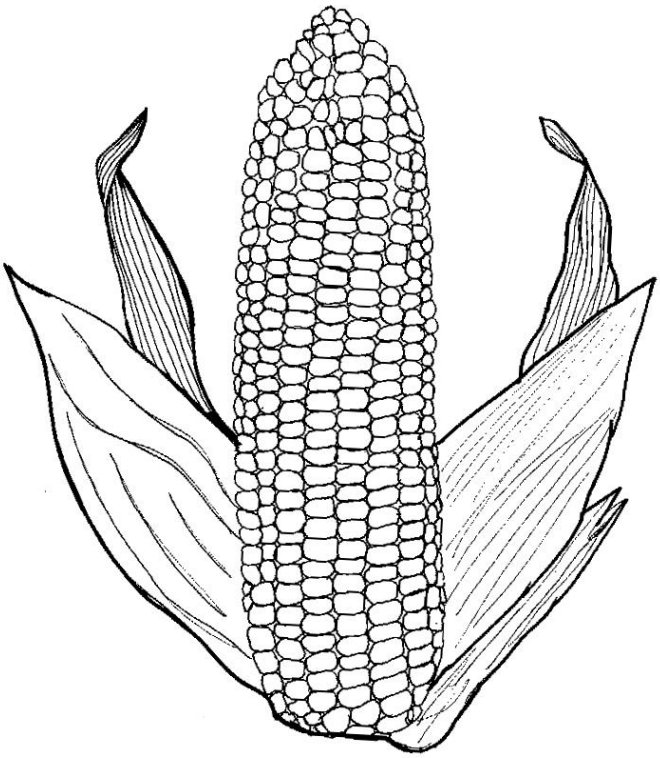
NW CROPS & SOILS PROGRAM

UNIVERSITY OF VERMONT EXTENSION

CULTIVATING HEALTHY COMMUNITIES

# 2010
# Vermont Organic Corn Silage Performance Trial Results

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# 2010 VERMONT ORGANIC CORN SILAGE PERFORMANCE TRIALS

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In 2010, the University of Vermont Extension conducted short and long season organic corn silage variety evaluations in cooperation with Vermont Technical College (VTC) and Organic Valley Farmers Advocating for Organics Program (FAFO). The purpose of the program was to provide unbiased performance comparisons of commercially available organic corn varieties. It is important to remember, however, that the data presented are from replicated research trials from only 3 locations in Vermont. Crop performance data from additional tests in different locations and often over several years should be compared before you make conclusions.

## TESTING PROCEDURE

In 2010, an organic corn silage performance trial was conducted at Vermont Technical College in Randolph, VT and at the Miller Family Farm in Vernon, VT. All fields were certified organic by Vermont Organic Farmers, LLC. Several seed companies and farmers submitted varieties for evaluation. Companies and contact names are listed in Table 1. The organic corn grown at the Randolph site was considered early maturing corn (75-95 RM), and at the Vernon site the corn was considered late maturing corn (90-108 RM) based on the Relative Maturities **provided by the companies**. The specific varieties and RM are listed in Tables 2 & 3.

**Table 1. Participating Companies and Local Contact Information**

| Albert Lea Seed | American Organic | Blue River Organics |
|---|---|---|
| 1414 West Main Street<br>PO Box 127,<br>Albert Lea, MN 56007<br>800-352-5247 | Art Scheele<br>PO Box 385<br>Warren, IL 61087<br>866-471-9465 | Boucher Fertilizer<br>2343 Gore Road<br>Highgate Ctr., VT<br>802-868-3939 |
| **Butterworks Farm** | **Lakeview Organic Grain** | |
| Jack Lazor<br>421 Trumpass Rd<br>Westfield, VT 05874<br>802-744-6855 | Klass & Mary-Howell Martens<br>Box 361<br>Penn Yan, NY 14527<br>315- 531-1038 | |

**Table 2. Organic corn varieties evaluated in Randolph, VT.**

| Company | Variety | RM | Description |
|---|---|---|---|
| Albert Lea Seed Co, Viking Corn, MN | 0.99-90N | 90 | Hybrid |
| Albert Lea Seed Co, Viking Corn, MN | E-95 | 95 | Open Pollinated |
| American Organic Seed & Grain, IL | B915 | 85 | Hybrid |
| American Organic Seed & Grain, IL | C710 | 88-92 | Open Pollinated |
| American Organic Seed & Grain, IL | B716 | 84-86 | Open Pollinated |
| American Organic Seed & Grain, IL | B913 | 83 | Hybrid |
| Blue River Hybrids, IA | 28B19 | 89 | Hybrid |
| Blue River Hybrids, IA | 33L90 | 93 | Hybrid |
| Butterworks Farm, VT | Early Riser | 75 | Open Pollinated |
| Lakeview Organic Grain, NY | Wapsie Valley | 89 | Open Pollinated |

**Table 3. Organic corn varieties evaluated in Vernon, VT.**

| Company | Variety | RM | Description |
|---|---|---|---|
| Albert Lea Seed Co, Viking Corn, MN | 0.99-90N | 90 | Hybrid |
| Albert Lea Seed Co, Viking Corn, MN | 0.5740 | 104 | Hybrid |
| Albert Lea Seed Co, Viking Corn, MN | 0.6710 | 98 | Hybrid |
| American Organic Seed & Grain, IL | VPD944 | 104 | Hybrid |
| American Organic Seed & Grain, IL | VPD843 | 102 | Hybrid |
| American Organic Seed & Grain, IL | D918 | 108 | Hybrid |
| American Organic Seed & Grain, IL | VPD901 | 101 | Hybrid |
| American Organic Seed & Grain, IL | VPD749 | 107 | Hybrid |
| Blue River Hybrids, IA | 48B30 | 102 | Hybrid |
| Blue River Hybrids, IA | 46M96 | 100 | Hybrid |

## WEATHER DATA

Seasonal precipitation and temperature was recorded at weather stations close in proximity to the two sites (Tables 4 & 5). This season brought ideal growing conditions followed by a wetter than average fall. The total accumulated Growing Degree Days (GDD) for corn growth was 2502 for Randolph and 2892 for Vernon. This presented above average accumulated GDD by 510 GDD for Randolph and 185 GDD for Vernon.

