Northern NY Agricultural Development Program
2008-2009 Project Report

Project Title: 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 30 April, the Madrid site on 4 May, and the Chazy site on 8 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. All hybrids were harvested at Sackets Harbor on 19 September, at Madrid on 21 September, and at Chazy on 22 September. The goal was to harvest all hybrids in the 60-70% moisture range, which was accomplished at Sackets Harbor. Some of the hybrids were above 70% at Madrid and Chazy because of the cool growing conditions.

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 140^0F 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^oF 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-NDF residue/initial NDF] x 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: The 2009 growing season in Northern NY was similar across sites in temperatures or growing degree days (GDD) but somewhat different for precipitation patterns (Table 1). The Sackets Harbor and Madrid sites were exceedingly wet in May, which resulted in uneven and delayed early-season growth at the Sackets Harbor site. June, however, was on the dry side at all three sites as was August, especially at Sackets Harbor. July and September were wet at Madrid, contributing to wet conditions at harvest. In contrast, Chazy was on the dry side in both August and September, which probably resulted in less than average yields at that site. Overall, Sackets Harbor and Chazy were somewhat dry whereas Madrid was wet during the 2009 growing season. All three sites, however, were exceptionally cool during the 2009 growing season. June and July

were exceptionally cool months, which reduced the growth and plant height of corn. The wet and cool conditions in July, however, allowed for good pollination and respectable yields at all sites, except for Sackets Harbor because of the stunted and delayed growth associated with the exceedingly wet and cool May conditions.

Three hybrids at Madrid and four hybrids at Chazy and Sackets Harbor had above-average calculated milk yields in the 80-89 day RM group (Tables 2,3, and 4). When averaged across sites, TA290-11 from T.A. Seeds, 1890 F from LICA, and HL SR35 from Hyland had much above-average milk yields. Also, HL B29R from Hyland had above-average milk yields when averaged across sites. The hybrid, TA290-11, had much-above silage yields and above-average milk/ton values, which contributed to its much-above milk yields; whereas 1890 F and HL SR35 had much-above silage yields. When averaged across sites, F2F297 had a much-above milk/ton value.

Eight hybrids at Chazy, seven hybrids at Madrid, and 10 hybrids at Sackets Harbor had above-average milk yields in the 91-95 day RM group (Tables 2, 3, and 4). When averaged across sites, HL S047 from Hyland, 946 LRR form LICA, 478SL from Doebler's, V3593VT3 from Dyna-Gro, 515HXR from RPM, 89B87CB/LL from Garst and HL BSR40 from Hyland had much above-average milk yields. The hybrids, HL S047, 946 LRR, and V3593VT3 had much-above-average silage yields and above-average milk/ton values, which contributed to their much-above-average milk yields. The hybrids, 478SL and 515HXR, had much-above silage yields; whereas HL BSR40 had an above-average milk/ton value, which contributed to their above-average milk yields. The Pioneer hybrids, 38M60, 38N88, 38P43, and 38H08 as well as DKC45-79 from DEKALB had above-average milk yields at Chazy. When averaged across sites, 491BMB from Doebler's had a much-above average milk/ton value.

Four hybrids at Chazy and Madrid and three hybrids at Sackets Harbor had above-average calculated milk yields in the 96-100 day RM group (Tables 2, 3, and 4). When averaged across sites, TA489-00F from T.A. Seeds had much-above average milk yields; whereas TA510-11 from T.A. Seeds, F2F485 from Mycogen, and TA476-11 from T.A. Seeds had above-average milk yields. The hybrid, TA489-00F, had a much-above average silage yield and an above-average milk/ton value; whereas TA510-11 had an above-average silage yield and milk/ton value. In contrast, F2F485 had a much-above milk/ton value.

Conclusions/Outcomes/Impacts: The 2009 growing season in Northern New York was challenging because of the cool wet spring and cool summer. The excessively wet May conditions in Jefferson County resulted in uneven growth for early-planted corn and delayed corn planting until late May for most farms in that county. Fortunately, August was warm and no frost occurred until early October allowing for most corn in Jefferson Co. to attain maturity before a killing frost. The wet conditions in the fall, however, in St. Lawrence Co, coupled with the cool summer, resulted in delayed harvest until October under wet conditions. At Chazy, August and September conditions were dry, which allowed for harvest under good conditions in late September, but may have contributed to disappointing corn silage yields. The results from this study reflect well the variability in yield in Northern New York in 2009.

