2011 Maine Corn Hybrid Performance Trial

Funding provided by local seed companies, the University of Maine Cooperative Extension, and Northeast SARE (Project LNE09-287).

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

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NORTHEAST SARE Sustainable Agriculture Research & Education

In 2011, the University of Maine Cooperative Extension repeated 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, however, that the data presented are from a single test at only one location. Hybrid performance data from additional tests in different locations, and often over several years, should be compared before you make conclusions.

Contacts for hybrid seed sources for 2011

American Organics
- Paris Farmers Union   Milt Sinclair   (207) 743-1291   miltwspfu@hotmail.com

Blue River
- Lauchlin Titus   (207) 314-2655   LTitus1@myfairpoint.net
- Newman Gamage   (207) 622-5009 (H)   (207) 446-5620 (M)

Croplan
- Northeast Ag Sales

Dairyland
- Dairyland Seed Co.   James Stone   800-236-0163   (262) 685-8859   jstone@dairyland.com
- Paris Farmers Union   Milt Sinclair   (207) 743-1291   miltwspfu@hotmail.com

DeKalb
- Northeast Ag Sales
- Klaus Busch   (518) 320-246   klaus.j.busch@monsanto.com
- Crop Production Services

Dyna-gro
- Crop Production Services

Garst
- Lauchlin Titus   (207) 314-2655   LTitus1@myfairpoint.net
- Feed Commodities International   Ellis Additon   (207) 487-5589   eadditon@feedcommodities.com
- MPG   Tim Donovan   (207) 877-5923   tdonovan@mpgco-op.com
- Richard Belanger   (207) 576-5845   veggiefarmerinmaine@roadrunner.com
- Northeast Ag Sales

Masters Choice
- Newman Gamage   (207) 622-5009 (H)   (207) 446-5620 (M)
- Paris Farmers Union   Milt Sinclair   (207) 743-1291   miltwspfu@hotmail.com

Mycogen
- Crop Production Services
- Paris Farmers Union   Milt Sinclair   (207) 743-1291   miltwspfu@hotmail.com

NK Seeds
- Crop Production Services
- Northeast Ag Sales

Nutridense
- Crop Production Services
- Northeast Ag Sales

Pioneer
- Derek Hines   (207) 717-0550   abhines@msn.com

Schlessman
- Michele Bennett   1-800-734-1945   (207) 754-0764   Michele.bennett@kngfeed.com

Seedway
- Lauchlin Titus   (207) 314-2655   LTitus1@myfairpoint.net
- Feed Commodities International   Ellis Additon   (207) 487-5589   eadditon@feedcommodities.com

MPG	Tim Donovan	(207) 877-5923	tdonovan@mpgco-op.com
Richard Belanger	(207) 576-5845		veggiefarmerinmaine@roadrunner.com
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Randy Drown	(207) 650-0310	randy.drown@cpsagu.com

Northeast Ag Sales

Rebecca Bubier	888-296-4818	(207) 441-6250 (M)	rebeccaneag@gmail.com
Justin Choiniere	800-462-7672	(802) 535-9938 (M)	Justin@neag.net
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Steve Goodwin	888-296-4818	(207) 242-2339 (M)	goodberry@roadrunner.com

TESTING PROCEDURE

The experiment was planted at the Misty Meadows Farm in Clinton on May 26, 2011, using a six-row corn planter. The predominant soil type was Woodbridge fine sandy loam. Prior to planting, liquid cow manure was applied at the rate of 6,000 gallons per acre. Lumax (3 quarts/acre) and atrazine (1 pound/acre) pre-emergent herbicides were used. Starter fertilizer (7-22-5, 5 gallons per acre) and Awaken (zinc ammonium acetate and corn micronutrients) were applied at planting. Liquid nitrogen was sidedressed at the rate of 50 pounds of nitrogen per acre.

Three replications of 43 hybrids were planted in a randomized block design, and plots were 75 feet long and 6 rows (30 feet) wide. Hybrids used were nominated and donated by seed companies. The hybrids used had relative maturity days ranging from 78 to 113 (Tables 1 and 2). We targeted a planting density of 32,000 plants/acre.

Growing degree days were calculated using results from a temperature sensor at the field edge. Total growing degree days (86/50) were 2287 for 2011. This is the highest since the replicated trials began. Growing degree days were 2120, 1908, 1840, and 2086 in 2010, 2009, 2008, 2007, respectively. The experiment was harvested on October 7, 2011, the day after the first killing frost.

Rainfall for 2011 as recorded by National Weather Service for May, June, July, and August at the Winthrop, Maine location is indicated in Table 3. Data for September were not available at press time.

Table 1. Varieties, yield, and select quality results, non-BMR varieties, 2011. Yield and milk data omitted from lodged plots and one outlier.

Hybrid	Relative Maturity	Yield, corrected to 30% DM, tons/acre	Expected milk yield, lbs/acre *	% Dry Matter	% Crude Protein	% NDF	% NFC	NEL, Mcal/lb	IVTD 30h,r % of DM **	NDFD, % of NDF
American Organic VP3P26	78	21.8	20552	32.9	9.4	45.7	37.3	0.71	77	50
Blue River 08T91	78	20.2	15633	42.9	7.8	41.8	41.9	0.69	76	43
DeKalb DKC 29-98	79	19.5	16400	42	8.8	43.9	39.2	0.72	78	51
Seedway SW 1994 RR	80	23.8	20106	36.8	8.1	41.5	a	0.68	75	41
American Organic VP3P55	82	24.0	20335	36.4	8.9	40	42.6	0.69	76	39
Croplan 2329RR	83	26.0	25029	38.2	8.5	36.3	46.7	0.78	83	54
DeKalb DKC 33-10	83	22.3	19099	35.9	8.3	46.6	37.2	0.67	75	46
Masters Choice MC 468	83	23.7	20594	38.3	7.7	38.9	44.8	0.72	78	44
American Organic VP2P58	84	23.6	22431	32.1	8.4	41.8	41.3	0.7	77	45
Blue River 19K19TP	84	19.4	17368	32.3	8.7	50.5	33.7	0.67	74	49
Blue River 22A10	85	24.4	22495	37.8	8.6	38.8	44.1	0.75	80	49
Croplan DS86RR	86	21.1	20482	30	9.3	48.4	35	0.72	78	56
DynaGro 52V01	86	25.2	23199	34.7	8.5	43.7	39.6	0.71	77	48
Mycogen 2T222	86	22.5	20728	32.2	9.4	45.9	37.1	0.69	76	47
NK N21J 3000 GT	86	22.6	22861	32.1	8	40.6	42.8	0.74	80	52
Schlessman 861LfYGT	86	27.1	27511	31.9	7.9	43.5	40.2	0.74	81	55
DynaGro D27GC19	87	21.5	20107	34.3	6.9	48.4	36.6	0.7	78	54
Mycogen TMF 2Q298	87	26.0	23273	33.5	9.1	48	35.6	0.68	75	48
Garst 89K65 3000 GT	88	24.1	21244	39.2	7.6	41.9	42	0.73	79	50
Masters Choice MC 480	90	26.0	22285	36.2	7.3	40.3	43.8	0.69	76	40
Seedway SW 3254 RR	90	24.3	22978	35.2	8.8	42.2	40.7	0.73	79	51
DeKalb DKC 42-91	92	25.4	25267	32.3	8.1	37.7	45.7	0.74	80	46
DynaGro D32VP29	92	26.2	27210	32.6	8.3	42.2	41.1	0.76	82	57
Garst 89T43 3000 GT	92	26.4	24575	36.8	8.5	39.6	43.5	0.74	80	49
NK N29T 3000 GT	92	27.4	22885	37.2	8	43.2	40.4	0.68	75	42

