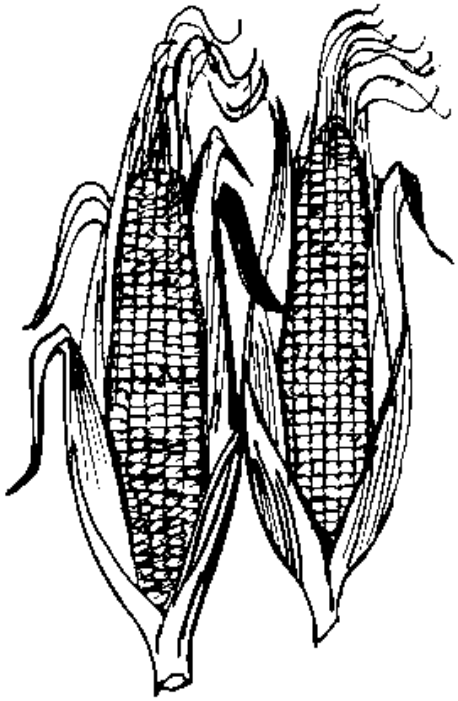
NW CROPS & SOILS PROGRAM

UNIVERSITY OF VERMONT EXTENSION

CULTIVATING HEALTHY COMMUNITIES

2010 BMR Corn Report



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2010 BMR Corn Report

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In 2010, the University of Vermont Extension Crops and Soils Team conducted an experiment to evaluate yield and quality of Brown Mid-Rib (BMR) corn varieties at Borderview Farm in Alburgh, VT. Two seed companies submitted varieties for evaluation. Companies and contact names are listed in Table 1.

Table 1. Participating companies and local contact information.

Mycogen	Seedway
Claude Fortin District Sales Manager Highgate, VT 802-363-2803	Ed Schillawski 3442 Rt 22A Shoreham, VT 802-897-2281

Seven corn varieties ranging in relative maturity from 90 – 109 were evaluated at this site. Relative Maturity (RM) was provided by the company. Specific varieties, their traits, and relative maturities are listed in Table 2. It is important to remember that the data presented is 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 a conclusion.

Table 2. . Varieties and descriptions evaluated in Alburgh, VT.

Company	Varieties	RM	Traits
Mycogen	F2F297	90	BMR
Seedway	SW3737	96	BMR
Mycogen	F2F488	99	BMR, HXT, LL, RR2
Mycogen	F2F569	105	BMR, HXT, LL, RR2
Seedway	SW5555	106	BMR
Mycogen	F2F665	109	BMR, HXT, LL, RR2
Mycogen	F2F622	109	BMR, HXI, LL, RR2

HXI – Hercluex I®, provides protection against above-ground pests such European corn borer, western bean cutworm and black cutworm.
HXT – Herculex Xtra®, provides season-long control of a variety of pests, including European corn borer, western bean cutworm, corn rootworm, and black cutworm.
LL – Glufosinate-ammonium herbicide (LibertyLink®) tolerant.
RR2 – Roundup Ready corn is glyphosate herbicide (Roundup®, Touchdown®) tolerant.

WEATHER DATA

Seasonal precipitation and temperatures recorded at a weather station in close proximity to the 2010 research site are shown in Table 1. This year presented a beautiful growing season with temperatures slightly higher than usual, and while we had a drier spring, overall, we ended up with above average rainfall. This growing season resulted in 348.4 more Growing Degree Days (GDD) than usual. GDDs are reported for corn with a base 50° – 86°F, in Table 3.

Table 3. Temperature, precipitation, and GDD summary – 2010.

	May	June	July	August	September	October
Avg. Temperature (°F)	59.6	66.0	74.1	70.4	64.0	50.6
Departure from Normal	3.0	0.2	3.0	1.4	3.6	1.8
Precipitation (inches)	0.92	4.61	4.30	5.48	4.32	*
Departure from Normal	-2.01	1.40	0.89	1.63	0.86	
GDDs (base 50°)	331.8	478.5	747.1	634.0	418.5	128.7
Departure from Normal	71.4	4.5	94.6	45.0	106.5	26.4

Based on National Weather Service data from South Hero, VT. Historical averages are for 30 years of data (1971-2000).

CULTIVATION SPECIFICS

The seedbed was prepared with a moldboard plow, disked, and then finished with a spike tooth harrow. The previous crop was sunflowers. Starter fertilizer was applied at a rate of 200 lbs of 10-20-20 to the acre. Plots were 10' x 50', and were planted with a John Deere 1750 planter on May 20, 2010. The seeding rate was 34,000 seeds to the acre. The soil type was a silt loam, and the experimental design was a randomized complete block with two replications. On May 30th Lumax (S-metolachlor, atrazine, and mesotrione) was sprayed on the plots at 2 qts/acre. Urea nitrogen was side-dressed at a rate of 70 lbs/acre lbs/ acre at V6 growth stage. Corn was harvested when it was at the appropriate moisture, on September 19th, 27th, or October 3rd. The plots were harvested with a two-row corn chopper. Yield was measured by weighing wagons on drive-up platform scales. A subsample of corn was taken and analyzed for forage quality by the Cumberland Valley Forage Laboratory in Maryland. Pertinent trial information is summarized in Table 4.