Outreach: The results of the two sites (Madrid and Chazy) were used to recommend corn silage hybrids in Northern NY for the 2010 growing season in our What's Cropping Up? Newsletter that was published in December of 2009 (Vol.19, No.5, p.1-3, on our web site at: www.fieldcrops.org.). Furthermore, the results will be incorporated into the recommended corn silage tables in our 2010 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. The 2009 results from Northern NY were presented at a winter workshop, the Seed Expo in St. Lawrence Co., on December 4, 2009. We also presented the results of the study at our Field Crop Dealer Meetings in late October, at a Cornell In-Service for our field crop educators in November, and at the advanced session of our Certified Crop Advisors Training Session.

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Person(s) to contact for more information (including farmers who have participated): Ron Robbins and John Greenwood (participating farmers).
Mike Hunter, Jefferson Co., Stephen Canner, St. Lawrence Co., Joe Lawrence, Lewis Co, Cornell Cooperative Extension.

Table 1. Monthly and total precipitation and growing degree days (GDD, 86-50 F system) at the three experimental sites during the 2009 growing season at the three experimental sites.

	Precipitation				GDD (86-50 F)		
Month	Sackets	Chazy	Madrid*		Sackets	Chazy	Madrid*
June	1.24	2.49	1.87		394	416	398
July	3.46	3.81	5.93		522	522	517
August	1.89	2.30	2.81		588	580	569
Sept.	1.92	2.20	3.24		345	293	318
Total	**13.49**	**13.97**	**18.54**		**2102**	**2066**	**2062**

Table 2. Silage yield (adjusted to 65% moisture), moisture at harvest, quality characteristics, milk/ton, and calculated milk yields of corn hybrids at Madrid, NY 2009.

Brand/Co.	Hybrid	Yield	Moisture	NDF	NDFD	CP	Starch	Milk/ton	Milk Yield
		tons_65	%DM	%DM	30 hr	%DM	%DM	lbs/ton	lbs/acre
				85 to 90-d RM					
TA Seeds	TA 290-11	26.6	68.8	38.5	54.4	8.5	33.1	3347	31228
LICA	1890 F	26.3	70.2	41.7	56.8	8.7	29.4	3263	30016
Hyland	HL SR35	25.4	70.5	42.5	56.8	8.8	28.5	3249	28950
Hyland	HL B29R	23.1	67.9	40.5	52.3	8.5	29.2	3056	24689
Dekalb	DKC 38-89	20.7	70.8	40.4	55.2	8.7	29.9	3206	23298
Mycogen	F2F 297	18.8	70.6	38.9	68.3	8.6	29.8	3400	22336
King's Agriseeds	MC 468	19.2	66.7	42.1	56.7	9.0	29.5	3266	21999
Hyland	HL R228	19.5	69.2	42.6	54.9	8.7	28.7	3205	21902
				91 to 95-d RM					
Hyland	HL SO47	27.0	70.2	41.1	58.5	8.9	29.9	3324	31430
Dyna-Gro	V3593VT3	26.5	71.4	40.8	58.6	8.0	32.7	3366	31154
Doebler's	478SL	28.0	71.1	42.0	56.7	8.5	28.2	3169	31114
RPM	515 HXR	28.0	72.3	41.9	54.2	7.8	29.7	3166	31007
LICA	946 LRR	26.2	71.5	43.4	58.5	8.7	26.8	3191	29164
Garst	89B87 CBLL	25.3	69.6	41.2	53.0	8.3	30.1	3156	27950
Hyland	HL BSR40	24.0	70.9	41.9	58.5	8.9	29.2	3296	27735
LICA	994 LRR	23.2	71.7	40.7	58.4	9.3	28.9	3272	26560
Mycogen	TMF 2L418	22.7	71.0	40.8	57.6	8.6	29.7	3276	26090
Pioneer	38P43	23.6	67.9	42.7	54.2	8.2	28.9	3159	26066
Dekalb	DKC 45-79	23.4	72.0	40.5	54.6	8.2	29.9	3158	25804
NK	N29R CBLL	23.3	69.2	40.3	52.0	8.3	30.4	3140	25620
Pioneer	38H08	23.2	68.1	40.4	53.1	8.2	29.5	3047	24728
Doebler's	491 BMB	19.8	73.2	39.5	72.5	8.2	29.2	3475	24119
Pioneer	38M60	22.1	67.5	42.1	52.7	8.1	28.5	3056	23688
Pioneer	38N88	20.6	67.7	39.9	53.3	8.6	29.0	3045	21957
				96 to 100-d RM					
TA Seeds	TA 489-00F	26.6	70.0	40.9	58.0	8.6	30.3	3313	30911
TA Seeds	TA 510-11	25.7	70.9	40.8	53.8	8.3	30.4	3208	28871
Dekalb	DKC 50-44	24.9	72.1	40.6	56.6	8.0	31.4	3279	28643
TA Seeds	TA 476-11	24.9	69.9	41.9	53.7	8.3	30.9	3234	28233
Mycogen	F2F 485	22.6	71.7	40.2	73.0	8.6	28.9	3521	27798
Dekalb	DKC 48-37	21.7	71.2	41.7	52.3	8.1	30.3	3158	24007
	LSD 0.10	**3.37**	**1.60**	**1.53**	**1.52**	**0.32**	**1.84**	**110**	**4176**
	Mean	23.8	70.2	41.1	57.0	8.5	29.7	3234	26902

