.5***	46.8	47.2
14-October	21.0	82.5*	48.1	48.4
21-October	15.5	80.6	**48.9**	**48.7**
29-October	8.5	60.8	43.8	48.1
LSD(0.10)	5.5	7.4	0.60	0.60
Trial mean	19.8	78.2	48.0	48.1

*Results those are not significantly different that the top performers in a particular column are indicated with an asterisk.

Table 4. Impact of planting date on winter rye dry matter and nitrogen yield in spring of 2011.

Planting date	Dry matter yield	Plant biomass nitrogen	
	lbs/acre	%	lbs/acre
5-October	**3981***	1.8	71.7
14-October	3875*	1.9	73.6
21-October	2789	1.9	52.9
29-October	1443	**2.1***	30.3
LSD	485	0.10	NA
Trial Mean	3022	1.98	NA

*Results those are not significantly different that the top performers in a particular column are indicated with an asterisk.
NA- Statistical analysis not completed on this portion of the data.

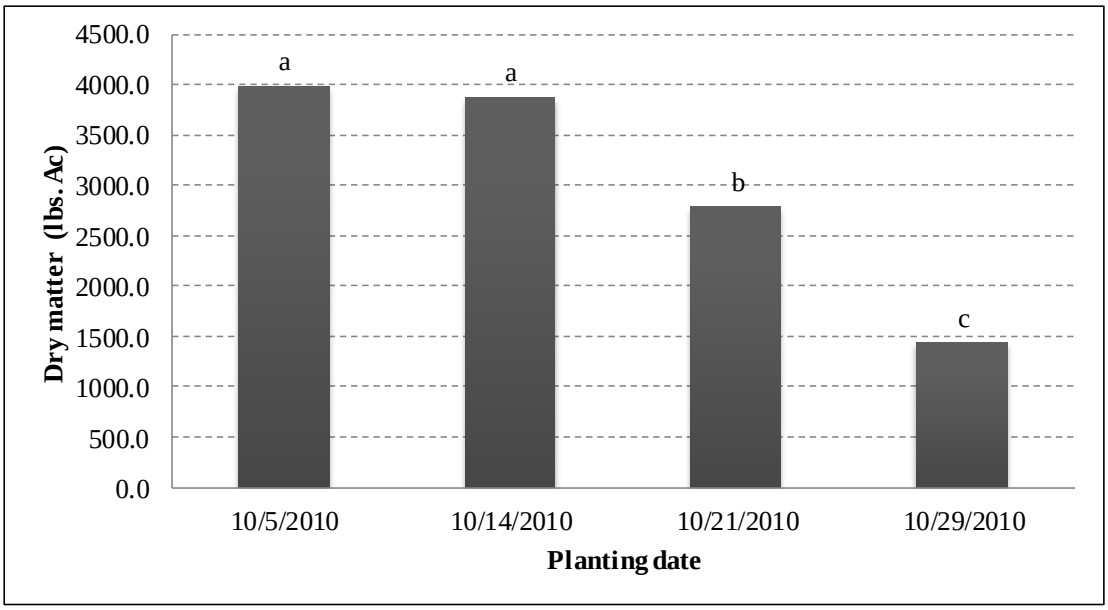

Figure 1. Impact of planting date on winter rye dry matter yields in spring of 2011.

Impact of Seeding Rate

Winter rye seeding rate significantly impacted the percentage of ground cover (Table 5). Seeding rates of 100, 125, and 150 lbs per acre resulted in significantly higher ground coverage when compared to 50 and 75 lb per acre seeding rates. There was no impact of seeding rate on soil temperature. The highest dry matter yields were obtained at seeding rates of 100, 125, and 150 lbs per acre. The higher biomass also translated into the greatest yield of nitrogen.

Table 5. Impact of winter rye seeding rate on ground cover and soil temperature.

