

NNY Agricultural Development Program 2006-2007 Project Report

Corn Silage Hybrid Trials in Northern NY

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Background:

Corn silage is a major crop in New York because dairy producers prefer this high-energy forage in the feed ration. Dairy producers in the six-county region (Lewis, Jefferson, St. Lawrence, Franklin, Clinton, and Essex) of Northern NY have planted about 100,000 acres of corn silage annually since 1999, which represents almost 85% of the annual corn acreage in Northern NY. Consequently, dairy producers in Northern NY plant about 20% of the New York corn silage crop (~500,000 acres). Clearly, corn silage is an important crop in Northern NY and Northern NY is an important region of the state for corn silage production. Corn silage research in Northern NY would greatly benefit both Northern NY and New York State.

We have evaluated numerous corn hybrids under different management practices including planting date, plant density, row spacing, N rate and timing, harvest date, and harvest cutting height. In most instances, the hybrid planted had a greater influence on silage quality than have management practices. Consequently, we believe that hybrid selection is the most important management practice affecting corn silage quality in most growing seasons.

Until 1990, most agronomists and animal nutritionists believed that high-yielding grain hybrids were the best corn silage hybrids. In the 1990s, however, it became increasingly clear that high-yielding silage hybrids with excellent quality do not require high grain content. In fact, many agronomists and animal nutritionists now believe that stover fiber digestibility is the most important hybrid characteristic affecting silage quality. Consequently, seed companies have recently released brown midrib and leafy hybrids, which have high stover fiber digestibility. Corn silage hybrid trials, however, have shown that some of the new silage hybrids have reduced emergence in cool wet springs, poor kernel set in warm dry summers, and poor standability at harvest. Corn silage hybrid trials can provide excellent information on the agronomic performance and silage quality of corn silage hybrids grown in specific regions, such as Northern NY, in normal growing conditions, years of cool and wet springs, or years of warm and dry summers.

Methods:

We planted all hybrids with a 2-row plot planter at three sites in Northern NY at about 36,000 plants/acre to achieve harvest populations of 32,000-34,000 plants/acre. The Sackets Harbor site was planted on 2 May, the Madrid site on 8 May, and the Chazy site on 12 May. All hybrids were grouped within a 5-day Relative Maturity (RM, i.e. 91-95 day, 96-100, etc.) group, and planted in a randomized complete block design with four replications. Each individual plot consisted of two 22-ft. rows spaced 30 inches apart. Each individual plot received about 250 lbs/acre of 10-20-20 at planting. The Chazy site received about 140 lbs N/acre of sidedressed N at the 4 to 5-leaf (V4 to V5) stage. The Sackets Harbor and Madrid sites were well-manured dairy sites so they received no sidedressed N. We used preemergence herbicides and hand-weeding to control weeds.

Both rows, trimmed back to an 18-foot length, of each hybrid were harvested for silage yield with a retrofitted 3-row New Holland Chopper with a platform and a weigh-basket, mounted on load cells. The goal was to harvest all hybrids in the 60-70% moisture range and only a very few of the hybrids were outside that range at Madrid and Chazy. All hybrids were harvested at Madrid on 11 September and at Chazy on 14 September. Unfortunately, we were unable to harvest the Sackets Harbor site in a timely manner because extremely dry August conditions resulted in silage moisture in the range of 65- 70% by 1 September. By the time that we were ready to harvest the site on 10 September, the moistures were in the 55-60% range, and most hybrids had incurred significant bird damage. Consequently, we decided not to harvest the site because of the extreme bird damage and the less than optimum moistures.

An approximate 10,000 g well-mixed sample was originally collected from each plot. The 10,000 g sample was then ground further in the field with a chipper-shredder. An approximate 1,000 g sub-sample was then weighed with a gram-scale in the field and stored on ice packs in a cooler or refrigerated in a generator-powered freezer (samples were not frozen). At the end of each day, the samples were brought back to a Cornell Research Farm for drying. The samples were dried at 140°F in a forced air drier to constant moisture and then weighed to determine moisture content of each sample.

