



Northern New York Agricultural Development Program 2013 FINAL REPORT

Corn Silage Hybrid Trials in NNY

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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 planted about 90,000 acres of corn silage in 2012 (64,500 acres in Jefferson, Lewis, and St. Lawrence counties and 26,000 acres in Clinton and Franklin counties), which represented almost 20% of the New York corn silage crop in 2012 (~475,000 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 benefits dairy producers in both Northern NY and other regions in 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 over the last 30 years. In almost all 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, most agronomists and animal nutritionists now believe that stover fiber digestibility is one of the most important hybrid characteristics affecting silage quality.

Furthermore, some animal nutritionists believe that starch concentrations are no longer adequate in assessing corn silage hybrids for quality but rather starch digestibility of the grain is far more important.

Seed companies released brown midrib hybrids in the 1990s and 2000s, which provided dairy farmers with the choice of selecting hybrids with high fiber digestibility. Some of these hybrids, however, had agronomic challenges such as lower tonnage and lodging problems, as evidenced again on some farms in 2013 after storms with high winds lodged BRM corn.

In the future, it is expected that seed companies will release hybrids that have higher starch digestibility, which will provide dairy farmers with the choice of selecting hybrids with high starch digestibility. Nevertheless, we also must evaluate the agronomic performance, including stand emergence under cool conditions, lodging tolerance, and yield, as well as silage quality of these new hybrids.

Dairy producers must produce as much high quality corn silage as possible on their farms for the foreseeable future because of the exorbitant price of grain corn. Dairy producers no longer can afford to purchase a significant amount of feed concentrates. Corn silage hybrid trials across three locations can help dairy producers identify corn silage hybrids that produce the most tonnage with the highest quality under growing conditions in Northern New York. Corn silage hybrid trials in Northern NY can aid dairy producers in selecting high-yielding corn silage hybrids with high silage quality. This information will help Northern New York dairy producers survive in the short-term and thrive in the future.

Methods:

We planted all hybrids with a 2-row plot planter at 36,000 plants/acre to achieve harvest populations of 32,000-34,000 plants/acre. The Madrid site was planted on May 2 and the Sackets Harbor site on May 3. The Chazy site was planted on May 14 but sustained significant flooding damage in early June and the study had to be abandoned.

All hybrids were grouped within a 5-day RM (i.e. 91-95 day RM, 96-100, etc.), and planted in a randomized complete block design with four replications. Each individual plot consisted of two 20-ft. rows spaced 30 inches apart. Both sites were well-manured dairy sites, so they received no side-dressed N. We used preemergence and postemergence herbicides and hand-weeding to control weeds.

Both rows, trimmed back to an 18-foot length, were harvested for silage yield with a retrofitted 3-row New Holland Chopper with a platform and a weigh-basket, mounted on load cells.

We harvested all maturity groups at the Sackets Harbor site in Jefferson County on 9 September. Unfortunately, most hybrids were in the 56 to 60% range because of the dry preceding conditions.

We harvested all maturity groups at Madrid in St. Lawrence County on 11 September when most hybrids were in the 64 to 68% moisture range.

An approximate 10,000 g well-mixed sample was originally collected from the chopper after harvest of each plot. The 10,000 g sample was then ground further in the field with a chipper-shredder. An approximate 600 g sub-sample was then weighed and recorded with a gram-scale wired to a computer in the field and refrigerated in a generator-powered freezer (samples were kept cool but not frozen). At the end of each day, the samples were brought back to a Cornell Field Lab 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.

Dry samples were ground to pass a 1 mm screen using a Wiley mill. 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 (NDFD). 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 (Tables 2-5. 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 were considered **exceptional performers** if the calculated milk yield exceeded the average of their respective RM group by more than 5%. Hybrids were considered **good performers** if their calculated milk yield exceeded the respective average calculated milk yield of their respective RM group.

Results:

When averaged across maturity groups, average silage yields increased approximately 1.5 tons/acre at Madrid and approximately 0.5 tons/acre at Sackets Harbor with each 5-day increase in RM (Tables 2 and 3).

Yields ranged from 25.2 tons/acre for the 84-90 day RM and 27.0 tons/acre for the 96-102 day RM group at Madrid. At Sackets Harbor, the range was 24.5 tons/acre (84-90 day RM) to 26.1 tons/acre (96-102 day RM).

Harvest moisture % also increased by approximately 1.1 percentage units with each 5-day increase in RM at Madrid and 1.3 percentage units at Sackets Harbor, where all hybrids were harvested on the same day.

When averaged across the Madrid and Sackets Harbor sites, the hybrid, **MC-4050** from KingsAgriseed, which had the highest calculated milk yield at Sackets Harbor and the 2nd highest at Madrid, performed exceptionally well in the **84 to 90 day RM** group (Tables 2 and 3).