Croplan DS93VT3	93	27.8	27966	30.5	7.4	41	43.1	0.74	80	52
Pioneer 38A55	93	25.5	24605	35	8.6	41.8	41.2	0.74	80	52
Masters Choice MC 490	94	29.7	27465	34.7	7.9	40.7	42.9	0.71	78	45
Dairyland DL 3195	95	25.0	25466	31.6	8.6	39.8	43.1	0.75	81	52
Seedway SW 3788 RRYGCRW	95	28.2	28541	31.2	9.4	42.9	39.6	0.75	81	55
Garst 88E24 3000 GT	96	30.8	28284	35.7	8.9	47.6	36	0.71	78	53
NK N34N 31119 Viptera	96	29.5	30395	33.5	7.3	42	42.3	0.76	82	58
Mycogen TMF 493	97	28.5	29831	31.8	8.2	37.3	46	0.77	82	52
Masters Choice MC T515GT	98	23.6	21678	28.7	8.3	48.5	35.7	0.68	76	50
Nutridense D34VN19	99	27.0	25360	32.8	9.1	41.5	41.1	0.71	77	45
Nutridense D39QN29	99	26.8	27461	29.1	9.6	40.5	41.6	0.75	81	54
Pioneer P0125HR	103	27.2	26651	28.5	8.9	38.4	44.2	0.73	79	45
Nutridense CX1004	104	29.0	30123	28.9	9.5	38.8	43.2	0.76	82	53

*Expected milk yield = Milk lbs/ton multiplied by dry matter. Milk lbs/ton is a projection of potential milk yield per ton of forage dry matter, based on forage digestibility and energy content.
**IVTD 30 hr, % of DM = in vitro true digestibility samples incubated in rumen fluid for 30 hours.

Table 2. Varieties, yield, and select quality results, BMR varieties, 2011. Yield and milk data omitted from lodged plots and one outlier.

Hybrid	**Relative Maturity**	**Yield, corrected to 30% DM, tons/acre**	**Expected milk yield, lbs/acre ***	**% Dry Matter**	**% Crude Protein**	**% NDF**	**% NFC**	**NEL, Mcal/lb**	**IVTD 30hr, % of DM ****	**NDFD, % of NDF**
Mycogen F2F 298 BMR	87	21.3	23003	33.3	8.2	38.9	44.5	0.8	85	60
Seedway SW3737 BMR	95	21.7	20544	35.7	7.8	48.8	35.7	0.72	79	57
Mycogen F2F 383 BMR	97	22.7	24672	30.2	8.8	46.8	36.7	0.75	85	67
Mycogen F2F 488 BMR	98	25.3	27577	31.2	8.3	41.7	41.5	0.78	88	72
Pioneer P1376XR BMR	113	23.7	24373	24	8.8	45.1	38.2	0.75	81	58

*Expected milk yield = Milk lbs/ton multiplied by dry matter. Milk lbs/ton is a projection of potential milk yield per ton of forage dry matter, based on forage digestibility and energy content.
**IVTD 30 hr, % of DM = in vitro true digestibility samples incubated in rumen fluid for 30 hours.

Table 3. Rainfall, Winthrop, Maine, 2011

Month	Rain, inches observed
May	4.86
June	4.17
July	1.94
August	7.66

The plots were harvested using a six-row corn chopper with corn from each plot loaded into a mixer wagon with scales. Grab samples from one replicate of each treatment were frozen and sent to the Dairy One Laboratory in New York for immediate analysis for moisture and quality.

Statistical analysis of differences between hybrids was performed on silage yield (corrected to 30% dry matter), expected milk yield (milk per ton of dry matter multiplied by dry matter), and percent dry matter.

RESULTS

Table 1 summarizes yield and select quality results.

Yield

Yields are corrected to a standard 30% dry matter.

Parts of four plots (one plot each of American Organics VP3P26 and Nutridense D34VN19; two plots of American Organics VP3P55) were blown down by the wind during Hurricane Irene and could not be completely harvested. Data from these plots were excluded from all analyses. With only one observation remaining, American Organics VP3P55 had to be excluded from all analysis of variance tests. That observation was included in the regression analysis. An outlying result from one observation of Croplan DS93VT3 was excluded from analysis of variance for yield and expected milk yield.

There were significant differences in yield (corrected to 30% dry matter) among the hybrids tested ($p < 0.0001$). Figures 1, 2, and 3 show these results. The hybrids are presented in order of relative maturity. Across all hybrids there was an average corrected yield of 24.8 tons per acre. Hybrids with similar superscripts are not statistically different (Tukey's HSD). There was a significant, but weak, linear correlation between relative maturity and yield (30% dry matter) ($r^2 = 0.20$) (Figure 4).

Data from BMR (Brown Mid-Rib) varieties are displayed in Table 2. 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 also segregate BMR varieties at harvest to utilize this feed with cows for specific rations, including pre-fresh, fresh and high producing groups.

Figure 1. Average Yield, Corrected to 30% Dry Matter (2011)
Hybrids with Relative Maturity 78-86 Days

