Maine Corn Silage Hybrid Trial
2020 Results

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Location: Misty Meadows Farm, Clinton, Maine
Soil type: Woodbridge fine sandy loam
Planting date: May 22, 2020
Fertility: 10,000 gallons/acre liquid manure + 75 lbs/A N (sidedress)
Herbicide: pre emergence 2 ½ qt. Acuron + 1 Qt. Atrazine + 1Qt. MaKaze
post emergence: 3 qt Yukon + 1 Qt Makaze
Plot size: 15' x 75'
Treatment arrangement: Randomized complete block design with 3 replications
Target planting density: 32,000 plants/acre
Harvest date: September 11, 2020. No frost had yet occurred. Silage harvest was underway in the region.

Growing degree days: 2345 (86/50) (Climate Smart Farming) This was a historical record for the time period between planting and harvest.
Rainfall: 7.94 inches (NWS, Waterville, ME)

Harvest weights: Corn from each plot was chopped into a mixer wagon with scales.
Quality samples: Collected September 10, 2020. Three stalks per plot were randomly selected and chopped with a portable chipper. The chopped material was mixed, and a subsample was collected, frozen, and shipped for analysis (Cumberland Valley Analytical Services).

Data analysis: Analysis of variance was conducted using JMP. 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 (pounds of milk/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 1.

Average plot yield and milk yield were impacted in 2020 by low rainfall and record level growing degree days. Average yield over all plots was over 25 tons per acre corrected to 30% dry matter with an estimated milk yield of 23,875 lbs. of milk per acre.

Analysis of variance showed that there were significant differences among the hybrids tested for both yield (p=0.0023) and estimated milk yield (p=0.0055). In Table 1, hybrids followed by the same letter are statistically similar (Tukey's HSD). When comparing most pairs of hybrids, the means were statistically equal.

There was a statistically significant linear correlation between relative maturity and yield (30% dry matter) (p=0.0084). This relationship was weak, with an r^2 of 0.064291. There was no statistically significant linear correlation between relative maturity and estimated milk yield (p=0.2523).

Quality

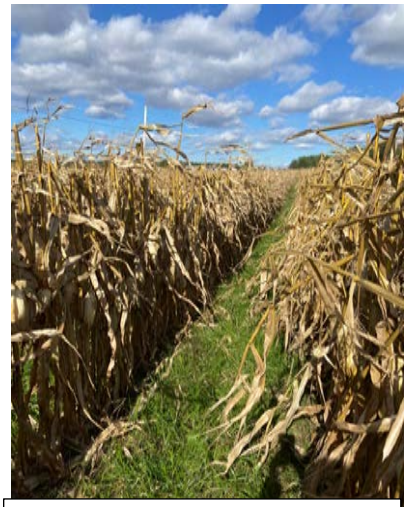
Tables 1 and 2 lists select quality results for the 2020 trial.

In 2020, we encountered the most intense GDD (Growing Degree Days) season on record with an accumulation of 2345 GDD. Unfortunately, we also encountered several periods of moisture deficit with predictions of severe water deficit from 6/15-6/29, 7/31-8/5 and 8/10-8/25. (Climate Smart Farming)

Harvest moisture average was 32% dry matter with a range of about 28% DM to 39.5% DM. The variety with the highest dry matter at harvest was also the variety with the shortest predicted relative maturity (75 RM DynaGro D15VC77).

One way to select high-performing hybrids is to identify those that have both high crop yield and high milk yield (estimated pounds of milk per ton of dry matter). Within an experiment, we can compare hybrids by looking at their relative yields. Relative yields can be calculated by dividing a hybrid's yield by the average yield of the whole experiment. Those hybrids with relative yields greater than 100% performed better than average, while those with relative yields less than 100% performed worse than average for the experiment. Figure 3 shows the relative crop yield and relative milk yield. Hybrids that yield better than average for both parameters are in the upper right quadrant of the graph.

Another measurement of interest that many nutritionists use in developing rations is uNDF Dig (240 hr.). A good example of how this impacts rations is seen in hybrid 28, the only entry in the 2020 that was a BMR variety and had the lowest uNDF percentage. While the BMR variety did not have the lowest ADF or NDF values, it did have the highest NDF digestibility and one of the lowest starch values. This is important when feeding rations that include corn silage as the major portion of the forage component of the diet.



