THE UNIVERSITY OF MAINE
Cooperative Extension

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2017 Maine Corn Hybrid Performance Trial

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Special thanks to John Stoughton and the farm crew at Misty Meadows Farm for hosting the trial and helping with planting and harvesting.

Rick Kersbergen
342-5971 / 800-287-1426
richard.kersbergen@maine.edu

Caragh Fitzgerald
622-7546 / 800-287-1481
cfitzgerald@maine.edu

In 2017, the University of Maine Cooperative Extension conducted a hybrid silage corn evaluation program in cooperation with local seed dealers, Maine Farm Days and Misty Meadows Farm, who hosted the trial in Clinton, Maine.

The purpose of the program is to provide unbiased performance comparisons of hybrid corn available in the central Maine area. It is important to remember that the data presented are from a single test at one location. Hybrid performance data from additional tests in different locations, and often over several years, should be compared before you make conclusions.

TESTING PROCEDURE

The experiment was planted at the Misty Meadows Farm in Clinton on May 24, 2017, using a six-row corn planter. The predominant soil type was Woodbridge fine sandy loam.

Prior to planting, 5,000 gallons per acre of liquid cow manure was applied to the field and incorporated by vertical tillage harrowing. Acuron (2.5 qt/A) and dicamba (1 pt/A) were applied post-emergence. Additional nitrogen (66 lbs N/A) was applied in early July as 33-0-0.

Three replications of 39 hybrids were planted in a randomized complete block design. Plots were 75 feet long and 15 feet wide with 6 rows on 30-inch centers. The hybrids used were nominated and donated by seed companies. Hybrids had relative maturity days ranging from 80 to 99 (Table 3). We targeted a planting density of 32,000 plants/acre.

Quality samples were collected on October 2 and 3, 2017 by randomly hand-cutting three stalks per plot and chopping them with a portable chipper. Representative samples were frozen, then transported to Dairy One Laboratory in New York for analysis for moisture and quality using wet chemistry. The experiment was harvested on October 5, 2017. At this time, silage harvest was underway on commercial farms, and a light frost had occurred at the experiment site. The plots were harvested using a six-row corn chopper. Weights were collected when corn from each plot was loaded into a mixer wagon with scales.

Growing degree days were determined using the Cornell University's ClimateSmartFarming.org web site. Total growing degree days (GDD) (86/50) were 2035 GDD for 2017. The 15-year average for this site is 2045 GDD and the 30-year average is 1945 GDD, with a range of 1731-2281 GGD.

Table 1. Growing degree days, Maine corn silage hybrid trial, 2007-2017.

Year		Growing degree days (86/50)
2007	Clinton	2086
2008	Clinton	1840
2009	Leeds	1908
2010	Leeds	2120
2011	Clinton	2287
2012	Clinton	2160
2013	Clinton	2027
2014	Clinton	1933
2015	Clinton	2347
2016	Clinton	2082
2017	Clinton	2035

A total of 14.3 inches of rain was recorded in Clinton, Maine, by the FarmLogs web site (farmlogs.com) between May 24 and October 5, 2017 (Table 2).

Table 2. Monthly rainfall, May 24 – October 5, 2017 Clinton, Maine.

	Rain (inches)
May	1.58
June	3.12
July	3.02
August	2.78
September	3.8
Total	**14.3**

Analysis of variance was conducted using JMP to identify differences between hybrid silage yield (corrected to 30% dry matter), expected milk yield (milk per ton of dry matter multiplied by dry matter), and all quality parameters. When a significant effect was found, linear regression analysis was conducted to see the effect of relative maturity on these parameters.

RESULTS

Yield and Expected Milk Yield

Yields were corrected to a standard 30% dry matter. Forage digestibility and energy content were used to project potential milk yield (milk lbs/ton of dry matter). Expected milk yield per acre was calculated by multiplying the potential milk per ton of dry matter by the tons of dry matter per acre. This serves as another measure of productivity of each hybrid. Both yield (30% DM) and expected milk yield results are shown in Table 3.

Analysis of variance showed that there were significant differences among the hybrids tested for both yield ($p=0.0091$) and expected milk yield ($p=0.0061$). In Table 3, hybrids followed by the same letter are statistically similar (Tukey's HSD).