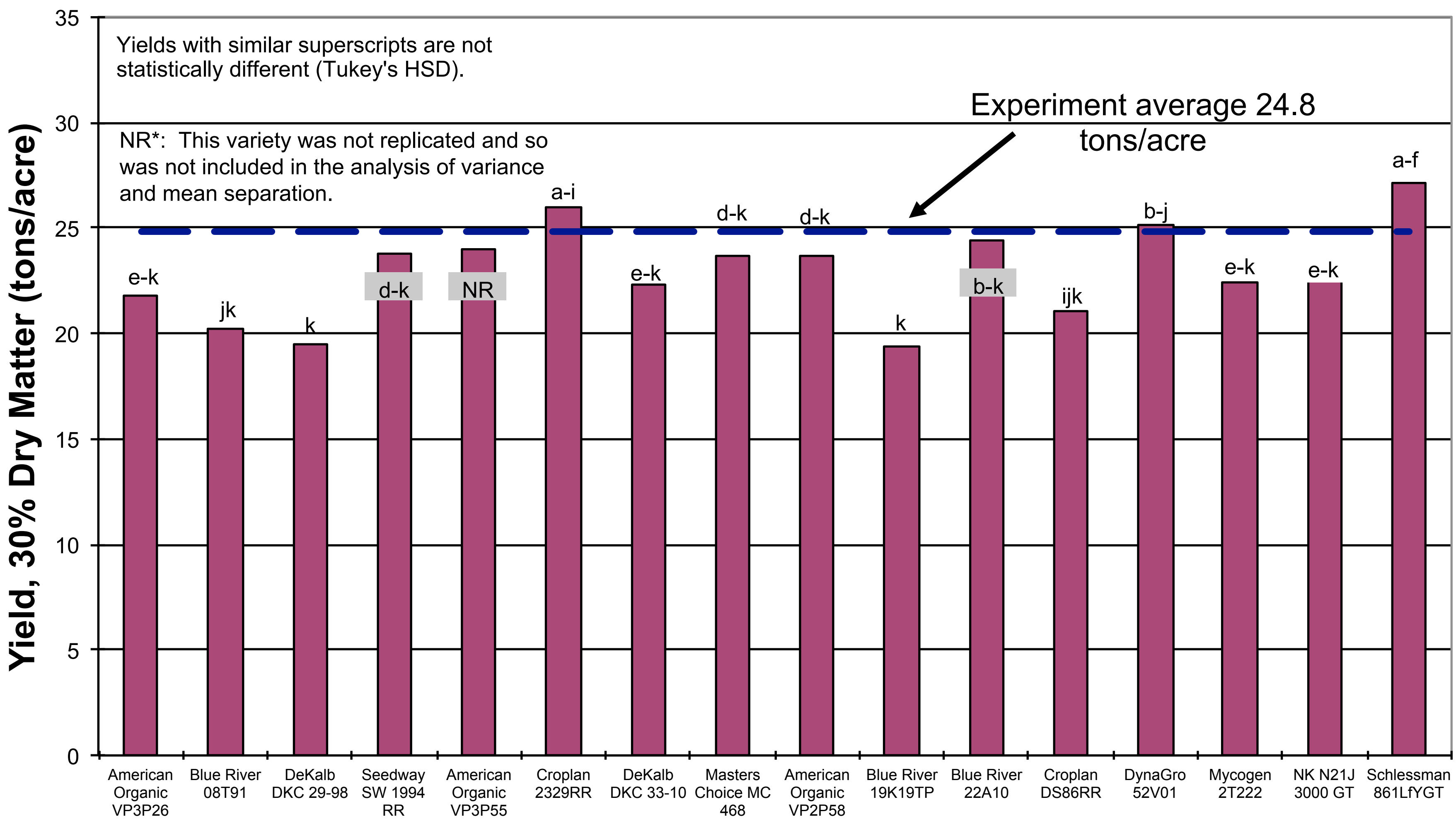


Figure 2. Average Yield, Corrected to 30% Dry Matter (2011)
Hybrids with Relative Maturity 87 - 94 Days

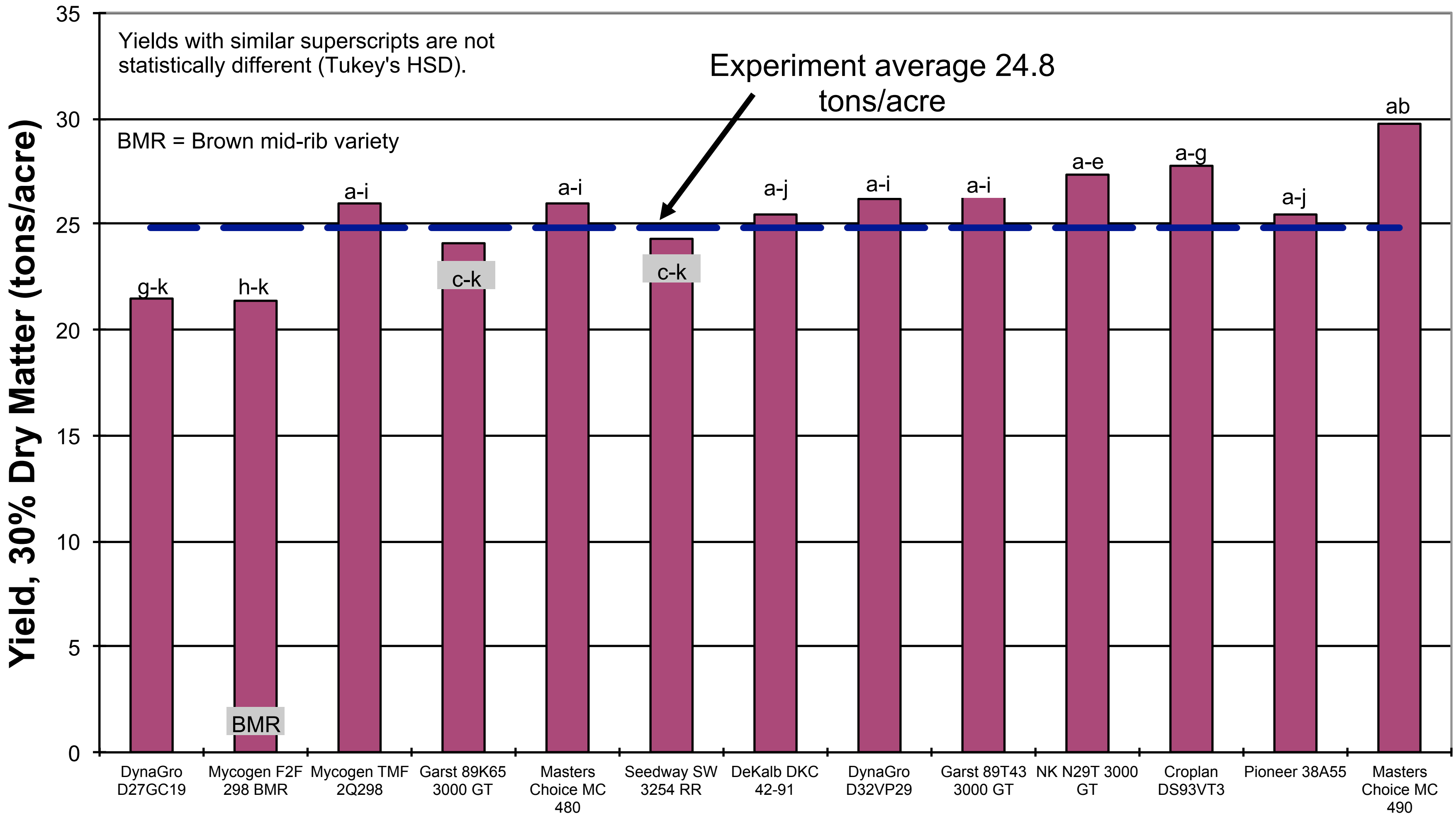


Figure 3. Average Yield, Corrected to 30% Dry Matter (2011)
Hybrids with Relative Maturity 95 - 113 Days

