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2022 Corn silage overview

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The growing season varied greatly across the Northeast in 2022. These extremes were captured in the field locations in the NY VT Corn Silage Hybrid Evaluation Program (Table 1 and 3). This level of variation offers the opportunity to contrast crop performance across diverse environments (Table 5); however, it may reduce the usefulness of studying the broader trends in forage quality across the project (Figure 1).

TABLE 1

2022 Growing Season Summary by Location

Maturity Group	**Location**	**Planting Date**	**Harvest Date**	**Seasonal Rainfall** (inches)	**Seasonal GDD** (86/50)
80 – 95 day RM *26 entries*	Willsboro, NY Oakfield, NY Alburgh, VT	May 13 May 11 May 13	Sept. 2 Aug. 29 Sept. 12	15.0 9.7 22.5	2,099 2,041 2,117
96 – 110 day RM *41 entries*	Madrid, NY Aurora, NY Alburgh, VT	May 10 May 13 May 10	Sept. 15 Sept. 8 Sept. 21	18.8 14.6 25.0	2,138 2,132 2,264

As 2022 corn silage sits in storage, hopefully fermenting for the next few months before being fed out, it is helpful to understand how this crop might feed compared to previous years. These results offer an indicator of what to expect when transitioning into the 2022 crop. The location-to-location weather variability in 2022 increases the importance of focusing on location specific data where weather patterns were most similar to your farm's location.

Furthermore, it is helpful to take samples of your forage at harvest and again prior to feed out to understand the opportunities and challenges as you begin to feed this year's crop. We also need to remember that while fresh samples are a very helpful indicator, some characteristics of the forage will change during fermentation, particularly starch digestibility. A summary of expected changes is described in Table 2.

TABLE 2

General Direction of Nutritional Changes to Corn Silage During Fermentation

Dry Matter	↘	Dependent on level of DM loss (shrink) during fermentation
Starch Digestibility	↑	Ferment for minimum 3 to 4 months[1]
Starch Content	-	Could have slight changes in composition
Processing Score	-	Changes observed have not been consistent[2,3]
Fiber Digestibility	-	No change[1]
Mycotoxins	↗*	Majority originate in the field, very few are storage related. Not alive – will not "grow". Any increases in storage predominately associated with increased concentration (DM loss) ***Need to be present at harvest.**
Yeast and Molds	↗*	Increased risk with poor fermentation, low density, poor face management. ***Need to be present at harvest.**

[1]Influence of Ensiling on the Digestibility of Whole-Plant Corn Silage, Wisconsin Focus on Forage
[2]Does fermentation change corn silage processing?, Ferraretto
[3]Kernel Processing Information Series, Lawrence & Kerwin

Precipitation trends of note include the droughty conditions in Western NY (Oakfield), excessive early season moisture at the Madrid location, and a generally wet season from start to finish at the Alburgh, VT location (Table 3a). Growing Degree Day (GDD) accumulation did not standout in either direction for 2022 (Table 3b), though it should be noted that harvest timing at the Willsboro and Aurora locations resulted in an average whole plot dry matter (DM; Table 5) lower than desired, indicating additional time (GGD accumulation) prior to harvest was warranted.

TABLE 3a

Rainfall (inches) comparison by location and year

Maturity Group	Location	2017	2018	2019	2020	2021	2022
80 – 95 day RM	Willsboro, NY	17.7	10.2	12.4	10.5	14.0	15.0
	Oakfield, NY	13.8	8.3	12.4	12.6	15.4	9.7
	Alburgh, VT	20.3	10.8	14.2	15.5	12.5	22.5
96 – 110 day RM	Madrid, NY	16.8	15.3	16.5	11.4	21.3	14.6
	Aurora, NY	20.7	12.1	11.9	10.4	14.9	18.8
	Alburgh, VT	20.3	10.8	18.0	15.7	12.8	25.0

TABLE 3b

Growing Degree Day (GDD, 86/50) comparison by location and year

Maturity Group	Location	2017	2018	2019	2020	2021	2022
80 – 95 day RM	Willsboro, NY	2,131	2,233	2,039	2,073	2,155	2,099
	Oakfield, NY	2,004	2,195	1,954	2,163	2,185	2,041
	Alburgh, VT	1,928	2,265	1,971	2,099	2,193	2,117
96 – 110 day RM	Madrid, NY	1,975	2,204	2,022	2,144	2,220	2,138
	Aurora, NY	2,087	2,283	1,972	2,231	2,175	2,132
	Alburgh, VT	2,077	2,134	2,096	2,198	2,242	2,264

With these observations in weather patterns, it can be useful to look at key forage quality parameters and how the season impacted their relative values compared to previous years. Figures 1a and 1b show the differences in undigested neutral detergent fiber after 240 hours of in vitro fermentation (uNDF240) and starch content, respectively. The data in Figures 1 and Table 5 represents the last six growing seasons (2017 – 2022) with results combined from all locations by year in Figure 1.

