2016

Long Season Corn Silage Variety Trial

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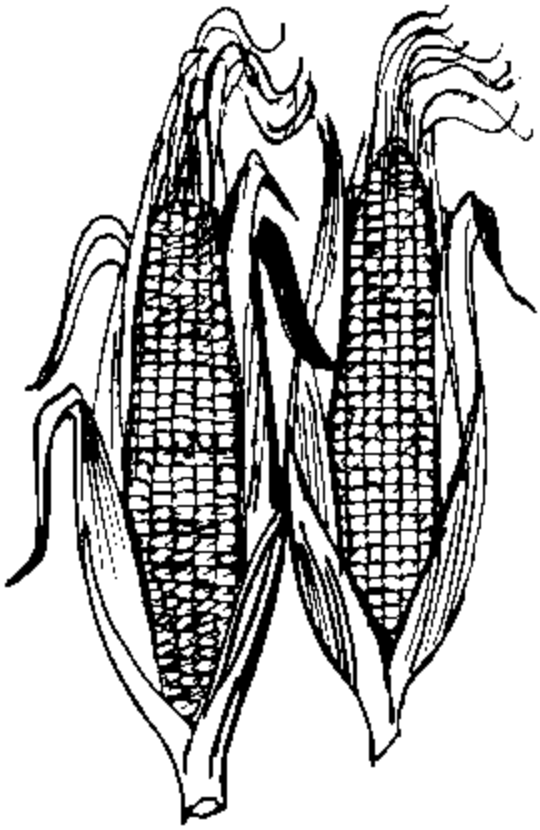

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UNIVERSITY OF VERMONT EXTENSION
CULTIVATING HEALTHY COMMUNITIES

2016 LONG SEASON CORN SILAGE VARIETY TRIAL

Dr. Heather Darby, University of Vermont Extension

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In 2016, the University of Vermont Extension Northwest Crops and Soils Program evaluated yield and quality of 43 long season corn silage varieties at Borderview Research Farm in Alburgh, VT. Long season corn can be difficult to grow in Vermont due to limited Growing Degree Days (GDDs) accumulating through the growing season. In addition, wet springs and falls are common across Vermont, delaying corn planting and complicating harvest timing. Late harvest can also reduce the chances of timely fall manure applications and planting of cover crops. However, if planted early, long season corn can produce high yield and quality forage by maximizing the entire growing season. While the information presented can begin to describe the yield and quality performance of these long season corn silage varieties in this region, it is important to note that the data represent results from only one season and one location. Compare other hybrid performance data before making varietal selections.

MATERIALS AND METHODS

In 2016, 43 varieties were evaluated from eight seed companies (Table 1) at Borderview Research Farm in Alburgh, Vermont. The plot design was a randomized complete block with three replications. Treatments were 43 corn silage varieties with relative maturities (RM) of 98 days and greater. These varieties were evaluated for silage yield and quality. Relative maturity and varietal characteristics are provided in Table 2.

Table 1. Participating companies and local contact information.

Albert Lea Seed	Brownseed Genetics, LLC	Channel Bio, LLC	Chemgro Seeds
1414 W. Main, POB 127 Albert Lea, MN 56007 800-352-5247	N1279 530th Street P.O. Box 7 Bay City, WI 54723 715-594-3355	800 N. Lindbergh Blvd. St. Louis, MO 63167 814-571-8600	P.O. Box 218 East Petersburg, PA 17520 800-346-4769

DEKALB-Monsanto	Mycogen Seeds	Seedway LLC	T.A. Seeds
40 Sheraton Drive Ithaca, NY 14850 352-278-7131	6383 Ethan Allen Hwy. St. Albans, VT 05478 802-363-2803	171 Ledgemere Point Bomoseen, VT 05732 802-338-6930	39 Seeds Lane Jersey Shore, PA 17740 570-753-5503

Table 2. Forty-three long season silage corn varieties evaluated in Alburgh, VT, 2016.