**Table 4. Temperature, precipitation, and growing degree days summary – Randolph, VT.**

| Bethel, VT (Randolph) | April | May | June | July | August | September | October |
|---|---|---|---|---|---|---|---|
| Average Temperature (F) | 46.5 | 56.7 | 62.9 | 71.1 | 67.5 | 60.1 | 45.3 |
| Departure from Normal | 4.6 | 0.5 | 1.6 | 5.1 | 3.1 | 3.4 | 2.5 |
| | | | | | | | |
| Precipitation (inches) | 2.87 | 2.27 | 6.35 | 4.70 | 2.28 | 1.67 | 10.0 |
| Departure from Normal | -0.49 | -1.36 | 2.71 | 0.74 | -1.99 | -2.00 | 6.3 |
| | | | | | | | |
| Growing Degree Days (base 50) | 156.0 | 341.0 | 387.0 | 652.6 | 541.0 | 324.0 | 100.8 |
| Departure from Normal | 114.0 | 79.1 | 4.5 | 162.8 | 111.7 | 42.0 | -4.6 |

**Table 5. Temperature, precipitation, and growing degree days summary – Vernon, VT.**

| Keene, NH (Vernon, VT) | April | May | June | July | August | September | October |
|---|---|---|---|---|---|---|---|
| Average Temperature (F) | 48.6 | 58.8 | 66.0 | 72.1 | 68.6 | 63.2 | 48.6 |
| Departure from Normal | 5.1 | 2.9 | 1.6 | 2.6 | 1.3 | 4.2 | 1.4 |
| | | | | | | | |
| Precipitation (inches) | 1.64 | 2.78 | 3.23 | 2.76 | 1.91 | 1.85 | 9.2 |
| Departure from Normal | -1.66 | -1.07 | -0.29 | -1.14 | -2.05 | -1.60 | 3.5 |
| | | | | | | | |
| Growing Degree Days (base 50) | 196.5 | 379.8 | 478.5 | 686.7 | 575.1 | 406.5 | 168.9 |
| Departure from Normal | 87.0 | 65.2 | -13.5 | 28.0 | -29.4 | 57.0 | -9.4 |

*Based on National Weather Service data from cooperative observer stations in close proximity to field trials. Historical averages are for 30 years of data (1971-2000)..

## CULTURAL PRACTICES

The seedbed at each location was prepared by conventional tillage methods. The previous crop at the Randolph site was an alfalfa/grass mix hayfield. The previous crop at the Vernon site was corn for silage followed by a cover crop of winter rye. Both sites were planted with a John Deere 7000 four row corn planter. Plots were planted the length of the field. Two replications of each variety were planted in the field. The plots were hand harvested with machetes. From each plot, two 17.5' row sections were harvested and weighed with small platform scales. A 10 plant subsample was chopped with Troy-Built chipper shredder. After mixing, a subsample of chopped corn was taken and analyzed for forage quality by the Cumberland Valley Forage Laboratory in Maryland. Pertinent trial information is summarized in Tables 6 & 7.

**Table 6. Organic silage corn variety trial information – Randolph, VT 2010**

| Trial Information | Vermont Technical College, Randolph |
|---|---|
| Soil type | Silt loam |
| Previous Crop | Hay |
| Row Width (in.) | 30 |
| Planting date | 28-May |
| Harvest date | 29-Sept. |
| Harvest population (plants/acre) | 24,000 |
| Tillage operations | Spring Plow<br>Spring Disk |
| Manure (gal/acre) | Spring applied - 8000 gal/acre |
| Tineweeding | 1x |
| Row cultivation | 2x |

**Table 7. Organic silage corn variety trial information – Vernon, VT2010**

| Trial Information | Miller Family Farm, Vernon |
|---|---|
| Soil type | Loamy Fine Sand |
| Previous Crop | Corn, rye cover crop plowdown |
| Row Width (in.) | 30 |
| Planting date | 11-May |
| Harvest date | 24-Sept. |
| Harvest population (plants/acre) | 24,000 |
| Tillage operations | Spring Plow<br>Spring Disk |
| Manure (gal/acre) | Spring applied - 8000 gal/acre |
| Tineweeding | 1x |
| Row cultivation | 2x |

## SILAGE QUALITY

Silage quality was analyzed using wet chemistry techniques at the Cumberland Valley Forage Laboratory in Pennsylvania. Plot samples were dried, ground and analyzed for crude protein (CP), acid detergent fiber (ADF), 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 N 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, nonprotein 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 exists.
3) Genetic, dietary, and environmental differences affecting feed utilization are not considered.

