2018 Cover Crop Variety Trial

Dr. Heather Darby, UVM Extension Agronomist
Abha Gupta, Lindsey Ruhl, and Sara Ziegler
UVM Extension Crops and Soils Technicians
(802) 524-6501

Visit us on the web: http://www.uvm.edu/extension/cropsoil

THE UNIVERSITY OF VERMONT
EXTENSION

2018 COVER CROP VARIETY TRIAL

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

Boosting and maintaining soil health can provide a multitude of benefits to the farming operation. Cover cropping is a strategy that can be used to improve soil health. Cover cropping prevents 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 a successful cover crop given other demands from a farm operation and weather limitations. In this trial, our goals were to evaluate the effect of various cover crop combinations on percent soil cover, cover crop biomass and nutrient concentration, soil active carbon, soil aggregate stability, soil nitrate-N, and subsequent crop yields.

MATERIALS AND METHODS

Table 1. Agronomic information for the cover crop variety trial, Alburgh, Fairfax, and Grand Isle, VT, 2018.

Location	Borderview Research Farm Alburgh, VT	River Berry Farm Fairfax, VT	Pomykala Farm Grand Isle, VT
Soil type	Benson rocky silt loam, 8-15% slope	Windsor loamy fine sand, 0-3% slope	Amenia silt loam, 0-3% slope
Previous crop	Summer annuals	Peppers	Broccoli
Plot size (ft)	5 x 20	10 x 300	10 x 75
Planting date	24-Aug and 11-Sep 2017	21-Aug 2017	21-Aug 2017
Planting equipment	Great Plains NT60 Cone Seeder	Sunflower Grain Drill	Sunflower Grain Drill

The trial was conducted at Borderview Research Farm in Alburgh, VT, River Berry Farm in Fairfax, VT, and Pomykala Farm in Grand Isle, VT (Table 1). The experimental design was a randomized complete block with four replications at Borderview Farm and three replications at River Berry and Pomykala Farm.

Table 2. Cover crop mixes grown in the trials.

Mix #	Variety	Seeding rate lb ac^{-1}
1	Annual ryegrass	15
	Crimson clover	9
	Arifi radish	3
2	Fridge triticale	40
	Eco-till tillage radish	2
	Freedom red clover	5
	Lynx winter pea	20
3	Winter rye	40
	Dynamite clover	1
7	Everleaf oats	40
	Duration clover	5
	Appin turnip	2
8	Bruiser ryegrass	15.2
	Appin turnip	2.11
9	Fria ryegrass	22
	Eco-till radish	3
10	Everleaf oats	70
11[t]	Eco-till radish	8
12	Dixie crimson clover	10

	Appin turnip	2	13*ŧ	Everleaf oats	70
4	Hyoctane triticale	60		Eco-till radish	3
	Dynamite clover	3		Crimson clover	10
	Appin turnip	2	14ŧ	VNS winter rye	75
5	Everleaf oats	60	15*	Rye and Vetch	70
	Ground hog radish	3	16	Fria annual ryegrass	30
6	Triticale triticale	60	17	Hairy vetch	24
	Dwarf essex rape	3	18*	Control – No cover crop	

*Cover crops grown at Fairfax location.
ŧCover crops grown at the Grand Isle location.

All seventeen cover crop mixes (Table 2) were planted at the Alburgh location on 24-Aug (Image 1). Mix 13 and 15 were planted at the Fairfax location on 21-Aug (Image 2). Mix 11, 13, and 14 were planted at the Grand Isle location on 21-Aug. These mixes represent both overwintering and winterkilled cover crops.

Image 1. Cover crop treatments, Alburgh, VT, 2017.

Image 2. Cover crop treatments Fairfax, VT, 2017.

On 17-Oct 2017 at Alburgh and on 20-Oct 2017 at Fairfax and Grand Isle locations, all plots were photographed in order to assess the percent soil cover from the cover crops, as opposed to bare ground. Digital images were analyzed with the automated imaging software, IMAGING crop response analyzer, which was programmed in MATLAB (MathWorks, Inc., Natick, MA) and later converted into a free web-based software (www.imaging-crop.dk). At the time of photographing, the biomass within a 0.25 m^2 quadrat was harvested per plot. The biomass was dried at 105° F until a stable weight was reached, which was used to determine dry matter yields. The biomass was evaluated by the University of Vermont Agricultural Testing Lab (Burlington, VT) for carbon and nitrogen concentration. The following spring, percent cover and dry matter yields were measured again on overwintering cover crops 3-May 2018 at Fairfax, and 10-May 2018 at Alburgh and Grand Isle locations. At that time, soil samples from select plots were analyzed by the Cornell Soil Health Testing Laboratory (Ithaca, NY) for wet aggregate stability and active carbon. Cover crop biomass was analyzed for nitrogen concentration by Dairy One Laboratory (Ithaca, NY).