Variety	Company	Traits	Relative Maturity (RM)
Viking 58-98 GS	Albert Lea Seed	None	98
198-98STXRIB	Channel Bio, LLC	SSRIB	98
DKC48-56	DEKALB-Monsanto	SSRIB	98
TA487-22DPRIB	T.A. Seeds	Double Pro RIB	98
199-72STXRIB	Channel Bio, LLC	SSRIB	99
201-28STXRIB	Channel Bio, LLC	SSRIB	99
TMF99Q47RA	Mycogen Seeds	RR, CB, LL	99
F2F499	Mycogen Seeds	RR, LL	99
6069RSX	Chemgro Seeds	SSRIB	100
TMF2L505	Mycogen Seeds	RR, LL, HX	100
SW 4018 Gen VT3P	Seedway LLC	RR, CB	100
SW 4010 GenSS	Seedway LLC	RR, CB, LL	100
TMF2L538	Mycogen Seeds	RR	101
202-20STXRIB	Channel Bio, LLC	SSRIB	102
6258G3A	Chemgro Seeds	Artesian 3011A	102
DKC52-30	DEKALB-Monsanto	SSRIB	102
Viking O.51-04GS	Albert Lea Seed	None	104
205-19STXRIB	Channel Bio, LLC	SSRIB	105
6538G3N	Chemgro Seeds	3000GT	105
6546R3P	Chemgro Seeds	VT3P, RIB	105
DKC54-38	DEKALB-Monsanto	SSRIB	105
F2F569	Mycogen Seeds	RR, LL, HX	105
2K595	Mycogen Seeds	SSRIB	105
SW 5430 GenSS	Seedway LLC	RR, CB, LL	105
206-30STXRIB	Channel Bio, LLC	SSRIB	106
6638G3	Chemgro Seeds	3000GT	106
TMF06S67	Mycogen Seeds	SSRIB	106
SW 5554 RT	Seedway LLC	GT	106
TA566-31	T.A. Seeds	None	106
207-27STXRIB	Channel Bio, LLC	SSRIB	107
DKC57-75	DEKALB-Monsanto	SSRIB	107
16BEL:42	Brownseed Genetics, LLC	None	108
DKC58-06	DEKALB-Monsanto	SSRIB	108
TA583-22DPRIB	T.A. Seeds	Double Pro RIB	108
TM2H708	Mycogen Seeds	SS	109
Viking 53-10 GS	Albert Lea Seed	None	110
210-95STXRIB	Channel Bio, LLC	SSRIB	110

Variety	Company	Traits	Relative Maturity (RM)
7037RVPN	Chemgro Seeds	VT3P	110
DKC60-67	DEKALB-Monsanto	SSRIB	110
TMF2R720	Mycogen Seeds	SSRIB	110
DKC61-88	DEKALB-Monsanto	VT3P, RIB	111
TMF17L86	Mycogen Seeds	SS	117
TMF2L874	Mycogen Seeds	SS	118

Traits:
Agrisure Artesian 3011A - The Agrisure Artesian® 3011A trait stack combines Agrisure Artesian® water optimization technology with the Agrisure® 3000GT trait stack, for herbicide flexibility as well as protection from corn borer and corn rootworm.
Agrisure 3000GT - This triple stack protects against both corn borer and corn rootworm with tolerance to in-season applications of both glyphosate and glufosinate herbicides
CB - protects against corn borer.
Double PRO RIB - contains dual modes of action for maximum protection against corn earworm and other above-ground pests, like European and Southwestern corn borers and fall armyworm
GT - Glyphosate tolerant.
HX- Herculex Xtra is an in-plant, insect protection stacked trait that combines broad-spectrum, above-ground protection from insect pests and below-ground protection against larval stages of major corn rootworm pests, including western, northern and Mexican corn rootworm.
LL – Glufosinate-ammonium herbicide (LibertyLink®) tolerant.
RIB – RIB Complete® (Refuge In a Bag) means that refuge seed is blended into each bag of insect-protected corn seed.
RR – Roundup Ready corn is glyphosate herbicide (Roundup®) tolerant.
SS - SmartStax
SSRIB - Genuity® SmartStax®RIB Complete® provides broad spectrum protection against corn earworm and other ear-feeding insects as well as fall armyworm, European corn borer, and corn earworm with multiple modes of action; glyphosate herbicide tolerance ((Roundup Ready®, Touchdown®) and glufosinate-ammonium (LibertyLink®)). Bags of this seed also contain refuge seed mixed in eliminating the need for a separate refuge (Refuge-in-bag).
VT3P - provides two modes of action to protect from corn earworm and other above ground insect pests as well as one mode of action to protect against below ground pests.

The soil type at the Alburgh location was a Benson rocky silt loam (Table 3). The seedbed was spring chisel plow and disk followed by spike tooth harrow. The previous crop was corn. Starter fertilizer (10-20-20) was applied at a rate of 200 lbs ac^{-1}. Plots were 30 feet by 5 feet and replicated 3 times. The trial was planted with a John Deere 1750 corn planter on 17-May. The seeding rate was 34,000 seeds ac^{-1}. Nitrogen fertilizer in form of urea (46-0-0) was applied on 27-Jun at a rate of 240 lbs ac^{-1}, along with 100 lbs ac^{-1} potash (0-0-62). Fertility rates were based on soil and nitrate tests. Lumax was sprayed at a rate of 3 pints ac^{-1} on 3-Jun. Corn was harvested on 27-Sep and 29-Sep with a John Deere 2-row chopper, and forage was weighed in a wagon fitted with scales. Dry matter yields were calculated and then yields were adjusted to 35% dry matter.

Table 3. Long season corn variety trial details, Alburgh, VT, 2016.