Samples were processed and analyzed by Cumberland Valley Analytical Services, Inc. Samples were analyzed by wet chemistry for neutral detergent fiber (NDF), according to procedures by Van Soest et al. (1991). Samples were incubated for 30 hours at 39°F in a buffered rumen fluid, according to procedures by Van Soest and Robertson (1980) using a flask system and Van Soest buffer. Following fermentation, residues were analyzed for NDF by wet chemistry to determine 30-hour NDF digestibility (dNDF). The NDF digestibility was calculated as $[(1-\text{NDF residue}/\text{initial NDF}) \times 100]$. Crude protein (CP), starch, ether extract, and ash were determined using NIRS. Milk per ton and milk per acre were then calculated using the Milk2006 spreadsheet program.

Data were analyzed using the PROC GLM procedure of SAS. The LSD values for separating hybrid means were generated at the $P = 0.10$ level. Hybrids are considered above-average for calculated milk yield, milk/ton, or silage yield when the hybrid's value is 101% or more of the mean value within their RM group.

Results and Discussion:

The 2007 growing season in Northern NY was generally favorable for corn growth (Table 1). Temperatures were ideal throughout most of the growing season at both sites. Although three of the four months were dry at Canton (5 miles from the Madrid site), 7.20 inches of precipitation were recorded in July, insuring a high-yielding corn crop at Madrid. At Chazy, growing conditions were almost perfect for corn growth until well into August when dry conditions set in. Nevertheless, corn yields were also excellent at Chazy.

Two hybrids at Madrid and at Chazy had above-average milk yields in the 75-85 day RM group (Tables 2 and 3). The hybrids, HL S011 from Hyland and 377BWR from Doebler's, had much above-average milk yields at both sites. The hybrid, TA240-11 from T.A. Seeds, had much above-average milk yield at Madrid. The hybrid, 286XRR from Doebler's, had much above-average milk yields at Chazy. When averaged across sites, HL S011, TA240-11, and 377BWR had much-above-average silage yields. The six hybrids in the 75-85 day RM group averaged 27.4 tons/acre at Madrid and 23.1 tons/acre at Chazy.

Five hybrids at Madrid and at Chazy had above-average milk yields in the 86-90 day RM group (Tables 2 and 3). The hybrids, HL S034 from Hyland, 38N87 from Pioneer, HL SR35 from Hyland, and 8866RR from Garst, had above-average milk yields at both sites. The hybrid, TA270-11 from T.A. Seeds, had much above-average milk yields at Madrid. The hybrid, 52P81 from Dyna-Gro, had above-average milk yields at Chazy. When averaged across sites, HL S034, HL SR35 and 38N87 had much above-average silage yields, and 38N87 had above-average milk/ton values. The seven hybrids in the 86-90 Day RM group averaged 28.0 tons/acre at Madrid and 25.2 tons/acre at Chazy.

Nine hybrids at Madrid and at Chazy had above-average milk yields in the 91-95 day RM group (Tables 2 and 3). The hybrids, TMF2N422 from Mycogen, TA310-02F from T.A. Seeds, 38K47 from Pioneer, 946LRR from LICA, 53K69 from Dyna-Gro, and TMF2L416 from Mycogen, had above-average milk yields at both sites. The hybrids, EX2604 from Growmark FS, DKC45-82 (RR2), a DEKALB brand, and N29-A2, an NK brand, had above-average milk yields at Madrid. The hybrids, 53B04 from Dyna-Gro, N27-B5, an NK brand, and DKC41-57 (YGPL/RR2), a DEKALB brand, had above-average milk yields at Chazy. When averaged across sites, TMF2N422, TA310-02F, 38K47, 946LRR, TMF2L416, 53K69, and EX2604 had above-average silage yields in the 91-95 day RM group. When averaged across sites, TMF2N422 and N29-A2 had above-average milk/ton values. The 18 hybrids in the 91-95 day RM group yielded 27.4 tons/acre at Madrid and 24.1 tons/acre at Chazy.

