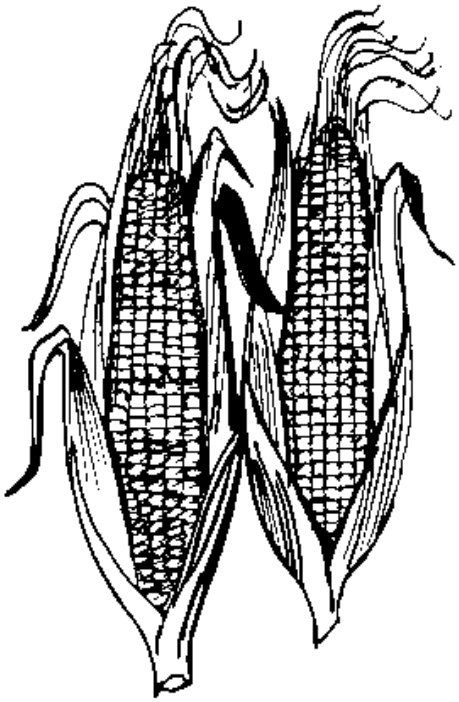
NW CROPS & SOILS PROGRAM

UNIVERSITY OF VERMONT EXTENSION

CULTIVATING HEALTHY COMMUNITIES

2010 Short Season Corn Silage Report



Dr. Heather Darby
UVM Extension Agronomic Specialist
Rosalie Madden, Erica Cummings, Amanda Gervais, and Philip Halteman
802-524-6501

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2010 Short Season Corn Silage Report

Dr. Heather Darby, UVM Extension
heather.darby[at]uvm.edu

In 2010, the University of Vermont Extension Crops and Soils Team conducted an experiment to evaluate yield and quality of short season corn hybrids at the Seward Family Farm in East Wallingford, VT. Several seed companies submitted varieties for evaluation. Companies and contact names are listed in Table 1. Nine corn varieties ranging in relative maturity (RM) from 69 – 90 were evaluated at this site. Specific varieties, their traits, and RM are listed in Table 2. It is important to remember that the data presented is from a single test at only one location. Hybrid-performance data from additional tests in different locations and often over several years should be compared before you make a conclusion.

Table 1. Participating companies and local contact information.

Dekalb	Mycogen	Schlessman Seed Co.	Seedway	Wolf River Valley Seeds
Scott Walker District Manager Schenectady, NY 315-528-0580	Claude Fortin District Manager Highgate, VT 802-363-2803	11513 U.S. Rt. 250 Milan, OH 888-534-7333	Ed Schillawski 3442 Rt 22A Shoreham, VT 802-897-2281	Marcel Moreau District Manager Swanton, VT 802-309-4674

Table 2. Varieties and descriptions evaluated in East Wallingford, VT.

Company	Variety	RM	Traits
Dekalb	37-39	87	VT3
Mycogen	2J086	80	RR2
Mycogen	TMF2Q296	86	HXT, RR2
Mycogen	2T092	80	HXI/LL/RR2
Mycogen	2T224	86	SSX/LL/RR2
Schlessman	698RR	69	RR, Dual Purpose
Seedway	SW3008	90	VT3
Wolf River Valley Seeds	WRV2990	90	GT
Wolf River Valley Seeds	WR2087L	87	

GT – Glyphosate herbicide (Roundup®, Touchdown®) tolerant.
HXI – Hercluex I®, provides protection against above-ground pests such European corn borer, western bean cutworm and black cutworm.
HXT – Herculex Xtra®, provides season-long control of a variety of pests, including European corn borer, western bean cutworm, corn rootworm, and black cutworm.
LL – Glufosinate-ammonium herbicide (LibertyLink®) tolerant.
RR2 – Roundup Ready corn is glyphosate herbicide (Roundup®, Touchdown®) tolerant.
SSX – SmartStax corn provides a broad spectrum of insect control, using multiple modes of action, as well as glyphosate herbicide (Roundup Ready®, Touchdown®) and glufosinate-ammonium (LibertyLink®) tolerance.
VT3 – YieldGard VT Triple™ uses VecTran™ technology which stacks insect- and weed-control traits in one variety. Provides glyphosate herbicide (Roundup®, Touchdown®) tolerance, as well as protection against western corn rootworms, northern corn rootworms, European corn borers, black cutworms, stalk borers, wireworms, white grubs, seed corn maggots, early flea beetles, and corn earworms
YGCB – YieldGard® against corn borer

WEATHER DATA

Seasonal precipitation and temperatures recorded at a weather station in close proximity to the 2010 research site are shown in Table 3. This year presented a drier spring, and a very wet fall. This year we accumulated 97.6 more Growing Degree Days (GDD) than the 30 year average. GDDs are reported using base 50° – 86°F.

