Northwest Crops & Soils Program

UVM Extension

2019

Syngenta Silage Corn Variety Trial

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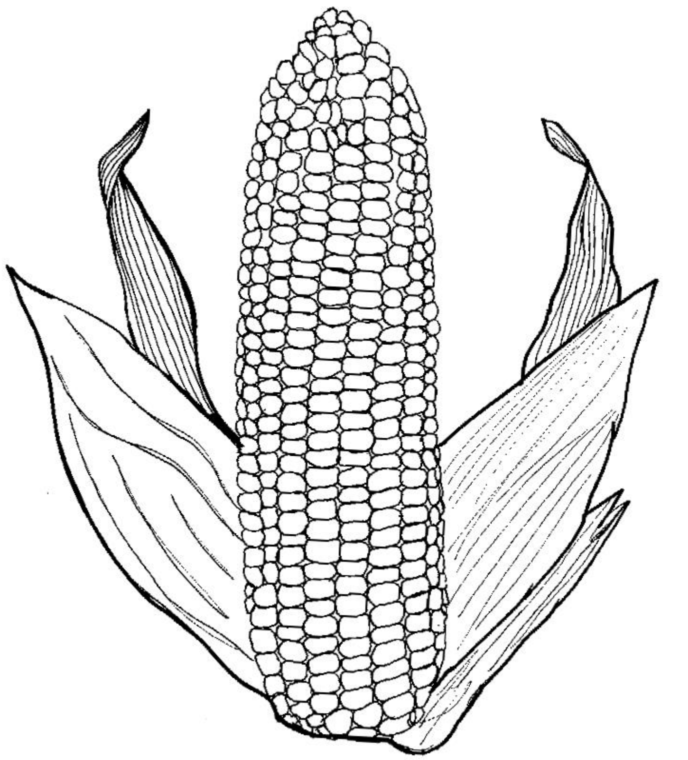

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THE UNIVERSITY OF VERMONT EXTENSION

2019 SYNGENTA SILAGE CORN VARIETY TRIAL
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The University of Vermont Extension Northwest Crops and Soils Program conducted a variety trial of silage corn from Syngenta AG (Greensboro, NC) to provide unbiased performance comparison of eight commercially available varieties, and to determine varieties best suited to this production system and local climate. 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, eight corn silage varieties (Table 1) were evaluated from Syngenta (Greensboro, NC) at Borderview Research Farm in Alburgh, VT. The experimental design was a randomized complete block with four replications. These varieties were evaluated for silage yield and quality. The soil type at the trial location in Alburgh, VT was a Covington silty clay loam with 0-3 percent slopes (Table 2). The seedbed was prepared with spring disking followed by a spike tooth harrow. The previous crops were hemp and corn. Plots were fertilized with 5000 gal ac^{-1} liquid dairy manure on 13-May prior to planting. Plots were planted on 22-May with a 4-row cone planter with John Deere row units fitted with Almaco seed distribution units (Nevada, IA) at a rate of 40,000 seeds ac^{-1}, and were later thinned to 34,000 plants ac^{-1}. Plots were 10'x 20' and consisted of four rows of corn. The plots were sprayed with 3 pints of Lumax® EZ herbicide to control grasses and broadleaf weeds on 7-Jun. On 29-Jun, corn was side-dressed with 144 lbs ac^{-1} of additional N.

Table 1. Relative maturity by variety, 2019.

Variety	Relative Maturity
NK8005-3011A	80
NK8618-3120A	86
NK8881-3010A	88
NK9175-3011A	91
NK9227-3220A	92
NK9535-3220	95
NK9610-3010	96
NK0440-3122	104

The corn was harvested on 10-Oct with a John Deere 2-row chopper and a wagon fitted with scales. An approximate 1 lb subsample was taken from each plot and dried to calculate dry matter content. The dried subsamples were then ground on a Wiley sample mill to a 2 mm particle size and to 1 mm particle size on a cyclone sample mill from the UDY Corporation. The samples were analyzed for crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF), and 48-hour NDF digestibility (NDFD), starch, ash, lignin, total digestible nutrients (TDN), and net energy of lactation (NE_L) at the University of Vermont Cereal Testing Lab (Burlington, VT) with a FOSS NIRS (near infrared reflectance spectroscopy) DS2500 Feed and Forage analyzer.

Table 2. Syngenta silage corn variety trial information, Alburgh, VT, 2019.

Location	**Borderview Research Farm Alburgh, VT**
Soil type	Covington silty clay loam, 0-3% slopes.
Previous crop	Hemp, corn
Row width (in)	30
Plot size (ft)	5
Seeding rate (seeds ac^{-1})	40,000
Population achieved by thinning	34,000
Planting date	22-May
Tillage operations	Spring disk, spike tooth harrow
Harvest date	10-Oct

Mixtures of true proteins, composed of amino acids, and non-protein nitrogen, make up the crude protein (CP) content of forages. The CP content is determined by measuring the amount of nitrogen and multiplying by 6.25. The bulky characteristics of forages come from fiber. Forage feeding values are negatively associated with fiber since the less digestible portions of plants are contained in the fiber fraction. The detergent fiber analysis system separates forages into two parts: cell contents, which include sugars, starches, proteins, non-protein nitrogen, fats and other highly digestible compounds; and the less digestible components found in the fiber fraction. The total fiber content of forage is contained in the neutral detergent fiber (NDF). Chemically, this fraction includes cellulose, hemicellulose, and lignin. Because of these chemical components and their association with the bulkiness of feeds, NDF is closely related to feed intake and rumen fill in cows. Forage testing laboratories also evaluate forages for NDF digestibility (NDFD). This analysis can be conducted over a wide range of incubation periods from 30 to 240 hours, and in this trial it was evaluated for 48 hours. Research has demonstrated that lactating dairy cows will eat more dry matter and produce more milk when fed forages with optimum NDF digestibility. Increased NDF digestibility will result in higher energy values and increased forage intakes.

