Cover Crop Mix in Corn Silage Trial

NORTHWEST CROPS & SOILS PROGRAM

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2015 COVER CROP MIX IN CORN SILAGE TRIAL

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INTRODUCTION

While growing corn silage, it is important to plan for soil health management during the season. Cover cropping is one way to prevent soil erosion, maintain and/or improve soil nutrients, improve soil aggregation, prevent nutrient loss from runoff, and increase water retention. Such soil improvements can promote conditions that add resiliency to a crop, especially in light of extreme weather patterns that may affect yields. It can be challenging to grow cover crop into corn silage without having proper interseeding equipment, or correct timing, so that the cover crop will be able to survive. In this trial, our goals were to evaluate the effect of cover crop seeding dates within corn silage varieties of differing relative maturities and harvest dates. An additional goal was to evaluate a variety of cover crop mixes for biomass production and percent cover. The trial consisted of three corn varieties at 85, 96, and 110 relative maturity (RM) each, planted with nine cover crop mixes in order to assess management strategies for establishing a robust cover crop and maintaining corn yields.

MATERIALS AND METHODS

The cover crop mix in corn silage trial took place at Borderview Research Farm in Alburgh, VT. General plot information is shared in Table 1. Three varieties of corn, Mycogen TMF2R198 110 day RM, Mycogen TMF2Q413 96 day RM, and Mycogen TMF2H699 85 day RM were planted on 5-May (Table 1). Corn was harvested from the 110 day corn on 23-Sep, the 96 day corn on 15-Sep, and the 85 day corn on 2-Sep.

Nine cover crop mixes were interseeded in each variety of corn (Table 2). On 19-Jun the 110 day corn was interseeded with each cover crop mix using the Penn State Interseeder (Figure 1). The 96 day corn was interseeded on 16-Sep and the 85 day corn on 4-Sep, both using a grain drill (Table 1).

Photos of the cover crop were taken on 28-Oct in order to assess the percent of cover from the cover crop, as opposed to bare ground. Photos were taken in all three corn silage plantings, however, cover crop did not establish in the 110 day corn. Cover crop mixes were sampled on 26-Oct to determine biomass only for the 85 day corn planting, since the 96 day planting did not have a substantial amount of cover crop growth. The samples were weighed and dried till they reached a stable weight.

Table 1. General plot management, 2015.

Trial Information	Borderview Research Farm Alburgh, VT
Soil Type	Benson rocky silt loam 8-15% slope Covington silty clay loam 0-3% slope
Previous crop	Corn
Varieties	Mycogen TMF2R198, 110 RM Mycogen TMF2Q413, 96 RM Mycogen TMF2H699, 85 RM
Corn planting dates	5-May
Harvest date	23-Sep, 15-Sep, 2-Sep
Corn seeding rate	34,000 seeds ac^{-1}
Tillage methods	Disk and spike tooth harrow
Cover crop planting dates	19-Jun in 110 RM 16-Sep in 96 RM 4-Sep in 85 RM

Figure 1. The Penn State Interseeder.

Table 2. Cover crop mixes, Alburgh, VT 2015.

Cover Crop Mixes
Mix 1: Fria Ryegrass and Eco-Till Radish (pre-mixed) (18 lbs/acre)
Mix 2: Tri-Cal Triticale (60 lbs/acre) and Dwarf Essex Rape (3 lbs/acre)
Mix 3: Everleaf Oats (60 lbs/acre) and Groundhog Radish (3 lbs/acre)
Mix 4: Winter Rye (40 lbs/acre), Milvus Clover (5 lbs/acre), and T-Raptor Brassica (2 lbs/acre)
Mix 5: Prince Brand Rye Grass (12 lbs/acre) and Milvus Clover (6 lbs/acre)
Mix 6: Winter Wheat (60 lbs/acre) and Ladino Clover (6 lbs/acre)
Mix 7: Soil Builder - TriCal Triticale, MOI & KB Supreme ryegrass, Crimson Clover, Hairy Vetch, and Daikon Radish (120 lbs/acre)
Mix 8: Indy Mix - Tillage Root Max Ryegrass, Crimson Clover, and Tillage Radish (18 lbs/acre)
Mix 9: Everleaf Oats (40 lbs/acre), Dynamite Clover (5 lbs/acre), and Vivant Radish (2 lbs/acre)
Mix 10: Control

Variations in yield and quality can occur because of variations in genetics, soil, weather and other growing conditions. Statistical analysis makes it possible to determine whether a difference among varieties 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 (i.e. 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 varieties. Treatments that were not significantly lower in performance than the highest value in a particular column are indicated with an asterisk. In the following example, A is significantly different from C but not from B. The difference between A and B is equal to 1.5, which is less than the LSD

value of 2.0. This means that these varieties 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 yields of these varieties were significantly different from one another. The asterisk indicates that B was not significantly lower than the top yielding variety.