Location	Borderview Research Farm Alburgh, VT
Soil type	Benson rocky silt loam
Previous crop	Corn
Tillage operations	Fall chisel plow, disk and spike tooth harrow
Seeding rate (viable seeds ac^{-1})	34,000
Planting equipment	John Deere 1750 corn planter
Treatments (varieties)	43
Replications	3
Row width (in.)	30
Plot size (ft)	5' x 30' (2 rows of corn)
Planting dates	17-May
Weed control	3-Jun, Lumax 3 pints ac^{-1}
Starter fertilizer (at planting)	200 lbs ac^{-1} 10-20-20
Additional fertilizer (topdress)	140 lbs ac^{-1} 46-0-0 100 lbs ac^{-1} 0-0-62
Harvest dates	27-Sep and 29-Sep

An approximate 2 lb subsample of the harvested material was collected, dried, ground, and then analyzed at the University of Vermont's Testing Laboratory, Burlington, VT, for silage quality. Dry matter yields were calculated and then adjusted to 35% dry matter.

Silage quality was analyzed using the FOSS NIRS (near infrared reflectance spectroscopy) DS2500 Feed and Forage analyzer. Dried and coarsely-ground plot samples were brought to the lab where they were reground using a cyclone sample mill (1mm screen) from the UDY Corporation. The samples were then analyzed using the FOSS NIRS DS2500 for crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF), 48-hour digestible NDF (NDFD), and total digestible nutrients (TDN). A subset of samples (n=20) was sent to DairyOne forage laboratory (Ithaca, NY) for wet chemistry analysis. This information was used to bias our current NIR forage calibration.

Mixtures of true proteins, composed of amino acids, and non-protein nitrogen make up the CP content of forages. The CP content of forages is determined by measuring the amount of nitrogen and multiplying by 6.25. The bulky characteristics of forage 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. Recently, forage testing laboratories have begun to evaluate forages for NDF digestibility (NDFD). Evaluation of forages and other feedstuffs for NDFD is being conducted to aid prediction of feed energy content and animal performance. Research has demonstrated that lactating dairy cows will eat more dry matter and produce more milk when fed forages with optimum NDFD. Forages with increased NDFD will result in higher energy values and, perhaps more importantly, increased forage intakes. Forage NDFD can range from 20 – 80% NDF.

Net energy for lactation (NE_L) is calculated based on concentrations of NDF and ADF. NE_L can be used as a tool to determine the quality of a ration, but should not be considered the sole indicator of the quality of a feed, as NE_L is affected by the quantity of a cow's dry matter intake, the speed at which her ration is consumed, the contents of the ration, feeding practices, the level of her production, and many other factors. Starch can also have an effect on NE_L, where the greater the starch content, the higher the NE_L (measured in Mcal per pound of silage), up to a certain point. High grain corn silage can have average starch values exceeding 40%.

The silage performance indices of milk per acre and milk per ton were calculated using a model derived from the spreadsheet entitled "MILK2006," developed by researchers at the University of Wisconsin. Milk per ton measures the pounds of milk that could be produced from a ton of silage. This value is generated by approximating a balanced ration meeting animal energy, protein, and fiber needs based on silage quality. The value is based on a standard cow weight and level of milk production. Milk per acre is calculated by multiplying the milk per ton value by silage dry matter yield. Therefore, milk per ton is an overall indicator of forage quality and milk per acre an indicator of forage yield and quality. Milk per ton and milk per acre calculations provide relative rankings of forage samples, but should not be considered as predictive of actual milk responses in specific situations for the following reasons:

1) Equations and calculations are simplified to reduce inputs for ease of use,
2) Farm to farm differences exist,
3) Genetic, dietary, and environmental differences affecting feed utilization are not considered.

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 because of 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 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.

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

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). Weather through the growing season was both warmer and drier than normal. Warm, dry weather in early May allowed for timely planting of corn for most growers in the region. Temperatures were average through June and July, and slightly warmer than average in August and September. From May to September there were an accumulated 2708 GDDs at a base temperature of 50° F, 268 GDDs above normal. The 2016 was a dry growing season, with all months below normal precipitation and a total of 7.27 inches below normal over the growing season. The warm, dry late summer and fall weather allowed for timely harvest, completed by the end of September.

Table 4. Weather data for Alburgh, VT, 2016.

	May	Jun	Jul	Aug	Sep
Average temperature (°F)	58.1	65.8	70.7	71.6	63.4
Departure from normal	1.80	0.00	0.10	2.90	2.90
Precipitation (inches)	1.50	2.80	1.80	3.00	2.50
Departure from normal	-1.92	-0.88	-2.37	-0.93	-1.17
Growing Degree Days (base 50°F)	340	481	640	663	438
Departure from normal	74	7	1	82	104

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.
Missing precipitation data from 17-Aug through 31-Oct was supplemented using data provided by the NOAA from Highgate, VT.