Table 3. Temperature, precipitation, and GDD summary – 2010.

	April	May	June	July	August	September	October
Average Temperature (°F)	47.7	58.5	64.7	71.2	67.5	60.8	46.2
Departure from Normal	2.9	1.6	-0.1	2.0	0.3	1.9	-1.9
Precipitation (inches)	3.04	2.87	3.00	5.35	4.14	1.95	9.8
Departure from Normal	0.24	-0.65	-0.85	0.77	-0.04	-1.96	6.6
Growing Degree Days	150	333	441	657	542	324	100
Departure from Normal	45	18.7	-3.0	64	9.3	12	-48

Based on National Weather Service data from Rutland, VT. Historical averages are for 30 years of data (1971-2000).

CULTIVATION SPECIFICS

The seedbed was prepared with conventional tillage methods. The previous crop was silage corn. Prior to planting 150 lbs of 10-10-20 was broadcast applied. A starter fertilizer was applied at 200 lbs of 25-0-12 to the acre. Four-row plots were planted with a John Deere 7000 planter on June 3, 2010. The seeding rate was 32,000 seeds to the acre. Lumax was sprayed at 2.5 quarts per acre pre-emergence.
The soil type was Castile gravely fine sandy loam on an A slope (0-3%). The plot design was a randomized complete block with two replications. On October 4th the corn was harvested by hand from an 87.5 ft^2 sub-plot and weighed with a platform scale. A subsample of five plants was chopped with a Troy-Built chipper shredder, mixed, and a sample collected for moisture determination and quality analysis. Pertinent trial information is summarized in Table 4.

Table 4. Short season corn variety trial information, 2010.

Trial Information	**Seward Family Farm E. Wallingford, VT**
Soil type	Gravely fine sandy loam
Previous Crop	Corn
Row Width (in.)	30
Planting date	June 3, 2010
Harvest date	October 4, 2010
Tillage operations	Spring plow, disk
Manure (gal/acre)	Spring – 16 ton/acre

SILAGE QUALITY

Silage quality was analyzed using wet chemistry techniques at Cumberland Valley Analytical Services in Hagerstown, Maryland. Plot samples were dried, ground and analyzed for crude protein (CP), neutral detergent fiber (NDF), and 30h digestible NDF (dNDF). Mixtures of true proteins, composed of amino acids, and nonprotein 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. Evaluation of forages and other feedstuffs for NDF digestibility 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 NDF digestibility. Forages with increased NDF digestibility will result in higher energy values, and perhaps more importantly, increased forage intakes. Forage NDF digestibility can range from 20 – 80%.
The silage performance indices of milk per acre and milk per ton were calculated using a model derived from the spreadsheet entitled, "MILK2007" 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.

PRESENTATION OF DATA

Results for the short season variety trial are listed in Table 5. Dry matter yields were calculated and then adjusted to 35% dry matter for the report. Varieties are ranked by dry matter yields at harvest in table 5. The numbers presented in the tables are of two replications. There is a figure displaying the relationship between milk per ton and milk per acre. The dotted lines dividing the figure into four quadrants represent the mean milk per ton and acre for the location. Therefore hybrids that fall above the lines performed better than the average and hybrids below the lines performed below average.

LEAST SIGNIFICANT DIFFERENCE (LSD)

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 (LSD's) at the 10% level of probability 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 9 times out of 10 that 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 the example on the next page, hybrid A is significantly different from hybrid C but not from hybrid 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 hybrids 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 hybrids were significantly different from one another. The asterisk indicates that hybrid B was not significantly lower than the top yielding hybrid, hybrid C.

Hybrid	Yield
A	6.0
B	7.5*
C	**9.0**
LSD (0.10)	2.0

RESULTS

Table 5. Silage yield and quality evaluation of short season corn varieties - East Wallingford, VT.