Data on yield and quality from subsequent crops grown in 2018 were also recorded. At Alburgh, plots were incorporated with a disc on 16-May 2018. On 24-May 2018 the sweet corn variety, 'Sugar Buns' was planted. The sweet corn yield and population was measured on 21-Aug by counting the plants and harvesting the ears from the middle two rows of each plot. Corn ear length was measured from a subsample of 5 ears per plot.

At the Grand Isle location, the cover crop was incorporated with a disc on 20-May 2018. On 3-Jul, the sweet corn was planted and fertilized with 100 lbs N ac^{-1}, 100 lbs P ac^{-1} and 300 lbs K ac^{-1}. Three weeks later, the sweet corn was side dressed with 25 lbs N ac^{-1}, 25 lbs P ac^{-1}, and 75 lbs K ac^{-1}. On 30-Aug, sweet corn populations were recorded by counting the number of plants in two 10-foot long sections within each plot. Sweet corn height was recorded by measuring three plants per plot. The sweet corn weight and ear length was recorded by weighing 5 ears per plot.

At the Fairfax location, the cover crop plots were terminated on 1-May and fertilized with 80 lbs N ac^{-1}, 37 lbs P ac^{-1}, and 37 lbs K ac^{-1}. On 3-May, strawberries were planted. The strawberries will not be harvested until 2019.

At all farms, soil nitrate-N samples were collected every two weeks starting on 27-Apr 2018 in Grand Isle, 29-Apr 2018 in Fairfax, and 9-May 2018 in Alburgh and continued until August 2018. Samples were analyzed at the University of Vermont Agricultural Testing Lab (Burlington, VT).

The data was analyzed using mixed model analysis using the mixed procedure of SAS (SAS Institute, 1999). Replications within trials were treated as random effects, and varieties were treated as fixed. Mean comparisons were made using the Least Significant Difference (LSD) procedure when the F-test was considered significant ($p<0.10$).

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

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 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 (i.e. yield). Least Significant Differences (LSDs) at the 0.10 level of significance are shown, except where analyzed by pairwise comparison (t-test). 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 that for 9 out of 10 times, there is a real difference between the two treatments. Treatments that were not significantly lower in performance than the top-performing treatment in a particular column are indicated with an asterisk. In this example, hybrid C is significantly different from hybrid A but not from hybrid B. The difference between C and B is equal to 1.5, which is less than the LSD value of 2.0. This means that these hybrids did not differ in yield. The difference between C and A is equal to 3.0, which is greater than the LSD value of 2.0. This means that the yields of these hybrids were significantly different from one another. The asterisk indicates that hybrid B was not significantly lower than the top yielding hybrid C, indicated in bold.

RESULTS

Seasonal precipitation and temperature were recorded with a Davis Instrument Vantage Pro2 weather station, equipped with a WeatherLink data logger at Borderview Research Farm in Alburgh, VT (Tables 3 and 4).

Table 3. Seasonal weather data collected in Alburgh, VT, 2017.

	2017				
Alburgh, VT	**August**	**September**	**October**	**November**	**December**
Average temperature (°F)	67.7	64.4	57.4	35.2	18.5
Departure from normal	-1.07	3.76	9.16	-2.96	-7.41
Precipitation (inches)	5.5	1.8	3.3	2.3	0.8
Departure from normal	1.63	-1.80	-0.31	-0.84	-1.59
Growing Degree Days (base 50°F)	553	447	287	18	1
Departure from normal	-28	129	287	18	1

Based on weather data from a Davis Instruments Vantage Pro2 with WeatherLink data logger. Alburgh precipitation data from August-October was provided by the NOAA data for Highgate, VT. Historical averages are for 30 years of NOAA data (1981-2010) from Burlington, VT.