Data collected at harvest includes dry matter at time of harvest and yield (adjusted to 35% DM) for all 43 corn varieties (Table 5).

Table 5. Harvest data for 43 long season corn varieties, 2016, Alburgh, VT.

Variety	Company	Relative Maturity	Harvest DM	Yield at 35% DM
		days	%	tons ac^{-1}
Viking 58-98 GS	Albert Lea Seed	98	38.6	18.1
198-98STXRIB	Channel Bio, LLC	98	38.5	17.6
DKC48-56	DEKALB-Monsanto	98	38.8	15.7
TA487-22DPRIB	T.A. Seeds	98	38.6	19.9
199-72STXRIB	Channel Bio, LLC	99	39.7	20.6
201-28STXRIB	Channel Bio, LLC	99	38.9	20.4
TMF99Q47RA	Mycogen Seeds	99	39.3	25.4*
F2F499	Mycogen Seeds	99	38.8	23.1*
6069RSX	Chemgro Seeds	100	38.9	22.3
TMF2L505	Mycogen Seeds	100	39.3	23.2*
SW 4018 Gen VT3P	Seedway LLC	100	38.5	18.7
SW 4010 GenSS	Seedway LLC	100	38.7	23.5*
TMF2L538	Mycogen Seeds	101	36.6	25.3*
202-20STXRIB	Channel Bio, LLC	102	39.4	21.7
6258G3A	Chemgro Seeds	102	38.6	20.3
DKC52-30	DEKALB-Monsanto	102	38.3	22.8
Viking O.51-04GS	Albert Lea Seed	104	38.8	24.9*
205-19STXRIB	Channel Bio, LLC	105	39.4	23.5*
6538G3N	Chemgro Seeds	105	37.2	20.6
6546R3P	Chemgro Seeds	105	38.3	22.3
DKC54-38	DEKALB-Monsanto	105	38.8	24.4*
F2F569	Mycogen Seeds	105	38.2	16.1
2K595	Mycogen Seeds	105	39.1	27.6*
SW 5430 GenSS	Seedway LLC	105	37.7	23.9*
206-30STXRIB	Channel Bio, LLC	106	37.5	26.7*
6638G3	Chemgro Seeds	106	36.3	24.3*
TMF06S67	Mycogen Seeds	106	36.5	27.2*
SW 5554 RT	Seedway LLC	106	36.9	20.9
TA566-31	T.A. Seeds	106	36.8	23.7*
207-27STXRIB	Channel Bio, LLC	107	38.8	27.0*
DKC57-75	DEKALB-Monsanto	107	38.8	25.0*
16BEL:42	Brownseed Genetics, LLC	108	37.5	18.6
DKC58-06	DEKALB-Monsanto	108	38.2	25.2*

Variety	Company	Relative Maturity	Harvest DM	Yield at 35% DM
		days	%	tons ac^{-1}
TA583-22DPRIB	T.A. Seeds	108	39.0	19.9
TM2H708	Mycogen Seeds	109	36.9	26.1*
Viking 53-10 GS	Albert Lea Seed	110	38.9	21.2
210-95STXRIB	Channel Bio, LLC	110	38.8	21.3
7037RVPN	Chemgro Seeds	110	35.7	26.7*
DKC60-67	DEKALB-Monsanto	110	39.2	23.7*
TMF2R720	Mycogen Seeds	110	37.4	**28.1***
DKC61-88	DEKALB-Monsanto	111	36.4	24.7*
TMF17L86	Mycogen Seeds	117	**31.4***	24.0*
TMF2L874	Mycogen Seeds	118	**31.4***	23.8*
LSD (p = 0.10)			3.78	5.20
Trial Mean			37.7	22.8

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

The average dry matter at harvest (37.7%) was less than optimum. Warm, dry conditions in the fall lead to crops maturing faster than anticipated. In addition, an equipment breakdown caused a delay in harvest. The average yield at 35% dry matter was 22.8 tons ac^{-1} (Figure 1). Yields ranged from 15.7 by variety 'DKC48-56' to 28.1 tons ac^{-1} by variety 'TMF2R720'. Eleven of the varieties produced yields over 25 tons ac^{-1}. Corn yields were negatively impacted by drought conditions and none of the long season corn varieties in this year's trial produced yields over 30 tons ac^{-1}. It is interesting to note that, of the 24 varieties that produced statistically similar yields to the top performer, four of them had relative maturities of 100 days or less ('F2F499', 'TMF99Q47RA', 'SW 4010 GenSS', and 'TMF2L505').