Variety	Yield
A	6.0
B	7.5*
C	9.0*
LSD	**2.0**

The p-value is another statistical marker that is given. This value represents the probability that the difference between treatments happened randomly by chance. For example, a trial comparing the nutritive quality of forage A and forage B has a p-value of 0.01. That means that there is a 1% chance that the difference in quality between the two forages was a random occurrence and there is a 99% chance that the difference in quality was due to the difference in the forages themselves.

RESULTS AND DISCUSSION

Seasonal precipitation and temperature was recorded with a Davis Instrument Vantage Pro2 weather station, equipped with a WeatherLink data logger at Borderview Research Farm in Alburgh, VT. June was a wet month with 2.73 more inches of precipitation than normal (Table 3). The remainder of the summer was relatively dry with 9.92 fewer inches of precipitation than normal over July, August, and September. Temperature varied with May and September being much warmer than the 30 year average. Overall, there were an average of 2523 Growing Degree Days (GDDs) accumulated this season which is 311 more than the 30-year average.

Table 3. Seasonal weather data[1] collected in Alburgh, VT, 2015.

Alburgh, VT	April	May	June	July	August	September
Average temperature (°F)	43.4	61.9	63.1	70.0	69.7	65.2
Departure from normal	-1.4	5.5	-2.7	-0.6	0.9	4.6
Precipitation (inches)	0.09	1.94	6.42	1.45	0.00	0.34
Departure from normal	-2.73	-1.51	2.73	-2.70	-3.91	-3.30
Growing Degree Days (base 50°F)	22	376	399	630	626	470
Departure from normal	22	177	-75	-10	45	152

[1]Based on weather data from a Davis Instruments Vantage Pro2 with WeatherLink data logger.
Historical averages are for 30 years of NOAA data (1981-2010) from Burlington, VT.

All three corn varieties yielded well for the 2015 season (Table 4).

Table 4. Yields from corn silage of varying relative maturity, Alburgh, VT, 2015.

Corn varieties, planted 5-May		Moisture content at harvest	Yield at 65% mst	Corn harvest	Cover crop planting
Relative maturity	**Name**	**%**	**Tons/acre**	**Date**	**Date**
110 day	Mycogen TMF2R198	59.7	30.5	23-Sep	19-Jun
96 day	Mycogen TMF2Q413	54.9	43.9	15-Sep	16-Sep
85 day	Mycogen TMF2H699	66.6	35.4	2-Sep	4-Sep

Percent cover in the 85 day corn was significantly higher than percent cover in the 96 day corn (p = <.0001) (Figure 2). When comparing percent cover crop mixes from the 85 day corn only, mix 4 of winter rye, milvus clover, and t-raptor brassica was the top performer. Mixes 9, 1, 3, 7, and 8 did not perform significantly lower than the top performing cover crop, LSD (0.10) = 16.5%. When comparing dry matter yield from the 85 day corn only, mix 1 of fria ryegrass and eco-till radish had the greatest yield. Mixes 9, 8, 4, 3, and 7 did not perform significantly lower than the top performing cover crop mix, LSD (0.10) = 279.5 (Figure 3).