Seeding rate	Ground cover		Soil temperature	
	4-12-11	**5-2-11**	**4-12-11**	**5-2-11**
	%		**°F**	
50	12.4	66.7	47.9	48.1
75	16.5	75.7	47.8	48.3
100	20.3*	80.8*	**48.7**	**48.4**
125	**25.4***	83.8*	47.8	47.9
150	24.4*	**84.0***	48.0	48.2
LSD (0.10)	6.2	8.3	NS	NS
Trial mean	19.7	78.2	48.0	48.2

*Results those are not significantly different that the top performers in a particular column are indicated with an asterisk.
NS- None of the treatments were significantly different form one another.

Table 6. Impact of seeding rate on winter rye dry matter and nitrogen yield in spring of 2011.

Seeding rate	Dry matter yield	Plant biomass nitrogen	
	lbs/acre	%	lbs/acre
50	2339	**2.0**	46.8
75	2931	2.0	58.6
100	3181*	1.9	63.6
125	**3392***	2.0	67.8
150	3267*	1.9	65.3
LSD	543	NS	NA
Trial Mean	3022	2.0	NA

*Results those are not significantly different that the top performers in a particular column are indicated with an asterisk.
NS- None of the treatments were significantly different form one another.
NA- Statistical analysis not completed on this portion of the data.

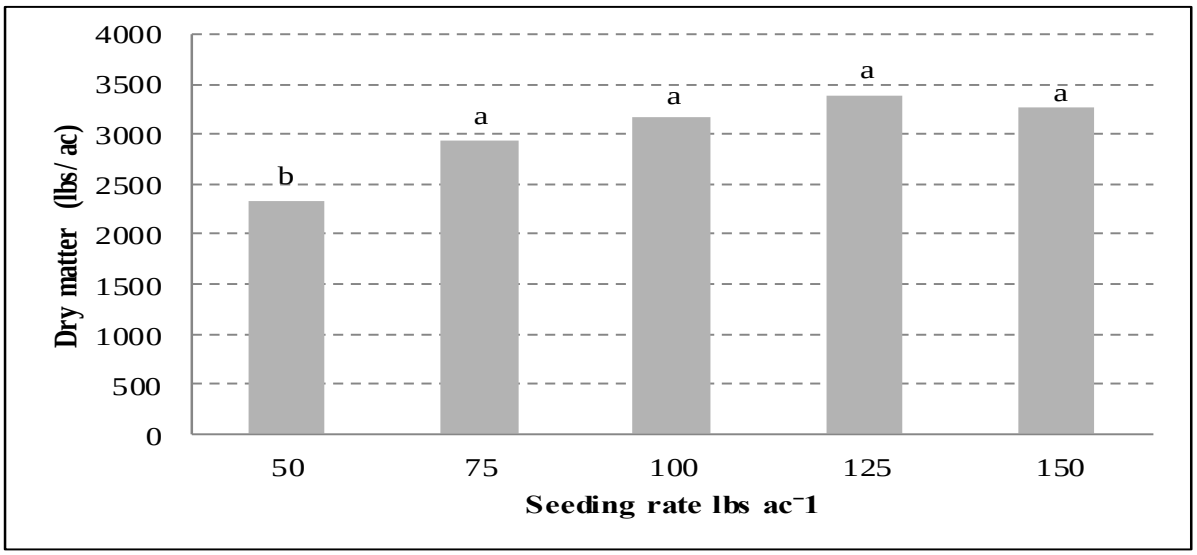

Figure 2. Impact of seeding rate on winter rye dry matter yields in spring of 2011.

DISCUSSION

Cover crop planting is important to reduce erosion throughout the non-growing season months. Cover cropping can also provide other benefits such as improved soil tilth and nitrogen for the subsequent crop. Based on this research the earlier the winter cover crop can be seeded the better ground coverage and more plant biomass that can be obtained from this critical practice. Late cover crop plantings will ultimately result in poor soil coverage and may not aide in reducing soil erosion. Seeding rates of at least 100 lbs per acre will also provide adequate coverage and yields. Increasing the seeding rate above 100 lbs per acre would be more costly and does not appear to provide any additional benefit to plant yield and ground coverage regardless of the planting date. It should be noted that these plots were broadcast seeded and hence lower seeding rates may be appropriate for drill seeding.

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