Company	Hybrid	RM	DM at harvest	Yield 35%DM	Forage quality characteristics					Milk per	
					CP	ADF	NDF	dNDF	NEL	ton	acre
			%	T/ac	%	%	%	%	Mcal/lb		
Mycogen	2T092	80	30.2*	18.5	7.60*	24.2	40.3	**53.1**	0.77	3437	22100
Schlessman	698RR	69	**33.1***	18.5	**8.10***	23.9	38.9	52.8	**0.78**	**3526**	22700
Wolf River	2987	87	26.4	18.9	7.55*	**28.3**	**45.9**	**53.1**	0.74	3138	20750
Mycogen	2J086	80	31.0*	19.3	7.05	24.7	40.2	47.4	0.76	3282	22100
Wolf River	2990	90	30.6*	20.7	7.45*	26.6	43.7	51.2	0.75	3282	23750
Mycogen	2T224	86	31.3*	20.8	6.90	24.6	39.8	52.0	0.77	3418	24900
Mycogen	TMF2Q296	86	30.5*	21.9	6.45	27.6	45.4	49.8	0.75	3204	24500
Seedway	3008	90	28.9	22.4	6.90	26.5	42.5	49.7	0.75	3233	25300
Dekalb	37-39	87	28.6	**23.9**	7.15	26.9	43.6	50.1	0.75	3237	**27100**
Trial Mean			30.0	20.5	7.24	25.9	42.2	51.0	0.75	3306	23700
LSD (0.10)			2.95	NS	0.70	NS	NS	NS	NS	NS	NS

NS – Varieties were not significantly different

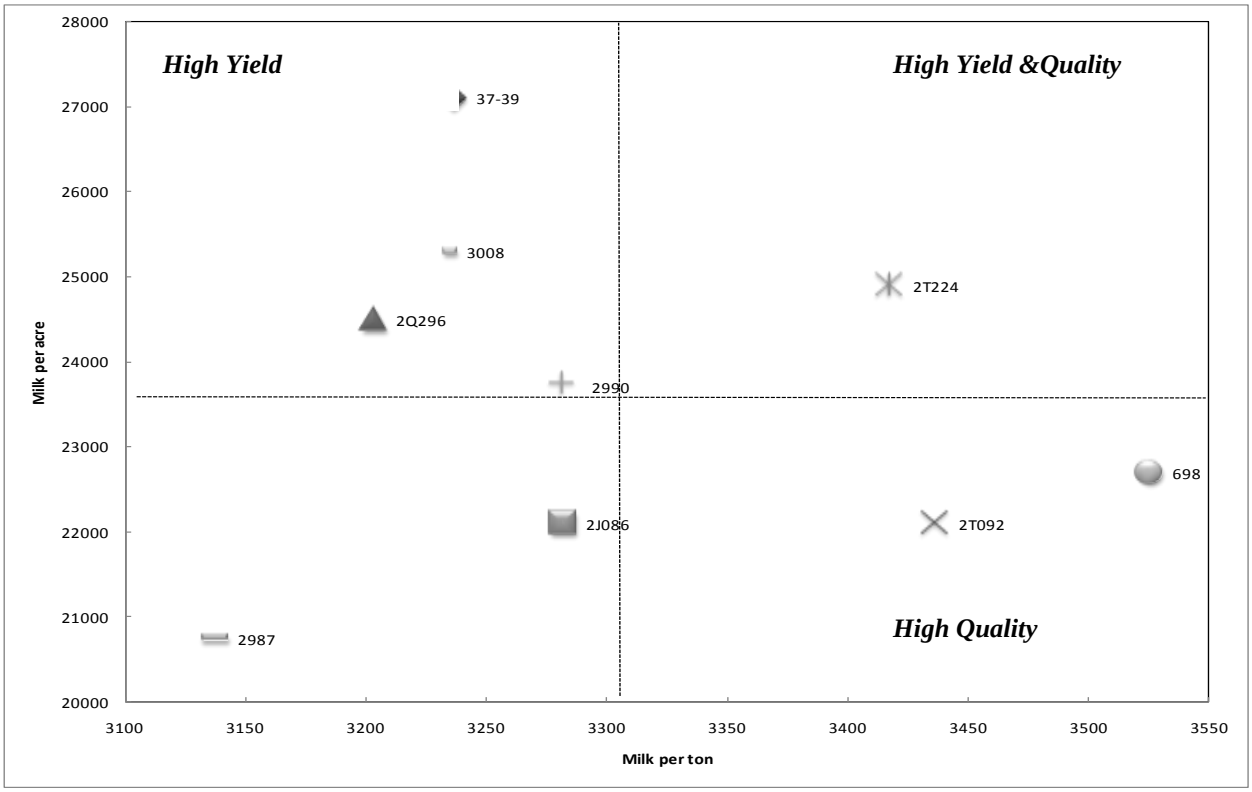

Figure 1. Relationship between milk per ton and milk per acre. *Dotted lines represent the mean milk per ton and milk per acre.*