Cover crop interseeded June 30 into 60-inch rows. Photo Oct. 8, 2020.

Discussion

2020 provided Maine corn silage growers with one of the warmest on record. Good soil conditions also offered growers the ability to plant earlier and harvest the crop at the correct moisture content for most varieties before a killing frost. Drought conditions throughout the state probably limited yield and quality parameters.

Researchers also used this opportunity to compare growing the same variety in 30-inch rows versus 60-inch rows with double the planting population in the row (estimated 32,000

seeds per acre for both plots). Variety 36 was the same as variety 27, but planted at 60-inch rows. Looking at variety 27 compared to variety 36, you can see that the yield in tons/acre and milk yield (lbs/ton of DM and lbs/acre) are not statistically different. Researchers were interested in the potential for 60-inch rows to facilitate interseeding cover crops during the growing season. Data from another site indicates significant cover crop growth with interseeding corn at 60-inch rows versus 30-inch rows

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 growers choosing longer season hybrids for higher yield, especially given changing climate conditions with large swings in growing conditions from year to year. 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.

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.

Table 1. Yield and estimated milk yield, 2020 Maine corn silage hybrid trial.

Variety Number	Hybrid name	RM	Yield (tons/acre at 30% DM)*		Relative Yield**	Milk Yield (lbs/ton DM)*, ***		Relative Milk Yield**	Estimated Milk (lbs/acre)*		Dry Matter (%)*	
1	Schlessman 908GT 522 E2	90	22.0	abc	88%	2607	c	82%	17601	b	28.2	d
2	Schlessman SX770 rr	77	27.0	abc	108%	3393	ab	107%	27512	ab	34.1	a-d
3	Seedway SW 2190 GEN ss	83	24.0	abc	96%	3154	abc	100%	22628	ab	32.7	a-d
4	Seedway SW2369 3000 GT	84	25.9	abc	103%	3113	abc	98%	24108	ab	39.5	a
5	Seedway SW 3664 RR	91	24.5	abc	98%	3261	abc	103%	23964	ab	30.9	bcd
6	Seedway SW2840 Gen VT2	87	22.7	abc	91%	3218	abc	102%	22026	ab	30.6	bcd
7	Croplan 2123	81	26.5	abc	106%	3223	abc	102%	25649	ab	36.9	abc
8	Croplan 2790	87	25.1	abc	100%	3347	abc	106%	25349	ab	30.1	bcd
9	Croplan 2845	86	24.5	abc	98%	3329	abc	105%	24470	ab	31.8	a-d
10	NK 9535-322- EZ-1	95	25.8	abc	103%	3206	abc	101%	24841	ab	31.0	bcd
11	NK 9227-5222A.1 EZ-1	92	26.0	abc	104%	2850	abc	90%	22314	ab	27.9	d
12	NK 9653-5220.0 EZ-1	96	29.4	a	117%	3011	abc	95%	26454	ab	32.3	a-d
13	Pioneer P8820Q	88	25.2	abc	100%	2985	abc	94%	22432	ab	37.4	abc
14	Pioneer P9301AM	93	27.0	abc	107%	3278	abc	104%	26511	ab	35.0	a-d
15	Pioneer P0414AM	102	28.9	ab	115%	3134	abc	99%	27240	ab	29.0	cd
16	DeKalb DKC44-80 RIB	94	26.2	abc	104%	3265	abc	103%	25670	ab	29.3	bcd
17	DeKalb DKC45-07 RIB	95	27.6	abc	110%	3479	a	110%	28837	a	32.5	a-d
18	DeKalb DKC47-55 RIB	97	24.0	abc	96%	3373	ab	107%	24265	ab	30.0	bcd
19	DeKalb DKC48-56 RIB	98	24.9	abc	99%	3154	abc	100%	23612	ab	28.1	d
20	DynaGro DG CX20185VC	80	26.4	abc	105%	3308	abc	105%	26226	ab	30.6	bcd
21	DynaGro DG D32VC56VT2P	92	27.1	abc	108%	3367	ab	106%	27427	ab	31.0	bcd
22	DynaGro DG D35SS58SS	95	24.8	abc	99%	3314	abc	105%	24538	ab	31.8	a-d
23	DynaGro DG D15VC77RIBVT2P	75	24.3	abc	97%	3014	abc	95%	21968	ab	39.6	a
24	Brevant B86Y02AM	86	24.2	abc	96%	3001	abc	95%	21750	ab	33.8	a-d
25	Brevant B90R92AM	90	27.3	abc	109%	3241	abc	103%	26588	ab	32.3	a-d
26	Brevant B97T04SXE	97	25.5	abc	101%	2680	abc	85%	20450	ab	27.9	cd
27	Brevant B83T86PWE	83	23.6	abc	94%	3079	abc	97%	21730	ab	31.8	a-d
28	Brevant B90B77SXE (BMR)	90	21.6	ab	86%	3160	abc	100%	20494	ab	31.5	a-d
29	Channel 185-30 VT2prib	85	24.3	abc	97%	3388	ab	107%	24712	ab	34.1	a-d
30	Channel 189-39VT2 prib	89	23.2	abc	93%	3236	abc	102%	22497	ab	32.2	a-d
31	Channel 199-39VT2 prib	99	24.7	abc	98%	2641	bc	84%	19462	ab	28.3	d
32	Channel 183-55 smart stax	83	20.3	c	81%	3346	abc	106%	20472	ab	36.2	a-d
33	Masters Choice MCT 3223	82	23.5	abc	93%	3242	abc	103%	22817	ab	37.5	ab
34	Masters Choice MCT 4056	90	26.0	abc	104%	3138	abc	99%	24578	ab	29.3	bcd
35	Red Tail 45T04	95	27.3	abc	109%	3217	abc	102%	26368	ab	31.3	a-d
36	Mycogen 83y26, 60 inch rows	83	22.5	abc	90%	3075	abc	97%	20794	ab	33.6	a-d
		Plot mean	25.1			3162			23843		32.2	