Table 4. Seasonal weather data collected in Alburgh, VT, 2018

	2018							
Alburgh, VT	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**
Average temperature (°F)	17.1	27.3	30.4	39.2	59.5	64.4	74.1	72.8
Departure from normal	-1.73	5.79	-0.66	-5.58	3.10	-1.38	3.51	3.96
Precipitation (inches)	0.8	1.2	1.5	4.4	1.9	3.7	2.4	3.0
Departure from normal	-1.26	-0.60	-0.70	1.61	-1.51	0.05	-1.72	-0.95
Growing Degree Days (base 50°F)	3	6	1	37	352	447	728	696
Departure from normal	3	6	1	37	154	-27	88	115

Based on weather data from a Davis Instruments Vantage Pro2 with WeatherLink data logger. Alburgh precipitation data from August-October was provided by the NOAA data for Highgate, VT. Historical averages are for 30 years of NOAA data (1981-2010) from Burlington, VT.

In 2017, August was cooler and wetter than historical averages while September and October were unseasonably hot and dry. The winter months of November through January were cold and dry. The early months of 2018 experienced a lot of variation. February was unseasonably warm, March was typical, April was unseasonably cold and wet, and May was warm and dry. The months of July and August were warmer and dryer than historical averages.

Results from Fairfax Location

Table 5. Cover crop mix yield and quality, Fairfax, VT, 2017-18.

Mix	**Fall 2017**				**Spring 2018**		
	Dry matter yield	**Percent cover**	**Nitrogen**	**C:N**	**Dry matter yield**	**Percent cover**	**Nitrogen**
	lbs ac^{-1}	**%**	**%**	**Ratio**	**lbs ac^{-1}**	**%**	**%**
13	**7380**	**79.1**	3.10	**12.7**	---	4.37	---
15	7268*	72.6*	**4.39**	8.99	1871	66.8	2.88
Control	0	0.231	---	---	---	5.24	---
LSD (0.10)	**2072**	**8.27**	**0.519**	**3.33**	**NA**	**NS**	**NA**
Trial mean	**4883**	**50.7**	**3.75**	**10.8**	**NA**	**5.48**	**NA**

*Treatments marked with an asterisk did not perform statistically worse than the top performing treatment (p=0.10) shown in **bold.**
NS – There was no statistical difference between treatments in a particular column (p=0.10).
NA – Statistical analysis was not performed as only one treatment had living biomass to measure in the spring.

Both treatments 13 (oats, radish, clover) and 15 (winter rye and vetch) performed comparably in the fall for yield and percent soil cover (Table 5). Treatment 15 had a greater nitrogen concentration, which was to be expected as it contained a legume. In the spring, the cover crop that contained winter rye and vetch provided ample soil cover and biomass.

Table 6. Soil active carbon and wet aggregate stability, Fairfax, VT, 3-May 2018.

Mix	**Active carbon**	**Wet aggregate stability**
	mg C kg^{-1}	**%**
15	578	15.8
Control	**634**	15.3
LSD (0.10)	**25.3**	**NS**
Trial mean	**606**	**15.6**

The top performing treatment (p=0.10) shown in **bold.**
NS – There was no statistical difference between treatments in a particular column (p=0.10).

Surprisingly, the control had a greater amount of active carbon in the soil compared to treatment 15 (winter rye and vetch) (Table 6). Soil active carbon was measured prior to termination of the cover crop. Hence, it is possible that the measurement of active carbon would have been higher had the cover crop been amended into the soil before the samples were taken. Ample dead and decomposing weed biomass were present in the control plots and may have contributed to active carbon.