Overall, adequate accumulation of GDD with timely rainfall during ear development, even at the drought-stressed Oakfield location, resulted in a distribution of starch content very similar to the last two growing seasons (Figure 1b). It is of note that locations where harvest occurred earlier than desired (Willsboro and Aurora), starch content deviated from the generally accepted "rule of thumb" that starch content tracks closely with whole plant DM (Table 4 and 5). This suggests there was potential for starch content to be even greater than what is reported here if the plant was harvested in the target range around 35 percent whole plant DM.

An example of this change as the corn plant reaches target silage maturity can be observed in a sub-study of this program, where the same group of hybrids were planted on the same date and harvested one week apart from each other at the Alburgh, VT location in 2018 (Table 4). As the plants continued to mature, starch content increased in concert with whole plant DM and yield was also influenced as the liquid in the kernels was converted to starch, contributing to the DM yield of the whole plant.

TABLE 4

Changes in key forage quality parameters with harvest date

	Harvest Date		*P*-value
	September 12, 2018	September 19, 2018	
Whole Plant Dry Matter (DM), %	32.4	37.2	< 0.001
uNDF240, %DM	13.0	13.4	0.39
NDFd30hr, %NDF	54.3	52.9	0.08
Starch Content, %	30.8	35.0	0.04
Yield, tons/acre, 35% DM	20.4	23.1	0.05

The documented influence of rainfall on fiber digestibility suggests that the location specific data, presented in Table 5, provides a better indicator of the impact on 2022 corn silage for a specific growing environment than the general trend presented in Figure 1a. However, when considering the regional impact on feeding programs with 2022 corn silage, the profile (Figure 1a) suggests the level of undigestible fiber (uNDF240) will support feeding programs similar to 2021 corn silage. Within these locations, an exception would be the growing pattern experienced at Aurora in Central NY, where uNDF240 levels are lower in contrast to 2021 (Table 5).

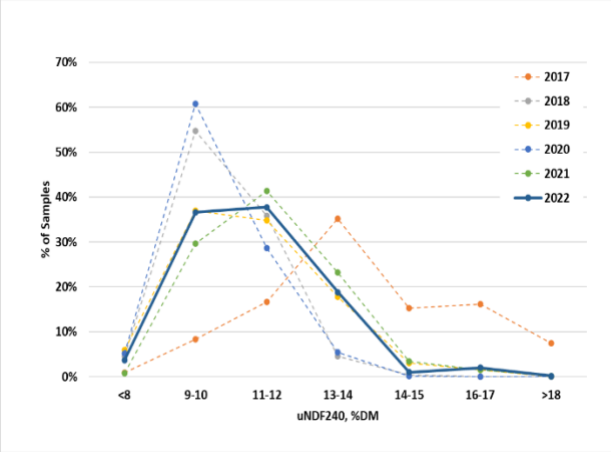

Figure 1a

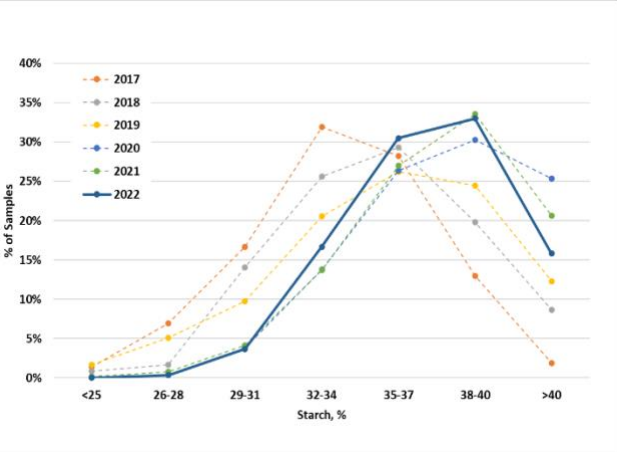

Figure 1b

Each year brings its own challenges and opportunities. Given the variation in growing conditions across the region, it is critical to test your own forages to understand the site-specific impacts of the growing season.

It is important to evaluate this data in the context of your farm when selecting hybrids. The top performing hybrid at any one location or in any one category may not be a good fit for your feeding program. Factors that influence this vary by farm but include land base, soil resources, forage inventory, quality of available hay crops, access and cost of supplemental ingredients, and expectations of cow performance.

The trial results and location averages serve as a means to calibrate hybrid performance to a particular growing season. These averages can be used in conjunction with a company's data on hybrids in their lineup, including hybrids not entered into these trials, to understand how a hybrid performed relative to what is realistic for a given growing season. For example, in Figure 1, we see that the highest percentage of samples have an uNDF240, percent DM value in the 11 to 12 percent category and nearly 50 percent of samples have a starch content of 38 percent or greater. This can be used to evaluate how hybrids not included in these trials performed in 2022.

