

2011 VERMONT ORGANIC GRAIN CORN VARIETY TRIAL

In 2011, the University of Vermont Extension Crops and Soils Team conducted an organic grain corn variety trial at Borderview Research Farm in Alburgh, VT. The objective of this trial was to evaluate varieties suitable for our growing season for yield and quality. Grain corn is a long season crop and therefore varieties with a maturity range of 78 to 97 RM were selected for the trial.

MATERIALS AND METHODS

The trial was conducted at Borderview Farm in Alburgh, VT (Table 1). The corn was planted on May 26, 2011 at a rate of 34,000 seeds per acre with a John Deere 1750 four row corn planter. The research plots were 5' x 20'. The previous crop was spring wheat, and the seedbed was prepared by spring disc, harrowed, and spike-tooth harrowed. The soil was a rocky silt loam. The experimental design was a randomized complete block with two replications. The treatments were 17 different varieties (Table 2). Corn ears were harvested by hand on November 4, 2011. Ears were then evaluated for bird and raccoon damage, and weighed using a platform scale. The ears were fed through an Almaco SPC50 plot combine to strip the kernels. Once the kernels were stripped they were weighed and subsampled for analysis. The samples were then dried in a 70°C drying oven and ground using an UDY Cyclone Sample Mill and analyzed at the UVM Cereal Testing Laboratory. Corn samples were analyzed for moisture, protein, fiber and starch content using the Perten Inframatic 8600 Flour Analyzer.

Table 1. Agronomic and trial information for Alburgh, VT.

Trial information	Borderview Farm, Alburgh, VT
Soil type	Benson rocky silt loam
Previous crop	Small grains
Plot size (ft.)	5 X 20
Row width (in.)	30
Fertilizer	750lbs/acre Pro Booster 10-0-0
Tillage operations	Spring disc, harrow, spike-tooth harrow
Seeding rate	34,000 plants/acre
Replicates	2
Planting date	May 26, 2011
Harvest date	November 7, 2011
Cultivation	2x
Tineweeded	1x

Table 2. Organic grain corn varieties in Alburgh, VT.

Company	Variety	Relative Maturity	Description
Albert Lea Co, Viking Corn, MN	E95	95	Open Pollinated
Albert Lea Co, Viking Corn, MN	23-86	86	Hybrid
Albert Lea Co, Viking Corn, MN	99-90	90	Hybrid
Albert Lea Co, Viking Corn, MN	80-92	92	Hybrid
American Organic Seed & Grain, IL	B916	87	Hybrid
American Organic Seed & Grain, IL	VP3P26	89	Hybrid
American Organic Seed & Grain, IL	C714	97	Hybrid
Blue River Hybrids, IA	08N01	78	Hybrid
Blue River Hybrids, IA	19K19	83	Hybrid
Blue River Hybrids, IA	23L99	86	Hybrid
Blue River Hybrids, IA	26A17	88	Hybrid
Butterworks Farm, VT	Early Riser	80	Open Pollinated
De Dell Seeds Inc., Ontario	DL1005	85	Hybrid
De Dell Seeds Inc., Ontario	DL1197	87	Hybrid
Lakeview Organic Grain, NY	Wapsie Valley	88	Open Pollinated
Lakeview Organic Grain, NY	VK13	90	Open Pollinated
Lakeview Organic Grain, NY	D2901	90	Hybrid

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, C is significantly different from A but not from B. The difference between C 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

The weather for the corn planting season was rainy, with 5.35 inches of precipitation above average resulting in saturated soil and cool temperatures. Corn was planted late and into marginal soil conditions. Overall this resulted in relatively poor stands. This also resulted in delayed cultivation and higher than normal weed pressure. Dry summer conditions resulted in a better than normal dry down of the corn crop. The precipitation was 13.63 inches above normal during corn season. Total GDDs accumulated were 2,459 (170.1 more GDDs than average).

Table 3. Summarized temperatures, precipitation, and GDD information, Alburgh, VT, 2011.