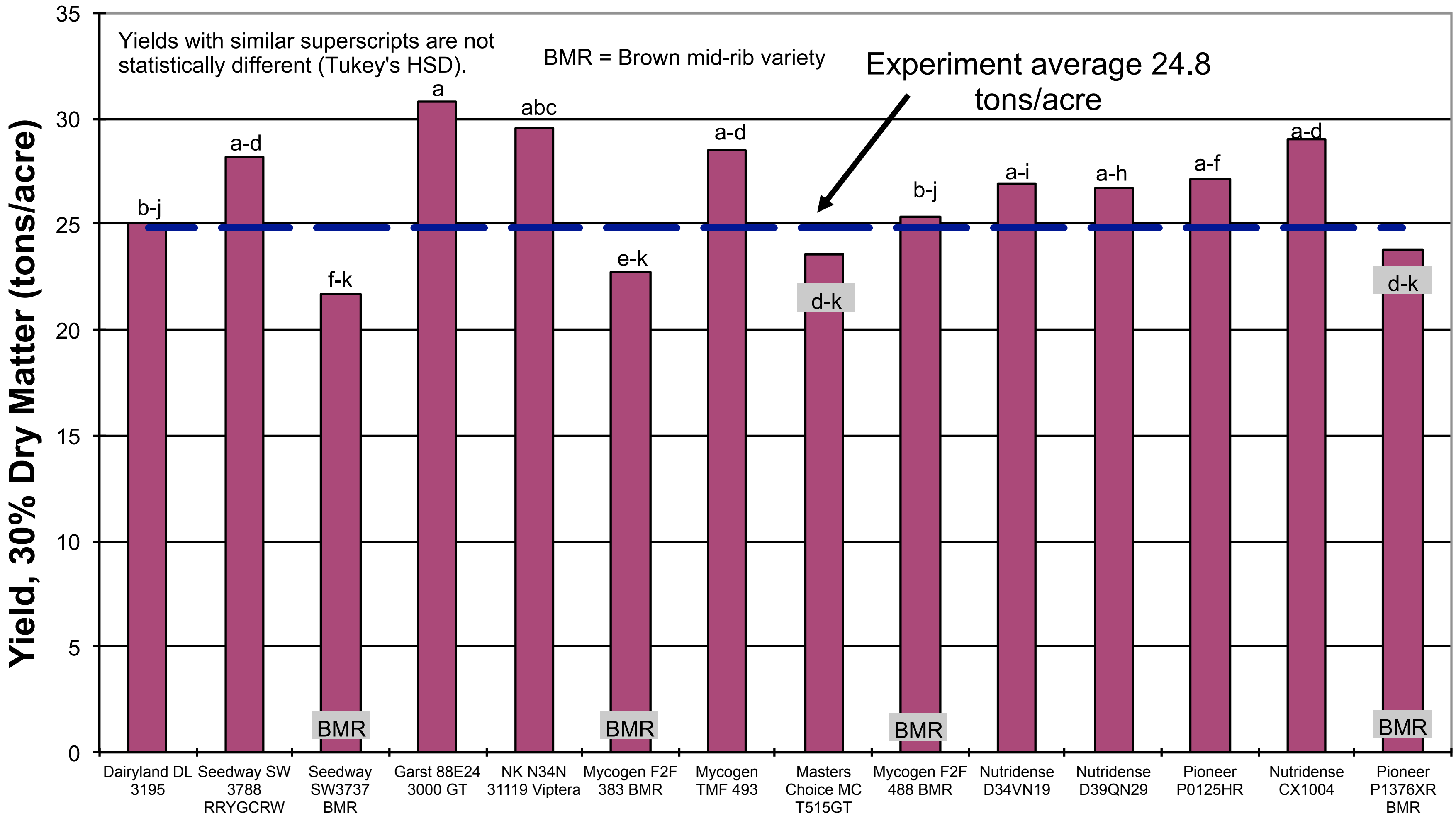
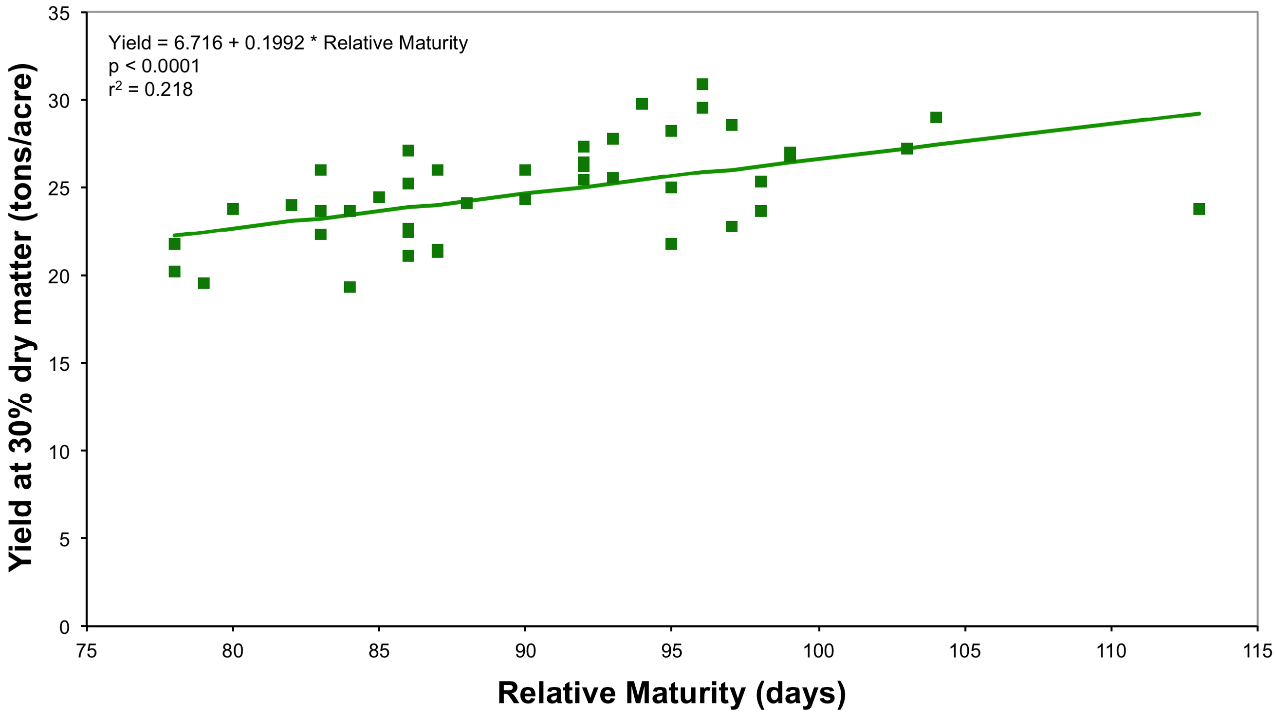


Figure 4. Effect of Relative Maturity on Corn Silage Yield (corrected to 30% DM) (2011)



Expected Milk Yield

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.

Parts of four plots (one plot each of American Organics VP3P26 and Nutridense D34VN19 and two plots of American Organics VP3P55) were blown down by the wind and could not be completely harvested. Data from these plots were excluded from all analyses. With only one observation remaining, American Organics VP3P55 had to be excluded from all analysis of variance tests. The remaining observation was included in the regression analysis.

There were significant differences in expected milk yield among the hybrids tested ($p < 0.0001$). Figures 5, 6, and 7 show these results. The hybrids are presented in order of relative maturity. Across all hybrids there was an expected milk yield of 23,689 pounds per acre. Hybrids with similar superscripts are not statistically different (Tukey's HSD). There was a significant linear correlation between relative maturity and expected milk yield ($r^2 = 0.39$) (Figure 8).