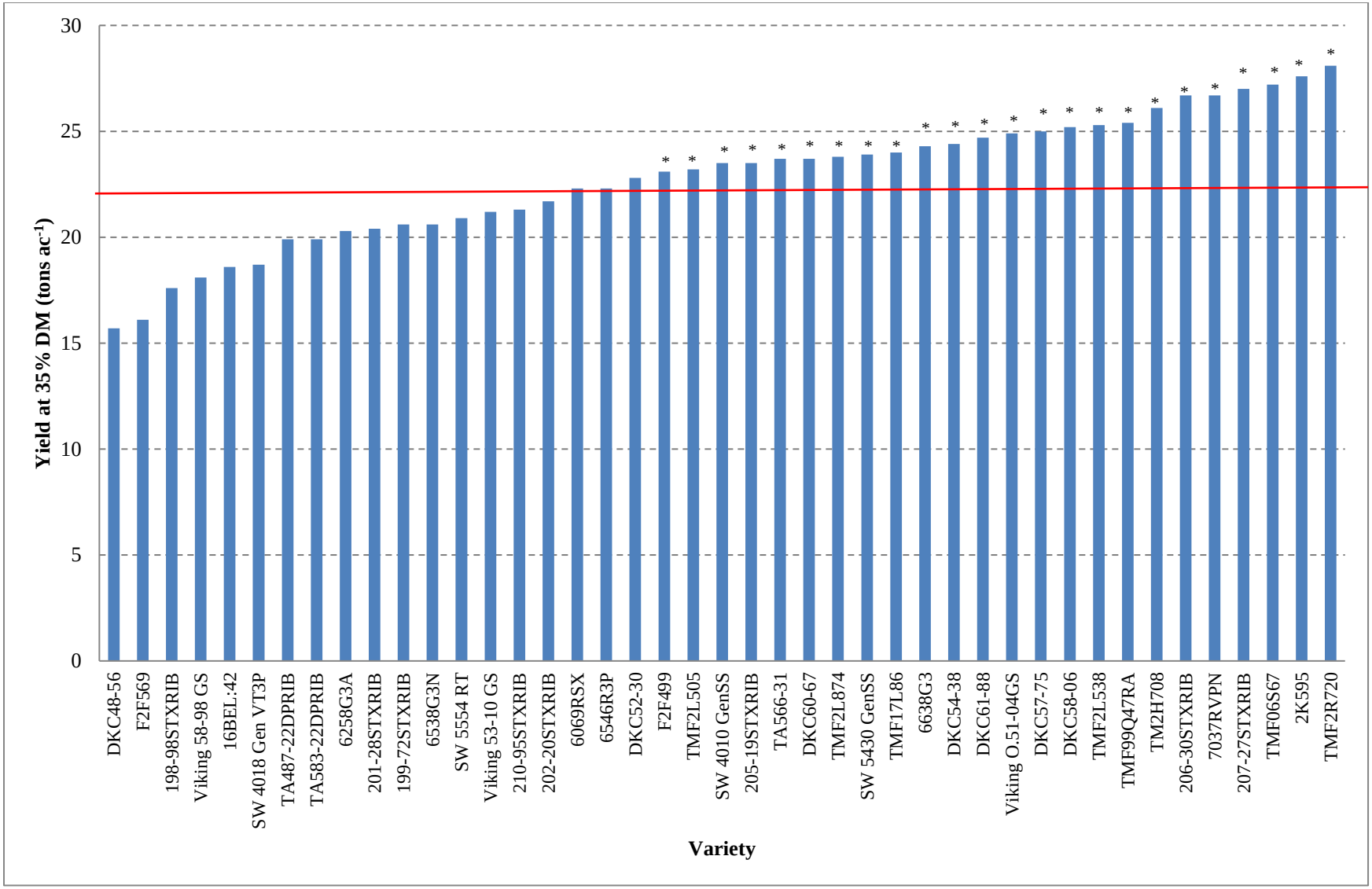

Figure 1. Yield at 35% dry matter of 43 long season varieties, 2016.

Varieties with an asterisk (*) above them did not differ significantly from the top performing variety. The red line indicates the average yield.

Forage quality characteristics varied significantly by variety (Table 6). Crude protein ranged from 6.44 to 8.38% with a trial average of 7.54%. Protein was highest in the variety 'SW 4010 GenSS' (8.38%), though did not statistically differ from 19 other varieties. The variety 'SW 4010 GenSS' also had the lowest ADF (23.5%) and NDF (34.8%), though not statistically different than four and five other varieties respectively. Digestible NDF (NDFD), or the amount of NDF that is digestible in a 48-hour period, varied significantly by variety, and averaged 68.0% of NDF. The top performer in NDFD and TDN was the Mycogen Seeds variety 'F2F499' (72.0% NDFD and 73.3% TDN), though this was not statistically greater than 8 other varieties for NDFD and four other varieties for TDN. The Brownseed Genetics variety '16BEL:42' had the highest NE_L (0.72 Mcal lb^{-1}), which was statistically similar to three other varieties.

