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2013 OAT VARIETY TRIAL

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INTRODUCTION

Oats (*Avena sativa* L.) have a long history of production in the Northeast. Although most oats are planted for a cover crop or hay, grain oats are a potential revenue source for farmers. According to the 2007 census, about 200 acres of land in Vermont is cultivated for oat grain production, with an average yield of 1747 lbs per acre. With the exception of hull-less varieties, oats need to be de-hulled before being used for human consumption and further processing is required to make oatmeal, steel cut oats or oat flour. Since 2009, the University of Vermont Extension has conducted oat variety trials to provide yield comparisons in Vermont's climate. Varietal selection is one of the most important aspects of crop production and significantly influences yield potential. It is important to remember, however, that the data presented are from replicated research trials from only one location in Vermont and represent only one season. The goal of this project was to evaluate yields and protein of ten oat varieties.

MATERIALS AND METHODS

In 2013, an oat variety performance trial was conducted at Borderview Research Farm in Alburgh, VT. Ten oat varieties were evaluated for yield and quality (Table 1).

Table 1. Oat varieties planted in Alburgh, VT, 2013.

Variety	Seed source	Oat type
Badger	Albert Lea Seed House	yellow
Dieter	RDR Grains Et Semences	white
Excel	Albert Lea Seed House	yellow
Jim	Albert Lea Seed House	yellow
Rigadon	RDR Grains Et Semences	white
Rockford	Albert Lea Seed House	white
Saber	Albert Lea Seed House	yellow
Souris	Albert Lea Seed House	white
Streaker	Albert Lea Seed House	hulless
Tack	Albert Lea Seed House	yellow

The trial was planted at Borderview Research Farm in Alburgh, VT on a Benson rocky silt loam (Table 2). The experimental design was a randomized complete block with four replications. The previous crop was corn. The research plots were each 5' x 20' and the seedbed was prepared by conventional tillage methods including fall plow, disc and spike tooth harrow. The oats were planted on 29-Apr with 6" row spacing at a rate of 125 lbs per acre. Pre-harvest plant measurements were taken to understand many factors affecting yield. These assessments included height and severity of lodging. Plots were harvested on 12-Aug with an Almaco SPC50 plot combine.

Table 2. Agronomic practices for the 2013 oat variety trial, Borderview Research Farm, Alburgh, VT.

	Borderview Research Farm Alburgh, VT
Soil type	Benson rocky silt loam
Previous crop	Corn
Tillage operations	Fall plow, disc, and spike tooth harrow
Row spacing (in)	6
Plot size (ft)	5 x 20
Seeding rate (lbs ac ⁻¹)	125
Replicates	4
Planting date	29-Apr
Harvest date	12-Aug

A one-pound subsample was collected from each plot and used to determine quality. Quality measurements included standard testing parameters used by commercial mills. After combining, harvest moisture was determined for each plot using a Dickey-john M20P. Test weight was measured using a Berckes Test Weight Scale, which weighs a known volume of grain. Subsamples were ground into flour with hulls on, using the Perten LM3100 Laboratory Mill, and were evaluated for crude protein (CP) content. Grains were analyzed for CP using the Perten Inframatic 8600 Flour Analyzer. CP is reported at 12% flour moisture.

All data were analyzed using a mixed model analysis where replicates were considered random effects. The LSD procedure was used to separate cultivar means when the F-test was significant ($P < 0.10$).

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 (e.g. yield). Least Significant Difference (LSD) at the 10% level of probability is 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

Variety	Yield
A	4615*
B	3886*
C	3161
LSD	889

sure in 9 out of 10 chances that there is a real difference between the two varieties. Oat varieties that were not significantly lower in performance than the highest variety in a particular column are indicated with an asterisk. In the example, variety A is significantly different from variety C but not from variety B. The difference between A and B is equal to 729 which is less than the LSD value of 889. This means that these varieties did not differ in yield. The difference between A and C is equal to 1454 which is greater than the LSD value of 889. This means that the yields of these varieties were significantly different from one another. The asterisk indicates that variety B was not significantly lower than the top yielding variety.

RESULTS

Using data from an onsite Davis Instruments Vantage Pro2 weather station at Borderview Research Farm in Alburgh, VT, weather data was summarized for the 2013 growing season (Table 3). The 2013 growing season experienced similar average temperatures compared to the 30 year average. Precipitation was higher than the 30 year average, especially for June, which saw extremely high rainfall for our area. Growing Degree Days (GDDs) were calculated at a base temperature of 32°F. From planting to harvest, there was an accumulation of 4510 GDDs. This is 18 more GDDs than the 30-year average.

Table 3. Temperature, precipitation, and growing degree days (GDD's) for Alburgh, VT in 2013.

Alburgh, VT	April	May	June	July	August
Average temperature (°F)	43.6	59.1	64.0	71.7	67.7
Departure from normal	-1.2	2.7	-1.8	1.1	-1.1
Precipitation (inches)	2.12	4.79	9.23 †	1.89	2.41
Departure from normal	-0.7	1.34	5.54	-2.26	-1.5
Growing Degree Days (base 32°F)	348	848	967	1235	1112
Departure from normal	-36	91	-47	37	-27

Based on weather data from a Davis Instruments Vantage Pro2 with WeatherLink data logger. Historical averages are for 30 years of NOAA data (1981-2010) from Burlington, VT.

† June 2013 precipitation data based on National Weather Service data from cooperative stations in South Hero, VT.

Pre-harvest measurements were collected on 29-Jul (Table 4). Plant height and lodging were assessed. The trial mean plant height was 111 cm, (43.7 inches). The tallest variety was 'Dieter' (128 cm), and was statistically different from all other varieties. Lodging was assessed visually on a 0-100% scale. The trial mean for lodging was 14.7%, with Rigadon, Rockford, and Streaker having the greatest incidence of lodged plants. Although some of the taller varieties seemed more prone to lodging this was not always the case. For example, Dieter was the tallest variety, and had less lodging than the three listed above.