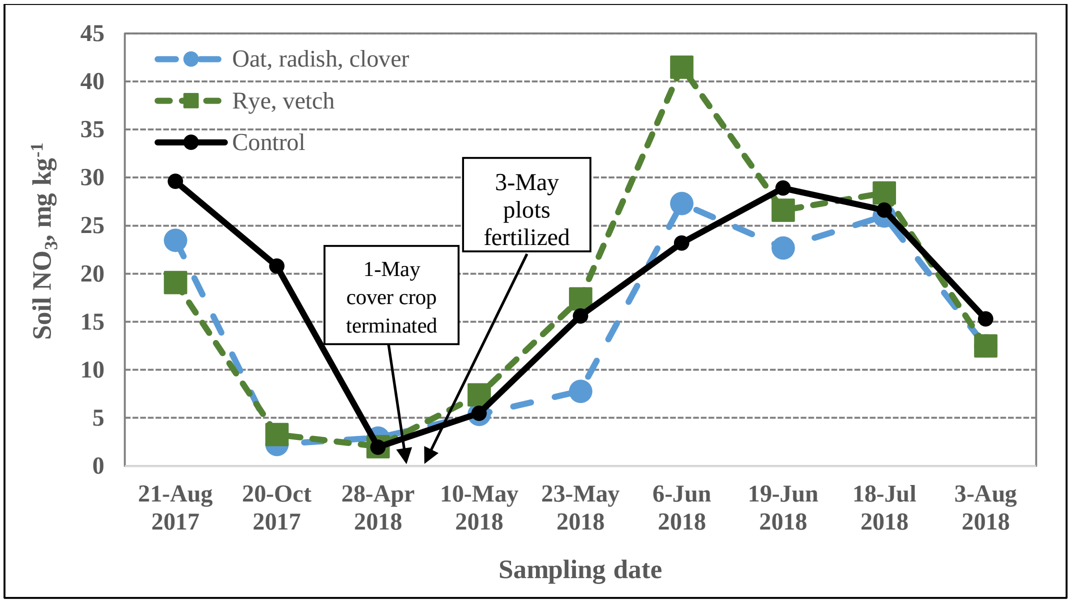

Figure 1. Soil NO_3 results from the Fairfax location.

Table 7. Soil NO_3-N within the different cover crop treatments, Fairfax, VT, 2017-18.

Mix	2017		2018						
	21-Aug	20-Oct	28-Apr	10-May	23-May	6-Jun	19-Jun	18-Jul	3-Aug
	mg kg^{-1}								
13	23.5	2.26	**2.92**	5.37	7.79	27.3	22.7	26.0	12.5
15	19.1	3.27	2.03	7.40	17.4	**41.5**	26.6	28.4	12.5
Control	29.6	**20.8**	1.95	5.48	15.6	23.2	28.9	26.6	15.3
LSD (0.10)	**NS**	**2.12**	**0.745**	**NS**	**NS**	**13.9**	**NS**	**NS**	**NS**
Trial mean	**24.0**	**8.76**	**2.30**	**6.08**	**13.6**	**30.6**	**26.1**	**27.0**	**13.4**

The top performing treatment (p=0.10) shown in **bold.**
NS – There was no statistical difference between treatments in a particular column (p=0.10).

Clearly, the cover crops helped to scavenge excess nitrogen in the soil. In the fall of 2017, the control plots had the highest level of soil nitrates compared to those with a cover crop. For all treatments, soil NO_3-N peaked between 6-Jun and 19-Jun (Figure 1, Table 7). Interestingly, the rye and vetch treatment peaked the highest for soil NO_3-N out of all the treatments. This occurred on the 6-Jun sampling and was significantly higher than the other treatments. This indicates that the N from the rye/vetch cover crop took approximately 40 days to begin mineralizing and releasing NO_3-N. The high levels of NO_3-N in the control show excess nutrients that would likely be lost into the environment. The value of having a cover crop is to scavenge excess nutrients and keep them from leaving the system through leaching or other pathways.

Results from the Grand Isle Location

Table 8. Cover crop mix yield and quality, Grand Isle, VT, 2017-18.

Mix	Fall 2017				Spring 2018		
	Dry matter yield	Percent cover	Nitrogen	C:N	Dry matter yield	Percent cover	Nitrogen
	lbs ac^{-1}	%	%	Ratio	lbs ac^{-1}	%	%
11	2048*	**85.6**	2.72*	13.1	---	15.1	---
13	**2678**	84.4*	2.37*	**17.0**	---	3.00	---
14	1401	71.6	**2.82**	13.6	2279	**35.8**	**2.03**
Control	835	44.9	1.66	12.9	---	17.8	---
LSD (0.10)	**654**	**10.7**	**0.500**	**2.96**	**NA**	**7.04**	**NA**
Trial mean	**1741**	**72.4**	**2.39**	**14.2**	**NA**	**17.9**	**NA**

*Treatments marked with an asterisk did not perform statistically worse than the top performing treatment (p=0.10) shown in **bold.**
NA – Statistical analysis was not performed as only one treatment had living biomass to measure in the spring.