Table 6. Forage quality data for 43 long season corn varieties, 2016, Alburgh, VT.

Variety	Company	*Forage quality characteristics*						Milk	
		CP	**ADF**	**NDF**	**NDFD**	**TDN**	**NE_L**	**ton^{-1}**	**ac^{-1}**
		% of DM	% of DM	% of DM	% of NDF	% of DM	Mcal lb^{-1}	lbs	lbs
Viking 58-98 GS	Albert Lea Seed	7.08	29.6	44.3	66.6	62.0	0.62	2709	16999
198-98STXRIB	Channel Bio, LLC	7.57	28.7	41.4	66.7	64.6	0.65	2887*****	17943
DKC48-56	DEKALB-Monsanto	8.20*****	29.9	45.3	65.9	60.9	0.61	2623	14268
TA487-22DPRIB	T.A. Seeds	7.73*****	26.7	40.2	67.2	63.6	0.64	2817	19665
199-72STXRIB	Channel Bio, LLC	6.84	27.7	42.8	69.0*****	63.1	0.64	2786	19941
201-28STXRIB	Channel Bio, LLC	6.70	27.3	42.6	68.0	61.4	0.62	2664	19217
TMF99Q47RA	Mycogen Seeds	8.05*****	26.6	41.3	67.7	64.5	0.65	2876	25329*****
F2F499	Mycogen Seeds	7.48	25.7*****	42.7	**72.0***	**73.3***	0.69*	3099*	25119*****
6069RSX	Chemgro Seeds	7.14	28.0	43.1	67.1	61.5	0.62	2677	20811
TMF2L505	Mycogen Seeds	7.69*****	28.9	43.3	66.9	61.5	0.62	2679	21916
SW 4010 GenSS	Seedway LLC	**8.38***	**23.5***	**34.8***	67.4	67.7	0.69*	**3112***	25581*****
SW 4018 Gen VT3P	Seedway LLC	7.22	29.6	46.3	68.8	60.7	0.61	2621	17089
TMF2L538	Mycogen Seeds	7.17	27.6	43.0	67.4	63.5	0.64	2822	25200*
202-20STXRIB	Channel Bio, LLC	7.34	28.6	43.0	67.6	63.3	0.64	2804	21368
6258G3A	Chemgro Seeds	8.10*****	27.4	42.1	66.2	61.9	0.62	2701	19239
DKC52-30	DEKALB-Monsanto	7.53	28.1	41.8	67.2	63.4	0.64	2815	22654*
Viking O.51-04GS	Albert Lea Seed	6.44	27.1	42.2	69.4*	63.7	0.64	2830	24843*****
205-19STXRIB	Channel Bio, LLC	7.79	28.3	44.0	67.2	71.7*	0.65	2850	23496*
6538G3N	Chemgro Seeds	7.41	29.9	46.2	68.3	60.5	0.61	2604	18748
6546R3P	Chemgro Seeds	7.13	27.7	44.6	68.1	61.1	0.61	2642	20572
DKC54-38	DEKALB-Monsanto	7.15	26.8	39.9	67.0	64.4	0.65	2889*****	24751*****