Data were analyzed using a general linear model procedure of SAS (SAS Institute, 2008). Replications were treated as random effects, and treatments were treated as fixed. Mean comparisons were made using the Least Significant Difference (LSD) procedure where the F-test was considered significant, at $p<0.10$. Variations in genetics, soil, weather, and other growing conditions can result in variations in yield and quality. Statistical analysis makes it possible to determine whether a difference between treatments is significant or whether it is due to natural variations in the plant or 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. This means that when the difference between two treatments within a column is equal to or greater to the LSD value for the column, there is a real difference between the treatments 90% of the time. Treatments that were not significantly lower in performance than the highest value in a particular column are indicated with an asterisk.

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

In the example to the right, treatment C was significantly different from treatment A, but not from treatment B. The difference between C and B is 1.5, which is less than the LSD value of 2.0 and so these treatments were not significantly different 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 treatments were significantly different from one another. The asterisk indicates that treatment B was not significantly lower than the top yielding treatment, 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 3).

Table 3. Weather data for Alburgh, VT, 2019.

Alburgh, VT	May	June	July	August	September	October
Average temperature (°F)	53.3	64.3	73.5	68.3	60.0	50.4
Departure from normal	-3.11	-1.46	2.87	-0.51	-0.62	2.22
Precipitation (inches)	4.90	3.06	2.34	3.50	3.87	6.32
Departure from normal	1.45	-0.63	-1.81	-0.41	0.23	2.72
Growing Degree Days (50-86°F)	189	446	716	568	335	146
Departure from normal	-9	-29	76	-13	17	146

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.

A cool and wet spring led to lower temperatures in June. The month of July was hot and dry when compared to the 30-year average, followed by a slightly cooler than normal August and September. Precipitation was below average in July and August, and the tail end of the season received above average amounts of precipitation. This summer 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. Overall, 2350 Growing Degree Days (GDDs) were accumulated May-September, 42 above the 30-year normal.

Varieties did not statistically differ in yields or quality, but there were significant differences in harvest dry matter percentages. Yields ranged from 25.6 to 30.4 tons ac^{-1}, with the variety NK0440-3122 yielding the most and with NK9175-3011A yielding the least (Table 4). Dry matter ranged from 36.0 to 52%, and averaged 42.5%, which indicated that all silage varieties were harvest too dry. The later than optimum harvest was due to excessive rain events that delayed chopping of the plots. Corn silage varieties did not vary significantly in terms of quality (Table 5).

Table 4. Harvest characteristics of 8 corn silage varieties, 2019.

Variety	**Harvest dry matter** %	**Yield, 35% dry matter** tons ac^{-1}
NK0440-3122	36.0	**30.4**
NK8005-3011A	**52.0**†‡	27.0
NK8618-3120A	45.9	27.1
NK8881-3010A	45.5	25.7
NK9175-3011A	41.1	25.6
NK9227-3220A	38.8	26.5
NK9535-3220	41.0	26.7
NK9610-3010	39.9	26.6
LSD (p = 0.10)‡	1.88	NS¥
Trial mean	42.5	26.9

†The top performer for a category is highlighted in **bold**.
‡LSD = Least significant difference at p=0.10.
¥NS = not significant.

Table 5. Quality characteristics of 8 corn silage varieties, 2019.

Variety	CP	ADF	NDF	Ash	Lignin	Starch	TDN	48-hr NDFD	NE$_L$	Milk	
					% of DM			% of NDF	Mcal lb^{-1}	lbs ton^{-1}	lbs ac^{-1}
NK0440-3122	7.13	**20.4**	**38.5**	3.56	**2.23**	38.8	**65.5**	**66.3**	**1.51**	**2834**	**30195**
NK8005-3011A	7.35	24.3	44.1	3.89	2.68	33.5	64.5	63.8	1.46	2715	25627
NK8618-3120A	7.18	22.9	41.7	3.55	2.40	37.4	64.8	63.8	1.48	2738	26021
NK8881-3010A	7.25	21.2	39.7	**3.54**	2.30	**39.3**	64.5	65.8	1.49	2792	25301
NK9175-3011A	6.89	24.2	43.3	3.89	2.63	35.2	63.4	62.5	1.44	2634	23670
NK9227-3220A	7.18	24.4	44.3	4.10	2.50	33.6	63.8	64.8	1.44	2679	24827
NK9535-3220	**7.53**†	22.2	40.8	4.18	2.68	35.0	63.8	63.0	1.46	2718	25492
NK9610-3010	7.30	23.0	42.3	3.74	2.55	35.1	64.0	62.0	1.46	2666	24817
LSD (p = 0.10) ‡	NS¥	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Trial mean	7.22	22.8	41.8	3.80	24.9	36.0	64.3	64.0	1.47	2722	25744

†The top performer for a category is highlighted in **bold**.
‡LSD = Least significant difference at p=0.10.
¥NS = not significant.

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