Four hybrids at Madrid and two hybrids at Chazy had above-average milk yields in the 96-100 day RM group (Tables 2 and 3). The hybrids, DKC50-48 (YGCB/RR2), a DEKALB brand, and 964L from LICA, had above-average milk yields at both sites. The hybrids, 99 S7 and 98 BS7 from LICA had above-average milk yields at Chazy. When averaged across sites, 964L, DKC50-48 (YGCB/RR2), and 99 S7 had above-average silage yields in the 96-100 day RM group. When averaged across sites, DKC50-48 (YGCB/RR2) and 98 BS7 had above-average milk/ton values. The six hybrids in the 96-100 day RM group averaged 28.5 tons/acre at Madrid and 24.4 tons/acre at Chazy. Overall, the 96-99 day RM group yielded the highest at Madrid and the 86-90 day RM group yielded the highest at Chazy.

Conclusions: The 2007 growing season in Northern NY was very favorable for corn growth through July, but then became very dry during August. Nevertheless, yields were exceptionally

high at both sites. The results from this study reflect well the yield and quality of corn silage that was planted during the first half of May of 2007 on well-drained soils in Northern New York.

The results of this study indicate that excellent corn silage yields can be obtained by growing 75-100 day hybrids in Northern NY. At one site, the 86-90 day hybrids had higher average yields than the 96-100 day hybrids probably because the dry conditions in August hurt the later-maturing hybrids more than the earlier hybrids. At the other site, the 96-100 day hybrids yielded the best, but only 1 ton/acre more than the 75-85 day hybrids. Dry conditions often occur in Northern NY in August so growers in Northern NY could consider selecting hybrids that are shorter than 95 days in length to avoid some of the droughty conditions that can occur in late August/early September. Hybrids shorter than 95 days in length also increase the probability of a timely harvest before the first fall frost.

Outreach: The results of the two sites (Madrid and Chazy) were used to recommend corn silage hybrids in Northern NY for the 2008 growing season in our **What's Cropping Up?** newsletter that was published in December of 2007 (Vol.17, No.4, p.5-7, on our web site at : www.fieldcrops.org). Furthermore, the results will be incorporated into the recommended corn silage tables in our **2009 Cornell Guide for Integrated Field Crop Management**. We only list hybrids that have above-average relative calculated milk yields in their hybrid RM group (i.e. 86-90, 91-95 day RM, etc.). We also list the relative silage yields and milk/ton values for the recommended hybrids.

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Table 1. Monthly rainfall and growing degree days (GDD) at the two test sites in 2007.

Month	<u>PRECIPITATION</u>		<u>GDD</u>	
	Madrid	Chazy	Madrid	Chazy
May	2.26	2.42	296	318
June	1.76	3.80	519	541
August	0.90	1.22	570	568
Total	12.12	13.38	1920	1978

Table 4. Silage yield, milk/ton, and calculated milk yield for corn silage hybrids at Madrid, NY in 2007.

