2010

Vermont Relative Maturity Corn Silage Trial

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NW CROPS & SOILS PROGRAM

UNIVERSITY OF VERMONT EXTENSION

CULTIVATING HEALTHY COMMUNITIES

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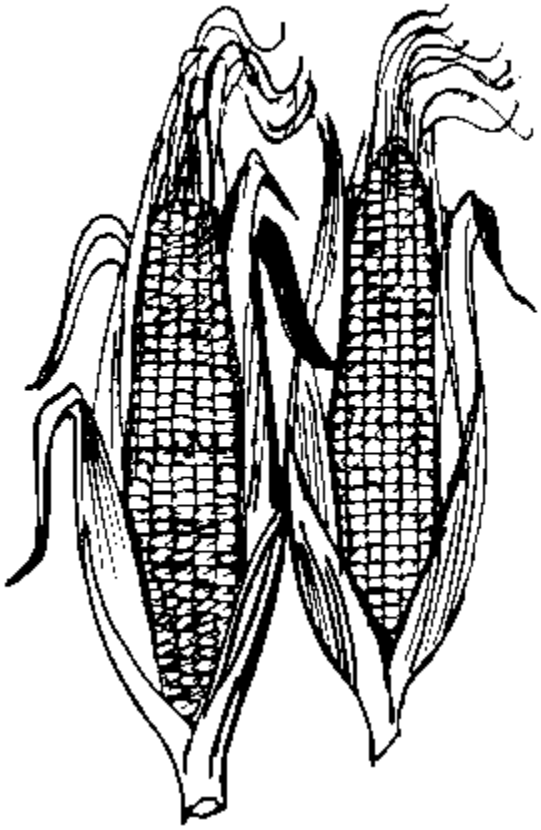

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2010 Vermont Relative Maturity Corn Silage Trials

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In 2010, the University of Vermont Extension conducted an experiment to evaluate yield and quality of corn hybrids with a range of relative maturities. The goal is to document the best range of corn silage maturities to grow in this area to maximize corn yield and quality. It is important to remember that the data presented are 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 conclusions are drawn.

TESTING PROCEDURE

Corn varieties of differing maturities were evaluated at Borderview Research Farm in Alburgh, VT for yield and quality performance. Several seed companies submitted varieties for evaluation. Companies and contact names are listed in Table 1. Twelve corn varieties ranging in maturities from 93-110 days were grown at this site. The Relative Maturity (RM) of each variety is provided by the companies.

Table 1. Participating companies and local contact information

Dekalb/Monsanto	Mycogen	Pioneer
Scott Walker District Sales Manager Schenectady, NY 315-528-0580	Claude Fortin District Sales Manager Highgate, VT 802-363-2803	Jacob Bourdeau Bourdeau Bros. Sheldon, VT 802-933-2277
Seedway	**Wolf River Valley Seeds**	
Ed Schillawski 3442 Rt 22A Shoreham, VT 802-897-2281	Marcel Moreau District Sales Manager Swanton, VT 802-309-4674	

Table 2. Corn silage hybrids, relative maturity (RM) and traits.

Company	Variety	RM	Description and Traits
Dekalb	DKC45-52	95	YGVT3
Dekalb	DKC46-07	96	GENSS
Mycogen	TMF2L418	94	HXT, LL, RR2
Mycogen	F2F488	99	HXT, LL, RR2
Mycogen	2D503	100	RR2, VT3
Mycogen	TMF2W583	104	RR2, TMF
Pioneer	PO125HR	100	HXI, LL, RR
Pioneer	35A34	106	HXX, LL, RR2
Pioneer	34A89	109	HXX, LL, RR2
Pioneer	P1011XR	110	HXX, LL, RR2
Seedway	3301L	93	Leafy
Seedway	3788RR	96	YGCRW
Seedway	E390L	98	RR2
Seedway	4091LYG	102	YG
Seedway	6601L	108	Leafy
Wolf River Valley	2702L	102	Leafy
Wolf River Valley	2114L	106-108	Leafy