Figure 5. Expected Milk Yield (2011)
Hybrids with Relative Maturity 78 - 86 Days

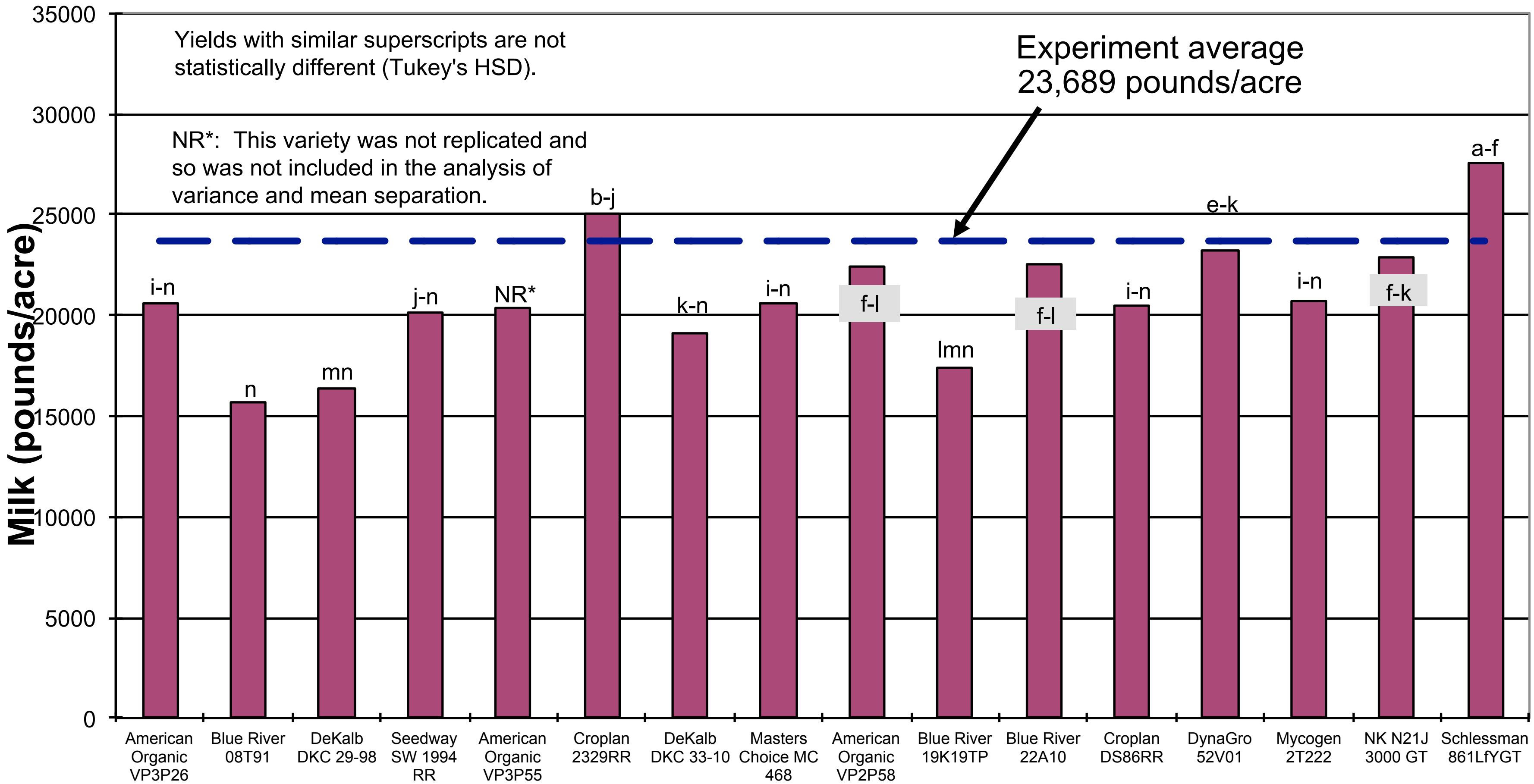


Figure 6. Expected Milk Yield (2011)
Hybrids with Relative Maturity 87 - 94 Days

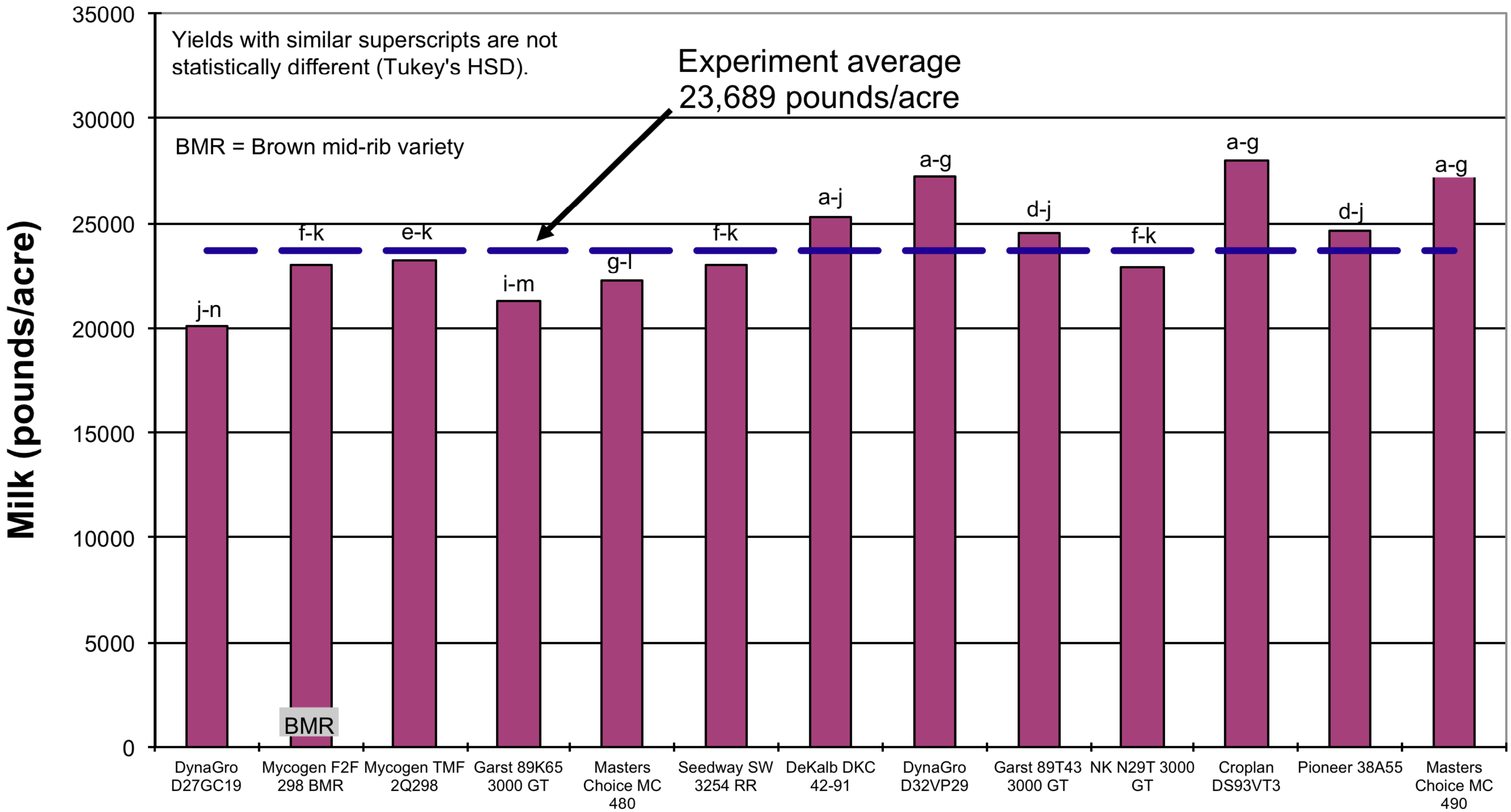


Figure 7. Expected Milk Yield (2011)
Hybrids with Relative Maturity 95 - 113 Days