## PRESENTATION OF DATA

Yield and quality results are listed in Table 8, and 9. Dry matter yields were calculated and than adjusted to 35% dry matter for the report. Varieties are ranked by dry matter at harvest. The numbers presented in the tables are an average of two replications. A graph has been included to report yields (Figure 1 & 3). Hybrids with the same letter were not statistically different in yield. Figure 2 and 4 displays the relationship between milk per ton and milk per acre. The dotted line dividing the figure into four quadrats represents the mean milk per ton and acre for the location. Therefore hybrids that fall above the lines performed higher than the average and hybrids below the lines performed below average.

## 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 varieties 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 varieties within a column is equal to or greater than the LSD value at the bottom of the column, you can be sure in 9 out of 10 chances that there is a real difference between the two varieties. Varieties that were not significantly lower in performance than the highest hybrid in a particular column are indicated with an asterisk. In the example below A is significantly different from C but not from 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 varieties 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 varieties were significantly different from one another. The asterisk indicates that B was not significantly lower than the top yielding variety.

| **Variety** | **Yield** |
|---|---|
| A | 6.0 |
| B | 7.5* |
| C | 9.0* |
| **LSD** | **2.0** |

## RESULTS

**Table 8. Silage yield and quality of short season organic corn varieties – Randolph, VT.**

| Company | Variety | Relative maturity | DM at harvest % | Yield 35 % DM T/A | Forage Quality Characteristics CP % | ADF % | NDF % | dNDF % | Nel % | Milk per ton | Milk per acre |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Albert Lea SH | E-95 | 95 | 28.0 | 14.7 | **8.3** | 26.9 | 45.8 | 55.7 | 0.75 | 2831 | 14558* |
| Viking Organic | O.99-90N | 90 | 29.1 | 17.9* | 7.1 | 28.4 | 47.0 | 52.9 | 0.74 | 2738 | 17122* |
| Lakeview OG | Wapsie Valley | 85 | 29.2 | 16.6* | 7.9 | 26.8 | 45.2 | 52.2 | 0.75 | 2768 | 14694* |
| Amer. Org. | B716 | 85 | 30.1 | 15.5* | 7.8 | **25.6** | **42.8** | 53.2 | 0.75 | 2750 | 14904* |
| Amer. Org. | B913 | 89 | 30.7 | 14.9 | 6.7 | 26.8 | 45.0 | 51.2 | 0.75 | 2660 | 13758 |
| Amer. Org. | C710 | 93 | 30.9 | 16.3* | 7.9 | 26.8 | 46.0 | **56.8** | 0.75 | 2834 | 16077* |
| Amer. Org. | B915 | 88-92 | 31.2 | 16.1* | 7.9 | 26.5 | 45.0 | 55.0 | 0.75 | 2781 | 15634* |
| Blue River | 28B19 | 89 | 31.6* | **19.3*** | 6.6 | 28.0 | 46.9 | 52.5 | 0.75 | 2769 | **18665*** |
| Blue River | 33L90 | 93 | 33.1* | 15.8* | 7.9 | 26.2 | 44.6 | 53.9 | 0.75 | 2777 | 15379* |
| Butterworks | Early Riser | 80 | **34.6*** | 14.4 | 7.7 | 26.2 | 45.2 | 55.6 | **0.76** | **2843** | 14442* |
| Trial Mean | | | 30.8 | 16.1 | 7.5 | 26.8 | 45.3 | 53.9 | 0.75 | 2775 | 15523 |
| LSD (0.10)** | | | 3.31 | 4.1 | NS | NS | NS | NS | NS | NS | 4400 |

* Corn that did not perform significantly lower than the top performing variety in a particular column is indicated with an asterisk.
** See text for further explanation.
NS - None of the varieties were significantly different from one another.