GENSS – Genuity® SmartStax™ controls corn earworm, fall armyworm, northern corn rootworm, western bean cutworm, European corn borer, black cutworm, and southwestern corn borer. Also contains resistance to Roundup Ready® Corn 2 and LibertyLink® herbicides
HXI – The Herculex® I Insect Protection offers resistance to European corn borer, southwestern corn borer and fall armyworm; black cutworm and western bean cutworm; and corn earworm
HXT – Herculex Xtra® (Mycogen brand), provides season-long control of a variety of pests, including European corn borer, western bean cutworm, corn rootworm, and black cutworm.
LL – LIBERTY LINK CORN® is tolerant to broadcast applications of Liberty® or Ignite® herbicide, glufosinate ammonium
RR2 – ROUND-UP READY 2® Technology is resistant to the herbicide glyphosate (Roundup®, Touchdown®), a post-emergent, foliar applied, non-selective.
VT3 – YieldGard VT Triple™ uses VecTran™ technology which stacks insect- and weed-control traits in one variety. Provides glyphosate herbicide 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
YG – YieldGard® against corn borer; YGCRW – YieldGard® against corn rootworm : YGVT3 – YieldGard VT Triple® insect protection trait controls 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

WEATHER DATA

Seasonal precipitation and temperatures recorded at a weather station in close proximity to the 2010 research site are shown in Table 3. In 2010, the season brought higher than average temperatures and lower than average precipitation in the spring and summer months. This year accumulated 2881 Growing Degree Days (GDD), 450 more than the 30 year average. GDDs are reported using base 50° – 86°F.

Table 3. Temperature, precipitation, and growing degree days summary – Alburgh, VT

	April	May	June	July	August	September	October
Average Temperature (°F)	49.3	59.6	66.0	74.1	70.4	64.0	50.6
Departure from Normal	5.8	3.0	0.2	3.0	1.4	3.6	1.8
Precipitation (inches)	2.76	0.92	4.61	4.30	5.48	4.32	*
Departure from Normal	0.25	-2.01	1.40	0.89	1.63	0.86	
Growing Degree Days	141	332	479	747	634	419	129
Departure from Normal	101	71.4	4.5	95	45	107	26

*Missing data.
Based on National Weather Service data from cooperative observer stations in South Hero. Historical averages are for 30 years of data (1971-2000).

CULTURAL PRACTICES

The seedbed was prepared with conventional tillage methods. The previous crop was canola, sunflowers, and corn. Starter fertilizer was applied at a rate of 200 lbs/acre of 10-20-20. Plots were planted with a John Deere 1700 4-row corn planter on May 19, 2010 at 34,000 seeds to the acre. The soil type was a silty loam. The plot design was a randomized complete block with two replications and the plots were 10'x35'. The plots were harvested on September 14th, 16th, 29th, and October 3rd, 2010, depending on maturity with a John Deere 2 row chopper, and the forage wagon was weighed on a platform scale. A subsample was collected for moisture determination and quality analysis. Pertinent trial information is summarized in Table 4.

Table 4. Cultural practices.

Trial Information	Alburgh, VT
Soil type	Silty loam
Previous Crop	Corn, canola, sunflowers
Row Width (in.)	30
Planting date	19-May
Harvest date	Sept 14, 16, 29 & Oct 3
Harvest population (plants/acre)	34,000
Tillage operations	Spring disk, harrow, spike-toothed harrow
Manure (gal/acre)	Spring & Fall applied - 7500 gal/acre
Starter fertilizer	200 lbs/acre 10-20-20
Other fertilizer	130 lbs/acre 46-0-0

SILAGE QUALITY

Silage quality was analyzed using wet chemistry 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 N 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 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 maturity 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 at harvest in Table 5. The numbers presented in the tables are of two replications. A table is included to report yields in order of relative maturity (Table 6). There is a figure displaying the relationship between milk per ton and milk per acre (Figure 1). 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 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 the example below 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 C.

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

RESULTS

Table 5. Yield and quality of corn silage hybrids ranging in maturity from 93-110 RM.