Another exceptional hybrid in the 84-90 RM Group was **287GRQ** from Doebler's, which had the highest calculated milk yield at Madrid.

Other hybrids that performed well when averaged across sites include **327GRB** from Doebler's, which had the 3rd highest calculated milk yield at Sackets Harbor, **MC-480** from KingsAgriseed, which had the 2nd highest calculated milk yield at Sackets Harbor, **TA304-02ND** from T.A.Seeds, **27A13** from Healthy Herd Genetics and Nutrition, which had the 3rd highest calculated milk yield at Madrid, and **FS 40R30SS** from FS InVISION.

When averaged across the two sites, the hybrids, **WRV 3396 FL** from Wolf River Valley Seeds, which had the highest calculated milk yield at Madrid, **455GRV** from Doebler's, which had the highest calculated milk yield at Sackets Harbor, **TMF2L418** from Mycogen and **P9917AMX** from Pioneer, all performed exceptionally well in the **91-95 day RM**.

The hybrids **TMF2L418** and **P9917AMX** had the second highest calculated milk yield at Sackets Harbor and Madrid, respectively.

When averaged across the two sites, the hybrids, **P0553AM1** from Pioneer and **MC-5250** from KingsAgriseed, which had the 2nd highest calculated milk yield at Sackets Harbor, performed exceptionally well in the **96-102 day RM**.

Other hybrids that performed well when averaged across sites include **FS 46R26SS** from FS InVISION, **43HF13** from Healthy Herd Genetics and Nutrition, which had the highest calculated milk yield at Sackets Harbor, **471XY** from Doebler's, and **39HF13** from Healthy Herd Genetics and Nutrition.

The hybrids, **TMF2Q413** and **TMF2Q427** from Mycogen had the highest calculated milk yields at Madrid but were not entered at the Sackets Harbor site. Likewise, the hybrid, **Garst 86T-823122** from Syngenta had the 3rd highest calculated milk yield at Sackets Harbor, but was not entered at the Madrid site

Conclusions/Outcomes/Impacts:

The 2013 growing season again proved to be another challenging year because of the excessive precipitation from late May through June. Corn silage producers on well-drained soils in New York had record yields; whereas producers on somewhat poorly to poorly drained soils had below-average yields.

The results of this study were incorporated into the Recommended Corn Silage Hybrid tables for Northern NY in our **2014 Cornell Guide for Integrated Field Crop Management**, which were first distributed at the Cornell Field Crop Dealer Meetings in December of 2013. We only recommend hybrids that have above-average comparative calculated milk yields (>100%) in their hybrid RM group (i.e. 96-100, 101-105 day RM, etc.). We also list the comparative silage yields and milk/ton values for the recommended hybrids.

Outreach:

The results of the NNY corn silage hybrid trials were presented to extension educators at Cornell's November In-Service, to industry personnel at the Field Crop Dealer Meetings in December, and to farmers at the Soybean Congresses in February.

The results were also incorporated into our Recommended Corn Silage Hybrid Tables for NNY in our **2014 Cornell Guide for Integrated Field Crop Management**.

Table 1. Monthly precipitation and growing degree days (GDD) at Sackets Harbor and Madrid during the 2013 growing season.

Month	Precipitation-Inches		GDD-°F	
	Sackets* Harbor	Madrid**	Sackets Harbor*	Madrid**
May	1.64	3.69	357	323
June	6.04	7.43	448	441
July	3.06	3.11	674	626
August	2.10	2.31	547	532
Seasonal	12.84	16.54	2026	1922

*Watertown Airport weather data.

**Canton weather data.

Table 2. Silage yield (adjusted to 65% moisture), moisture at harvest, quality characteristics, milk/ton, and calculated milk yields of corn hybrids at Madrid in St. Lawrence County in 2013.

