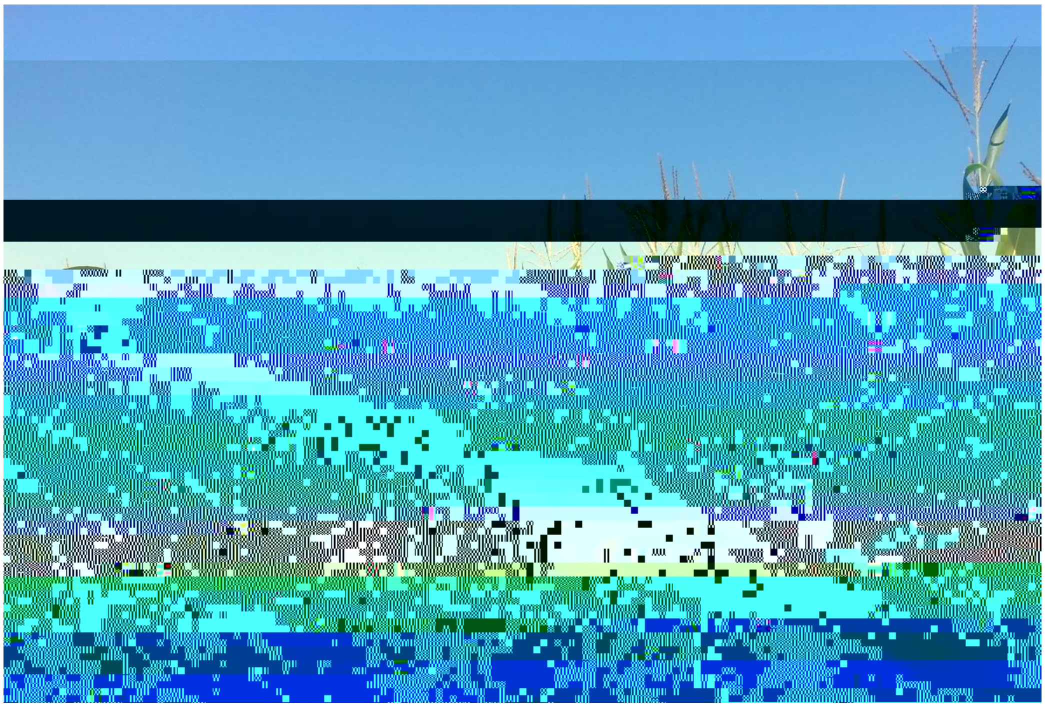
2019 Vermont Organic Silage Corn Performance Trial



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2019 VERMONT ORGANIC SILAGE CORN PERFORMANCE TRIAL

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The University of Vermont Extension Northwest Crops and Soils Program conducted an organic silage corn variety trial in 2019 to provide unbiased performance comparisons of commercially available varieties. With the expansion of the organic dairy industry in our region there is increased interest in organic corn silage production. To determine varieties that are best suited to this production system and our region's climate, we evaluated 11 commercially available organic corn silage varieties. It is important to remember that the data presented are from a replicated research trial from only one location in Vermont and represent only one season. Crop performance data from additional tests in different locations and over several years should be compared before making varietal selections.

MATERIALS AND METHODS

In 2019, organic corn silage varieties were evaluated at Borderview Research Farm in Alburgh, Vermont. The plot design was a randomized complete block with four replications. Treatments were 11 corn silage varieties submitted for evaluation by two companies (Table 1). These varieties were evaluated for silage yield and quality. Relative maturity and varietal characteristics are provided in Table 2.

Table 1. Participating companies and contact information.

Albert Lea Seed	Blue River Hybrids
1414 West Main St, PO Box 127 Albert Lea, MN 56007 (800) 352-5247	2326 230th Street Ames, IA 50014 (800) 370-7979

Table 2. Organic corn varieties evaluated in Alburgh, VT, 2019.

Company	Variety	Traits	Relative Maturity (RM)
Blue River Hybrids	05ES7	None	73
Blue River Hybrids	08B55	None	78
Blue River Hybrids	14A91	None	82
Blue River Hybrids	27B16	None	88
Blue River Hybrids	33A16	None	92
Blue River Hybrids	33ND10	NutriDense	92
Albert Lea/Viking	42-92GS	None	92
Albert Lea/Viking	O.51-04PGS	None	104
Albert Lea/Viking	O.69-01UP	None	101
Albert Lea/Viking	O.71-90UPGS	None	90
Albert Lea/Viking	O.82-95P	None	95

The soil type at the Alburgh location is a Benson rocky silt loam (Table 3). The seedbed was prepared with spring disking followed by a spike tooth harrow. The previous crop was corn silage.