Madrid NY, 2007									
Brand/ Company	Hybrid	Silage Yield tons_65	Moisture %DM	NDF %DM	30 hour dNDF %	CP %DM	Starch %DM	Milk2006 Milk/ton lbs/ton	Milk2006 Milk Yield lbs/acre
74 to 85-d RM									
TA Seeds	TA 240-11	34.2	54.8	42.4	55.5	7.9	36.1	3182	38147
Hyland	HL S011	33.8	60.6	46.6	57.7	8.5	30.0	3120	36861
Doebler's	377 BWR	31.4	62.5	42.2	58.7	7.9	34.9	3251	35721
Hyland	HL SR22	25.7	60.2	45.7	57.7	8.7	30.2	3108	27929
Doebler's	286 XRR	22.4	64.0	44.5	56.7	8.5	30.7	3150	24674
Garst	8986 YG1/RR	16.8	62.8	44.0	55.4	8.5	31.4	3107	18250
86 to 90-d RM									
Hyland	HL S034	32.3	62.7	44.6	58.7	8.0	32.3	3172	35818
Pioneer	38N87	32.0	60.2	42.6	55.9	8.1	33.9	3168	35361
TA Seeds	TA 270-11	30.2	54.4	44.8	57.2	7.6	34.2	3144	33191
Hyland	HL SR35	30.4	63.0	46.3	59.4	7.9	30.7	3100	32950
Garst	8866 RR	29.4	59.4	45.8	55.5	7.5	32.5	3051	31346
Mycogen	TMF2Q296	23.7	64.1	43.1	57.0	8.7	31.2	3140	26080
DynaGro	52P81	18.0	64.8	41.9	58.7	8.4	33.7	3258	20555
91 to 95-d RM									
Mycogen	TMF2N422	33.1	63.1	44.7	61.7	7.5	33.2	3263	37796
Growmark FS	EX 2604	31.2	63.2	40.8	59.4	7.5	37.5	3313	36114
Pioneer	38K87	31.9	60.2	41.9	56.4	7.8	35.6	3229	36056
TA Seeds	TA 310-02F	32.6	61.8	45.6	58.1	8.2	30.9	3156	35966
DynaGro	53K69	29.8	62.4	42.8	58.5	7.7	35.3	3210	33525
DEKALB	DKC45-82	29.8	65.2	43.3	55.4	7.8	33.3	3116	32503
LICA	946 L RR	28.4	61.6	46.2	60.2	7.4	31.5	3182	31635
Mycogen	TMF2L416	28.2	60.9	44.8	58.9	8.1	32.1	3164	31172
NK Brand	N29-A2	27.3	55.5	42.1	57.1	7.9	37.0	3242	30967
Hyland	HL S041	25.9	64.2	42.5	61.2	8.2	33.5	3275	29668
NK Brand	N27-B5	26.6	55.9	43.1	56.8	7.8	35.1	3193	29659
Hyland	HL SR42	25.7	65.2	41.8	60.3	8.3	34.2	3276	29431
Fielders Choice	4095 ND	26.0	60.0	45.7	57.6	8.4	31.6	3145	28538
TA Seeds	TA 451-11	25.1	57.6	43.0	55.1	7.6	35.7	3138	27532
DynaGro	53B04	24.1	64.1	41.8	59.0	8.0	35.4	3264	27421
Chemgro	5434 RR	25.5	61.4	47.0	56.6	8.6	28.5	3041	27134
Growmark FS	4453 XRR	22.4	62.8	42.2	56.6	8.0	35.2	3217	25161
DEKALB	DKC41-57	20.8	64.8	41.6	57.7	8.4	34.4	3235	23486
96 to 99-d RM									
DEKALB	DKC50-48	31.4	66.2	41.1	59.1	7.6	36.0	3292	36179
LICA	99 S7	32.2	63.2	44.4	59.0	7.8	31.9	3192	36080
LICA	98 BS7	31.0	63.7	43.3	62.9	7.9	33.1	3324	36065
LICA	964 L	31.8	61.5	46.5	56.5	8.0	30.7	3038	33922
LICA	UFO 996 B	22.2	62.8	43.0	73.1	8.3	33.5	3556	27732
TA Seeds	TA 465-13	22.4	59.3	46.0	55.5	8.0	31.4	3054	23861
LSD 0.10		3.20	2.55	2.03	1.31	0.43	1.84	94	3947
Overall Mean		27.7	61.6	43.8	58.3	8.0	33.2	3191	30932

Table 5. Silage yield, milk/ton, and calculated milk yield for corn silage hybrids at Chazy, NY in 2007.

