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Oat Variety Trial Report

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2010 VERMONT OAT VARIETY TRIAL

INTRODUCTION

Oats (*Avena sativa* L.) have a long history of being grown in the Northeast. Although most of the oats are planted for a cover crop or hay, growing oats for grain is another 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/acre. Unless, a hulless variety is grown, oats need to be hulled before being used for human consumption, and further processing is required to make oatmeal, steel cut oats or oat flour. The goal of this project was to evaluate yields and processing characteristics of oat varieties.

METHODS

Oat variety trials were planted at Borderview Research Farm in Alburgh, VT and Butterworks Farm in Westfield, VT on April 13, 2010. The experimental plot design was a randomized complete block with four replications. Oat varieties evaluated are listed in Table 1.

Table 1: Oat varieties planted in Alburgh and Westfield, VT.

Oat Varieties	Seed Source
Bia	La Coop Fédérée
Esker	Albert Lea Seed House
Morton	Albert Lea Seed House
Nice	La Coop fédérée
Reeves	Albert Lea Seed House
Tack	Albert Lea Seed House

CULTURAL PRACTICES

The seedbeds in Alburgh and Westfield were prepared by conventional tillage methods. All plots were managed with practices similar to those used by producers in the surrounding areas (Table 2). The plots were seeded with a Carter cone seeder and harvested with an Almaco SP50 small plot combine.

This trial evaluated oats based on standard testing parameters used by commercial mills. Yield, moisture, and test weight (a measure of grain density) were recorded at the time of harvest. Only yield data was collected in Westfield. All data was 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 ($P < 0.10$).

Table 2: General plot management for trials.

	Borderview Farm	Butterworks Farm
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	Alburgh, VT	Westfield, VT
Soil type	Benson rocky silt loam	Dixfield sandy loam
Previous crop	Grass sod	Grass sod
Row spacing (in.)	6	6
Seeding rate	125 lbs./acre	125 lbs./acre
Replicates	4	4
Planting date	4/13/10	4/13/10
Harvest date	7/27/10	7/28/10
Harvest area (ft.)	5x20	5x20
Tillage operations	Fall plow, disc, & spike-toothed harrow	Fall plow, disc, & spike toothed harrow

WEATHER

Seasonal precipitation and temperature recorded at weather stations in close proximity to Alburgh and Westfield are shown in Tables 3 and 4. From planting to harvest, there was an accumulation of approximately 3,699 Growing Degree Days (GDD) at both locations. This is 367 GDDs more than the 30-year average in Alburgh, and 497 GDDs more than the 30-year average in Westfield.

Table 3: Temperature and precipitation summary for Alburgh, VT, 2010.

South Hero (Alburgh)	April	May	June	July
Average Temperature (F)	49.3	59.6	66.0	74.1
Departure from Normal	5.80	3.00	0.20	3.00
Precipitation (inches)	2.76	0.92	4.61	4.30
Departure from Normal	0.25	-2.01	1.40	0.89
Growing Degree Days (base 32)	521	854	1019	1305
Departure from Normal	176	91.5	4.50	94.6

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

Table 4: Temperature and precipitation summary for Westfield, VT, 2010.

Newport, VT (Westfield)	April	May	June	July
Average Temperature (F)	45.6	55.7	61.7	70.3
Departure from Normal	2.80	-0.40	-2.90	1.40
Precipitation (inches)	3.62	1.63	6.86	3.02
Departure from Normal	0.69	-2.04	2.93	-1.17
Growing Degree Days (base 32)	521	854	1019	1305
Departure from Normal	188	107	40.5	163

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

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 (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 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 below variety A is significantly different from variety C but not from variety B. The difference between A and B is equal to 725 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.

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

RESULTS

Bia was the top yielding variety at both locations, although there was not a significant difference in yields between varieties in Alburgh (Table 5). Overall, the yields were greater in Alburgh compared to Westfield. The soils in Westfield are a sandier loam and may not have as high fertility or water holding capacity as the soils in Alburgh.