Brand/ Company	Hybrid	Silage		30 hour				Milk2006	Milk2006
		Yield tons @65	Moisture %DM	NDF %DM	NDFD %	CP %DM	Starch %DM	Milk/ton lbs./ton	Milk Yield lbs./acre
84-90-d RM									
Doebler's	287GRQ	26.7	63.3	43.9	49.6	8.6	29.6	3276	30731
KingsAgriseed	MC-4050	26.6	65.8	44.6	49.8	8.5	30.9	3242	30218
Health Herd Genetics	27A13	23.5	64.3	46.8	57.4	8.3	28.3	3410	28114
FS InVISION	FS 40R30SS	24.1	64.7	44.3	51.6	8.4	30.8	3324	28066
Doebler's	327GRB	24.5	66.6	44.8	49.7	7.8	30.1	3223	27668
TA Seeds	TA304-02ND	23.6	65.0	45.7	52.9	8.9	28.7	3291	27206
Syngenta	N19L-3011 A	23.7	62.9	45.0	50.8	9.0	28.8	3282	27195
KingsAgriseed	MC-480	23.6	64.6	44.7	49.0	8.5	29.9	3225	26699
Wolf River Valley Seeds	WRV2387	22.1	64.1	48.0	56.8	8.8	26.9	3381	26173
DEKALB	DKC38-04	23.6	65.5	47.0	50.2	8.9	25.1	3118	25863
Hubner Seeds	H5080RC3P	22.0	64.8	46.2	50.7	9.2	26.9	3206	24673
DEKALB	DKC39-07	24.0	65.9	48.2	47.1	8.3	23.4	2914	24519
Average		24.0	64.8	45.8	51.3	8.6	28.3	3241	27260
91-95-d RM									
Wolf River Valley Seeds	WRV3396 FL	27.6	66.0	49.7	56.3	8.4	27.7	3299	31909
Pioneer	P9917AMX	26.4	63.8	43.7	52.5	8.0	31.6	3363	31060
Mycogen	TMF2L418	26.5	67.4	47.6	55.6	8.7	27.9	3339	30998
Doebler's	455GRV	27.4	66.6	49.7	50.5	7.2	27.5	3120	29919
DEKALB	DKC43-48	25.5	65.9	46.2	50.6	7.8	28.4	3218	28788
DEKALB	DKC43-10	24.3	65.8	46.1	53.2	8.6	28.2	3292	28014
Hubner Seeds	H5151RC3P	24.4	65.6	46.1	50.9	8.4	26.6	3217	27399
TA Seeds	TA333-28	24.0	64.5	46.4	52.0	8.7	27.1	3215	27019
Hubner Seeds	H4157RC2P	24.3	66.7	47.0	50.3	8.2	26.1	3146	26805
Hubner Seeds	H6040RCSS	24.4	66.6	49.8	50.4	8.4	27.5	3100	26501
Doebler's	428AMX	21.9	65.2	48.5	49.2	8.3	23.3	2950	22674
Average		25.2	65.8	47.3	52.0	8.3	27.4	3205	28280
96-102-d RM									
Mycogen	TMF2Q413	32.1	66.4	51.0	53.3	7.5	28.3	3160	35534
Mycogen	TMF2Q427	28.3	66.3	48.4	56.0	8.1	29.0	3339	33038
DEKALB	DKC46-20	28.1	64.7	44.6	52.8	8.6	29.5	3322	32670
Pioneer	P0533AM1	27.8	64.8	46.6	55.2	7.7	29.8	3334	32338
FS InVISION	FS 46R26SS	27.6	67.3	46.7	54.3	7.9	28.5	3321	32098
Hubner Seeds	H5297RC3P	28.3	67.9	46.1	49.9	7.9	28.1	3186	31575
KingsAgriseed	MC-5250	28.2	67.4	49.4	49.7	8.1	25.6	3100	30559
Doebler's	471XY	26.5	66.7	46.2	52.9	8.0	26.7	3244	30178
Health Herd Genetics	43HF13	25.6	70.3	49.4	55.5	8.2	25.1	3242	29094

DEKALB	DKC49-29	26.0	67.9	47.0	50.6	8.5	27.1	3183	29061
Health Herd Genetics	39HF13	24.6	67.6	46.1	55.7	8.8	28.3	3361	28931
TA Seeds	TA484-28	26.4	67.5	48.6	50.5	8.3	25.8	3123	28838
FS InVISION	FS 4939VT3P	23.9	66.2	45.4	53.8	8.1	28.2	3292	27532
Doebler's	468AMX	24.7	67.0	50.2	51.2	7.8	26.8	3101	26774
Average		27.0	67.0	47.6	53.0	8.1	27.6	3236	30587
LSD 0.10		2.16	1.16	2.97	2.45	0.58	3.10	147	2984
Overall Mean		25.5	65.9	46.9	52.1	8.3	27.8	3228	28822

Table 3. Silage yield (adjusted to 65% moisture), moisture at harvest, quality characteristics, milk/ton, and calculated milk yields of corn hybrids at Sackets Harbor in Jefferson County in 2013.