Table 2. Select quality results, 2020 Maine corn silage hybrid trial.

Variety Number	Hybrid name	RM	Crude Protein (%DM)	ADF (%DM)	NDF (%DM)	aNDFom (%DM)	Starch (%DM)	Net Energy Lactation (Mcal/lb)	NDF Dig. (30hr) (%NDF)	uNDF Dig. (240hr) (%NDF)
1	Schlessman 908GT 522 E2	90	8.17	27.23	42.83	41.70	23.17	0.71	50.53	41.00
2	Schlessman SX770 rr	77	7.07	22.73	36.57	36.03	37.00	0.76	53.13	41.67
3	Seedway SW 2190 GEN ss	83	7.17	24.00	39.03	38.40	34.57	0.74	50.10	37.23
4	Seedway SW2369 3000 GT	84	7.23	22.27	37.83	37.23	38.87	0.76	57.03	35.30
5	Seedway SW 3664 RR	91	7.80	24.83	40.77	40.07	31.53	0.73	53.27	38.13
6	Seedway SW2840 Gen VT2	87	7.57	25.40	40.93	40.33	32.00	0.73	53.97	36.40
7	Croplan 2123	81	7.97	20.80	35.03	34.47	40.07	0.77	52.83	37.03
8	Croplan 2790	87	7.07	24.30	39.00	38.30	35.90	0.74	54.30	36.30
9	Croplan 2845	86	6.67	24.83	40.13	39.47	35.20	0.74	54.90	36.90
10	NK 9535-322- EZ-1	95	7.50	25.53	40.73	39.97	31.47	0.73	53.57	38.93
11	NK 9227-5222A.1 EZ-1	92	8.23	25.03	39.67	38.33	27.43	0.73	50.97	40.80
12	NK 9653-5220.0 EZ-1	96	8.43	23.77	38.40	37.43	29.97	0.75	53.47	37.27
13	Pioneer P8820Q	88	6.97	23.77	38.20	37.60	39.37	0.74	48.40	39.53
14	Pioneer P9301AM	93	7.87	23.07	38.03	37.47	36.80	0.75	54.07	38.03
15	Pioneer P0414AM	102	7.70	24.43	39.03	37.83	30.13	0.74	57.97	33.83
16	DeKalb DKC44-80 RIB	94	6.83	25.20	40.53	39.70	33.47	0.73	54.27	35.73
17	DeKalb DKC45-07 RIB	95	7.60	21.23	35.60	34.77	38.23	0.77	57.90	30.90
18	DeKalb DKC47-55 RIB	97	7.47	23.80	39.00	38.27	33.67	0.75	56.60	34.67
19	DeKalb DKC48-56 RIB	98	7.30	26.30	42.23	41.50	30.10	0.72	53.77	38.23
20	DynaGro DG CX20185VC	80	7.73	24.03	39.03	37.87	33.40	0.74	54.77	32.80
21	DynaGro DG D32VC56VT2P	92	7.07	23.37	38.50	37.57	34.47	0.75	57.47	33.07
22	DynaGro DG D35SS58SS	95	7.20	24.03	39.00	38.33	34.27	0.74	53.87	36.90
23	DynaGro DG D15VC77RIBVT2P	75	8.27	23.53	39.90	39.30	34.17	0.74	55.30	39.17
24	Brevant B86Y02AM	86	7.43	24.93	39.97	39.13	31.90	0.73	51.23	39.33
25	Brevant B90R92AM	90	7.13	23.50	37.97	37.27	35.30	0.75	51.67	37.00