Test weight, a measure of grain density, is the most commonly used indicator of oat quality. At the Alburgh site, all oat varieties had test weights above the 32 pound per bushel industry standard. Interestingly, the milling market prefers higher test weights of over 38 lbs/ bushel.

Table 5: Harvest data for oat varieties in Alburgh, VT and Westfield VT.

Oat Variety	Alburgh, VT			Westfield, VT
	Harvest moisture	Test weight	Yield @13.5% moisture	Yield @13.5% moisture
	%	lbs/bu	lbs/ac	lbs/ac
Bia	16.2	34.3	3741	1681*
Esker	13.0*	33.8	2422	878
Morton	13.6*	34.6	1945	1405*
Nice	16.8	33.1	2745	1441*
Reeves	12.5*	34.3	2664	902
Tack	12.0*	35.0	2824	1082
<i>Trial Mean</i>	14.0	34.2	2724	1231
<i>LSD (0.10)</i>	3.02	NS	NS	286

*Results that are not significantly different than the top performer in a particular column are indicated with an asterisk.
NS; indicates that there was no significant difference among treatments.

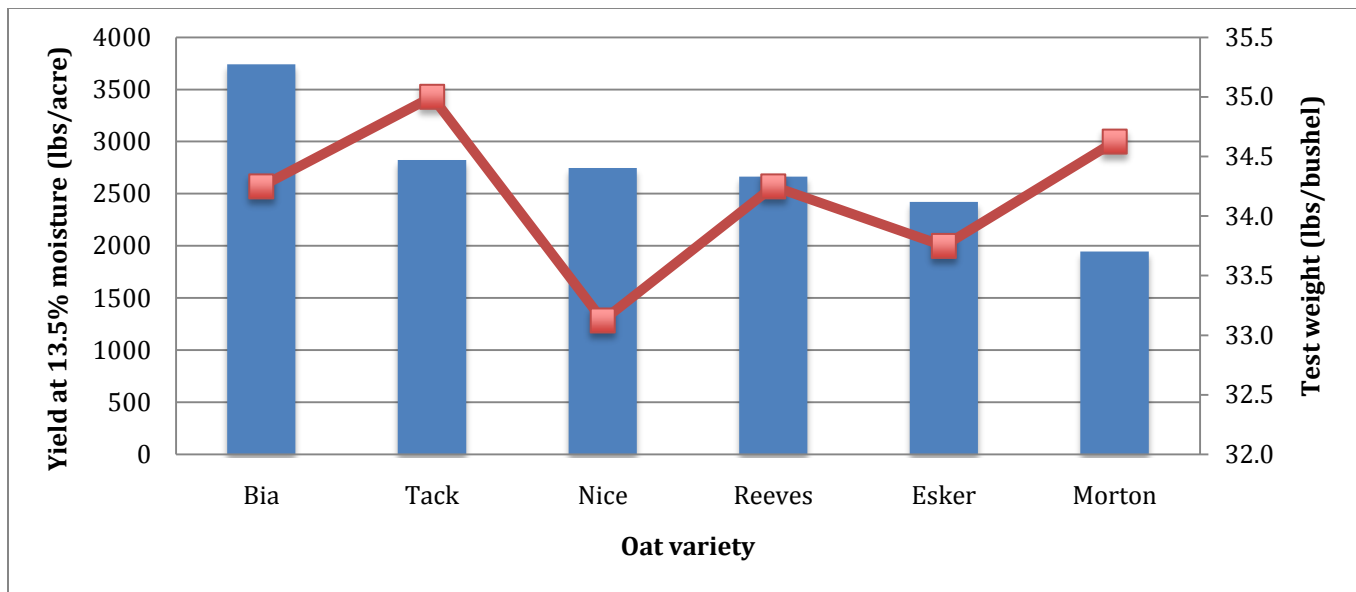


Figure 1: Oat yields and test weight in Alburgh, VT. Oat varieties did not differ significantly in yield or test weight.