There was a statistically significant linear correlation between relative maturity and yield (30% dry matter) (Figure 1) and also between relative maturity and expected milk yield (Figure 2) ($p<0.0001$ for both).

Table 3 includes data from two BMR (brown mid-rib) varieties. BMR varieties need to be evaluated for their higher digestibility and enhanced animal intake and performance if rations are balanced correctly. When comparing these varieties, producers should make sure they look at NDF digestibility (NDFD, % of NDF). Producers should segregate BMR varieties at harvest to utilize this feed with cows for specific rations, including pre-fresh, fresh and high-producing groups.

Table 3. Varieties, yield, and dry matter, 2017. Sorted by estimated milk yield.

Hybrid	RM	Estimated milk yield lbs/acre*,**		Yield (30% DM) (tons/acre)*		Dry Matter (%)*	
Mycogen BMR97B37	97	27843	a	26.73	ab	25.8	j
DynaGro D35SS58 RIB	95	27275	ab	28.57	ab	31.4	b-j
Pioneer P9789AMXT	95	26730	ab	27.23	ab	30.7	c-j
Channel 187-49	87	26386	ab	26.93	ab	32.7	a-i
DeKalb DKC 48-56/57	98	26323	ab	27.13	ab	32.4	a-i
Schlessman 861L	86	26250	ab	27.73	ab	27.2	g-j
Channel 198-98	98	26246	ab	29.70	a	27.8	e-j
Pioneer P9526AMX	90	26057	ab	26.50	ab	33.3	a-g
Channel 194-14	94	25888	ab	27.53	ab	31.4	b-j
Channel 197-68	97	25823	ab	27.70	ab	27.7	f-j
Schlessman 942lfy	94	25776	ab	27.13	ab	31.1	b-j
Mycogen BMR90B94	90	25428	ab	23.37	ab	30.9	b-j
Croplan 2845	89	24780	ab	26.60	ab	32.9	a-h
N27P 3110A	90	24651	ab	25.83	ab	30.6	c-j
DynaGro D32VC56 RIB	92	24538	ab	24.40	ab	28.7	e-j
8920 3010	89	24420	ab	28.33	ab	34.2	a-e
Seedway SW 2754 RR	86	24359	ab	27.60	ab	29.9	c-j
Mycogen TMF2Q419	96	24269	ab	26.33	ab	26.4	ij
Channel 193-53	93	24068	ab	25.27	ab	32.1	a-j
Croplan 2692	86	23939	ab	26.07	ab	37.1	ab
Croplan 3146	91	23725	ab	24.93	ab	33.2	a-h
DeKalb DKC 36-30	86	23695	ab	24.47	ab	32.4	a-i
DeKalb DKC 45-07	95	23680	ab	26.73	ab	29.8	c-j
Mycogen TMF94L37	94	23605	ab	27.30	ab	28.1	e-j
Mycogen TMF2R198	86	23508	ab	26.07	ab	32.8	a-h
Master's Choice MCT4572	95	23506	ab	27.13	ab	28.7	e-j
Axis 39R29	89	22864	ab	24.90	ab	30.7	c-j
N36G 3120	96	22852	ab	25.00	ab	29.1	d-j
Seedway SW 3654 RR	91	22564	ab	25.73	ab	26.8	hij
Master's Choice MCT4934	99	22530	ab	25.23	ab	28.6	e-j
Channel 185-81	81	22210	ab	24.73	ab	33.6	a-f
Master's Choice MC3220	82	21655	ab	23.93	ab	35.5	a-d
DynaGro D25VC45 RIB	85	21599	ab	24.53	ab	30.5	c-j
Schlessman 916	91	21376	ab	23.17	ab	26.9	g-j
Axis 42P55	92	21133	ab	24.67	ab	28.2	e-j
Axis 37H20	87	20705	ab	23.77	ab	27.6	f-j
Mycogen TMF81S81	81	20246	ab	24.47	ab	38.5	a
Master's Choice MCT3891	88	20140	ab	23.53	ab	36.0	abc
Seedway SW 1994 GT	80	19065	b	21.40	b	31.8	b-j

*Means followed by the same letter are not statistically different (Tukey's HSD).

** Expected milk yield is calculated by multiplying the dry matter yield by the calculated milk lbs/ton. Calculated milk lbs/ton is a projection of potential milk yield per ton of forage dry matter, based on forage digestibility and energy content.