26	Brevant B97T04SXE	97	7.47	27.63	43.63	42.60	25.27	0.72	54.57	38.43
27	Brevant B83T86PWE	83	7.30	27.97	45.63	44.90	27.97	0.71	56.83	34.60
28	Brevant B90B77SXE (BMR)	90	7.60	26.73	44.63	43.97	25.03	0.73	67.10	21.13
29	Channel 185-30 VT2prib	85	7.27	21.37	35.57	34.90	39.77	0.76	53.40	36.03
30	Channel 189-39VT2 prib	89	6.80	24.43	39.97	39.37	37.13	0.74	54.07	38.33
31	Channel 199-39VT2 prib	99	7.70	29.43	45.87	44.70	20.93	0.70	55.60	37.70
32	Channel 183-55 smart stax	83	7.27	20.27	34.33	33.83	41.30	0.77	53.60	35.87
33	Masters Choice MCT 3223	82	7.40	20.73	35.03	34.47	42.03	0.77	53.70	36.23
34	Masters Choice MCT 4056	90	7.53	24.97	39.27	38.10	32.00	0.73	51.67	40.03
35	Red Tail 45T04	95	7.63	23.03	38.13	37.30	32.97	0.75	53.53	35.13
36	Mycogen 83y26, 60 inch rows	83	7.73	24.10	39.47	38.80	33.33	0.74	54.20	36.23
		Plot mean	7.5	24.2	39.4	38.6	33.3	0.7	54.3	36.6

Table 3. Growing degree days, and increase in yield (30% dry matter) and expected milk yield for each 10 days increase in relative maturity as estimated by linear regression, Maine corn silage hybrid trial, 2007-2020.

Year	Location	Growing degree days (86/50)	Tons/acre yield (30% DM) increase per 10 days maturity	Pounds/acre milk yield increase per 10 days maturity
2007	Clinton	2086	1.10	Not calculated
2008	Clinton	1840	0.97	Not calculated
2009	Leeds	1908	No relationship	91
2010	Leeds	2120	1.90	2890
2011	Clinton	2287	2.00	3280
2012	Clinton	2160	1.10	1480
2013	Clinton	2027	No relationship	No relationship
2014	Clinton	1933	No relationship	No relationship
2015	Clinton	2347	1.08	2790
2016	Clinton	2082	Not calculated	Not calculated
2017	Clinton	2035	1.70	85
2018	Cinton	2004	0.62	No relationship
2019	Clinton	1890	1.20	132
2020	Clinton	2345	1.09	No relationship
	AVERAGE	**2076**	**1.28**	**1535**

Table 4. Monthly rainfall, Waterville, Maine, 2020 (National Weather Service)

Month	**Rain (inches)**
May (after planting)	0.08
June	1.83
July	4.68
August	1.28
September (before harvest)	0.07
Total	**7.94**