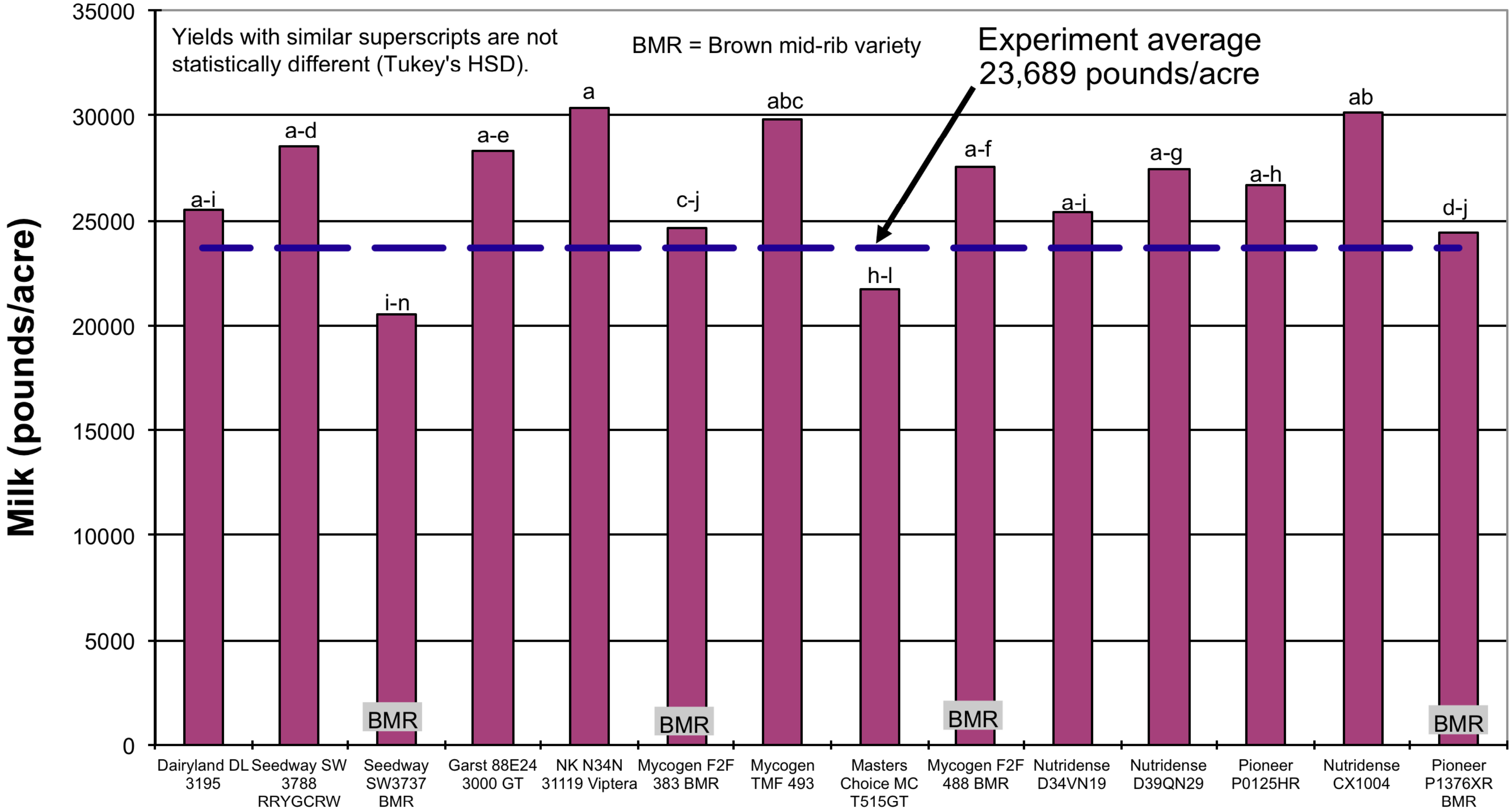
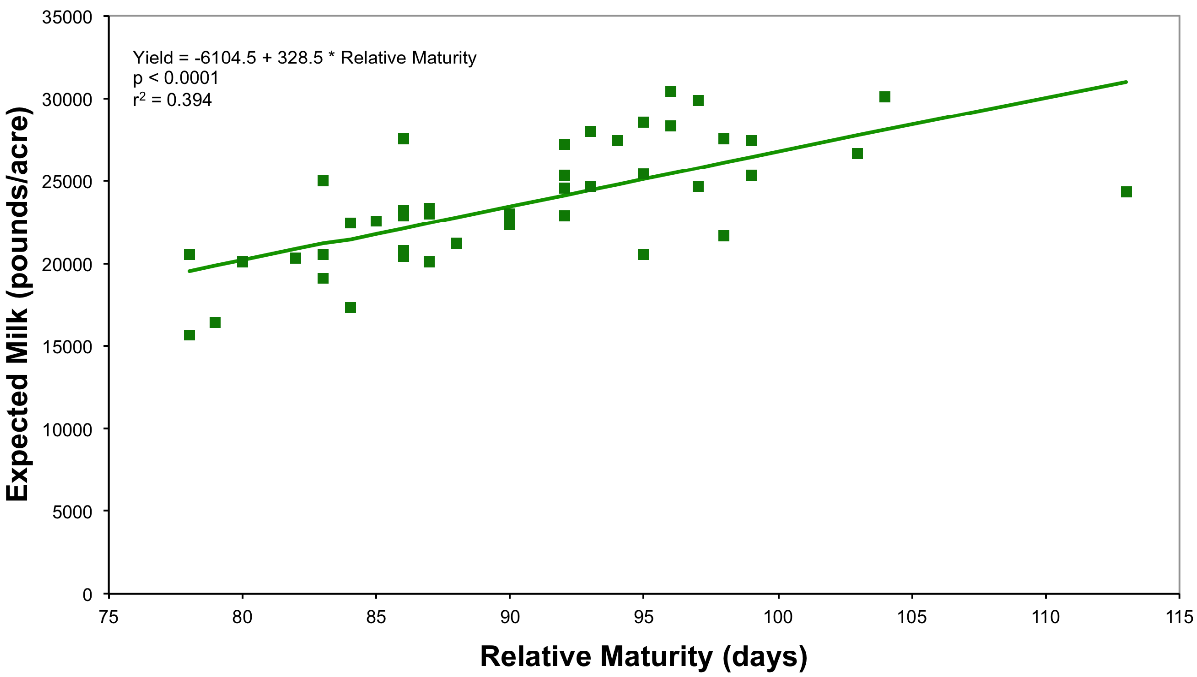


Figure 8. Effect of Relative Maturity on Expected Milk Yield (2011)



<u>Quality</u>

Dry matter decreased as relative maturity increased, as shown in Figure 9. There was a significant linear effect, and this relationship explained a moderate amount of variability in the data ($r^2 = 0.49$). As in 2010, most hybrids were at optimal dry matter at harvest.