Figure 1. Effect of Relative Maturity on Corn Silage Yield, Corrected to 30% DM (2017)

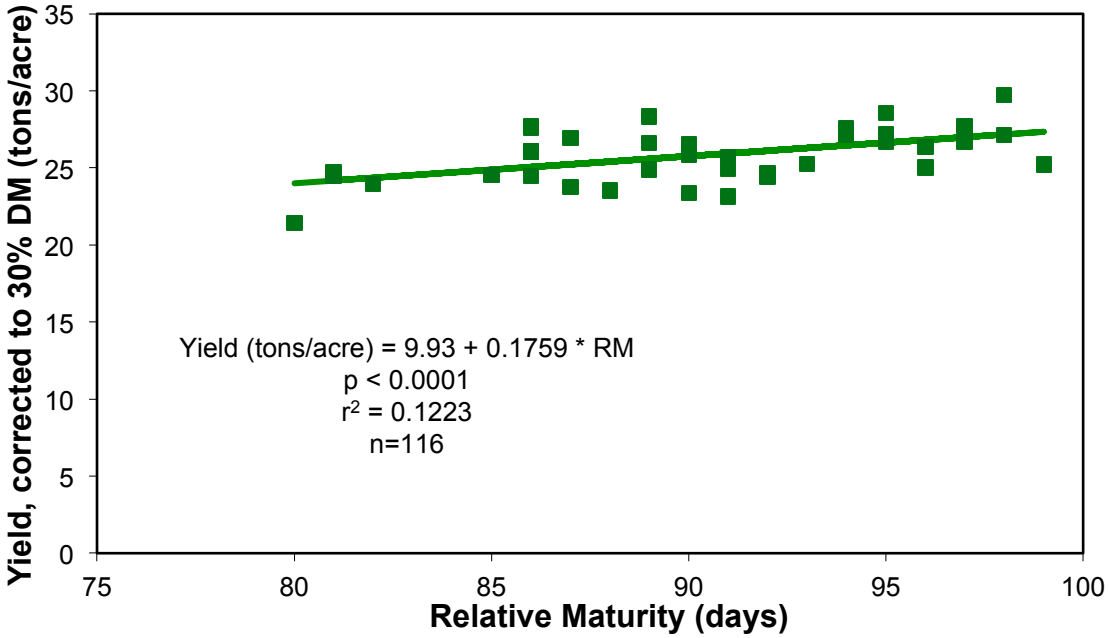
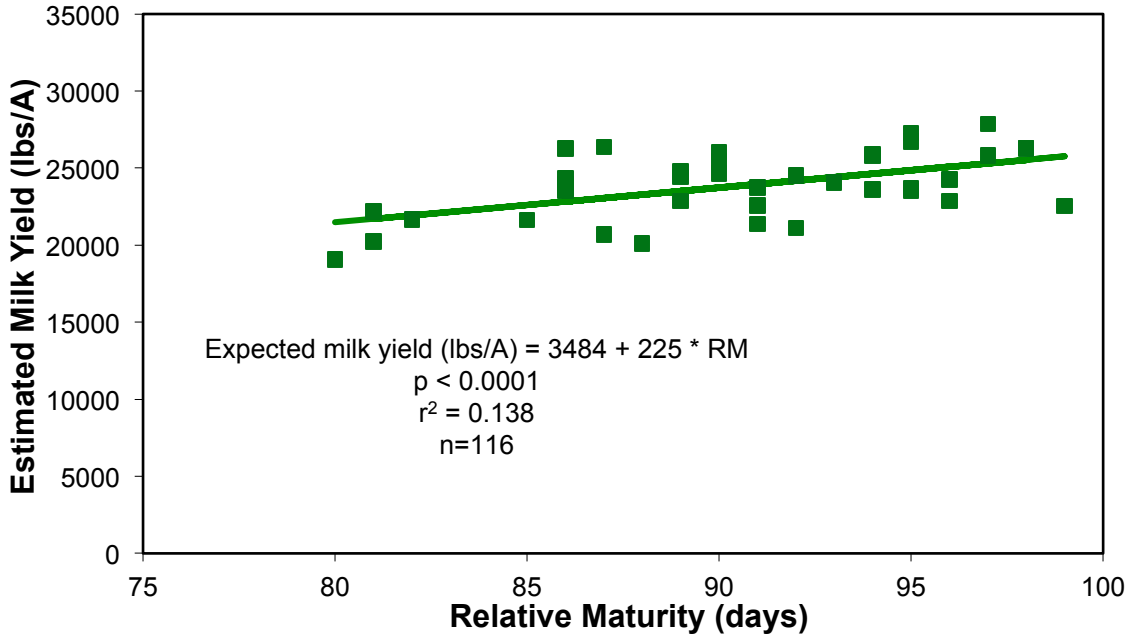