Company	Hybrid	Relative maturity	DM at harvest %	Yield 35 % DM T/A	Forage Quality Characteristics CP %	ADF %	NDF %	dNDF %	Nel Mcal/lb	Milk per ton	Milk per acre
Dekalb	DKC45-52	95	36.5	22.1	7.25	24.8	40.0	55.1	0.77*	2870	22150
Dekalb	DKC46-07	96	36.7	23.2*	8.55*	22.7*	37.9*	56.5	0.76*	2947	23850*
Mycogen	F2F488	99	36.8	19.0	**9.05***	23.0*	39.4*	**69.3***	0.77*	**3275***	21750
Mycogen	TMF2L418	94	36.9	20.3	7.95*	25.8	41.8	58.3	0.76	2994	21200
Seedway	SW3788	96	37.5	20.6	7.85*	24.6	39.8	53.4	0.76	2849	20550
Seedway	3301L	93	38.4	19.8	7.90*	23.8	38.9*	58.5	0.78*	3108	21450
Wolf River Valley	2114L	106	39.5	25.3*	8.05*	25.3	42.5	55.1	0.75	2875	25450*
Wolf River Valley	2702L	102	39.5	26.8*	8.00*	23.4	37.9*	56.2	0.76	2935	27550*
Seedway	6601L	108	39.6	23.6*	8.00*	24.7	41.5	56.2	0.76	2944	24250*
Pioneer	34A89	109	39.9	25.2*	7.60	24.0	40.1	57.5	0.77*	2973	26300*
Pioneer	P1011XR	110	40.2*	24.8*	7.40	25.9	43.3	54.8	0.75	2870	24850*
Mycogen	TMF2W583	104	40.6*	18.6	8.50*	22.7*	37.6*	58.0	0.78*	3006	19550
Mycogen	2D503	100	41.5*	26.1*	7.15	23.8	38.6*	55.0	0.77*	2904	26450*
Seedway	4091LYG	102	41.8*	25.6*	6.95	25.2	41.1	53.5	0.76	2830	25350*
Pioneer	PO125HRX	100	42.2*	19.1	6.75	22.5*	**35.8***	57.4	0.78*	2996	19950
Pioneer	35A34	106	43.6*	**27.5***	8.30*	**21.2***	36.5*	57.6	**0.78***	3021	**29200***
Seedway	E390L	98	**43.9***	24.9*	7.50	26.0	42.5	54.7	0.75	2894	25150*
LSD (0.10)**			3.6	5.5	1.24	1.9	3.4	2.6	0.02	117	5900
Trail Mean			39.7	23.1	7.81	24.1	39.8	56.9	0.77	2958	23824

* Corn that did not perform significantly lower than the top performing variety in a particular column is indicated with an asterisk.
** See text for further explanation.