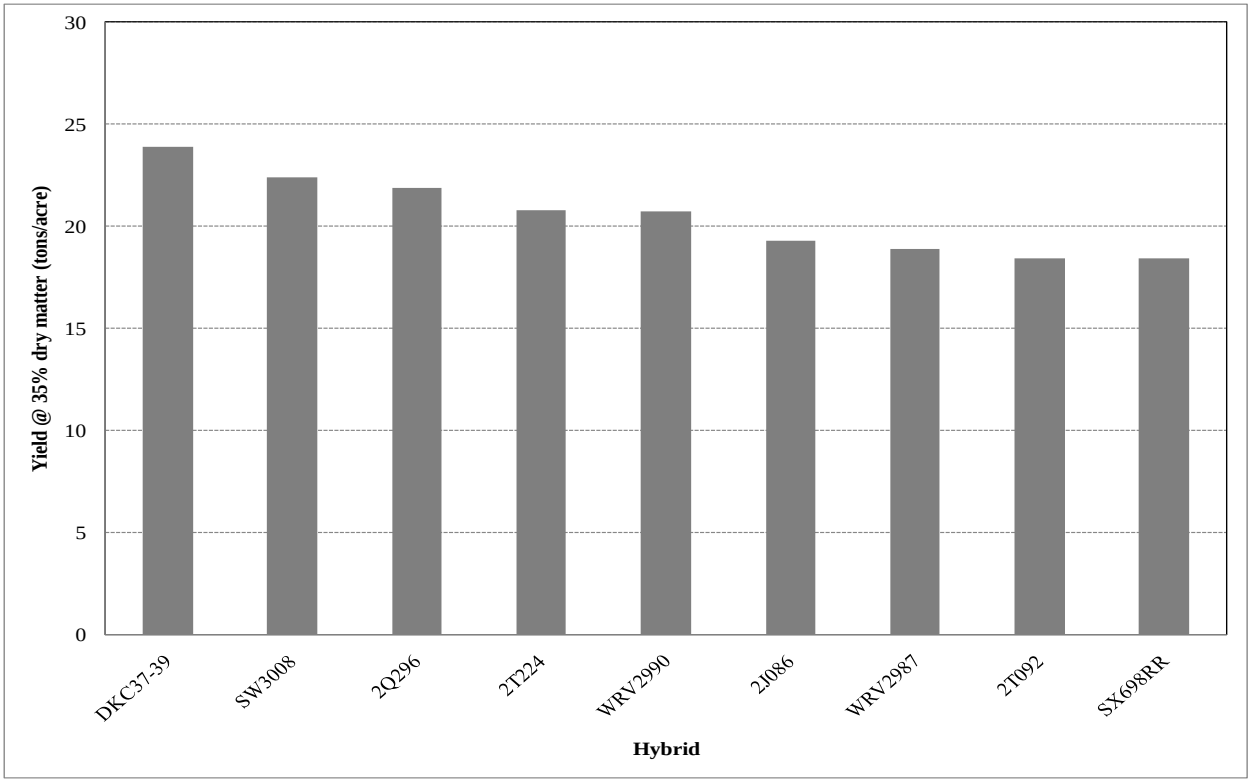

Figure 2. Yield comparison of short season corn silage hybrids. ***Yields were not statistically different among hybrids.***

DISCUSSION

There was no statistical difference between yield, ADF, NDF, dNDF, NEL, milk per ton, or milk per acre among the varieties trialed. There was a significant difference detected between crude protein content of the varieties, indicating that different hybrids use available soil nutrients more efficiently than others. Crude protein was exceptionally high for some of the varieties tested, with the Schlessman variety 698 performing best at 8.10% CP. Overall yields were high, for this short season site and average yields were over 20 ton. Variety selection for this location should really be focused on hybrids that can develop to the proper harvest moisture prior to a killing frost. Although yield is important the quality loss from harvesting immature silage can be substantial and can increase during storage. During this exceptional season with above normal GDD accumulation there were still several short season varieties that did not meet these requirements.

UVM Extension would like to thank Art Seward and family for their generous help with the trials. Any reference to commercial products, trade names, or brand names is for information only, and no endorsement or approval is intended.

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