Figure 2. Effect of Relative Maturity on Estimated Milk Yield (2017)



Quality

Table 4 lists select quality results for the 2017 trial.

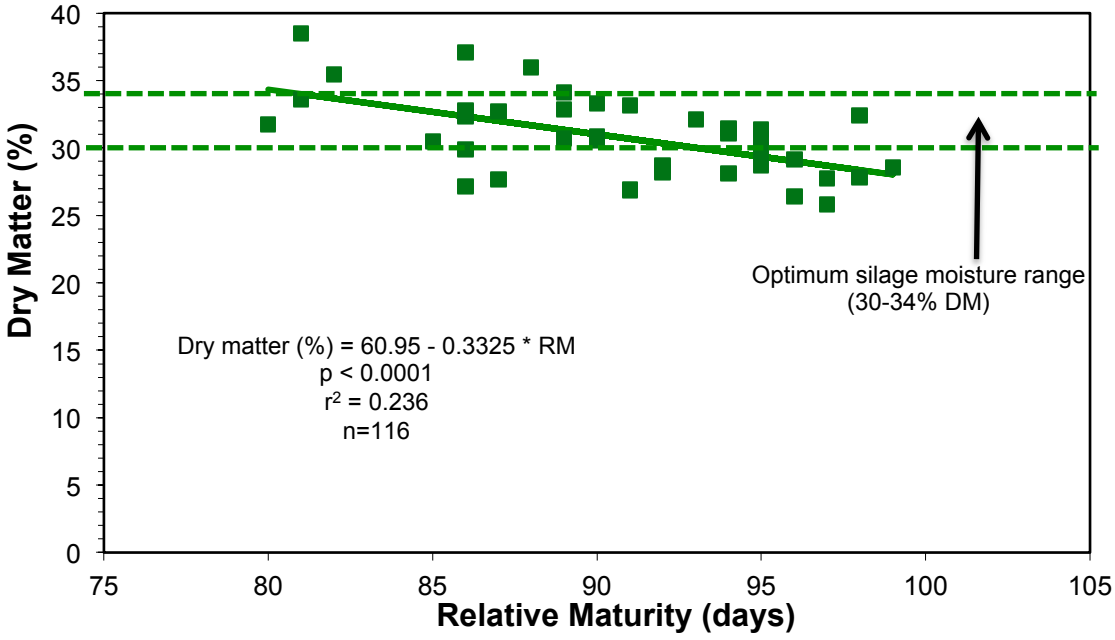
Dry matter decreased as relative maturity increased, as shown in Figure 3. There was a significant linear effect with $p<0.0001$ and $r^2 = 0.236$. In 2017, most varieties were at or below optimum dry matter.

The range of NDFD (% of NDF) is shown in Figure 4. This digestibility is an important characteristic when choosing varieties. In 2017, the trialed varieties varied from a low of 45.7 to a high of 66.0, although only one hybrid had an NDFD greater than 57.5. The two varieties with the highest NDFD (%of NDF) (measured at 66 and 57.5) were both BMR varieties, which greatly influences NDFD.

NDFD is a critical tool to use when evaluating corn silage performance at feeding. For every 1-unit increase in NDFD in the diet, we can expect to see a 0.3 increase in dry matter intake (DMI). If we safely assume that a one-pound increase in DMI will produce 2-2.5 pounds of additional milk per cow, then we can really appreciate the value that higher NDFD forages can have in our corn silage variety choices.

If we assume an average cost of feed for a dairy cow to be $0.12 per pound of dry matter, and we increase the DMI by 1 pound per cow through an increase in NDFD of the diet by 3 units, the return on the increase in intake will be $0.24 per cow per day with milk at $18/cwt. This small change would improve your bottom line by nearly $9,000 a year if you were milking 100 cows.