In the fall, treatments 11 (radish) and 13 (oats, clover, radish) were the best performers for yield and ground cover (Table 8). Treatments 11, 13, and 14 (winter rye) had comparable nitrogen concentrations, which may reflect the strong ability for winter rye to absorb available nitrogen. Biomass in the control plots were weeds but still provided adequate ground cover to protect the soil from erosion. Treatment 14 (winter rye) was the best performer for percent soil cover in the spring, which is not surprising since it overwinters.

Table 9. Soil active carbon and wet aggregate stability, Grand Isle, VT, 10-May 2018.

Mix	Active carbon	Wet aggregate stability
	mg C kg^{-1}	%
11	585	**39.7**
14	574	29.7
LSD (0.10)	**NS**	**7.31**
Trial mean	**580.0**	**34.7**

The top performing treatment (p=0.10) shown in **bold.**
NS – There was no statistical difference between treatments in a particular column (p=0.10).

Treatment 11 (radish) outperformed treatment 14 (winter rye) for wet aggregate stability (Table 9). Soil aggregates are formed when biological activity in the soil causes soil particles and organic matter to become glued together. The more glue, the more stable a soil aggregate may become. The stronger the aggregate, the more resistant it is to being degraded when disturbed by rain or mechanical action. Higher aggregate stability can improve soil drainage and other biological properties. The radish growing in the fall likely improved biological activity and helped to build soil aggregates. Once the radish died from cold winter temperature, microbial activity to decompose the root may have further enhanced the aggregate stability.

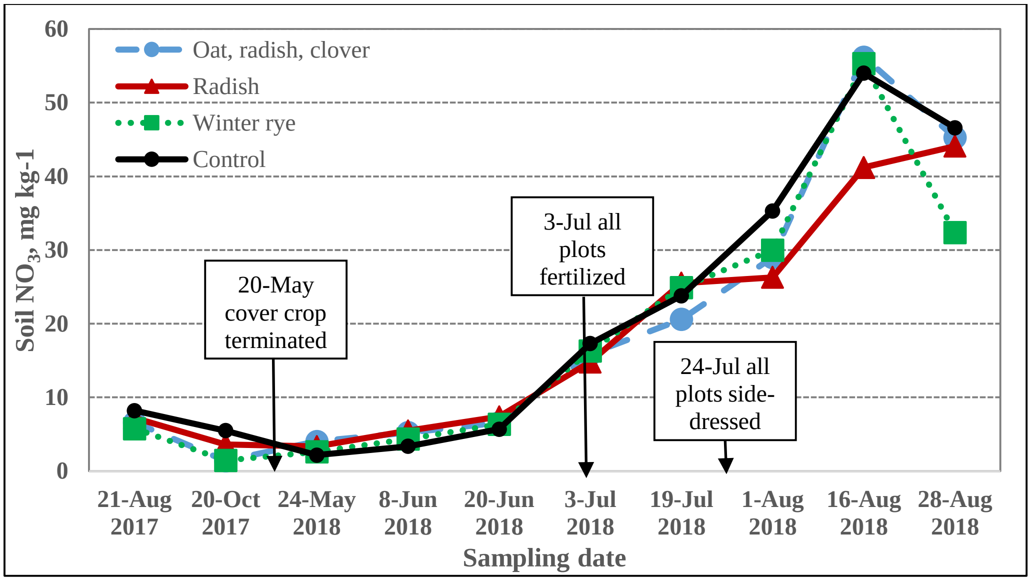

Figure 2. Soil NO_3 results from Grand Isle location, VT, 2017-2018.

Table 10. Soil NO_3-N within the different cover crop treatments, Grand Isle, VT, 2017-18.

Mix	2017		2018							
	21-Aug	20-Oct	24-May	8-Jun	20-Jun	3-Jul	19-Jul	1-Aug	16-Aug	28-Aug
	mg kg^{-1}									
11	7.16	3.61*	3.34	5.47	7.38	14.8	25.5	26.3	41.2	44.1
13	6.60	1.40	4.04	5.23	6.58	15.9	20.6	29.0	56.2	45.3
14	5.78	1.44	2.62	4.37	6.35	16.3	24.9	30.0	55.3	32.4
Control	8.20	**5.48**	2.16	3.37	5.69	17.3	23.8	35.3	54.0	46.6
LSD (0.10)	**NS**	**2.54**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
Trial mean	**6.94**	**2.98**	**3.04**	**4.61**	**6.50**	**16.1**	**23.7**	**30.1**	**51.7**	**42.1**

*Treatments marked with an asterisk did not perform statistically worse than the top performing treatment (p=0.10) shown in **bold.**
NS – There was no statistical difference between treatments in a particular column (p=0.10).