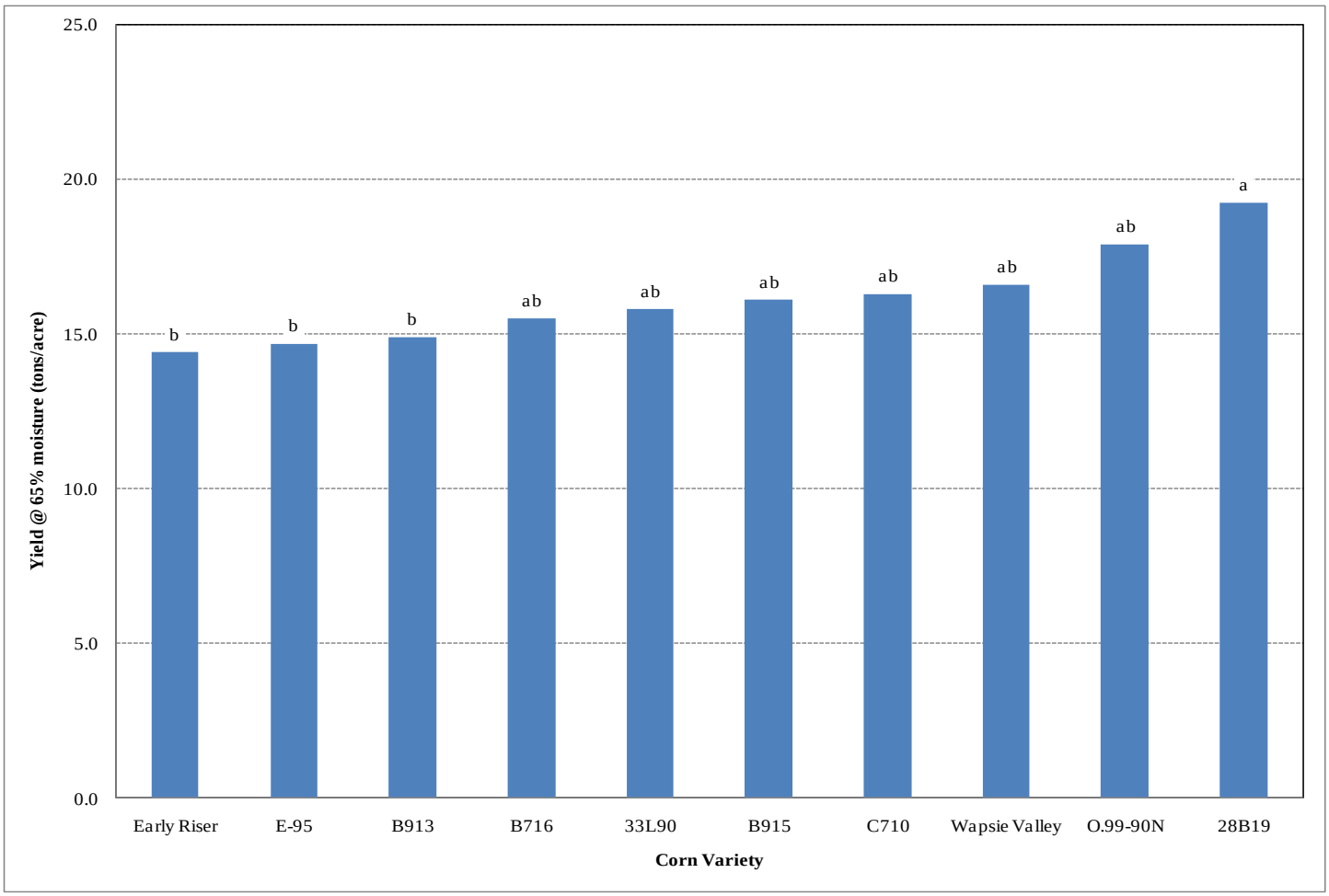


**Figure 1. Corn silage yield of short season organic corn varieties – Randolph, VT.** ***Varieties with the same letter did not differ significantly in yield.***

## RESULTS

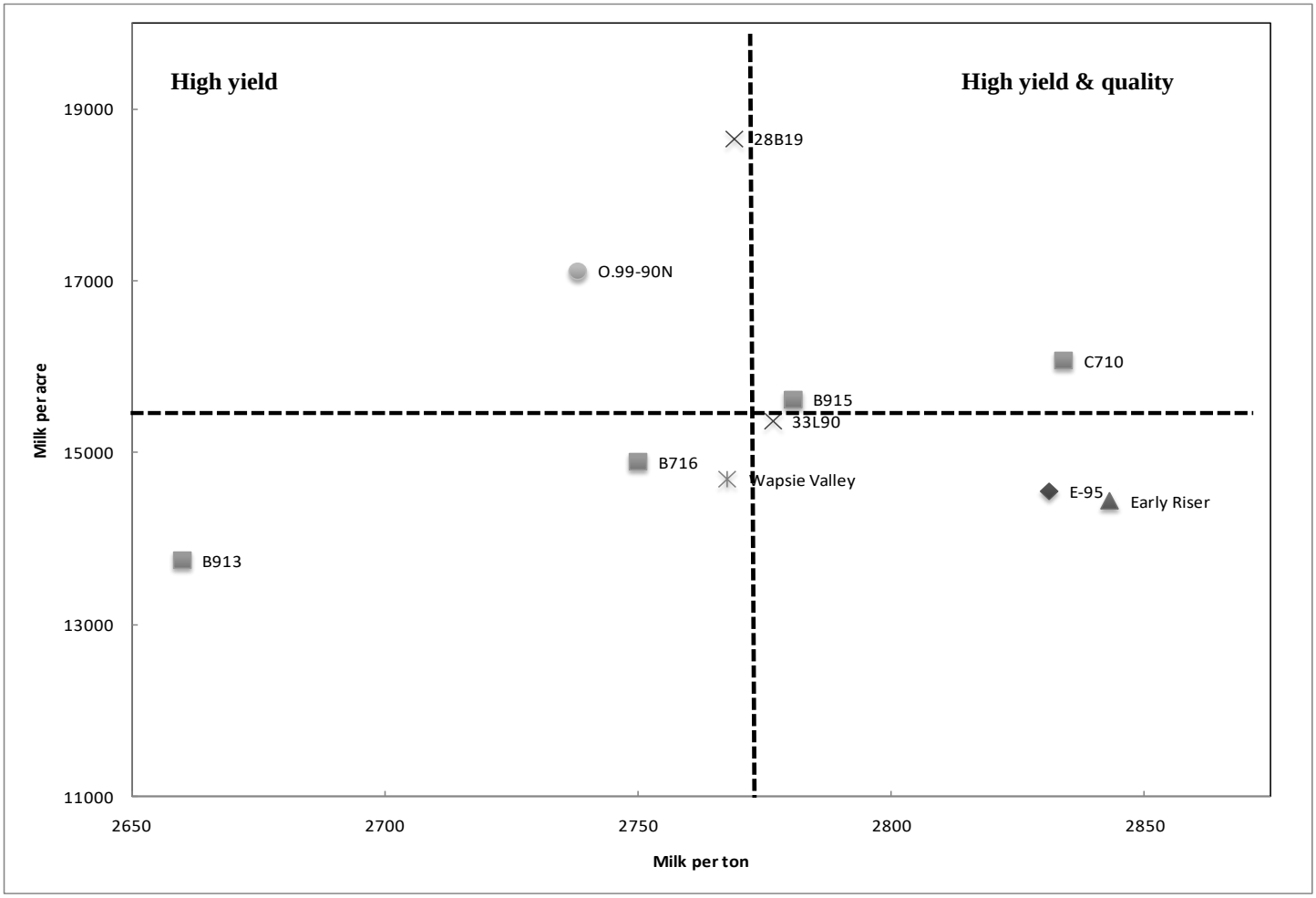


**Figure 2. Milk performance of organic corn silage varieties – Randolph, VT.** ***Dotted lines indicate overall milk per ton and milk per acre means of the corn varieties.***