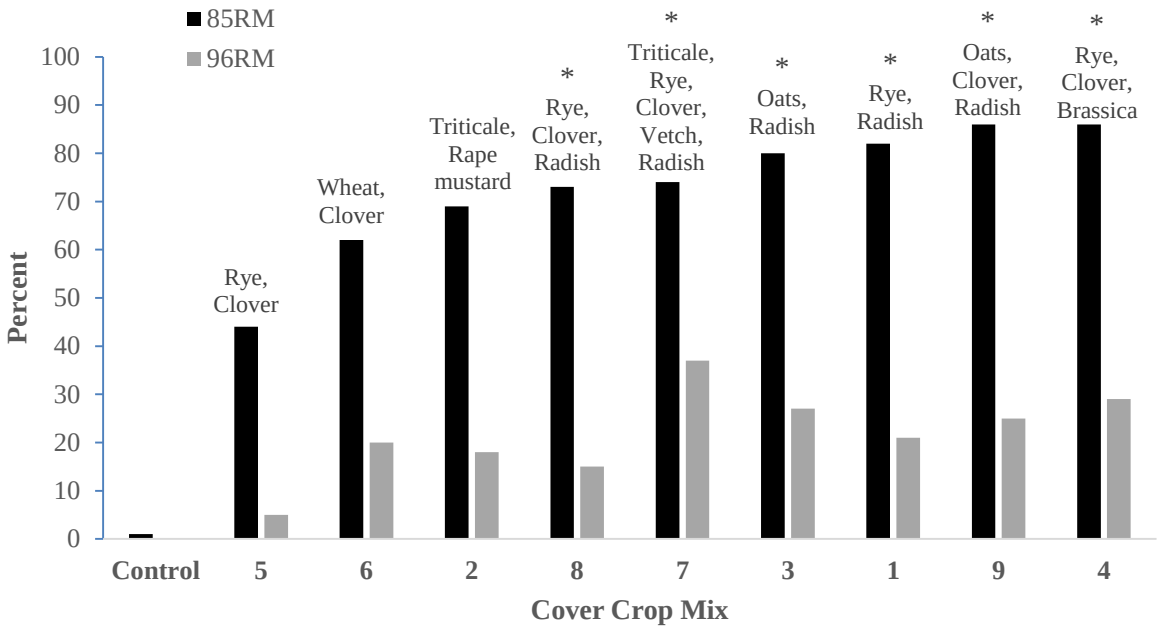

Figure 2. Percent cover from the cover crop mixes in the 85 and 96 relative maturity corn silage, Albugh, VT 2015. Percent cover varied significantly based on corn relative maturity (p = <.0001). Cover crop mixes from the 85 day corn indicated with an asterisk did not perform significantly lower than the top performing cover crop mix, LSD (0.10) = 16.5%.

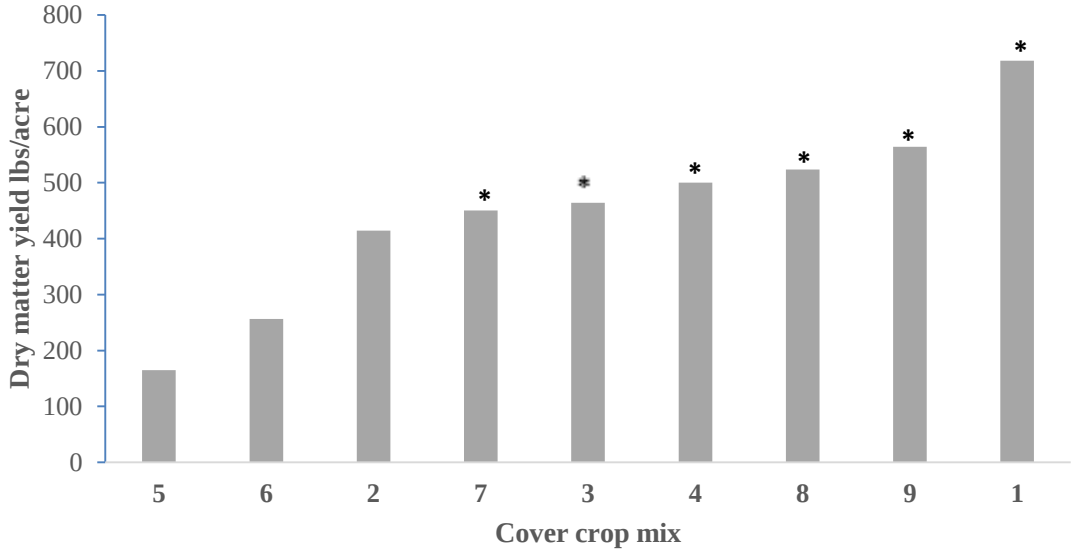

Figure 3. Cover crop mixes dry matter yield from the 85 day corn. Cover crop mixes indicated with an asterisk did not perform significantly lower than the top performing cover crop mix, LSD (0.10) = 279.5.

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