Table 4. Pre-harvest data for Borderview Research Farm, Alburgh, VT, 2013.

Variety	Height	Lodging
	cm	%
Badger	108	0*
Dieter	128*	6.3
Excel	107	0*
Jim	110	0*
Rigadon	124	16.3
Rockford	116	20.0
Saber	96	0*
Souris	110	0*
Streaker	117	16.3

Tack	108	0*
LSD (0.10)	16	NS
Trial mean	111	14.7

Treatments shown in **bold** are top-performing.

*Treatments that did not perform significantly lower than the top-performing treatment in a particular column are indicated with an asterisk.

NS-Treatments were not significantly different from one another (p=0.10).

The oat variety ‘Tack’ had the highest yield (2503 lbs per acre), although varieties Badger, Dieter, Jim, Saber, and Souris were statistically similar (Table 5, Figure 1). Mean oat yields for the trial were 1767 lbs per acre. Rockford had the highest harvest moisture (12.4%) for the second consecutive year; with the trial average being 10.3%. Crude protein was measured at 12% flour moisture with the trial mean being 11.7%. Test weight, a measure of grain density, is the most commonly used indicator of oat quality. All of the oat varieties had test weights above the 32 pound per bushel industry standard, except for Badger and Rigadon. The trial average for test weight was 34.0 lbs per bushel. Streaker had the highest test weight (37.0 lbs per bushel), and was not significantly different from Excel, Rockford, or Tack.

Table 5. Harvest data for Borderview Research Farm, Alburgh, VT, 2013.

Variety	Yield		Harvest moisture	Test weight	Crude protein
	lbs ac ⁻¹	tons ac ⁻¹	%	lbs bu ⁻¹	@12% moisture %
Badger	1911*	0.96*	9.80	31.3	11.5
Dieter	1794*	0.90*	9.53	32.3	12.1
Excel	1739	0.87	9.73	35.3*	11.5
Jim	1868*	0.93*	10.3	33.1	11.4
Rigadon	1449	0.72	10.8	31.6	11.4
Rockford	1724	0.86	12.4*	35.9*	12.0
Saber	2144*	1.07*	9.20	33.5	11.4
Souris	1802*	0.90*	9.43	33.4	11.4
Streaker	738	0.37	12.2*	37.0*	12.6
Tack	2503*	1.25*	9.90	36.3*	11.5
LSD (0.10)	709	0.35	1.9	2.4	NS
Trial mean	1767	0.88	10.3	34.0	11.7

Treatments shown in **bold** are top-performing.

*Treatments that did not perform significantly lower than the top-performing treatment particular column are indicated with an asterisk.

NS-Treatments were not significantly different from one another (p=0.10).

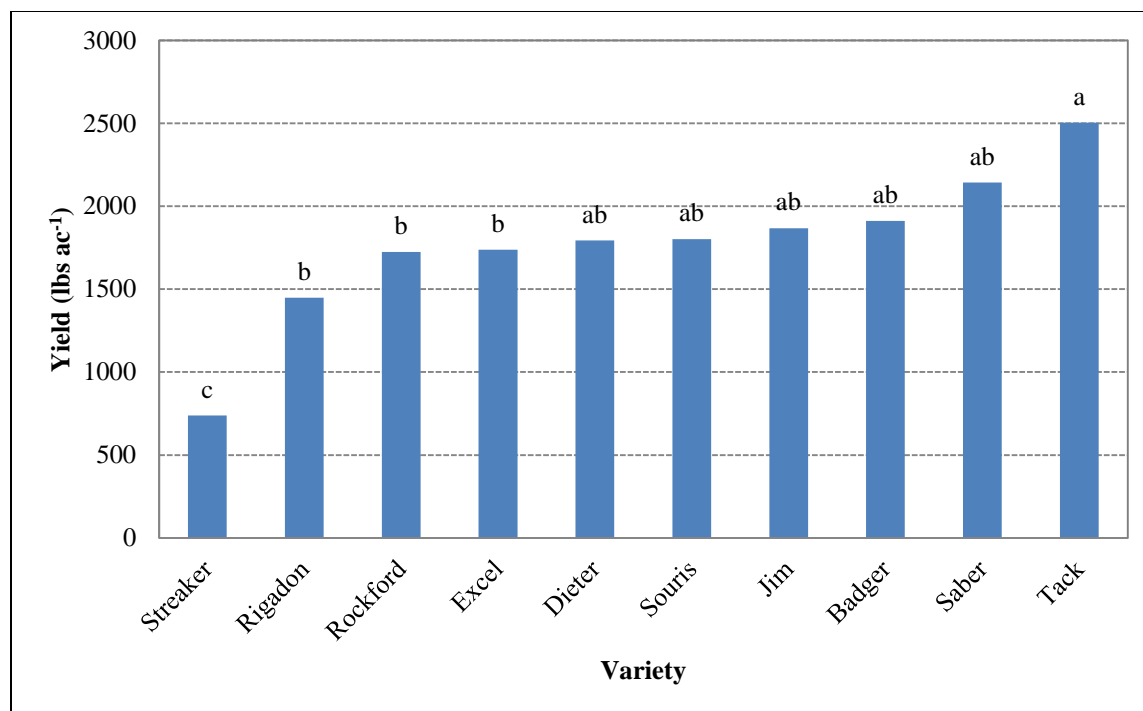


Figure 1. Yield of 10 oat varieties evaluated in Alburgh, VT, 2013. Varieties that share a letter did not differ significantly from one another ($p=0.10$).

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