There were low levels of soil nitrate in the fall of 2017. Interestingly, control soil nitrate levels were higher indicating that the cover crops were utilizing excess soil nitrate. Throughout the 2018 season, the differing cover crop treatments performed comparably for soil NO_3-N concentrations (Figure 2, Table 10). Given the drought conditions that were observed across the growing season, it is possible that cover crop decomposition was slow due to lack of moisture and above average temperatures.

Table 11. Sweet corn yield and quality, Grand Isle, VT, 30-Aug 2018.

Mix	Corn plant height	Population	Corn ear weight	Corn ear length
	cm	plants ac^{-1}	lbs	cm
11	165	29,506	0.620	18.9
13	170	28,264	0.511	17.6
14	166	27,953	0.599	18.7

Control	165	28,574	0.558	18.3
LSD (0.10)	**NS**	**NS**	**NS**	**NS**
Trial mean	**167**	**28,574**	**0.572**	**18.4**

NS – There was no statistical difference between treatments in a particular column (p=0.10).

The sweet corn grown following the cover crop did not show any significant differences for yield or quality, between cover crop treatments (Table 11).

Results from Borderview Farm

Table 12. Cover crop mix yield and quality, Alburgh, VT, 2017-18.

Mix	**Fall 2017**		**Spring 2018**	
	Dry matter yield	**Percent cover**	**Dry matter yield**	**Percent cover**
	lbs ac^{-1}	**%**	**lbs ac^{-1}**	**%**
1	3126	88.9*	490.0	37.0
2	2992	80.7	1075	74.0*
3	3561*	92.3*	720.0	35.0
4	3297	89.9*	768	45.0
5	2808	84.0*	1383	64.0
6	2221	82.9	1378	56.0
7	**4388**	78.3	1229	43.0
8	3438*	88.5*	805	39.0
9	3165	92.5*	486	34.0
10	2961	80.9	1288	75.0*
11	2890	**95.2**	323	14.0
12	1590	86.8*	796	84.0*
13	2964	85.0*	1463	78.0*
14	2076	84.3*	2720*	**100.0**
15	1088	69.9	**2862**	**100.0**
16	3122	73.8	1557	96.0*
17	1104	82.5	1714	**100.0**
Control	668	44.5	1559	**100.0**
LSD (0.10)	**984**	**12.0**	**583**	**28.8**
Trial mean	**2568**	**82.7**	**1252**	**65.3**

*Treatments marked with an asterisk did not perform statistically worse than the top performing treatment (p=0.10) shown in **bold.**

At Borderview Farm, the best performers for fall yield were treatments 3 (winter rye, clover, turnip), 7 (oats, clover, turnip), and 8 (ryegrass, turnip) (Table 12). All treatments had adequate soil cover and would have been protected from erosion. In the spring, two of the treatments consisting of overwintering varieties, treatments 14 (winter rye) and 15 (winter rye and vetch), had the best yields. These two treatments were among the top performers for spring ground cover. Interestingly, the control and two winterkilled treatments (treatment 10 – oats and 13 – oats, radish, crimson clover) also were top performers for ground cover, which may indicate that the dead plant materials were effective as a spring cover.

Table 13. Soil active carbon and wet aggregate stability, Alburgh, VT, 10-May 2018.

Mix	Active carbon	Wet aggregate stability
	mg C kg^{-1}	%
11	517	47.3
14	544	45.1
15	526	46.5
17	553	46.3
Control	530	53.6
LSD (0.10)	**NS**	**NS**
Trial mean	**534**	**47.8**

NS – There was no statistical difference between treatments in a particular column (p=0.10).

Among the treatments evaluated for active carbon and aggregate stability, there were no significant differences (Table 13).