Table 3. Silage yield (adjusted to 65% moisture), moisture at harvest, quality characteristics, milk/ton, and calculated milk yields of corn hybrids at the Miner Institute in Chazy, NY in 2009.

Brand/Co.	Hybrid	Yield	Moisture	NDF	NDFD	CP	Starch	Milk/ton	Milk Yield
		tons_65	%DM	%DM	30 hr	%DM	%DM	lbs/ton	lbs/acre
				85 to 90-d RM					
Hyland	HL B29R	22.3	66.8	40.5	56.0	7.9	32.4	3314	25832
Hyland	HL SR35	21.2	70.7	43.0	60.4	7.9	28.6	3224	23975
LICA	1890 F	20.5	70.9	42.0	58.7	8.1	30.5	3299	23618
TA Seeds	TA 290-11	20.2	69.2	40.9	57.2	7.5	32.9	3322	23541
Dekalb	DKC 38-89	19.2	68.7	38.5	57.9	7.9	34.6	3400	22816
Hyland	HL R228	18.3	65.1	38.6	58.1	7.4	36.2	3439	22077
Mycogen	F2F 297	16.3	67.6	37.1	72.9	7.9	34.8	3702	21107
King's Agriseeds	MC 468	16.8	67.3	39.7	60.2	8.4	32.5	3426	20077
				91 to 95-d RM					
LICA	946 LRR	21.5	70.7	42.7	62.3	8.0	29.9	3328	25064
Pioneer	38M60	21.4	67.4	39.4	57.6	7.7	32.9	3342	25013
Hyland	HL SO47	21.0	70.1	41.8	58.7	7.9	31.4	3306	24234
Pioneer	38N88	20.4	67.7	39.5	57.1	7.6	33.5	3354	23941
Garst	89B87 CBLL	20.0	68.3	40.3	58.8	7.5	34.0	3404	23757
Pioneer	38P43	20.8	67.7	41.1	56.5	7.8	31.9	3259	23689
Pioneer	38H08	20.3	68.5	41.2	59.4	7.5	32.1	3300	23422
Dekalb	DKC 45-79	20.0	71.5	40.9	58.1	7.8	31.9	3295	23013
Dyna-Gro	V3593VT3	20.2	71.4	41.8	59.3	7.4	30.2	3221	22741
RPM	515 HXR	20.5	72.1	43.2	59.3	7.7	28.6	3175	22709
Doebler's	478SL	20.8	71.6	41.8	59.7	7.8	28.3	3117	22680
Hyland	HL BSR40	19.4	71.0	40.9	61.8	8.1	30.9	3335	22669
NK	N29R CBLL	19.5	68.7	39.5	57.1	7.8	32.6	3308	22519
Mycogen	TMF 2L418	18.0	71.3	40.8	60.1	8.4	29.2	3191	20064
Doebler's	491 BMB	16.4	72.0	38.7	75.6	7.9	30.5	3484	19970
LICA	994 LRR	17.0	71.2	40.8	61.7	8.3	30.0	3292	19658
				96 to 100-d RM					
TA Seeds	TA 489-00F	21.7	70.5	41.9	59.7	8.0	29.1	3203	24312
Mycogen	F2F 485	19.5	71.9	39.7	75.3	8.6	30.0	3549	24153
TA Seeds	TA 476-11	21.2	70.1	42.2	55.0	7.6	30.9	3201	23796
TA Seeds	TA 510-11	20.2	70.6	39.5	58.9	7.7	32.4	3317	23457
Dekalb	DKC 48-37	19.4	69.5	40.5	55.7	7.5	32.8	3266	22113
Dekalb	DKC 50-44	19.7	71.4	41.2	57.1	7.5	30.4	3166	21841
	LSD 0.10	**2.09**	**1.08**	**1.59**	**1.99**	**0.30**	**1.37**	**90**	**2551**
	Mean	19.8	69.7	40.7	60.2	7.8	31.5	3318	22929