## RESULTS

**Table 9. Silage yield and quality evaluation of long season organic corn varieties –Vernon, VT.**

| Company | Variety | Relative maturity | DM at harvest % | Yield 35 % DM T/A | Forage Quality Characteristics CP % | ADF % | NDF % | dNDF % | Nel Mcal/lb | Milk per ton | Milk per acre |
|---|---|---|---|---|---|---|---|---|---|---|---|
| American Organics | VPD843 | 102 | 24.9 | 15.5 | 7.55 | 30.0 | 48.5 | 53.6 | 0.75* | 2658 | 14473 |
| American Organics | VPD944 | 104 | 25.1 | 15.9 | 6.70 | 32.0 | 53.5 | 52.3 | 0.72 | 2403 | 13312 |
| Blue River Hybrids | 46M96 | 100 | 26.3 | 18.4 | 6.90 | 32.1 | 51.8 | 50.8 | 0.72 | 2542 | 16429 |
| Blue River Hybrids | 48B30 | 102 | 27.2 | 13.5 | 6.70 | 29.6* | 48.3 | 58.0* | 0.74* | 2826* | 13335 |
| American Organics | VPD901 | 101 | 27.4 | 18.9 | 7.20 | 33.0 | 53.2 | 55.3* | 0.72 | 2798 | 18304 |
| American Organics | D918 | 108 | 27.6 | 15.9 | 6.25 | 29.9* | 48.0 | 54.7* | 0.74* | 2686 | 14893 |
| Viking Organic | 0.5740 | 104 | 27.8 | 16.9 | 6.70 | 27.6* | 47.5* | 53.6 | 0.75* | 2405 | 14164 |
| Viking Organic | 0.6710 | 98 | 28.3 | 20.6 | 6.55 | 33.9 | 54.0 | 51.6 | 0.71 | 2552 | 18451 |
| American Organics | VPD749 | 107 | 30.0* | **24.6*** | **8.50*** | 26.7* | 43.7* | **58.9*** | **0.76*** | **3019*** | **25976*** |
| Viking Organic | O.99-90N | 90 | **33.5*** | 24.2* | 7.05 | **26.3*** | **42.4*** | 53.9 | 0.76* | 2857* | 24199* |
| Trial Mean | | | 27.8 | 18.4 | 7.01 | 30.1 | 49.0 | 54.2 | 0.74 | 2674 | 17354 |
| LSD (0.10)** | | | 3.5 | 3.9 | 0.84 | 3.6 | 5.3 | 4.2 | 0.03 | 208 | 4057 |

* Corn that did not perform significantly lower than the top performing variety in a particular column is indicated with an asterisk.
** See text for further explanation.