Figure 1. Effect of Relative Maturity on Dry Matter (2020)

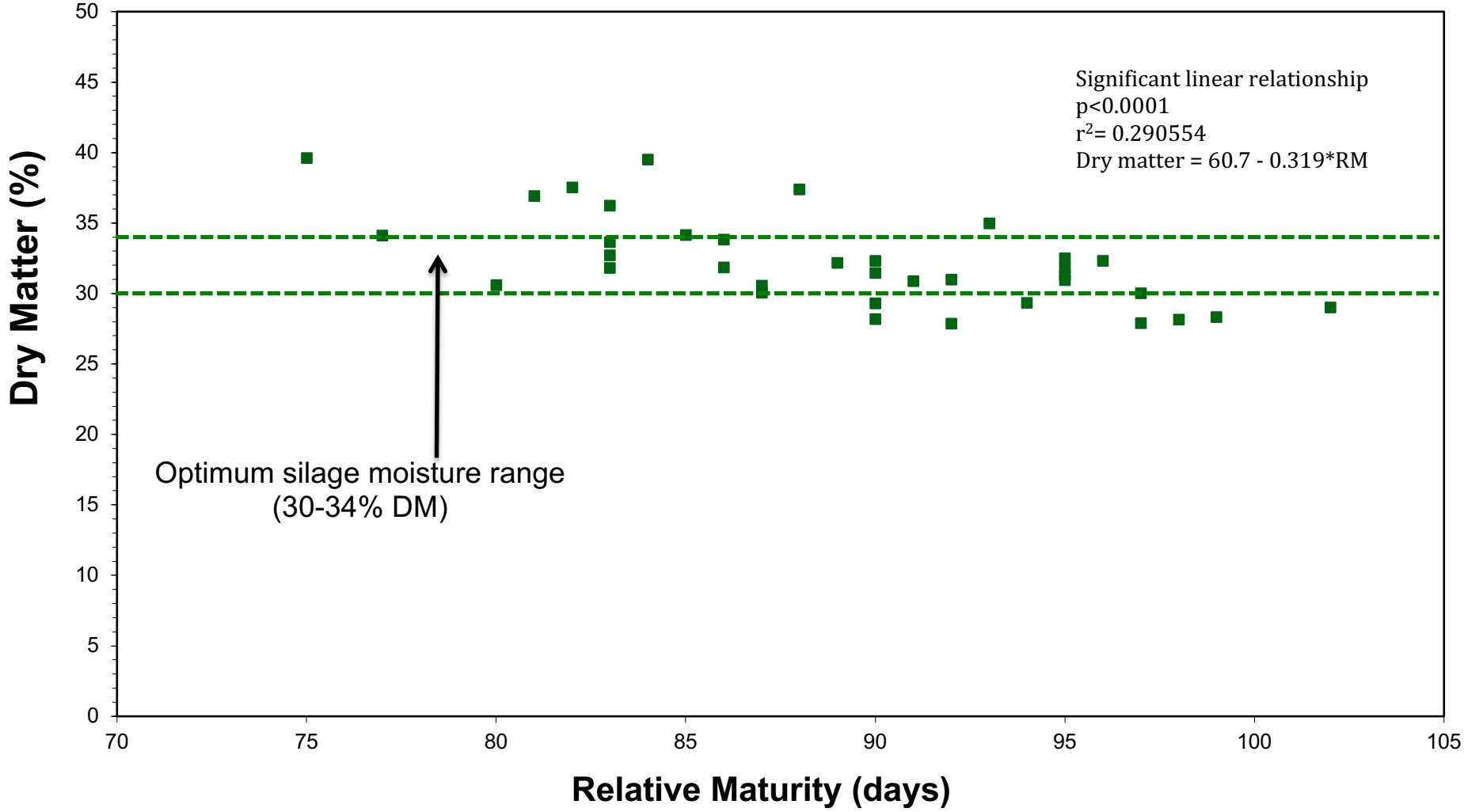


Figure 2. Distribution of NDFD (30hr), % NDF (2020)