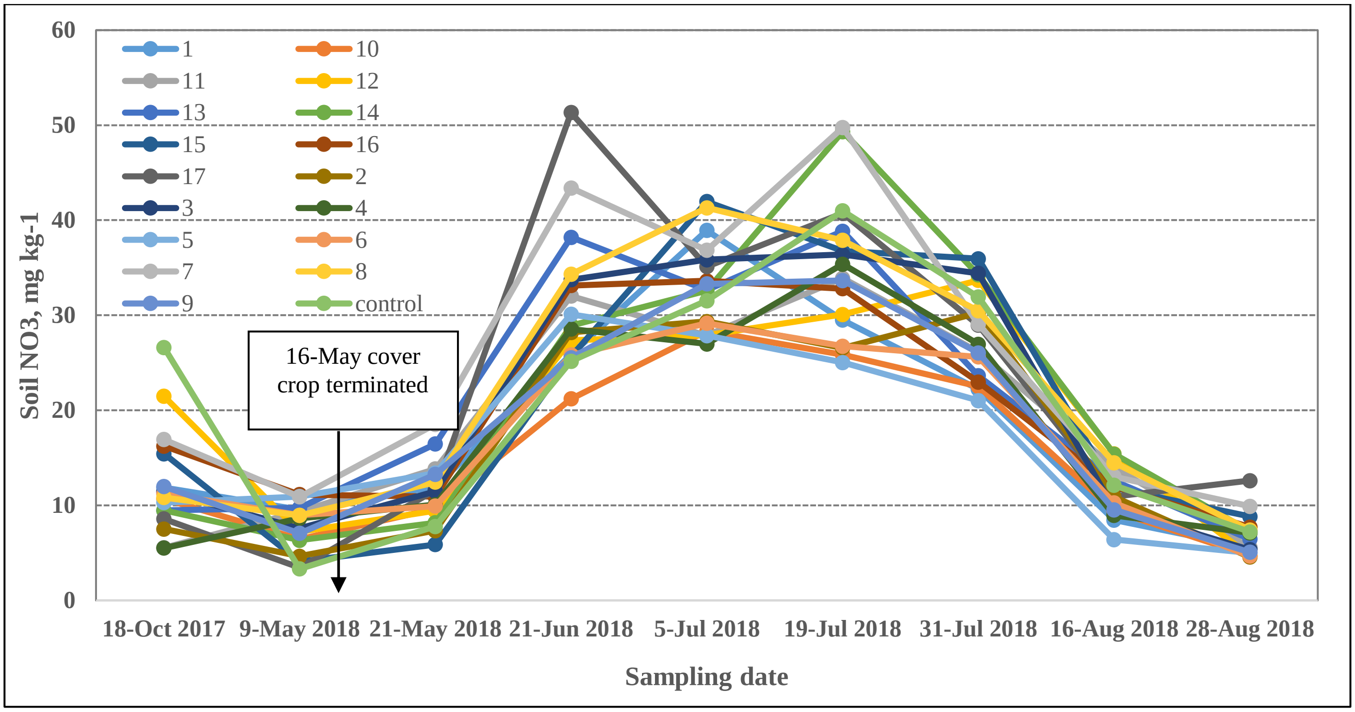

Figure 3. Soil NO_3 results from the Alburgh location, 2018.

Table 14. Soil NO_3-N within the different cover crop treatments, Alburgh, VT, 2017-18.

Mix	2017	2018							
	18-Oct	9-May	21-May	21-Jun	5-Jul	19-Jul	31-Jul	16-Aug	28-Aug
	mg kg^{-1}								
1	11.9	9.53*	11.9	25.9	38.9	29.5	22.2	8.46	5.52
2	7.51	4.65	7.34	28.2	29.3	26.6	30.3	10.9	4.56
3	11.5	7.57*	11.5	33.7	35.8	36.4	34.4	9.63	5.34
4	5.51	8.65*	10.1	28.6	27.0	35.4	27.0	8.95	7.11
5	10.3	**10.9**	13.4*	30.1	27.9	25.0	21.0	6.39	4.98
6	11.2	8.96*	9.93	25.8	29.2	26.8	25.6	10.3	4.67
7	16.9*	**10.9**	**18.5**	43.4*	36.8	49.7	29.1	13.0	9.91