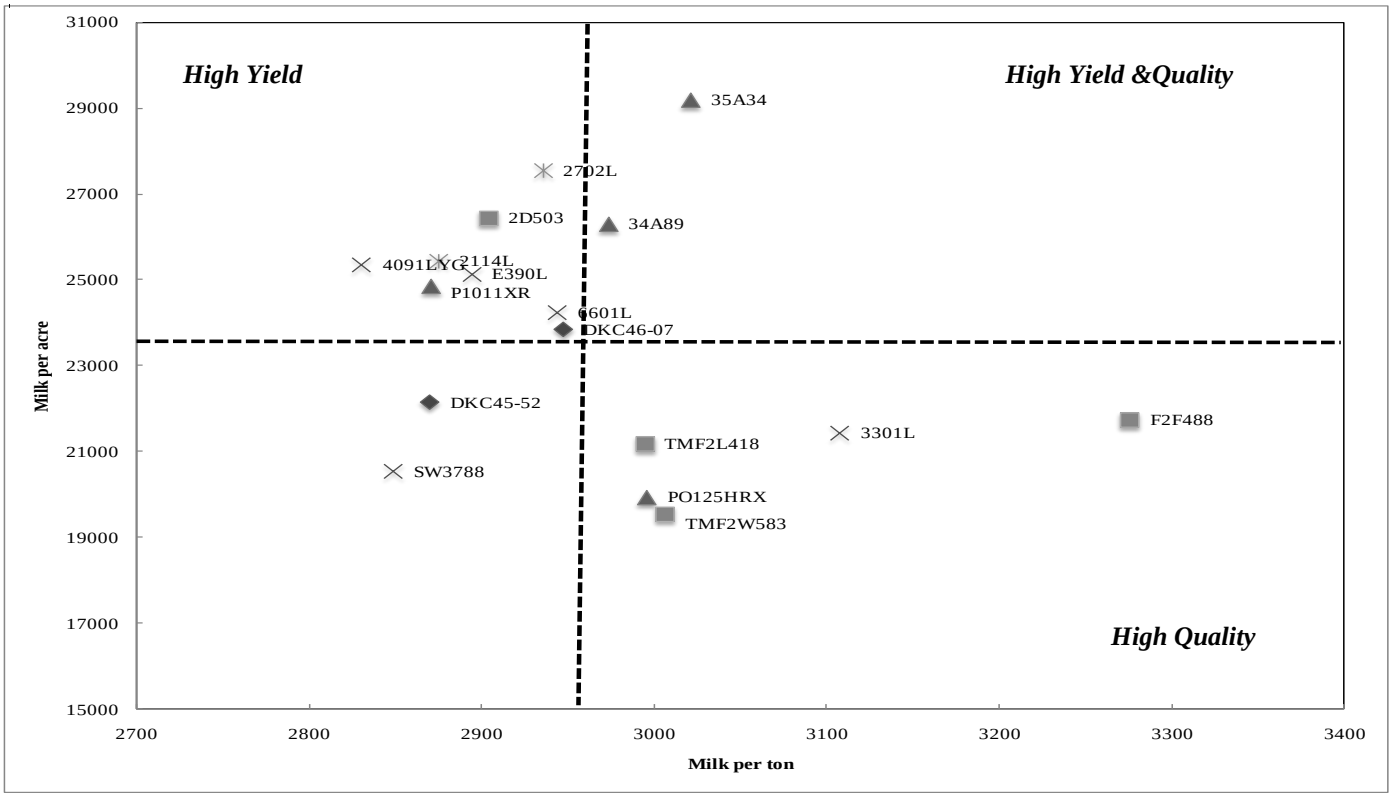

Figure 1. Milk performance of corn silage varieties. ***Dotted lines indicate overall milk per ton and milk per acre means of the corn varieties.***