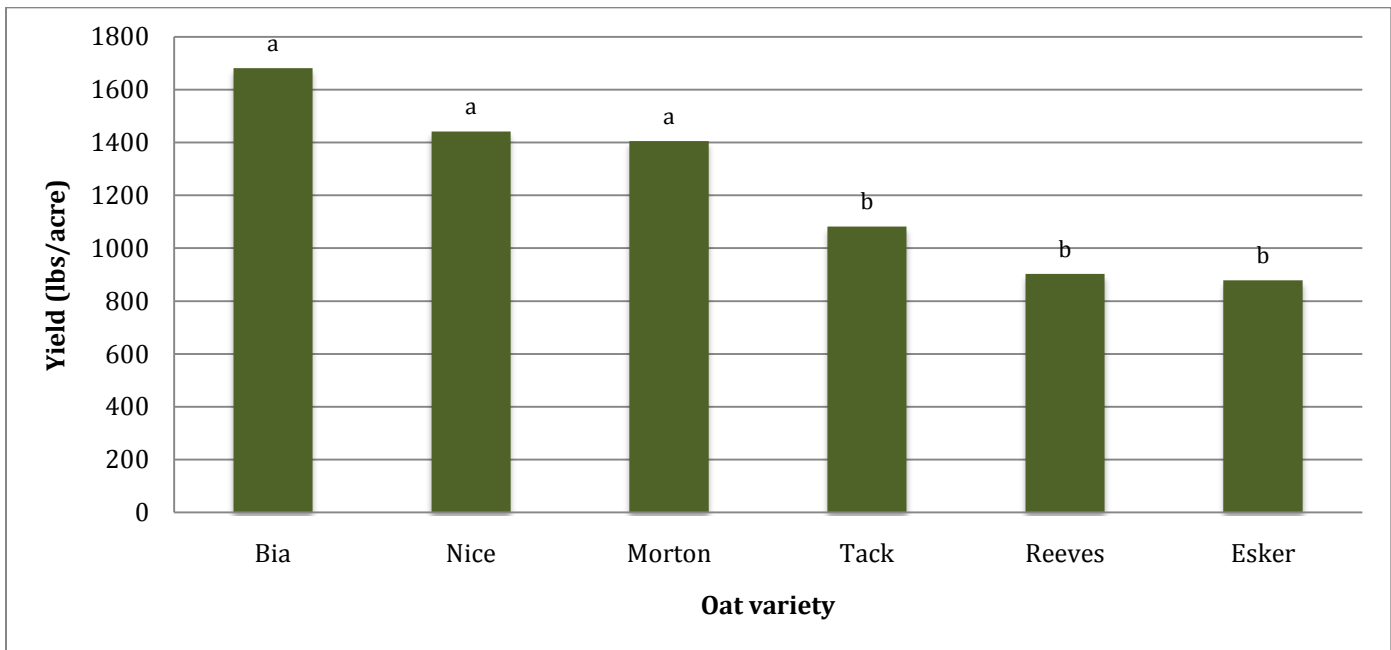


Figure 2: Oat yields in Westfield, VT. Varieties with the same letter did not differ significantly in yield ($P < 0.10$).

We are currently investigating how to evaluate oat varieties for foodgrade quality. Some of these quality characteristics may include measuring grain size, groat percentage (after hulling), color grade, hulling efficiency, protein, oil and b-glucan content. Continued evaluation across a range of growing season conditions will be required to find those varieties most suited for this climate.

The UVM Extension Crops and Soils Team would like to thank Borderview Research Farm and Butterworks Farm for their generous help with the trials. Any reference to commercial products, trade names, or brand names is for information only, and no endorsement or approval is intended. UVM Extension helps individuals and communities put research-based knowledge to work.

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