There were significant linear correlations between relative maturity and net energy of lactation (Figure 10) and digestibility (IVTD 30 hr, % of dry matter and NDFD, % of NDF; Figures 11 and 12). These relationships were weak ($r^2 < 0.20$).

There were no significant linear relationships between relative maturity and other significant quality parameters, including % crude protein.

Figure 9. Effect of Relative Maturity on Corn Silage Dry Matter (2011)

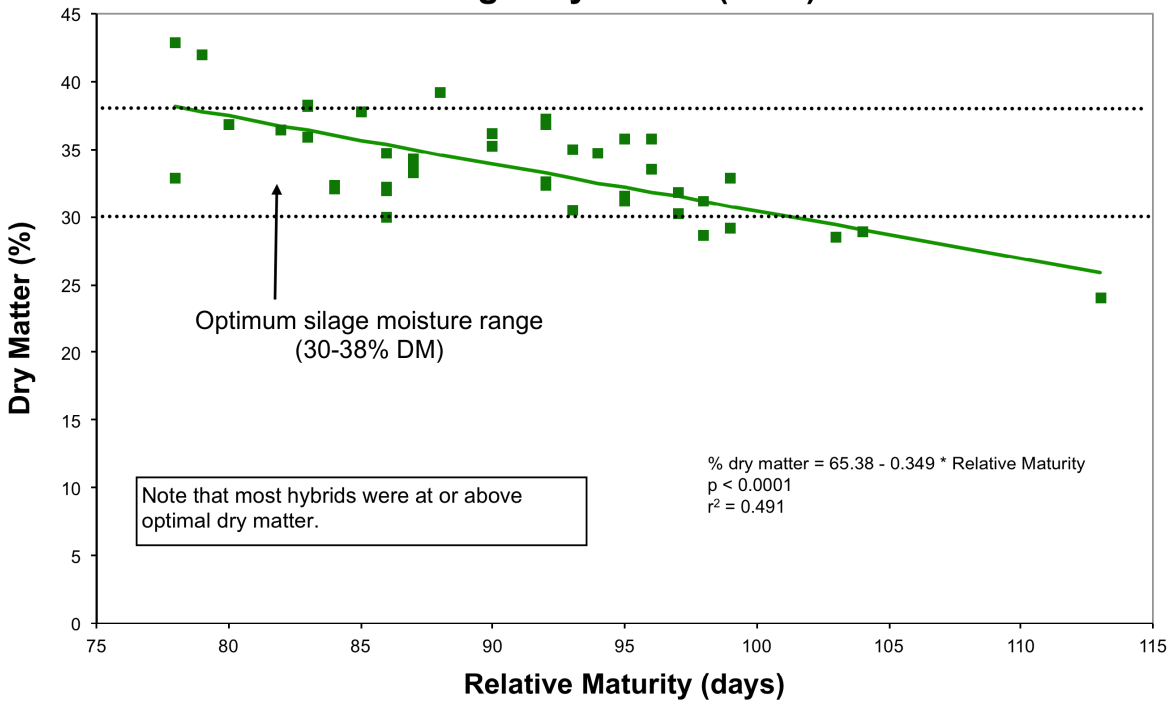


Figure 10. Effect of Relative Maturity on Energy (2011)

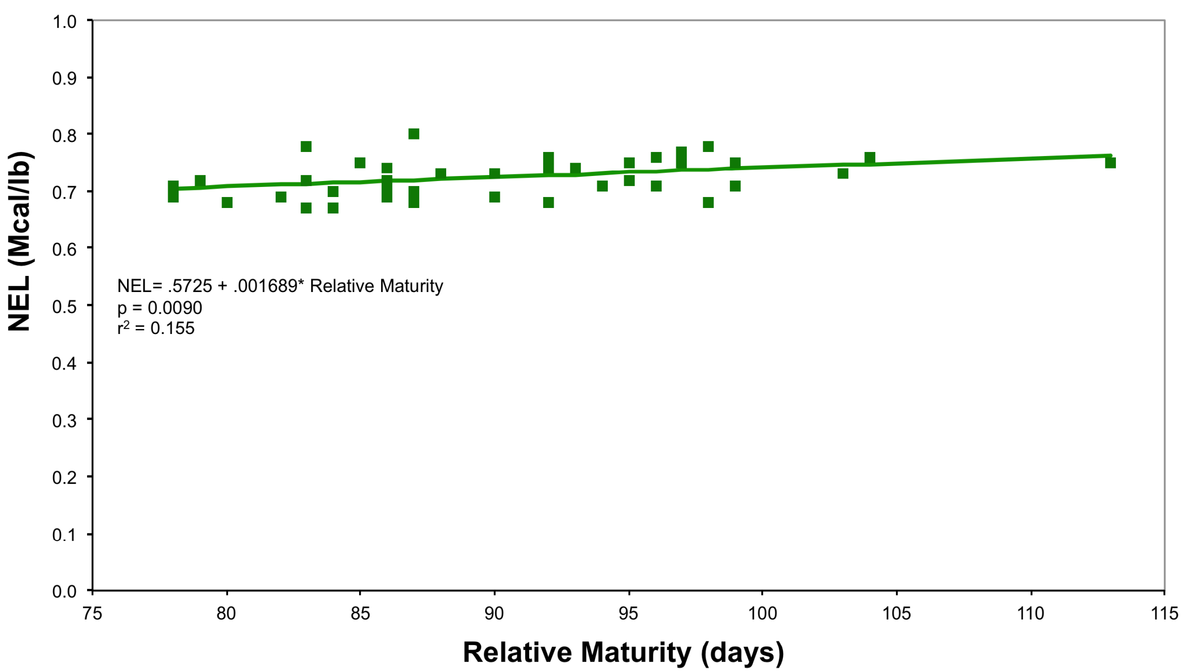


Figure 11. Effect of Relative Maturity on Digestibility (2011)