	May	June	July	August	September	October
Average Temperature (°F)	58.7	67.1	74.4	70.4	63.8	51.5
Departure from Normal	2.1	1.3	3.3	1.6	5.8	4.5
Precipitation (inches)	8.67*	3.52*	3.68*	10.23	5.56	2.68
Departure from Normal	5.35	0.09	-0.29	6.38	2.10	0.10
Growing Degree Days (base 50°F)	259	513	732	563	392	330
Departure from Normal	-0.9	39.0	79.5	-27.0	79.5	228

Average temperatures for August and September are taken from Burlington, VT

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

The populations for this organic corn study were not significantly different by variety, with an average population of 27,071 plants per acre (Table 4). There was a significant difference amongst varieties for lodging. Several high wind storms may have contributed to severe lodging in the test plots. Wapsie Valley had 53% of the plants lodged. There was also varying levels of damage from raccoons and birds in the plots. On average 24% of the ears in the experiment were damaged from pests. The average moisture at the time of harvest was 19.8%. The varieties with low moistures may indicate that they will dry down better within a shorter grower season. Overall test weight was just below the industry standard of 56 bushels per lb. The Blue River Hybrid variety 26A17 had the highest yield of 6.2 tons per acre, statistically the same as DL1197 and C714 (Table 4). The average yield for the trial was 3.5 tons per acre or 125 bushels per acre. The average crude protein is 7.4 percent. The highest crude protein was Early Riser. There was significant difference in the crude protein among the varieties. Interestingly most of the open pollinated varieties had the highest CP and fiber concentrations. Wapsie Valley, Early Riser, VK13, E95, DL1197, and 23L9 9 had the highest protein concentrations (Table 4).

Table 4. Yields and quality characteristics of organic grain corn, Alburgh, VT, 2011.

Variety	Population plants per acre.	Lodging %	Damage %	Moisture %	Test Weight. lbs/bu.	Yield @13%Moisture tons/acre	Yield @13%Moisture bu/acre	Forage quality characteristics		
								CP %	Fiber %	Starch %
08N01	32888	6.00	27	20.3	56.0	2.90	105	6.6	2.3	70.0
19K19	32234	10.0	22	16.7	55.5	4.50	159	7.5	2.3	69.2
23-86	25483	25.0	14	19.2	55.0	4.10	146	6.8	2.3	72.5
23L99	26354	19.0	19	20.0	55.5	2.90	105	8.7*	2.5	66.9
26A17	34412	4.00	16	17.6	56.0	6.20*	221*	6.8	2.3	70.0
80-92	28750	15.0	31	18.8	55.0	4.50	160	6.9	2.3	70.7
99-90	26354	29.0	18	18.5	51.5	3.00	108	6.4	2.3	70.7
B916	23522	12.0	29	19.8	54.0	3.60	130	7.3	2.3	70.1
C714	26572	11.0	32	21.1*	55.5	4.80*	170*	6.8	2.4	70.5
D2901	28967	16.0	27	21.4*	54.5	3.40	120	7.6	2.5	69.7
DL1005	25483	10.0	14	19.0	54.5	2.50	88.3	7.1	2.3	70.3
DL1197	32017	13.0	23	16.8	56.0	5.10*	181*	7.9*	2.4	68.7
E95	26354	7.00	36	23.6*	55.0	3.20	115	8.9*	2.5*	70.1
Early Riser	22216	28.0	34	22.4*	55.0	1.70	60.8	8.9*	2.6*	66.3
VK13	15028	23.0	36	19.1	55.0	1.40	49.0	8.0*	2.4	68.7
VP3P26	22869	7.00	0	22.8*	55.5	1.60	56.4	7.2	2.7*	69.0
Wapsie Valley	30710	53.0	24	19.6	55.0	4.20	149	8.6*	2.6*	69.7
LSD (0.10)	NS	NS	NS	3.06	NS	1.5	54.0	1.2	0.2	NS
Trial Mean	27071	17.0	24	19.8	55.0	3.5	125	7.4	2.4	69.6

* Varieties with an asterisk indicate that it was not significantly different than the top performer.