Chazy NY, 2007									
Brand/ Company	Hybrid	Silage Yield tons_65	Moisture %DM	NDF %DM	30 hour dNDF %	CP %DM	Starch %DM	Milk2006 Milk/ton lbs/ton	Milk2006 Milk Yield lbs/acre
74 to 85-d RM									
Doebler's	286 XRR	25.0	68.5	43.5	57.1	8.5	32.1	3256	28527
Doebler's	377 BWR	24.1	69.6	41.6	60.7	8.0	35.5	3367	28417
Hyland	HL S011	24.9	65.6	44.8	57.2	8.3	31.2	3208	27923
TA Seeds	TA 240-11	22.4	64.9	41.5	57.1	7.3	37.3	3312	25943
Garst	8986 YG1/RR	21.3	68.1	41.6	57.5	8.1	35.4	3319	24733
Hyland	HL SR22	20.9	67.6	43.2	58.7	8.4	32.7	3279	24038
86 to 90-d RM									
Hyland	HL SR35	27.4	69.4	44.4	58.5	8.0	31.6	3232	30946
Hyland	HL S034	27.3	68.6	45.8	58.5	7.4	31.3	3221	30775
Pioneer	38N87	25.7	66.7	41.0	55.7	7.8	36.0	3283	29508
Garst	8866 RR	25.8	68.3	43.7	57.1	7.4	34.0	3254	29355
DynaGro	52P81	24.7	66.8	40.8	59.4	7.8	36.9	3385	29274
TA Seeds	TA 270-11	23.0	67.3	42.6	57.3	7.4	35.1	3306	26641
Mycogen	TMF2Q296	22.3	67.5	41.4	57.9	8.2	35.0	3301	25838
91 to 95-d RM									
Mycogen	TMF2N422	28.7	69.4	44.2	62.4	7.4	33.2	3380	34017
TA Seeds	TA 310-02F	27.9	68.9	45.7	60.2	7.7	30.8	3246	31761
LICA	946 L RR	26.9	70.0	45.8	62.8	7.5	31.6	3347	31495
Pioneer	38K87	27.3	68.3	42.4	57.1	7.6	34.1	3255	31117
Mycogen	TMF2L416	26.0	69.9	44.0	60.3	7.8	32.6	3310	30151
DynaGro	53K69	24.8	69.2	42.0	58.4	7.2	35.9	3312	28752
DynaGro	53B04	24.6	69.2	41.8	59.2	7.6	35.6	3330	28676
NK Brand	N27-B5	24.4	69.0	41.7	57.6	7.7	35.6	3323	28367
DEKALB	DKC41-57	24.4	67.9	41.3	56.6	7.8	36.5	3292	28148
Growmark FS	EX 2604	23.7	69.5	42.5	57.5	7.2	35.4	3274	27165
NK Brand	N29-A2	23.1	68.7	41.3	58.6	7.8	36.1	3352	27113
Growmark FS	4453 XRR	23.7	69.1	44.1	58.4	7.7	32.4	3260	27045
DEKALB	DKC45-82	23.7	70.2	42.0	56.3	7.9	33.9	3231	26869
TA Seeds	TA 451-11	23.1	69.3	41.1	56.5	7.8	35.4	3278	26502
Hyland	HL SR42	21.3	71.3	41.3	61.4	8.4	33.5	3359	25049
Hyland	HL S041	20.7	70.9	42.3	61.0	8.3	33.5	3367	24391
Chemgro	5434 RR	21.2	68.7	45.1	58.8	8.0	31.3	3234	23958
Fielders Choice	4095 ND	17.5	70.8	43.5	59.1	8.6	32.0	3320	20247
96 to 99-d RM									
LICA	964 L	27.1	69.4	44.7	60.8	7.9	31.6	3301	31319
DEKALB	DKC50-48	25.7	70.3	42.7	58.9	7.5	34.3	3297	29595
LICA	99 S7	25.2	70.8	45.2	59.0	7.9	29.5	3227	28483
LICA	98 BS7	24.2	71.9	44.6	61.7	7.9	30.5	3322	28074
TA Seeds	TA 465-13	24.0	68.5	44.5	56.2	7.8	32.2	3182	26745
LICA	UFO 996 B	20.2	72.3	40.9	74.1	8.1	34.8	3691	26118
LSD 0.10		2.15	1.28	1.11	1.72	0.30	1.49	68	2638
Overall Mean		24.2	69.0	43.0	59.1	7.8	33.7	3303	27921