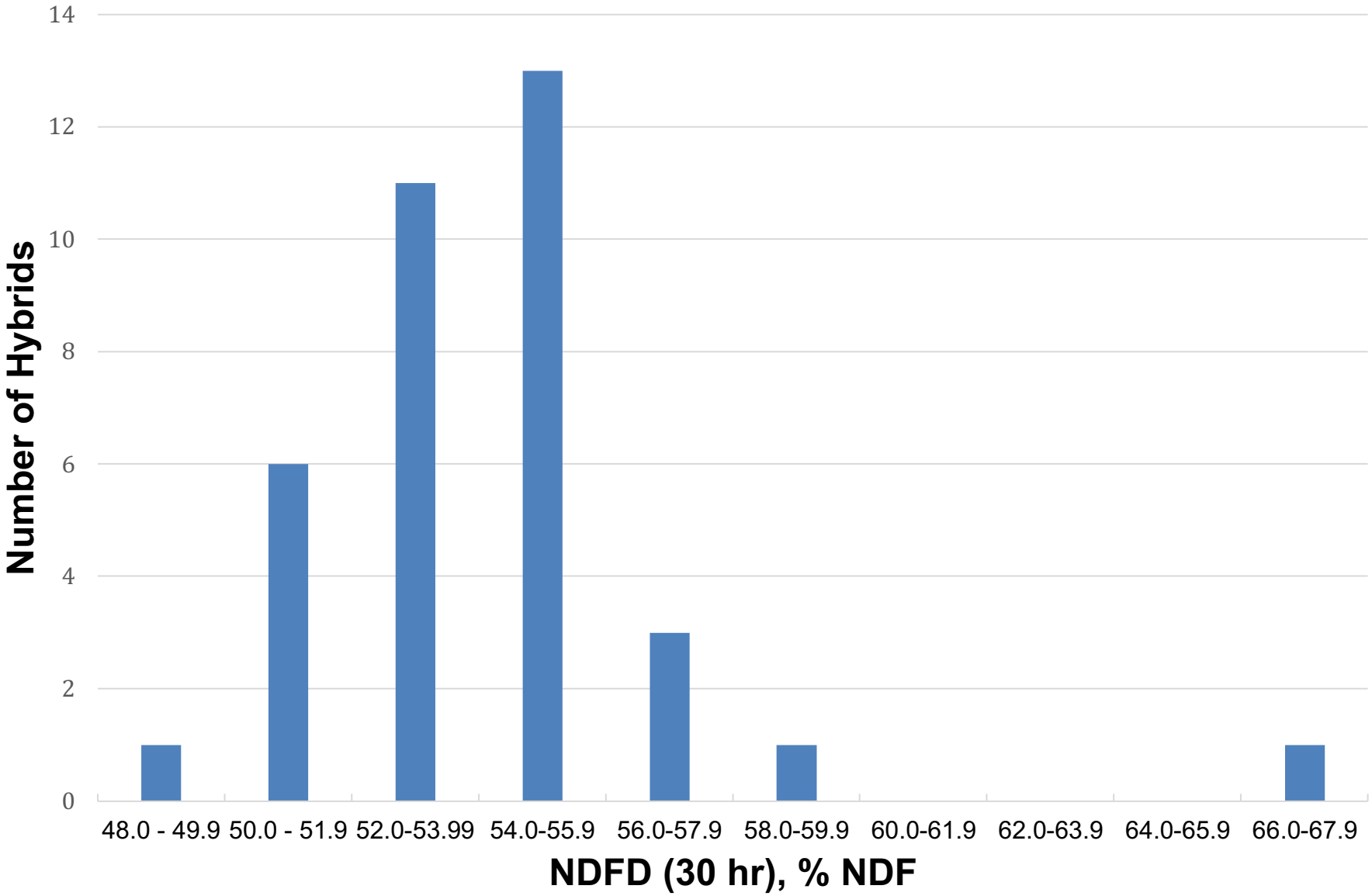


Figure 3. Relative Yield and Quality, 2020

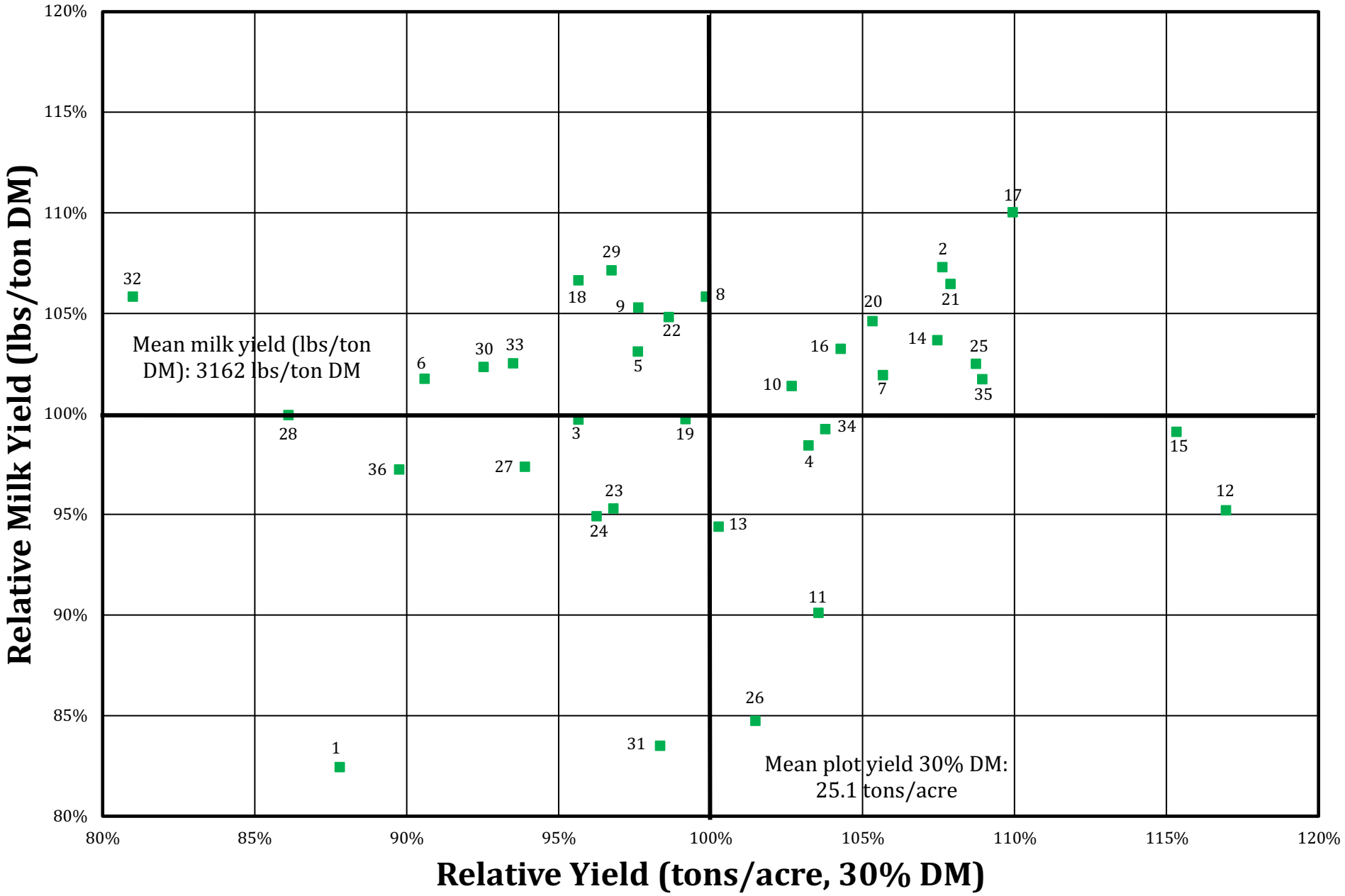


Figure 4. Annual Average Yield, tons/acre (30% DM), 2007 - 2020

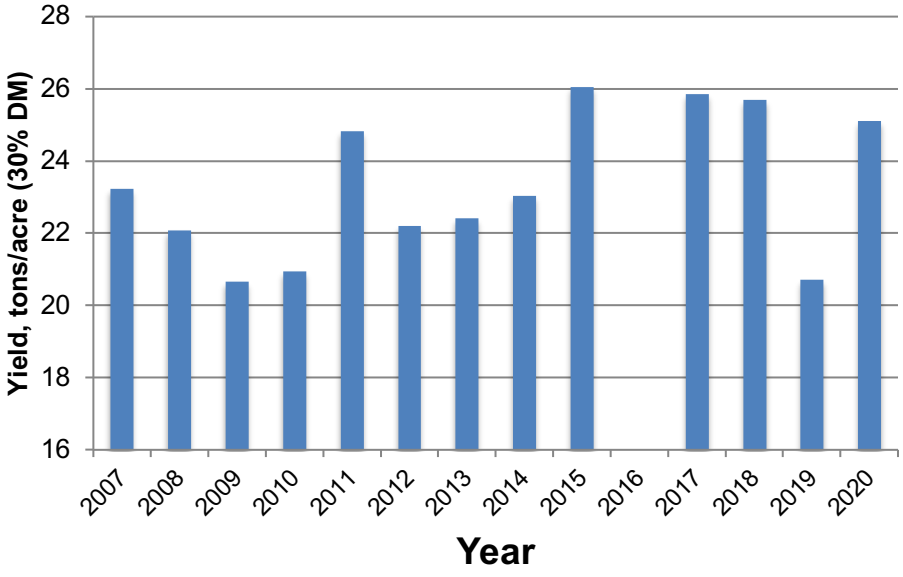
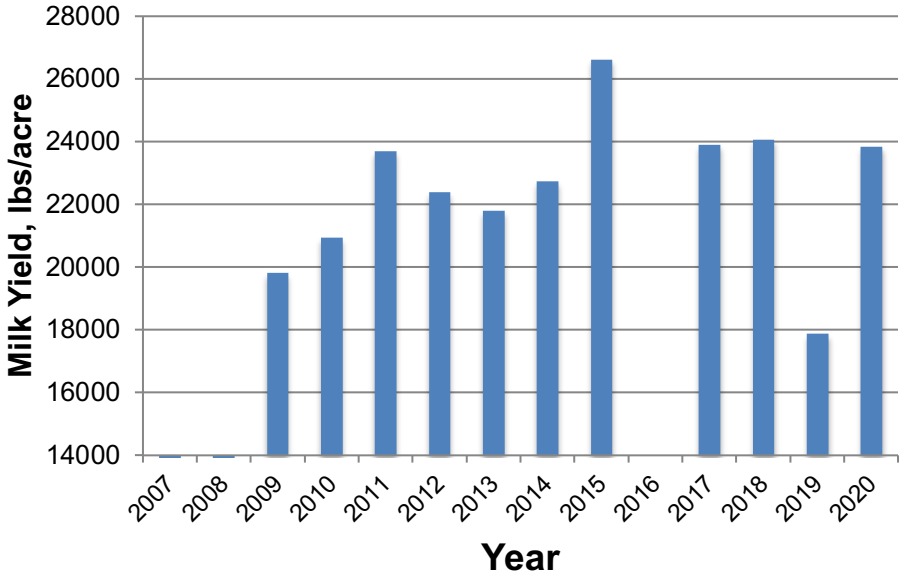


Figure 5. Annual Average Estimated Milk Yield, lbs/acre, 2007-2020



Contacts for corn hybrids in 2020 trial												
Company	**Contact**	**Phone**	**Email**	Channel	DeKalb	Dynagro	Master's Choice	Brevant	NK	Red Tail	Schlessman	Seedway
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Nutrien Ag Solutions (Office: 207.764.1860)	Brian McCleary	207.740.1911 (M)	brian.mccleary@nutrien.com		x	x		x	x			
	Franklin Leavitt	207.944.1922 (M)	frank.leavitt@nutrien.com		x	x		x	x			
	Randy Drown	207.650.0310 (M)	randy.drown@nutrien.com		x	x		x	x			
	Todd Winslow	207.551.6806 (M)	todd.winslow@nutrien.com		x	x		x	x			
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	Tim Donovan	207.744.5602	timdonovan.pfu@gmail.com				x					
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Syngenta/NK	Brendan Evans	607.302.0646	Brendan.evans@syngenta.com						x			