Table 4. BMR corn variety trial information, 2010.

Trial Information	Alburgh, VT
Soil type	Silt loam
Previous Crop	Sunflowers followed by rye cover crop
Row Width (in.)	30
Planting date	20-May
Harvest date	15 & 27-Sept, & 3-Oct.
Tillage operations	Spring disk, harrow, spike-toothed harrow
Manure (gal/acre)	Fall applied - 7000 gal/acre
Starter fertilizer (lbs/acre)	10-20-20 @ 200 lbs/acre
Other fertilizer (lbs/acre)	70 lbs N/acre sidedressed

SILAGE QUALITY

Silage quality was analyzed using wet chemistry techniques at Cumberland Valley Analytical Services in Hagerstown, Maryland. Plot samples were dried, ground and analyzed for crude protein (CP), neutral

detergent fiber (NDF), and 30h digestible NDF (dNDF). Mixtures of true proteins, composed of amino acids, and nonprotein nitrogen make up the CP content of forages. The CP content of forages is determined by measuring the amount of nitrogen and multiplying by 6.25. The bulky characteristics of forage come from fiber. Forage feeding values are negatively associated with fiber since the less digestible portions of plants are contained in the fiber fraction. The detergent fiber analysis system separates forages into two parts: cell contents, which include sugars, starches, proteins, non-protein nitrogen, fats and other highly digestible compounds; and the less digestible components found in the fiber fraction. The total fiber content of forage is contained in the neutral detergent fiber (NDF). Chemically, this fraction includes cellulose, hemicellulose, and lignin. Because of these chemical components and their association with the bulkiness of feeds, NDF is closely related to feed intake and rumen fill in cows. Recently, forage testing laboratories have begun to evaluate forages for NDF digestibility. Evaluation of forages and other feedstuffs for NDF digestibility is being conducted to aid prediction of feed energy content and animal performance. Research has demonstrated that lactating dairy cows will eat more dry matter and produce more milk when fed forages with optimum NDF digestibility. Forages with increased NDF digestibility will result in higher energy values, and perhaps more importantly, increased forage intakes. Forage NDF digestibility can range from 20 – 80%.

The silage performance indices of milk per acre and milk per ton were calculated using a model derived from the spreadsheet entitled, "MILK2007" developed by researchers at the University of Wisconsin. Milk per ton measures the pounds of milk that could be produced from a ton of silage. This value is generated by approximating a balanced ration meeting animal energy, protein, and fiber needs based on silage quality. The value is based on a standard cow weight and level of milk production. Milk per acre is calculated by multiplying the milk per ton value by silage dry matter yield. Therefore milk per ton is an overall indicator of forage quality and milk per acre an indicator of forage yield and quality. Milk per ton and milk per acre calculations provide relative rankings of forage samples, but should not be considered as predictive of actual milk responses in specific situations for the following reasons:

1) Equations and calculations are simplified to reduce inputs for ease of use,
2) Farm to farm differences exist,
3) Genetic, dietary, and environmental differences affecting feed utilization are not considered.

PRESENTATION OF DATA

Results for the BMR variety trial are listed in Table 4. Dry matter yields were calculated and then adjusted to 35% dry matter for the report. Varieties are ranked by dry matter yields at harvest in Table 4. The numbers presented in the tables are of two replications. The BMR variety yields are also displayed in Figure 1.

LEAST SIGNIFICANT DIFFERENCE (LSD)

Variations in yield and quality can occur because of variations in genetics, soil, weather, and other growing conditions. Statistical analysis makes it possible to determine whether a difference among hybrids is real or whether it might have occurred due to other variations in the field. At the bottom of each table a LSD value is presented for each variable (i.e. yield). Least Significant Differences (LSD's) at the 10% level of probability are shown. Where the difference between two hybrids within a column is equal to or greater than the LSD value at the bottom of the column, you can be sure 9 times out of 10 that there

is a real difference between the two hybrids. Hybrids that were not significantly lower in performance than the highest hybrid in a particular column are indicated with an asterisk. In the example on the next page, hybrid A is significantly different from hybrid C but not from hybrid B. The difference between A and B is equal to 1.5 which is less than the LSD value of 2.0. This means that these hybrids did not differ in yield. The difference between A and C is equal to 3.0 which is greater than the LSD value of 2.0. This means that the yields of these hybrids were significantly different from one another. The asterisk indicates that hybrid B was not significantly lower than the top yielding hybrid, hybrid C.

Hybrid	Yield
A	6.0
B	7.5*
C	**9.0***
LSD (0.10)	2.0

RESULTS

Table 5. Silage yield and quality evaluation of BMR varieties - Alburgh, VT.