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

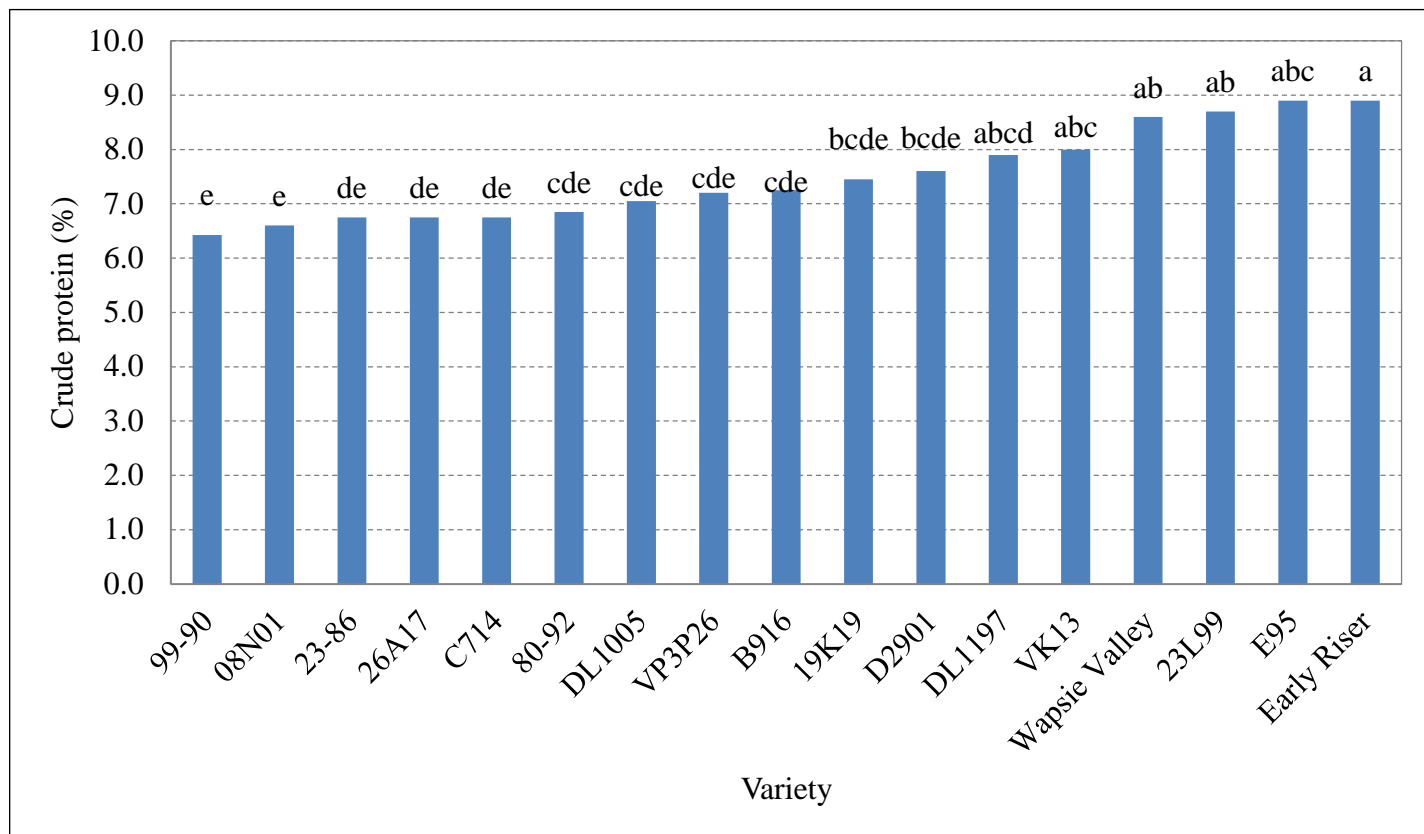


Figure 1. Crude protein of seventeen organic grain corn varieties. Treatments with the same letter did not differ significantly ($p=0.10$).

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