Figure 3. Effect of Relative Maturity on Dry Matter (2017)



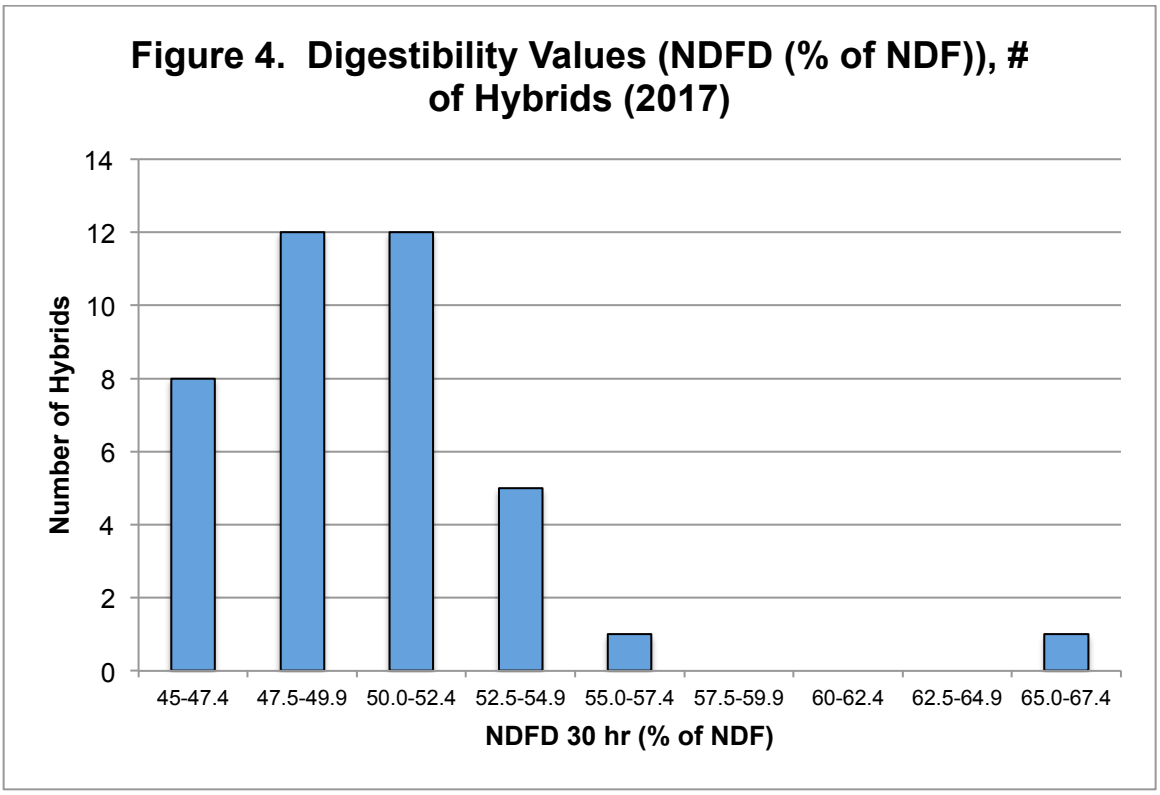


Figure 4. Digestibility Values (NDFD (% of NDF)), # of Hybrids (2017)
Number of Hybrids
14
12
10
8
6
4
2
0
45-47.4
47.5-49.9
50.0-52.4
52.5-54.9
55.0-57.4
57.5-59.9
60-62.4
62.5-64.9
65.0-67.4
NDFD 30 hr (% of NDF)