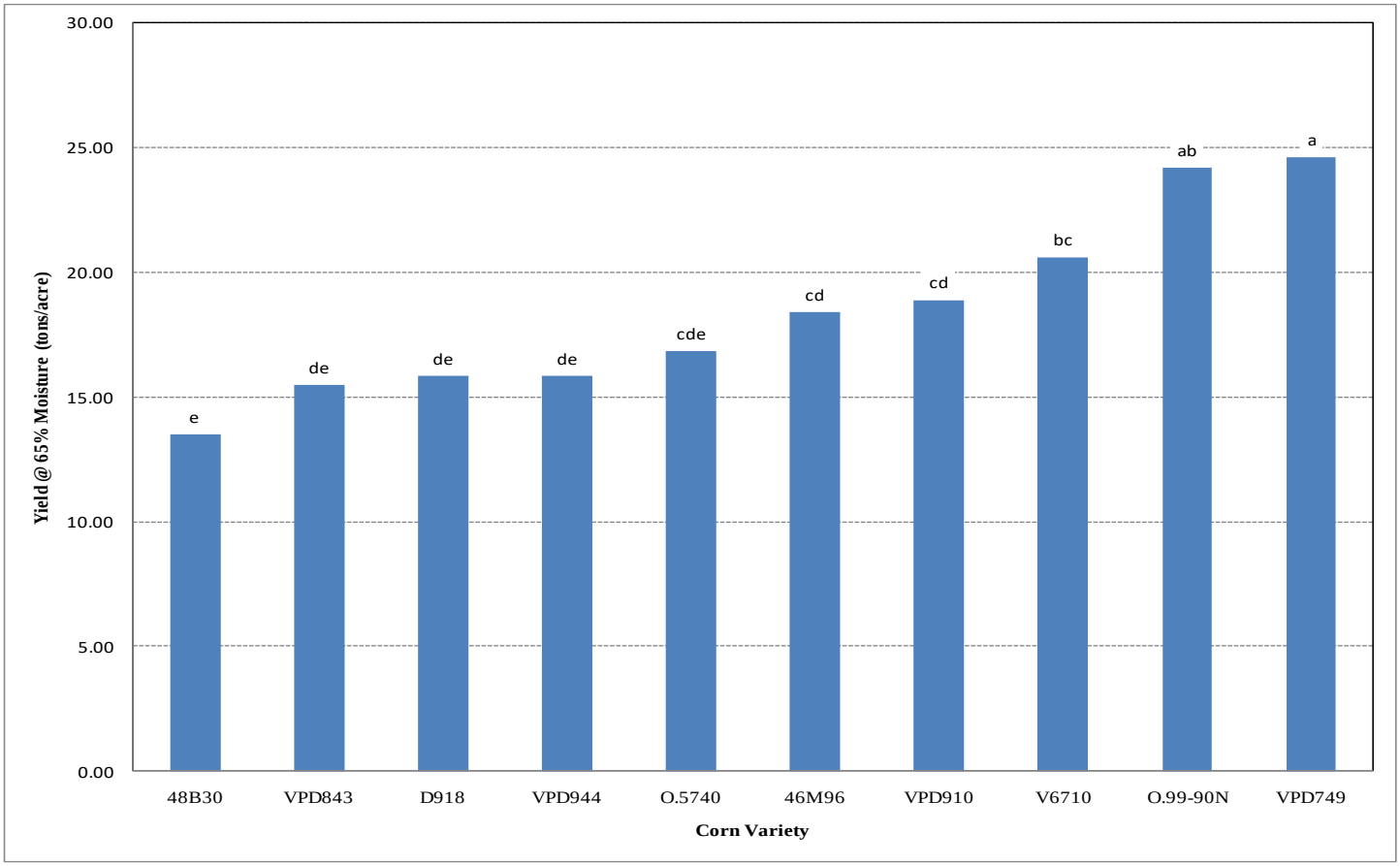


**Figure 3. Corn silage yield of long season organic corn varieties – Vernon, VT.** ***Varieties with the same letter did not differ significantly in yield.***

## RESULTS

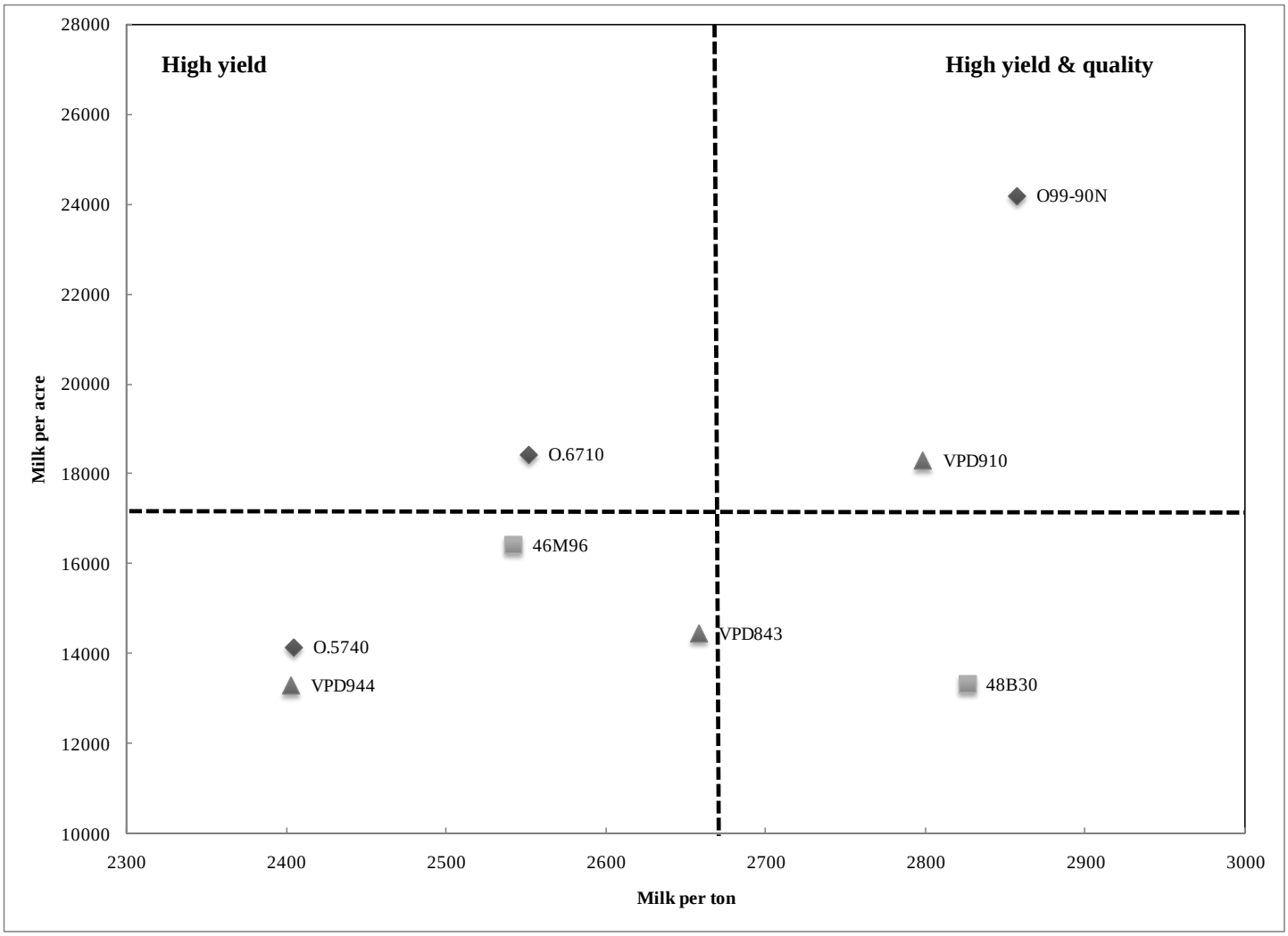


**Figure 4. Milk performance of organic corn silage varieties – Vernon, VT.** ***Dotted lines indicate overall milk per ton and milk per acre means of the corn varieties.***