Variety	Company	*Forage quality characteristics*						Milk	
		CP	**ADF**	**NDF**	**NDFD**	**TDN**	**NE_L**	**ton^{-1}**	**ac^{-1}**
		% of DM	% of DM	% of DM	% of NDF	% of DM	Mcal lb^{-1}	lbs	lbs
F2F569	Mycogen Seeds	8.17*****	29.0	45.2	68.4	70.4*****	0.71*	3087*	17390
2K595	Mycogen Seeds	7.75*****	29.2	44.7	66.5	61.0	0.61	2642	25415*****
SW 5430 GenSS	Seedway LLC	7.23	29.0	41.9	66.8	64.1	0.65	2862	23941*****
206-30STXRIB	Channel Bio, LLC	7.09	26.5	41.2	67.8	63.5	0.64	2818	26403*****
6638G3	Chemgro Seeds	7.92*****	26.0*****	39.6	67.3	64.9	0.66	2921*****	20908
TMF06S67	Mycogen Seeds	7.31	27.4	40.8	67.7	64.8	0.65	2909*****	**27696***
SW 5554 RT	Seedway LLC	7.95*****	27.4	42.5	68.9	63.7	0.64	2823	20747
TA566-31	T.A. Seeds	7.94*****	27.9	42.5	67.7	61.2	0.62	2649	22036
207-27STXRIB	Channel Bio, LLC	7.11	**25.7***	40.4	69.9*****	64.2	0.65	2865	27154*****
DKC57-75	DEKALB-Monsanto	6.74	27.8	44.0	69.0	61.2	0.62	2651	23166*****
16BEL:42	Brownseed Genetics, LLC	7.79*****	28.3	44.0	67.2	71.7*****	**0.72***	2940*	19131
DKC58-06	DEKALB-Monsanto	7.31	26.3*****	41.2	68.0	62.7	0.63	2759	24303*****
TA583-22DPRIB	T.A. Seeds	8.09*****	27.6	42.3	68.3	62.6	0.63	2753	19274
TM2H708	Mycogen Seeds	7.80*****	29.3	43.9	67.7	62.0	0.62	2707	24809*****
Viking 53-10 GS	Albert Lea Seed	7.11	26.3*****	40.8	69.7*****	63.4	0.64	2806	20886
210-95STXRIB	Channel Bio, LLC	7.66*****	**25.7***	40.0	69.5*****	64.7	0.65	2904*****	21710
7037RVPN	Chemgro Seeds	8.11	29.5	45.7	69.2*****	62.6	0.63	2748	25777
DKC60-67	DEKALB-Monsanto	7.29	25.7*****	41.0	67.8	62.4	0.63	2736	22755*
TMF2R720	Mycogen Seeds	7.59	29.5	44.6	67.6	61.9	0.62	2706	26600*****
DKC61-88	DEKALB-Monsanto	8.00*****	29.1	46.1	67.8	60.0	0.60	2567	22456*
TMF17L86	Mycogen Seeds	7.95*****	31.9	48.9	69.5*****	62.2	0.62	2724	22915*****
TMF2L874	Mycogen Seeds	8.00*****	32.7	50.5	68.5	62.1	0.62	2714	22793*****
LSD (p = 0.10)		0.78	2.87	4.79	2.96	3.38	0.036	228	5489
Trial Mean		7.54	27.9	42.9	68.0	63.4	0.64	2786	22163

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

Milk per ton and milk per acre can indicate the yield and quality of corn silage varieties (Figure 2). Milk per ton, an indicator of corn silage quality, ranged from 2567 to 3112 lbs ton^{-1} with an average of 2786 lbs ton^{-1}. Milk per ton was highest in variety 'SW 4010 GenSS' (3112 lbs per ton); this was not statistically different from seven other varieties. Milk per acre, which takes into consideration the dry matter yield of each variety, was statistically different by variety. The average milk per acre was 22,163 lbs ac^{-1}. The Mycogen Seeds variety 'TMF06S67' had the highest lbs ac^{-1} at 27,696, significantly similar to 20 other varieties. Other varieties with milk per acre over 25,000 lbs ac^{-1} include: '207-27STX', TMF2R720, '206-30STXRIB', '7037RVPN', SW4010 Gen SS, '2K595', TMF99Q47RA, and 'TMF2L538'.