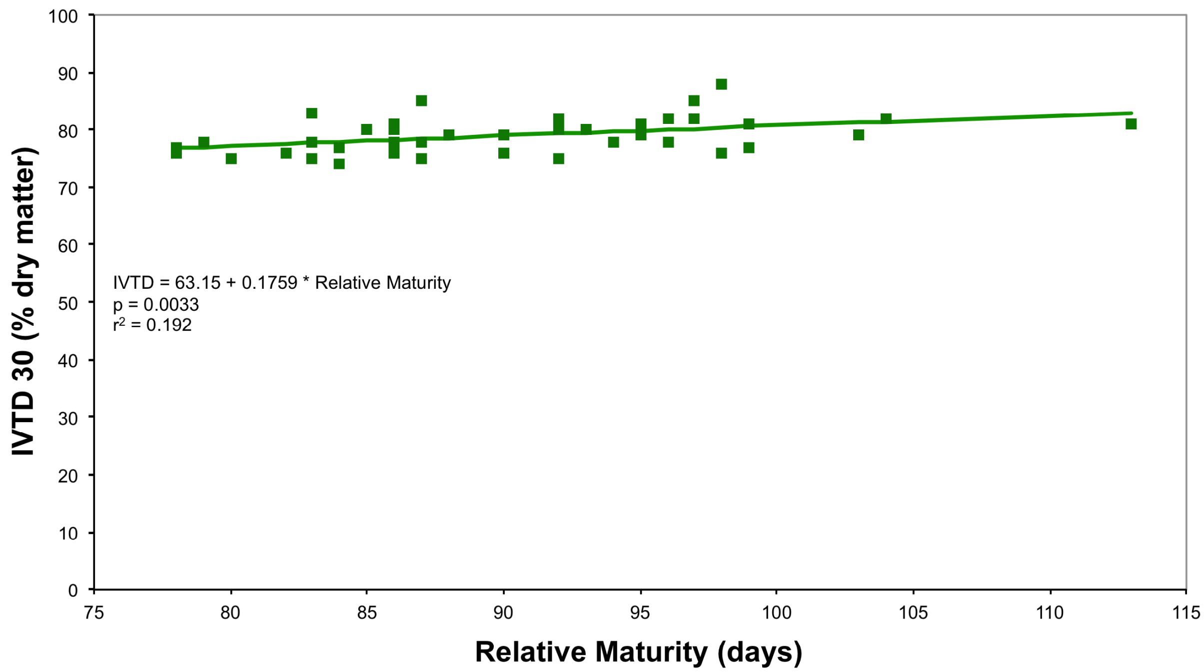
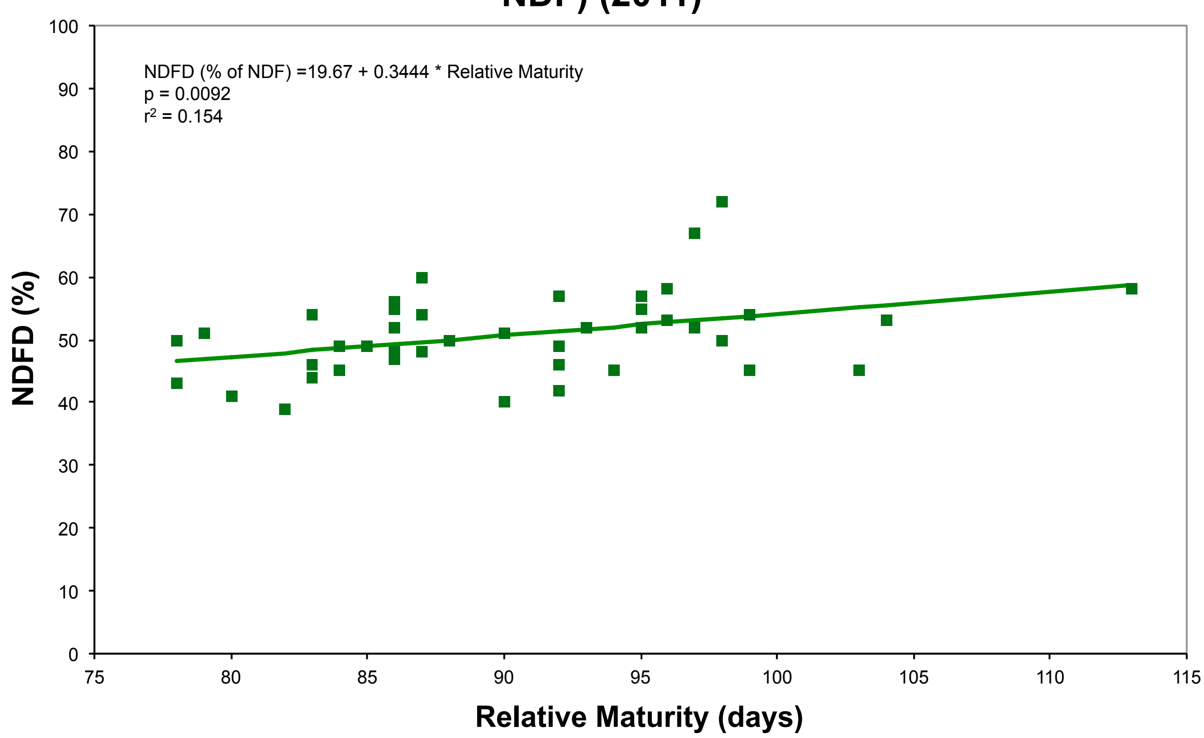


Figure 12. Effect of Relative Maturity on NDFD (% of NDF) (2011)



CONCLUSIONS

Overall 2011 was a good year for silage corn production in Maine. The total growing degree days recorded was the highest since the trial began in 2007. A dry July was followed by a wet August. High winds accompanying the remains of Hurricane Irene that passed through in September may have been responsible for knocking down parts of 4 plots.

In 2011, there were both differences among hybrids and a significant linear effect of relative maturity on yield corrected to 30% dry matter. This linear correlation indicated 2.0 tons/acre increase in yield (30% dry matter) for every additional 10 days of maturity. Results from all years of the trial are indicated in Table 4. Although these relationships are weak (low r^2), they do seem to be consistent. Please note that in 2009 there was no significant linear correlation between relative maturity and yield.

Table 4. Yield (30% dry matter) increase per 10 days relative maturity, 2007 – 2011, as estimated by linear regression.

	Tons/acre increase per 10 days maturity
2007	1.1
2008	0.97
2009	No relationship
2010	1.9
2011	2.0

Although the short season hybrids appear to be less productive in a single growing season, they offer options for improved cover crop establishment and the potential for double cropping. This can significantly improve the total yield of digestible nutrients per acre. Producers must also evaluate risk associated with choosing longer season hybrids for higher yield. While we did see a yield response to increased relative maturity, that response was greatest in the best growing years, and it was not present under poor growing conditions. By choosing short season or mid season varieties, producers will not only help to guarantee a level of maturity that produces quality corn silage, but they become less vulnerable to wet harvest years, such as 2011. They also open the door for improved nutrient and soil management options such as cover cropping.

In 2011, there were significant differences in expected milk yield among hybrids. The linear relationship between expected milk yield and relative maturity was significant and moderately strong (r^2 = 0.39), with longer-maturity hybrids having greater yield. This linear correlation indicated 3280 pounds/acre increase in expected milk yield for every additional 10 days of maturity.

Expected milk yield was also calculated in 2009 in 2010. In 2009, there were no differences among hybrids, but there was a significant linear relationship showing increased milk yield with longer-maturity hybrids. This relationship was small (91 pounds increased milk per acre for each additional 10 days maturity) and weak (r^2 = 0.094). In

2010, the relationship was larger (2890 pounds increased milk per acre for each additional 10 days maturity) and stronger (r^2 = 0.31)

At harvest time in 2011, some of the shorter-maturity hybrids showed higher than recommended dry matter content, potentially contributing to poor fermentation. Yields of these short season hybrids may have been higher if harvested earlier at the appropriate moisture content. In all five years of the trials, there has been a significant linear relationship between relative maturity and dry matter, with later-maturing hybrids having lower dry matter. From 2007 – 2009, most hybrids, especially those with longer maturities, showed lower dry matter content than recommended. In 2010 and 2011, hybrids with shorter maturities showed higher dry matter content than recommended, indicating that they should have been harvested earlier.

As in previous years, in 2011 there were no other notable significant effects of relative maturity on quality parameters.

ACKNOWLEDGEMENTS

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