It is important to recognize the companies that make these trials possible through their entry of hybrids. The following companies participated in the 2022 trials:
Brevant, Channel, CNI, Dekalb, Growmark FS, Hubner Seed, Nutrien Ag Solutions - Dyna-Gro, Pioneer, Redtail (King's Agri-seed), Revere Seed (formerly Local Seed), Seed Consultants, Seedway, Syngenta – NK

NY VT Corn Silage Hybrid Evaluation Program Reports can be found at blogs.cornell.edu/varietytrials/corn-silage/.

Table 5
Whole plot means for key corn silage performance indicators

Relative Maturity Group	Growing Season	Location	Yield, 35% DM	Dry Matter	Starch Content	aNDFom	30 hr NDFD	120 hr NDFD	240 hr uNDFom
			tons/acre	%	% DM	% DM	% NDFom	%NDFom	% DM
80-95 day RM	**2022**	**Oakfield, NY**	**21.0**	**37.4**	**36.7**	**37.5**	**60.5**	**69.1**	**10.4**
		Willsboro, NY	**25.9**	**30.3**	**37.2**	**35.4**	**60.6**	**67.9**	**10.3**
		Alburgh, VT	**27.8**	**33.6**	**36.2**	**36.2**	**55.8**	**66.3**	**11.2**
	2021	Oakfield, NY	29.1	37.7	40.3	33.0	57.7	65.1	10.6
		Willsboro, NY	23.6	32.1	39.0	34.6	56.3	67.4	10.3
		Alburgh, VT	19.9	36.3	37.9	36.1	52.8	64.1	12.0
	2020	Albion, NY	19.3	36.6	41.7	32.5	60.2	68.9	9.2
		Willsboro, NY	16.5	30.6	34.7	37.7	60.4	71.9	9.5
		Alburgh, VT	19.8	32.4	37.8	35.9	56.0	65.6	11.4
	2019	Albion, NY	26.0	31.9	35.1	36.5	59.1	66.3	11.3
		Willsboro, NY	19.2	32.6	36.9	35.8	60.5	67.6	10.6
		Alburgh, VT	23.4	33.7	36.5	37.8	61.6	67.6	11.2
	2018	Albion, NY	19.2	36.2	39.2	34.2	56.1	69.4	10.0
		Willsboro, NY	18.5	35.0	34.9	35.7	62.0	70.0	9.7
		Alburgh, VT	18.3	33.3	31.0	39.0	56.2	67.4	11.8
	2017	Albion, NY	25.2	30.8	32.3	37.2	59.1	69.8	10.1
		Willsboro, NY	19.2	31.3	38.1	39.5	56.3	66.8	12.1
		Alburgh, VT	27.5	31.8	34.4	38.9	53.2	62.7	13.4
96-110 day RM	**2022**	**Aurora, NY**	**20.6**	**31.7**	**37.2**	**37.4**	**61.5**	**70.0**	**10.0**
		Madrid, NY	**31.1**	**34.1**	**39.6**	**36.0**	**55.1**	**62.5**	**12.5**
		Alburgh, VT	**27.3**	**33.0**	**38.7**	**36.5**	**52.3**	**60.7**	**13.2**
	2021	Aurora, NY	29.3	35.2	37.8	38.5	54.1	62.7	13.3
		Madrid, NY	32.5	32.3	36.9	37.2	55.4	62.6	12.9
		Alburgh, VT	23.9	39.8	37.2	38.6	56.9	66.9	11.7
	2020	Aurora, NY	17.1	36.0	38.2	36.0	61.1	68.3	10.4
		Madrid, NY	23.6	34.1	40.1	32.9	60.3	67.6	9.8
		Alburgh, VT	25.1	36.4	37.9	36.5	55.4	65.6	11.6
	2019	Aurora, NY	27.1	34.7	38.3	36.9	55.5	62.2	12.9
		Madrid, NY	27.4	28.6	30.7	38.0	58.4	65.5	12.1
		Alburgh, VT	24.3	35.4	39.3	35.5	61.6	71.1	9.2
	2018	Aurora, NY	21.7	38.2	38.8	35.3	59.9	67.7	10.4
		Madrid, NY	28.6	32.9	35.4	35.9	61.2	69.9	9.8
		Alburgh, VT	23.3	34.9	34.2	38.3	55.2	66.0	12.0
	2017	Aurora, NY	26.0	31.9	31.2	42.6	54.5	63.8	14.4
		Madrid, NY	31.9	35.2	34.8	41.3	50.6	59.4	15.9
		Alburgh, VT	28.5	32.7	35.3	39.8	52.7	61.4	14.3