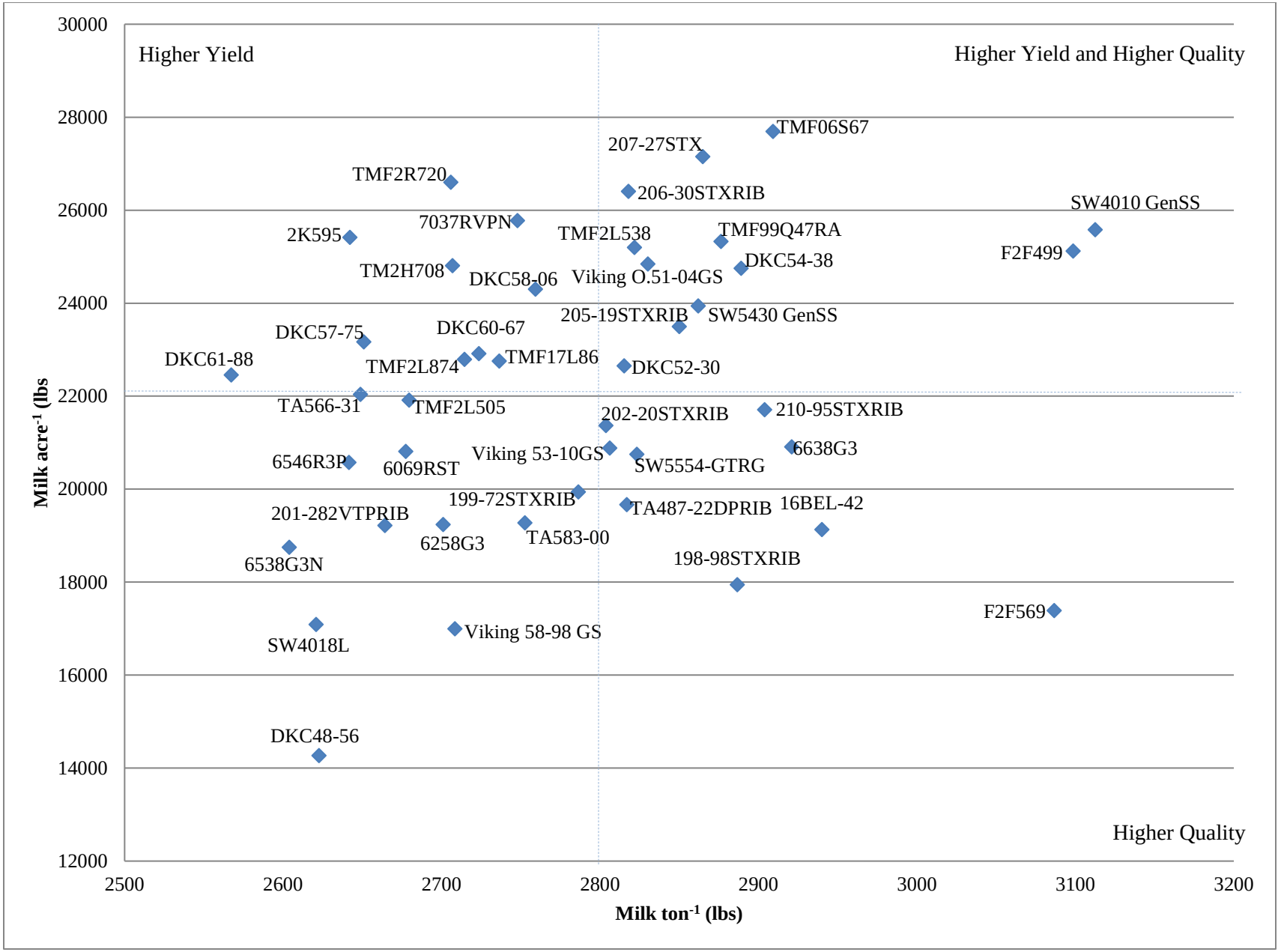

Figure 2. Milk production of 43 long season corn varieties, Alburgh, VT, 2016. Shows relationship between milk per ton and milk per acre. Dotted lines represent the mean milk per ton and milk per acre for the trial.

DISCUSSION

The average yield in the 2016 long season corn trials (22.8 tons ac^{-1} at 35% dry matter) was lower than in 2014 or 2015 (25.6 tons ac^{-1} and 26.9 tons ac^{-1} respectively) but comparable to 2013 average long season corn yields (22.4 tons ac^{-1}). The lower yields in 2016 were likely attributed to the lack of rainfall through the season.

The fact that all of the varieties reached maturity by the end of September in northern Vermont and many produced yields over 25 tons ac^{-1} indicates that varieties with maturities ranging from 96-112 days can reach maturity and produce high yields and quality feed. Table 7 below summarizes the top twelve performing varieties in yield and quality this year. It is important to remember that these data only represent one season that was strongly affected by dry weather. Consult additional research before making varietal selections or other agronomic decisions.

Table 7. Twelve varieties that were top performers in yield and quality indices.

Variety	Company	*Forage quality characteristics*							Milk	
		Yield at 35% DM	**CP**	**ADF**	**NDF**	**NDFD**	**TDN**	**NE_L**	**ton^{-1}**	**ac^{-1}**
		tons ac^{-1}	% of DM	% of DM	% of DM	% of NDF	% of DM	Mcal lb^{-1}	lbs	lbs
TMF06S67	Mycogen Seeds	27.2	7.31	27.4	40.8	67.7	64.8	0.65	2909	27696
207-27STXRIB	Channel Bio LLC	27.0	7.11	**25.7**	40.4	69.9	64.2	0.65	2865	27154
206-30STXRIB	Channel Bio LLC	26.7	7.09	26.5	41.2	67.8	63.5	0.64	2818	26403
SW 4010 GenSS	Seedway LLC	23.5	8.38	23.5	34.8	67.4	67.7	0.69	3112	25581
TMF99Q47RA	Mycogen Seeds	25.4	8.05	26.6	41.3	67.7	64.5	0.65	2876	25329
TMF2L538	Mycogen Seeds	25.3	7.17	27.6	43.0	67.4	63.5	0.64	2822	25200
F2F499	Mycogen Seeds	23.1	7.48	25.7	42.7	72.0	73.3	0.69	3099	25119
Viking O.51-04GS	Albert Lea Seed	24.9	6.44	27.1	42.2	69.4	63.7	0.64	2830	24843
DKC54-38	DEKALB-Monsanto	24.4	7.15	26.8	39.9	67.0	64.4	0.65	2889	24751
SW 5430 GenSS	Seedway LLC	23.9	7.23	29.0	41.9	66.8	64.1	0.65	2862	23941
205-19STXRIB	Channel Bio LLC	23.5	7.79	28.3	44.0	67.2	71.7	0.65	2850	23496
DKC52-30	DEKALB-Monsanto	22.8	7.53	28.1	41.8	67.2	63.4	0.64	2815	22654

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