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2011 Cover Crop Planting Date Trial

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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. In our region the growing season is short and common adverse fall weather can delay planting. It is important to understand the proper planting dates to maximize the cover crop benefits to the farmer and the environment. This study was designed to see what planting dates give the best cover crop performance into the spring.

MATERIALS AND METHOD

The experiment was initiated at Borderview Farm in Alburgh, VT in the fall of 2010. The experimental design was a randomized complete block design with three replications. In 2010, there were 8 weekly planting dates starting on 2-Sep. and ending on the 21-Oct. All plots were broadcast seeded and lightly incorporated with a tine harrow. The research plots were 10' by 22'. The ground coverage provided by the cover crop, crop height, and soil temperature was measured on 12-April and the 2-May. The cover crop was harvested on the 13-May in 2011. The cover crop biomass was measured by clipping plant material from a 2' diameter hoop. Plant analysis was used to determine the amount of nitrogen scavenged by the cover crop. The sample was then dried and weighed to determine dry matter yield. Trial agronomic information is listed 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	Winter canola
Plot size (ft.)	10 by 22
Seeding rate	100 lb ac^{-1}
Replicates	3
Planting date (2010)	9/2, 9/9, 9/16, 9/23, 9/29, 10/6, 10/14, 10/21
Harvest date (2011)	13-May

Variations in project can occur because of variations in genetics, soil, weather, and other growing conditions. Statistical analysis makes it possible to determine whether a difference among treatments is real or whether it might have occurred due to other variations in the field. At the bottom of each table a LSD value is presented for each variable (e.g. yield). Least Significant Differences (LSD's) at the 10% level of probability are shown. Where the difference between two treatments within a column is equal to

or greater than the LSD value at the bottom of the column, you can be sure in 9 out of 10 chances that there is a real difference between the two values. Treatments that were not significantly lower in performance than the highest value in a particular column are indicated with an asterisk. In the example below, treatment A is significantly different from treatment C but not from treatment C but not from treatment B. The difference between A and B is equal to 400, which is less than the LSD value of 2.0. This means that these treatments did not differ in yield. The difference between A and C is equal to 3.0, which is greater than the LSD value of 2.0. This means that the yield of these treatments were significantly different from one another.

Treatment	Yield
A	**2100***
B	1900*
C	1700
LSD	300.0

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. Warm early spring weather also resulted in substantial cover crop growth in March and April.

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.

Cover crop height was significantly higher at the 2-Sep. planting date regardless of measurement date. At the 12-April measurement date the cover crop provided 59.7% ground cover when seeded on the earliest date in September. The winter rye planting dates of 2, 9, 16, and 23 of September resulted in the most soil coverage. Cover crop planted in October provided the least coverage. Cover crop dry matter yields were highest when planted on the 2, 9, and 16th of September. At these planting dates dry matter yields ranged from 7189 to 5801 lbs of dry matter per acre. The 23rd of September planting date also yielded adequate coverage and yields. October planting dates were far less productive. As dry matter yield increased the amount of nitrogen in the plant biomass also increased per acre. Earlier planting dates also resulted in 160 to 200 lbs of nitrogen per acre. In order for N to be released from the plant biomass soil microorganisms must break down the residue into the plant available forms of nitrogen. Therefore the stage of maturity of the cover crop when terminated will be important to make sure the nitrogen is released in a timely fashion for the subsequent crop. Given the corn silage harvest schedule and growing season it is unlikely that cover crops would be seeded in early to mid-September. Planting dates of late

September to early October are more realistic and should be the target of producers to maximize cover crop benefits. Practices such as interseeding and aerial seeding may help achieve cover crop benefits through earlier planting dates.

Table 3. Impact of planting date on cover crop height and ground cover in spring of 2011.