8	10.8	8.94*	12.5	34.3	41.3	37.9	30.5	14.5	7.41
9	12.0	7.06*	13.3*	25.5	33.3	33.7	26.0	9.53	5.07
10	10.7	6.44	9.64	21.2	28.3	25.9	22.5	9.39	4.71
11	5.54*	9.35*	13.8*	32.0	27.9	33.9	26.2	14.0	5.57
12	21.5	7.21*	9.44	27.4	27.9	30.1	33.7	15.4	4.71
13	9.46	9.73*	16.5*	38.2	32.6	38.8	23.6	12.6	6.45
14	9.46	6.33	8.16	28.9	32.6	49.3	34.2	15.4	7.29
15	15.4	4.09	5.88	25.7	42.0	36.8	35.9	11.8	8.83
16	16.2	11.1*	10.9	33.1	33.6	32.8	23.0	12.0	7.71
17	8.56	3.44	11.6	**51.3**	35.1	40.7	29.0	10.9	12.6
Control	**26.6**	3.31	7.78	25.2	31.5	41.0	31.9	12.1	7.20
LSD (0.10)	**10.1**	**4.50**	**5.57**	**11.3**	**NS**	**NS**	**NS**	**NS**	**NS**
Trial mean	**12.3**	**7.68**	**11.2**	**32.8**	**35.0**	**28.1**	**11.4**	**6.65**	**31.0**

*Treatments marked with an asterisk did not perform statistically worse than the top performing treatment (p=0.10) shown in **bold.**
NS – There was no statistical difference between treatments in a particular column (p=0.10).

When most treatments were close to peak soil NO_3-N for the season, on 21-Jun, treatments 7 (oats, clover, turnip) and 17 (hairy vetch) were top performers (Figure 3, Table 14). This is not surprising since both of those treatments contained nitrogen fixing varieties.

Table 15. Sweet corn yield and quality Alburgh, VT, 2018.

Mix	**Population**	**Yield**	**Ear length**
	plants ac^{-1}	**lbs ac^{-1}**	**cm**
1	6098	4878	17.7
2	5082	3717	16.4
3	6534	7144	17.5
4	6970	5518	17.0
5	5808	5634	16.7
6	5518	4995	17.2
7	6534	7289	16.9
8	7115	7841	17.8
9	7696	7492	17.2
10	4792	4821	17.2
11	6098	2846	18.7
12	6534	4995	18.4
13	5808	9554	17.6
14	5518	3543	16.7
15	4646	2904	16.8
16	5953	7318	17.6
17	5082	6040	16.5
Control	5518	4182	17.5
LSD (0.10)	**NS**	**NS**	**NS**
Trial mean	**5961**	**5595**	**17.3**

NS – There was no statistical difference between treatments in a particular column (p=0.10).

No significant differences were seen in the sweet corn grown following the cover crop treatments (Table 15).

DISCUSSION

At both Pomykala Farm and Borderview Farm, there was no measurable impact on the subsequent cash crop that would indicate differences between the cover crop treatments. However, it is interesting to note when peak soil NO_3-N generally was at each farm. For River Berry Farm, peak soil NO_3-N was between 6-Jun and 19-Jun, approximately 75 days after the field was prepped and planted with strawberries. This was earlier than the other farms and may be influenced by River Berry's light soil, which would have warmed faster than the soils at the other two farms. Also, regular irrigation at River Berry Farm likely helped cover crops decompose more quickly. At Pomykala Farm, peak was on 16-Aug, which was approximately 45 days after field prep and planting. This was fairly late in the season and likely influenced by the extremely hot and dry conditions experienced during the growing season. At Borderview Farm, peak was from 21-Jun to 19-Jul, which was 30-60 days after field prep and planting of the sweet corn.

It is important to consider the effect of soil texture and seasonal differences on soil NO_3-N availability from cover cropping. Also, using a winterkilled cover crop variety may provide the benefit of not having to manage terminating the crop in the spring, when timing of this may be difficult due to wet, spring conditions. Cover cropping decisions will likely be based on the demands and goals within each operation and field management considerations.

ACKNOWLEDGEMENTS

The UVM Extension Northwest Crops and Soils Program would like thank the Sustainable Agriculture Research and Education Program (SARE) for funding this research (Project # ONE17-293-31064). Special thanks to Roger Rainville and the staff at Borderview Research Farm for their generous help with the trials. We would like to acknowledge John Bruce, Catherine Davidson, Hillary Emick, Amanda Gervais, Haley Jean, and Rory Malone for their assistance with data collection and data entry. This information is presented with the understanding that no product discrimination is intended and neither endorsement of any product mentioned, nor criticism of unnamed products, is implied.

UVM Extension helps individuals and communities put research-based knowledge to work.

THE UNIVERSITY OF VERMONT EXTENSION