RESULTS

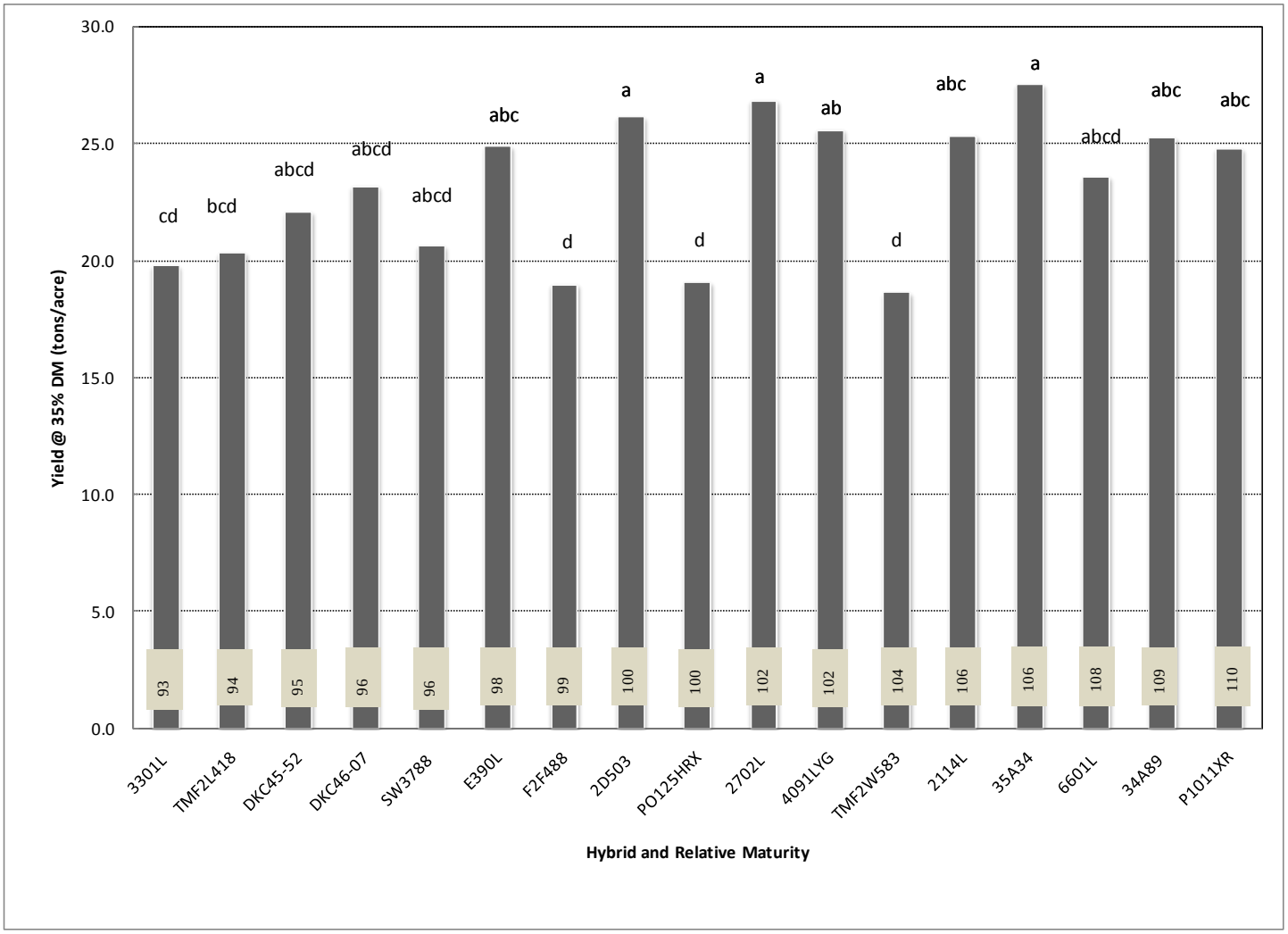

Figure 1. Yield comparison of corn silage hybrids ranging in maturity from 93 to 110 RM. ***Hybrids with the same letter did not differ statistically in yield.***

DISCUSSION

As seen in previous years there was no relationship between corn silage yield and corn silage relative maturity. The extra GDDs accumulated this season provided enabled all varieties regardless of maturity to reach proper stage for silage harvest. Overall the shorter season hybrids reached appropriate harvest dry matters up to two weeks earlier than some of the late season hybrids. An earlier harvest without yield and quality compromise would result in an opportunity for earlier manure application, cover cropping, and fall tillage. Hybrids were drier than optimal harvest moistures due to rain delays during harvest time. Again variety selection should be based on the goals of each individual farm. Data from local trials should be evaluated to determine what will perform best in your growing climate. Hybrids should also be selected on more than maturity alone. As obvious from the report 100 RM hybrids can perform significantly different in both yield and quality. During the 2010 growing season there were many hybrids ranging from 96RM to 1110RM that performed similarly in yield and quality.

UVM Extension would like to thank Roger Rainville and staff at Borderview Farm for their help implementing the trial. We would also like to thank Scott Walker of Seedway, Claude Fortin of Mycogen, Marcel Moreau of Wolf River Valley, Ed Schillawski of Seedway, and Dave Kostyo of Pioneer for the hybrid seed donation. The information presented with the understanding that no product discrimination is intended and no endorsement of any product mentioned or criticism of unnamed products is implied.