Table 4. Silage yield (adjusted to 65% moisture), moisture at harvest, quality characteristics, milk/ton, and calculated milk yields at Sackets Harbor, NY in 2009.

Brand/Co.	Hybrid	Yield	Moisture	NDF	NDFD	CP	Starch	Milk/ton	Milk Yield
		tons_65	%DM	%DM	30 hr	%DM	%DM	lbs/ton	lbs/acre
					85 to 90-d RM				
Hyland	HL SR35	22.3	65.5	39.7	60.5	8.6	33.9	3375	26347
Hyland	HL R228	20.4	63.5	37.3	61.3	8.0	38.1	3476	24878
TA Seeds	TA 290-11	18.8	64.1	37.0	59.2	8.5	37.2	3445	22641
LICA	1890 F	18.4	65.7	40.3	62.6	8.4	33.5	3388	21783
Dekalb	DKC 38-89	16.5	64.7	37.7	59.1	8.4	36.5	3413	19776
Hyland	HL B29R	15.8	64.4	41.7	57.5	8.6	33.1	3251	17885
King's Agriseeds	MC 468	14.7	64.7	39.3	61.8	9.0	35.7	3429	17670
Mycogen	F2F 297	13.2	63.0	37.5	70.0	8.1	36.3	3649	16838
					91 to 95-d RM				
Garst	89B87 CBLL	20.8	62.0	37.0	60.0	8.0	37.9	3488	25436
Hyland	HL BSR40	19.8	65.7	37.9	64.1	8.0	35.7	3484	24109
LICA	946 LRR	19.6	65.0	39.6	62.8	7.7	34.4	3416	23361
NK	N29R CBLL	19.2	62.8	38.1	58.8	7.9	37.3	3410	22866
Dyna-Gro	V3593VT3	18.6	66.4	39.6	64.3	7.6	34.4	3437	22329
LICA	994 LRR	18.0	66.8	36.7	64.8	8.7	35.8	3525	22232
Doebler's	478SL	18.5	65.2	39.7	63.3	7.3	34.6	3433	22153
Hyland	HL SO47	18.3	65.6	40.1	63.9	7.9	34.0	3437	22069
RPM	515 HXR	18.4	65.9	40.1	61.9	7.8	35.1	3382	21807
Pioneer	38N88	17.8	61.8	36.8	61.6	8.1	39.9	3487	21701
Pioneer	38H08	18.0	61.8	36.1	59.5	7.9	39.3	3435	21611
Pioneer	38M60	17.4	61.7	37.7	63.1	8.1	38.5	3500	21339
Pioneer	38P43	17.6	63.3	38.9	61.9	8.4	37.5	3439	21233
Mycogen	TMF 2L418	16.9	66.3	40.1	62.1	8.1	33.8	3388	19964
Dekalb	DKC 45-79	16.6	66.4	37.6	61.7	8.0	35.8	3415	19882
Doebler's	491 BMB	11.0	68.6	37.4	72.7	8.5	33.9	3606	13909
					96 to 100-d RM				
Mycogen	F2F 485	16.9	67.4	39.4	72.1	8.4	31.0	3494	20604
TA Seeds	TA 489-00F	17.7	67.1	40.9	60.6	8.4	31.9	3317	20571
TA Seeds	TA 510-11	17.2	65.3	39.3	61.4	8.1	33.5	3364	20192
TA Seeds	TA 476-11	16.8	65.3	40.4	58.9	8.1	33.8	3328	19523
Dekalb	DKC 50-44	16.6	68.0	39.6	62.5	8.0	33.0	3335	19380
Dekalb	DKC 48-37	14.4	66.0	38.3	60.4	7.9	35.6	3379	17039
	LSD 0.10	**2.41**	**1.68**	**2.12**	**1.73**	**0.66**	**2.91**	**103**	**3022**
	Mean	17.5	65.0	38.7	62.5	8.1	35.4	3431	21037