## DISCUSSION

This was the second year for the UVM Extension organic corn variety trial. This year the trial was expanded to include an area of Vermont with a longer growing season in order to evaluate later maturing corn varieties. Overall the trials were a success; the above average temperatures presented a welcome change from the past few years of cool wet summers. However, the below average rainfall caused drought stress at the Vernon site.

In Randolph there were few significant differences among the short season varieties trialed. The average yield for the trial location was just over 16 tons of silage per acre. The CP levels were also high reaching levels over 7.0 percent for most varieties. When selecting a variety it is most important to select a variety that will mature to the proper moisture before a killing frost. This season had higher than normal heat units and a slightly later killing frost than the 30 year average. In this exceptional year still only a handful of varieties were at 65 to 70% moisture at the time of harvest. The Vernon site experienced severe drought during the 2010 growing season. Even in these conditions the corn yields averaged over 18 tons per acre. The varieties American Organics VPD910 and Viking O.99-90N had superior yield and quality. The variety VDP910 by far surpassed all varieties in CP concentration with 8.50% compared to the trail mean of 7.0%.

UVM Extension would like to thank the Miller Family Farm in Vernon and Sosten Longu and the students at Vermont Technical College for their help planting, cultivating, and harvesting the organic corn variety trials. We would also like to thank Brent Beidler for his help organizing and cultivating the trial. Finally, we would like to recognize Organic Valley FAFO program for their generous support for this project. Any reference to commercial products, trade names, or brand names is for information only, and no endorsement or approval is intended.

# 2010 VERMONT ORGANIC CORN SILAGE SEED TREATMENT PERFORMANCE TRIALS

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In 2010, the University of Vermont Extension conducted an organic corn silage organic seed treatment trial in Alburgh, Vermont. The purpose of the program was to provide unbiased performance comparisons of commercially available organic corn varieties with and without organic approved seed treatments. Organic farmers often delay planting in the spring to allow the soil to reach optimal temperature for planting corn. Suboptimal planting temperatures for corn are actually optimum temperatures for certain pathogenic fungi and insect pests. Conventional seed is treated with fungicides and insecticides to protect the corn seed prior to and just after germination. Therefore conventionally treated seed can be planted in suboptimal conditions because of this added pest protection. Recently, several organic seed companies have started to offer various organic approved seed treatments for corn seed. This trial was to evaluate the impact of seed treatment on silage corn yield and quality. It is important to remember, however, that the data presented are from replicated research trials from only 1 location in Vermont. Crop performance data from additional tests in different locations and often over several years should be compared before you make conclusions.

## TESTING PROCEDURE

In 2010, an organic corn silage seed treatment performance trial was conducted at Borderview Research Farm in Alburgh, VT. The field was certified organic by Vermont Organic Farmers, LLC. Both treated and untreated organic corn seed of three hybrids was provided by Albert Lea Seed (Albert Lea, MN). The specific varieties and relative maturities are listed in Table 2.

**Table 1. Organic corn varieties evaluated in Alburgh, VT.**

| Company | Variety | RM | Description |
|---|---|---|---|
| Albert Lea Seed Co, Viking Corn, MN | O.99-90N | 90 | Hybrid |
| Albert Lea Seed Co, Viking Corn, MN | O.5740 | 104 | Hybrid |
| Albert Lea Seed Co, Viking Corn, MN | O.6710 | 98 | Hybrid |

## WEATHER DATA

Seasonal precipitation and temperature was recorded at weather stations close in proximity to Alburgh (Table 2). This season started off with above average temperatures in April and May. The summer months presented ideal growing conditions for corn. Total accumulated Growing Degree Days (GDD) for corn growth in Alburgh was 2880. This presented above average accumulated GDD by 449 GDD.

**Table 2. Temperature, precipitation, and growing degree days summary – Alburgh, VT.**

| South Hero (Alburgh) | April | May | June | July | August | September | October |
|---|---|---|---|---|---|---|---|
| Average Temperature (F) | 49.3 | 59.6 | 66.0 | 74.1 | 70.4 | 64.0 | 50.6 |
| Departure from Normal | 5.8 | 3.0 | 0.2 | 3.0 | 1.4 | 3.6 | 1.8 |
| | | | | | | | |
| Precipitation (inches) | 2.76 | 0.92 | 4.61 | 4.30 | 5.48 | 4.32 | * |
| Departure from Normal | 0.25 | -2.01 | 1.40 | 0.89 | 1.63 | 0.86 | |
| | | | | | | | |
| Growing Degree Days (base 50) | 141.0 | 331.8 | 478.5 | 747.1 | 634.0 | 418.5 | 128.7 |
| Departure from Normal | 100.5 | 71.4 | 4.5 | 94.6 | 45.0 | 106.5 | 26.4 |

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

## CULTURAL PRACTICES

The seedbed at each location was prepared by conventional tillage methods. The previous crop was an alfalfa/grass mix hayfield. Plots were planted with a four row corn planter. Plots measured 10' X 50'. The plots were harvested with a two-row pull type chopper. Yields were determined by weighing the wagon on drive-up platform scales. A one pound forage subsample was taken and analyzed for forage quality by the Cumberland Valley Forage Laboratory in Maryland. Pertinent trial information is summarized in Table 3.