Prior to planting, plots were fertilized with ProGro (5-4-3) and ProBooster (10-0-0) at a rate 1000 lbs ac^{-1} each. Both products are approved for use in organic production and produced by North Country Organics located in Bradford, VT. Plots were planted on 23-

Yield data and stand characteristics were analyzed using mixed model analysis using the mixed procedure of SAS (SAS Institute, 1999). Replications within trials were treated as random effects, and hybrids were treated as fixed. Hybrid mean comparisons were made using the Least Significant Difference (LSD) procedure when the F-test was considered significant ($p<0.10$). Variations in yield and quality can occur due to variations in genetics, soil, weather, and other growing conditions. Statistical analysis makes it possible to determine whether a difference among hybrids 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. Where the difference between two hybrids 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 hybrids. Hybrids that were not significantly lower in performance than the highest hybrid 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 yield 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

Weather data was recorded with a Davis Instrument Vantage Pro2 weather station, equipped with a WeatherLink data logger at Borderview Research Farm in Alburgh, VT (Table 4). Overall, the season began cooler and wetter than normal but became hot and dry in the middle of the summer. July brought above normal temperatures and little rainfall. The longest period without rainfall in July lasted 12 days. This dry period, which occurred around the time corn plants were developing tassels and silks for pollination, may have negatively impacted corn plant growth and productivity. This was evident in smaller than normal ears and poor tip fill experienced in corn fields around the region. However, these warm conditions did provide optimal Growing Degree Days (GDDs) through the season with a total of 2254 GDDs accumulated May-Sep, 42 above normal.

Table 4. Weather data for Alburgh, VT, 2019.

Alburgh, VT	May	June	July	August	September
Average temperature (°F)	53.3	64.3	73.5	68.3	60.0
Departure from normal	-3.11	-1.46	2.87	-0.51	-0.62
Precipitation (inches)	4.90	3.06	2.34	3.50	3.87
Departure from normal	1.45	-0.63	-1.81	-0.41	0.23

September. Dry matter content ranged from 31.1% to 43.9%. Ideally, silage should be harvested around 35% dry matter. At the time of harvest, most varieties had a dry matter around 35%, which is ideal for the ensiling process. Harvesting silage too dry can pose issues for fermentation, cause inadequate packing leading to mold growth, or complicate balancing rations and maintaining palatability. In years with droughty conditions, the moisture content of the whole corn plant can be misleading and may reach optimal levels earlier than expected. Therefore, monitoring maturity and moisture content early and constantly is crucial.

Table 5. Harvest characteristics of 11 organic corn silage varieties, 2019.

Variety	RM	Plant Population	Harvest DM	Yield, 35% DM
		plants ac^{-1}	%	tons aants ac

Table 6. Quality characteristics of 11 organic corn silage varieties, 2019.

Variety	CP	ADF	NDF	Ash	Starch	30-hr NDFD	Milk	
			% of DM			% of NDF	lbs ton^{-1}	lbs ac^{-1}
05ES7	7.88	28.1	45.9	5.65	24.0			

*Varieties with an asterisk are not significantly different than the top performer in **bold**.
NS - not statistically significant.

DISCUSSION

Figure 1 below displays the projected milk production, in lbs ton^{-1} and lbs ac^{-1} of the trialed corn silage varieties. The dotted lines indicate the trial averages for these parameters. This figure provides a visualization of yield and quality but does not, however, state that these differences are statistically significant (Tables 5 and 6). There were five varieties that produced both above average yield and quality: O.82-95P, 27B16, O.51-04PGS, 14A91, and 33ND10. Interestingly, these five varieties had a range of relative maturities ranging from 82-104 days. Even with a cool, wet start to the season, as conditions through the season and into the fall remained hot and dry, long season varieties were able to reach maturity. However, in some years when weather is less favorable this may become risky. Therefore, it is interesting to note that both short and long season varieties, can produce high yields and quality corn silage under organic management in this region. These data highlight the importance of varietal selection but also only represent one year of data. More data and other factors should be considered when making management decisions.

ACKNOWLEDGEMENTS

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Figure 1. Milk production of 11 on(3.94 125.06 Tm(g.06 a.06 nic0.000011802 0 792 612 reW* nBTF4 9.96 Tf1 0 0 1 103.94 125.06 232.3 g0 G[(M)-19(ilk)16(0.000011802 0 79