Variety	Harvest Date	DM at harvest	Yield 35% DM	Forage quality characteristics					Milk per	
				CP	ADF	NDF	dNDF	NEL	ton	acre
		%	tons/acre	%	%	%	%	Mcal/lb		
F2F622	10/3/10	37.7	27.1	8.50	23.4	40.2	71.2	0.78	3280	31200
F2F488	9/27/10	37.5	26.9	**9.35***	21.7*	37.4*	68.1	0.78	3290	31000
SW3737	9/27/10	41.9	23.5	8.45	**20.4***	**35.2***	69.0	**0.80***	3310	27200
F2F665	10/3/10	37.3	22.3	8.30	24.6	41.6	70.9	0.77	3280	25500
F2F297	9/15/10	37.5	21.4	8.90*	21.5*	36.9*	68.7	0.79	3380	25200
SW5555	9/27/10	36.0	21.4	9.30*	21.5*	36.7*	69.0	0.79*	3350	25000
F2F569	9/27/10	37.4	18.5	8.80*	22.3	37.9	69.8	0.78	3320	21400
	LSD (0.10)	NS	NS	0.70	1.66	2.43	NS	0.015	NS	NS
	Means	37.9	23.0	8.80	22.2	38.0	69.5	0.78	3310	26600

NS – Varieties were not significantly different

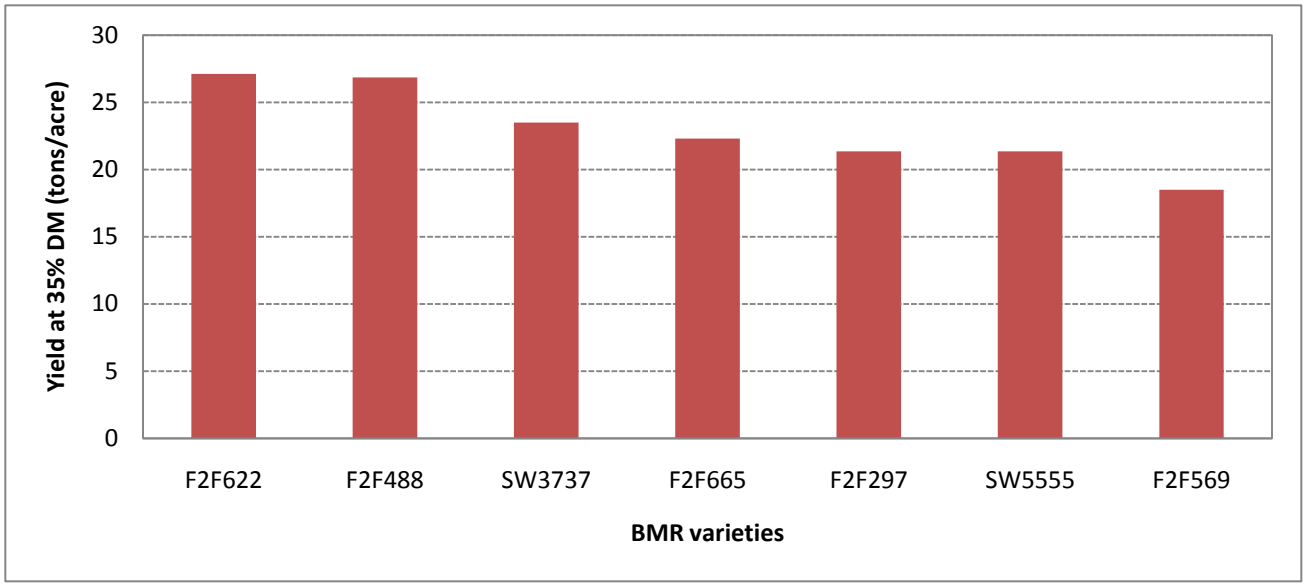

Figure 1. Yield comparison BMR varieties. Yields were not statistically different among hybrids.

DISCUSSION

As a rule, BMR varieties produce higher quality whole plant corn silage, as they have less lignin, a fiber. As a result, we expect to see BMR varieties with lower NDF and ADF values, and would expect cows feed BMR feed to have better feed intake and rumen fill. High producing dairy cows fed BMR corn have been shown to have a production advantage over dairy cows fed conventional corn varieties (Cropper and Comerford 2007), and cows fed BMR corn have been found to increase in weight (Lauer and Coors 1997). Due to less lignin, BMR varieties are often subject to lodging and predation, and as a result, frequently yield lower than conventional hybrids. Interestingly, in this experiment, all varieties yielded well with a trial average of 23 tons of corn per acre. The yield of short season varieties such as F2F297, SW3737, and F2F488 performed similar to longer BMR hybrids. This insinuates that BMR can be grown in a number of climate zones. The varieties did not differ significantly in digestible fiber but did differ in overall fiber content. The BMR varieties F2F622, F2F665, and F2F569 had significantly higher ADF and NDF concentrations than other BMR varieties. Even though varieties differed in fiber content there were no overall milk per ton differences between the BMR varieties. Overall there were several BMR corn varieties that would provide high yield and quality results for area dairy producers.

UVM Extension would like to thank Borderview Farm Research Facility for their help implementing the trial. We would also like to thank Claude Fortin of Mycogen, and Ed Schillawski, from Seedway, for the hybrid seed donation.