Planting date	Cover crop height				Ground cover			
	4-12	4-22	5-2	5-9	4-12	4-22	5-2	5-9
	inches				%			
9/2/2010	**6.1***	**7.8***	**13.9***	**23.9***	**59.7**	**39***	90.6*	81.2*
9/9/2010	4.7	7.8*	11.8	21.1*	45.7	36*	98.3*	90.6*
9/16/2010	4.6	6.4	11.7	20.2	43.0	39*	99.1*	**95.7***
9/23/2010	4.2	6.4	11.6	19.5	43.7	38.7*	**99.1***	90.6*
9/29/2010	3.3	3.5	9.1	10.8	16.3	10.7	73.5	48.7
10/6/2010	2.7	3.3	8.1	13.0	12.0	29.3	83.8	43.6
10/14/2010	0.9	2.7	6.0	8.8	6.7	20.7	70.9	56.4
10/21/2010	1.5	3.0	6.0	6.7	6.3	20.7	64.1	46.2
LSD (0.10)	0.8	0.8	1.5	2.9	11.4	9.6	13.1	22.3
Trial mean	3.5	5.1	9.8	15.5	32.9	29.3	84.9	69.1

*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 3. Impact of planting date on winter rye dry matter and nitrogen yield.

Planting date	Dry matter yield	Plant biomass nitrogen	
	lbs/acre	%	lbs/acre
9/2/2010	**7189***	**2.8***	**201***
9/9/2010	6618*	2.6*	171*
9/16/2010	5803*	2.8*	161*
9/23/2010	4056	2.5*	107
9/29/2010	1049	2.3	24.7
10/6/2010	1339	2.2	30.3
10/14/2010	589	2.5*	15.9
10/21/2010	314	2.1	11.2
LSD (0.10)	1591	0.30	45.5
Trial mean	3369	2.50	90.3

*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.

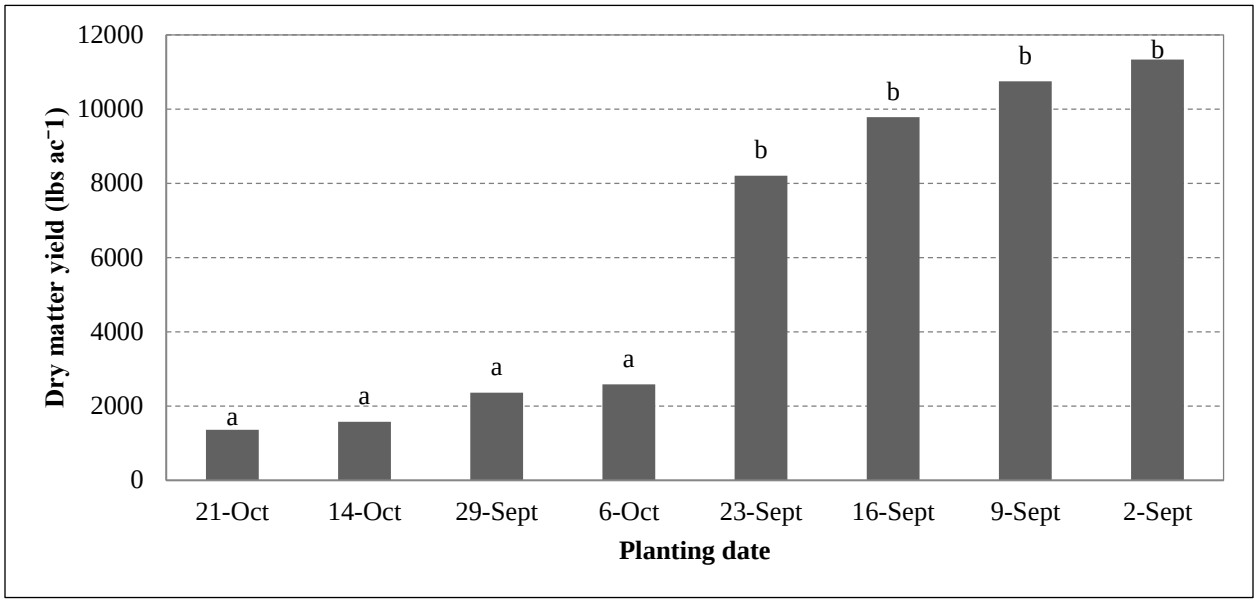

Figure 1. Impact of planting date on dry matter yield of cover crop. Treatments with the same letter are not significantly different.

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