Table 4. Varieties and select quality results, 2017

Hybrid	Relative Maturity	Crude Protein (%DM)	ADF (%DM)	NEL (Mcal/lb)	IVTD30hr (%DM)	NDFD30hr (% of NDF)
8920 3010	89	8.0	28.9	0.68	76	50
Axis 37H20	87	7.1	30.1	0.65	74	46
Axis 39R29	89	7.2	27.1	0.69	76	47
Axis 42P55	92	7.8	31.0	0.64	73	47
Channel 185-81	81	7.7	28.5	0.68	76	49
Channel 187-49	87	7.8	25.1	0.74	79	51
Channel 193-53	93	7.8	27.3	0.71	77	51
Channel 194-14	94	7.6	26.8	0.70	77	48
Channel 197-68	97	7.5	27.9	0.70	77	50
Channel 198-98	98	7.6	28.7	0.66	74	46
Croplan 2692	86	7.7	25.4	0.73	78	50
Croplan 2845	89	7.7	27.3	0.70	77	50
Croplan 3146	91	7.8	25.5	0.71	78	49
DeKalb DKC 36-30	86	7.6	26.2	0.73	78	51
DeKalb DKC 45-07	95	7.3	29.7	0.66	74	46
DeKalb DKC 48-56/57	98	7.5	25.9	0.72	78	51
DynaGro D25VC45 RIB	85	7.3	30.7	0.65	74	48
DynaGro D32VC56 RIB	92	7.5	26.9	0.74	79	53
DynaGro D35SS58 RIB	95	7.9	27.5	0.71	77	50
Master's Choice MC3220	82	8.1	26.6	0.71	77	51
Master's Choice MCT3891	88	7.6	28.1	0.68	75	46
Master's Choice MCT4572	95	7.6	29.8	0.65	73	46
Master's Choice MCT4934	99	7.5	28.8	0.68	76	50
Mycogen BMR90B94	90	8.5	25.5	0.78	85	66
Mycogen BMR97B37	97	8.1	26.9	0.77	81	57
Mycogen TMF2Q419	96	7.6	28.4	0.69	75	48
Mycogen TMF2R198	86	7.6	29.5	0.67	75	50
Mycogen TMF81S81	81	7.8	27.8	0.68	75	48
Mycogen TMF94L37	94	8.4	29.7	0.65	74	48
N27P 3110A	90	8.3	26.2	0.71	77	50
N36G 3120	96	7.6	28.0	0.69	76	48
Pioneer P9526AMX	90	7.5	26.3	0.74	80	53
Pioneer P9789AMXT	95	8.1	26.5	0.73	79	53
Schlessman 861L	86	8.7	28.0	0.72	78	53
Schlessman 916	91	7.3	30.1	0.67	75	50
Schlessman 942lfy	94	8.4	27.9	0.71	78	53
Seedway SW 1994 GT	80	8.0	29.7	0.67	75	49
Seedway SW 2754 RR	86	7.7	30.1	0.67	75	49
Seedway SW 3654 RR	91	7.8	31.1	0.65	73	47

CONCLUSION

Despite a cool early season and reduced summer rainfall, 2017 was a reasonable year for corn growth at this site. There was a significant linear relationship between relative maturity and yield corrected to 30% dry matter. This relationship has been significant but weak (low r^2) in seven of the ten years data was collected from the replicated trial (no calculations in 2016 due to herbicide damage). This relationship amounts to an increase of 0.97 – 2 tons per acre yield for every 10-day increase in relative maturity (Table 4).

Table 4. Increase in yield (30% dry matter) and expected milk yield for each 10 days increase in relative maturity as estimated by linear regression (2007 – 2017).

	Tons/acre yield (30% DM) increase per 10 days maturity	Pounds/acre milk yield increase per 10 days maturity
2007	1.1	Not calculated
2008	0.97	Not calculated
2009	No relationship	91
2010	1.9	2890
2011	2	3280
2012	1.1	1480
2013	No relationship	No relationship
2014	No relationship	No relationship
2015	1.08	2790
2016	Not calculated	Not calculated
2017	1.7	85

In 2017, there was also a significant linear relationship between relative maturity and expected milk yield. Again, these relationships have been weak, but consistent in the past, with an increase of 85 – 3280 pounds per acre of milk expected for each 10-day increase in relative maturity (Table 4).

Shorter season hybrids offer options for improved cover crop establishment and the potential for double cropping. Although they may be slightly less productive in some growing seasons, this additional crop flexibility can significantly improve the total yield of digestible nutrients per acre. There is risk associated with choosing longer season hybrids for higher yield. Yield responses to longer maturity was greatest in the highest growing degree years, and it tended to be lower or not present under average growing conditions. By choosing short-season or mid-season varieties, producers help to guarantee a level of maturity and dry matter that produces quality corn silage that ferments well in the silo. They become less vulnerable to late wet harvest years. This also opens the door for improved nutrient and soil management options such as cover cropping.