**Table 3. Organic silage corn variety trial information - 2010**

| Trial Information | Borderview Research Farm, Alburgh |
|---|---|
| Soil type | Silt loam |
| Previous Crop | Sod/Rye |
| Row Width (in.) | 30 |
| Planting date | 24-May |
| Harvest date | 29-Sept. & 3-Oct. |
| Planting population (plants/acre) | 34,000 |
| Tillage operations | Spring Plow, disk, spike tooth harrow |
| Fertilizer | 2.5 tons/acre of Pro-Gro 5-3-2<br>Applied 23-May |
| Dairy Compost (ton/acre) | Spring applied - 2 ton/acre |
| Tineweeding | 1x |
| Row cultivation | 2x |

## SILAGE QUALITY

Silage quality was analyzed using wet chemistry techniques at the Cumberland Valley Forage Laboratory in 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 N 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, nonprotein 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%.

## 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 varieties 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 varieties within a column is equal to or greater than the LSD value at the bottom of the column, you can be sure in 9 out of 10 chances that there is a real difference between the two varieties. Varieties that were not significantly lower in performance than the highest hybrid in a particular column are indicated with an asterisk. In the example below A is significantly different from C but not from 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 varieties 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 varieties were significantly different from one another. The asterisk indicates that B was not significantly lower than the top yielding variety.

| Variety | Yield |
|---|---|
| A | 6.0 |
| B | 7.5* |
| C | 9.0* |
| **LSD** | **2.0** |

## RESULTS

**Table 5. Silage yield and quality evaluation of treated and untreated organic corn varieties – Alburgh, VT.**

| Treatment | DM at harvest | Yield 35%DM | Forage quality characteristics | | | | | Milk per | |
|---|---|---|---|---|---|---|---|---|---|
| | | | CP | ADF | NDF | dNDF | NEL | ton | acre |
| | % | T/ac | % | % | % | % | Mcal/lb | | |
| untreated | 41.5 | 20.3 | 8.1 | 21.9 | 37.8 | 58.4 | 0.78 | 3023 | 21387 |
| treated | 39.5 | 19.8 | 8.2 | 22.6 | 38.6 | 58.7 | 0.78 | 3000 | 20814 |
| LSD (0.10)* | NS | NS | NS | NS | NS | NS | NS | NS | NS |

* See text for further explanation.
NS - None of the varieties were significantly different from one another.

**Table 6. Silage quality evaluation of organic corn varieties – Alburgh, VT.**

| Variety | Seed treatment | RM | DM at harvest | Yield 35%DM | Forage quality characteristics | | | | | Milk per | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | CP | ADF | NDF | dNDF | NEL | ton | acre |
| | | | % | T/Ac | % | % | % | % | Mcal/lb | | |
| O.99-90N | no | 90 | 42.6 | 17.2 | 8.0 | 24.2 | 39.0 | 57.0 | 0.78 | 2925 | 17611 |
| O.99-90N | yes | 90 | 42.2 | 17.4 | 7.9 | 23.9 | 37.0 | 59.6 | 0.79 | 3016 | 18308 |
| O.5740 | no | 104 | 43.4 | 27.7 | 8.3 | 28.3 | 37.1 | 57.8 | 0.79 | 3072 | 23142 |
| O.5740 | yes | 104 | 37.8 | 16.6 | 7.6 | 24.7 | 38.2 | 56.8 | 0.78 | 2987 | 17174 |
| O.6710 | no | 98 | 38.6 | 21.9 | 8.1 | 26.6 | 37.5 | 60.4 | 0.78 | 3073 | 23407 |
| O.6710 | yes | 98 | 38.5 | 25.4 | 9.2 | 24.6 | 40.7 | 59.8 | 0.77 | 2997 | 26961 |
| Trial Mean | | | 40.5 | 20 | 8.2 | 22.3 | 38.2 | 58.5 | 0.78 | 3012 | 21100 |
| LSD (0.10)* | | | NS | NS | NS | NS | NS | NS | NS | NS | NS |

NS - None of the varieties were significantly different from one another.

## DISCUSSION

Organically approved seed treatments are generally a combination of coating materials that form a pathogen barrier, plus protective bio-fungicides, biostimulants to energize the good soil microbes, and extra nutrients for strong early plant growth. Corn seed with organic seed treatments generally cost an additional $10-20 per 50 lb bag. In 2010, the goal of the trial was to evaluate the effectiveness of organic seed treatments to improve overall yield and quality. In 2010, the treated and untreated seed did not differ statistically in either yield or quality (Table 5 and 6). Ideal growing conditions, especially warm and dry weather at planting would most likely have negated the benefit that would have been seen from a seed treatment. Further research in less than ideal conditions needs to be performed to better evaluate benefits from organic approved seed treatments.

UVM Extension would like to thank Borderview Farm Research Facility for their help implementing the trial. We would also like to thank Albert Lea Seed House for the hybrid seed donation.

*UVM Extension helps individuals and communities put research-based knowledge to work.*