Brand/ Company	Hybrid	Silage		30 hour				Milk2006	Milk2006
		Yield tons @65	Moisture %DM	NDF %DM	NDFD %	CP %DM	Starch %DM	Milk/ton lbs./ton	Milk Yield lbs./acre
84-90-d RM									
KingsAgriseed	MC-4050	26.6	56.3	38.5	50.1	8.4	34.4	3406	31631
KingsAgriseed	MC-480	25.3	52.2	40.1	52.8	8.1	35.6	3484	30876
Doebler's	327GRB	25.0	53.6	38.7	51.3	8.6	34.8	3440	30176
TA Seeds	TA304-02ND	25.8	58.8	42.2	51.3	8.9	29.0	3286	29623
Wolf River Valley Seeds	WRV2387	24.9	55.8	45.4	54.3	8.2	29.3	3350	29142
Health Herd Genetics	27A13	23.4	53.9	43.4	56.3	8.3	32.0	3490	28668
FS InVISION	FS 40R30SS	24.6	59.3	43.4	52.6	8.3	29.5	3319	28544
DEKALB	DKC39-07	24.8	57.2	43.0	50.3	8.1	29.8	3226	28062
Doebler's	287GRQ	24.9	54.0	44.1	49.2	7.7	29.6	3159	27670
Hubner Seeds	H5080RC3P	21.6	57.3	42.5	51.8	8.3	30.6	3301	24975
DEKALB	DKC38-04	22.9	57.4	43.7	47.0	8.3	29.1	3132	24968
Average		24.5	56.0	42.3	51.6	8.3	31.2	3326	28576
91-95-d RM									
Doebler's	455GRV	27.2	55.2	42.0	51.2	7.9	33.4	3360	32008
Mycogen	TMF2L418	26.1	56.1	43.9	52.2	8.2	30.4	3349	30545
KingsAgriseed	MCT-4564	25.5	55.2	41.0	50.8	8.5	33.8	3386	30175
Wolf River Valley Seeds	WRV3396 FL	25.5	56.6	44.5	54.5	7.8	30.3	3372	30123
Hubner Seeds	H5151RC3P	25.7	56.9	41.6	49.9	8.3	31.3	3281	29484
Pioneer	P9917AMX	24.7	54.4	41.3	52.8	8.4	32.4	3404	29413
Hubner Seeds	H6040RCSS	24.4	59.6	42.1	50.6	8.0	31.6	3297	28147
Hubner Seeds	H4157RC2P	24.5	59.1	43.5	49.8	7.9	29.0	3200	27401
DEKALB	DKC43-48	23.5	58.3	42.1	50.3	8.0	32.0	3327	27354
TA Seeds	TA333-28	24.1	58.0	44.8	49.4	8.1	28.3	3137	26512
DEKALB	DKC43-10	22.0	58.3	43.2	50.8	8.0	30.9	3313	25554

Doebler's	428AMX	22.4	56.0	42.1	49.5	8.1	30.7	3244	25466
Average		24.6	57.0	42.7	51.0	8.1	31.2	3306	28515
96-105-d RM									
Health Herd Genetics	43HF13	28.4	61.1	43.4	57.3	8.2	31.7	3483	34581
KingsAgriseed	MC-5250	29.0	59.8	43.7	53.2	7.5	31.5	3353	33875
Syngenta	Garst 86 T-823122	29.1	60.3	45.4	53.4	6.8	29.6	3307	33709
Health Herd Genetics	39HF13	27.7	59.0	44.8	54.3	8.4	29.5	3363	32614
Doebler's	471XY	27.1	57.2	40.8	53.6	8.2	32.2	3402	32325
Pioneer	P0533AMI	26.1	55.0	40.2	56.0	7.9	34.7	3540	32283
FS InVISION	FS 46R26SS	26.4	59.8	41.8	54.2	7.9	32.4	3434	31775
Dairyland	HiDF 3197-7	26.6	59.7	46.4	53.4	7.7	28.2	3270	30501
Wolf River Valley Seeds	WRV2702L	27.1	58.2	46.4	51.4	7.7	27.5	3216	30437
DEKALB	DKC46-20	26.0	57.4	43.0	52.1	7.9	32.6	3322	30210
Doebler's	468AMX	25.3	57.0	41.3	51.9	8.2	33.1	3371	29935
KingsAgriseed	MC-4880	25.2	56.5	41.0	51.1	7.7	34.0	3392	29890
Hubner Seeds	H5297RC3P	24.8	60.2	43.2	50.1	7.6	31.1	3281	28528
TA Seeds	TA484-28	23.8	59.0	43.0	51.3	8.2	29.8	3276	27303
FS InVISION	FS 4939VT3P	21.9	58.2	39.7	53.6	8.8	33.1	3462	26535
DEKALB	DKC49-29	23.3	59.6	42.8	47.9	7.8	30.1	3180	25866
Average		26.1	58.6	42.9	52.8	7.9	31.3	3353	30648
LSD 0.10		2.68	2.70	2.67	2.76	0.65	3.19	163	3433
Overall Mean		25.2	57.4	42.7	51.9	8.1	31.3	3331	29407