In most years, earlier-maturing hybrids showed optimum or close to optimum dry matter content at harvest time. Later-maturing hybrids tend to show somewhat lower than recommended dry matter content at harvest. In 2017, most hybrids had dry matter at or below the optimum level of 30-34%. Once again, there was a significant linear relationship between relative maturity and dry matter, with later-maturing hybrids having lower dry matter at harvest.

ACKNOWLEDGEMENTS

We would like to thank John Stoughton and the farm crew at Misty Meadows Farm for their help with planting, crop management, and harvest. We also thank Barney Wright and the Wright Place farm crew for lending a planter in the spring and a weigh wagon and driver for harvest time. Thanks are also extended to the seed dealers who helped with seed donation, planting, and harvesting and to staff and students who helped in the field and in the office.

Contacts for corn hybrids in 2017 trial

Company	Contact	Phone	Email	Axis	Channel	Croplan	DeKalb	Dynagro	Master's Choice	Mycogen	NK	Pioneer	Schlessman	Seedway
AgMatters LLC	Lauchlin Titus	207.314.2655	lauchlin@agmattersllc.com								x			x
Axis NE, LLC	Tim Taylor	315.374.2611 (M)	timaxisne@gmail.com	x										
Winslow Agriculture, LLC	Alvin Winslow	207.330.5378	alvin.winslow@outlook.com		x									
Crop Production Services (Office: 207.764.1860)	Brian McCleary	207.740.1911 (M)	brian.mccleary@cpsagu.com				x	x		x	x			
	Franklin Leavitt	207.944.1922 (M)	Franklin.Leavitt@cpsagu.com				x	x		x	x			
	Randy Drown	207.650.0310 (M)	randy.drown@cpsagu.com				x	x		x	x			
	Todd Winslow	207.551.6806 (M)	todd.winslow@cpsagu.com				x	x		x	x			
Fedco Seeds	Alice Percy	207.426.8247	alice@fedcoseeds.com						x					
Feed Commodities International	Al Fortin	207.341.0968 800.462.4929	afortin@feedcommodities.com								x			x
	Patricia Henderson	207.487.1076	phenderson@feedcommodities.com								x			x
Gold Star Feed and Grain, LLC	Michele Bennett	207.754.0764	mbennett@goldstarfeed.com								x		x	x
	Emilee Robertson	207.399.6755	erobertson@goldstarfeed.com								x		x	x
	Andy Dugan	315.841.4167	adugan@goldstarfeed.com										x	
	Keith Hines		abhines@msn.com											
	Warren Hood	207.754.1853 (M)	hoodlah@aol.com							x				
Kent Nutrition Group	Nick Richardson	207.317.0469	nicholas.richardson@blueseal.com										x	
King's Agriseeds, Inc.	Rod Porter	607.227.0836	rodporter@kingsagriseeds.com						x					
Master's Choice	Kyle Vosburgh	618.697.7031	kyle@seedcorn.com						x					
	Nick Michaud	207.649.9786								x				
Mycogen	Claude Fortin, area mgr	802.363.2803								x				
Northeast Agricultural Sales (Office: 800.462.7672)	Justin Choiniere	802.535.9938 (M)	justin@neag.net			x	x				x			x
	Paul Peters	207.441.6250 (M)	pumpkinpaul1@aol.com			x	x				x			x
Paris Farmers Union	Milt Sinclair	207.743.1291	miltwspfu@hotmail.com						x		x			x
	Tim Donovan	207.744.5602	timdonovan.pfu@gmail.com											x
Pioneer Hi-Bred	Derek Hines, sales rep	207.717.0550	abhines@msn.com									x		
	Kelsea Dresch	518-222-5382	Kelsea.Dresch@Pioneer.com									x		
	Dan Mongeau, agronomist	607.229.5700	daniel.r.mongeau@pioneer.com									x		
R.E. Belanger & Son	Rick Belanger	207.576.5845	veggiefarmerinme@roadrunner.com	x							x			x
Seedway	Paul Soucy	207.577.4493	psoucy@seedway.com								x			x
	Taylor Putnam	207.540.0300	putnam.taylor@gmail.com								x			x
	Scott Soucy	207.933.2109	ssoucy@seedway.com								x			x
Syngenta/NK	Brendan Evans	607.302.0646	Brendan.evans@syngenta.com								x			
Winfield United	Klaus Busch	518.545.8094	kbusch@landolakes.com			x								