2011 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 $acre^{-1}$. 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 protein of twelve oat varieties.

METHODS

Twelve hulled oat varieties were planted at Borderview Research Farm in Alburgh, VT on May 13, 2011. 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, VT, 2011.

Oat Varieties	Seed Source
Badger	Albert Lea Seed House
Bia	La Coop Fédérée
Colt	Albert Lea Seed House
Esker	Albert Lea Seed House
Jim	Albert Lea Seed House
Morton	Albert Lea Seed House
Nice	La Coop Fédérée
Reeves	Albert Lea Seed House
Rockford	Albert Lea Seed House
Shadow	Semican
Spurs	Albert Lea Seed House
Tack	Albert Lea Seed House

The seedbed in Alburgh was 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 Kincaid cone seeder on May 13, 2011 and harvested with an Almaco SP50 small plot combine on August 5, 2011.

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. Following harvest, samples were cleaned with a Clipper M2B seed cleaner. A one-pound subsample was dried at 40^{o} C and ground with a Perten LM3100 Laboratory Mill. Flour protein was determined with a Perten Inframatic 8600 Flour Analyzer. 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 Alburgh, VT
Soil type	Benson rocky silt loam
Previous crop	organic corn
Row spacing (in.)	6
Seeding rate	125 lbs acre^{-1}
Replicates	4
Planting date	5/13/11
Harvest date	8/5/11
Harvest area (ft.)	5x20
Tillage operations	Fall plow, disc, & spike-toothed harrow

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 AND DISCUSSION

Seasonal precipitation and temperature recorded at a weather station in close proximity to Alburgh is shown in Table 3. Excessive spring rains prohibited a timely spring planting. We intended to plant oats mid-April. The 2011 oat variety trial was planted 30 days later than the 2010 trial. From planting to harvest, there was an accumulation of approximately 3,694 Growing Degree Days (GDDs). This is a 362 increase in GDDs than the 30-year average, but similar to GDDs accumulated in 2010.

Table 3: Temperature and precipitation summary for Alburgh, VT, 2011.

South Hero (Alburgh)	April	May	June	July	August
Average Temperature (F)	46.6	58.7	67.1	74.4	70.4
Departure from Normal	3.1	2.1	1.3	3.3	1.6
Precipitation (inches)	7.88	8.67	3.52	3.68	10.23
Departure from Normal	5.00	5.35	0.09	-0.29	6.38
Growing Degree Days (base 32)	465	826	1088	1314	1121
Departure from Normal	120	63.6	74.1	103	-26.3

*Based on National Weather Service data from stations in close proximity to trials. When data from South Hero was not available, data from Burlington, VT was used. Departure from normal from historical averages of 30 years of data (1971-2000).

Overall oat yields were low most likely due to late planting and saturated soils that persisted after planting. There were no significant yield differences among the oat varieties (Table 4). Mean oat yields for the trial were 1393 lbs acre^{-1} (Table 4), which was about 50% less than the 2010 average harvest. Population counts were made approximately two weeks after planting, on May 25, 2011. Populations ranged from 383 to 606 plants m^{-2}. Varying populations may be related to marginal weather conditions during germination. Oat variety differed significantly in height and harvest moisture (Table 4 and Figure 2). Tallest oat varieties ranged from 42.4 to 39.0 inches. Test weight, a measure of grain density, is the most commonly used indicator of oat quality. Most of the oat varieties had test weights above the 32 pound per bushel industry standard, except Nice, which had the lowest test weight of 31.5 lbs bushel^{-1}. The milling market prefers higher test weights of over 38 lbs bushel^{-1}. The average crude protein level for all oat varieties was 10.1%.

Table 4: Oat plant populations, harvest height, yield at 12% moisture, harvest moisture, test weight, and crude protein of oat varieties grown in Alburgh, VT, 2011.

Oat variety	**Population** plants m^{-2}	**Height** inches	**Yield** lbs acre^{-1}	**Harvest moisture** %	**Test weight** lbs bushel^{-1}	**Crude protein** %
Badger	430	36.0	**1777**	**11.5***	**36.8**	10.5
Esker	462	37.3	1772	12.4*	32.5	10.1
Colt	**606**	39.0*	1656	13.4*	35.0	10.6
Bia	465	40.7*	1500	13.0*	33.0	9.1
Spurs	440	34.9	1481	13.5	35.5	10.7
Tack	440	34.8	1471	13.7	33.3	**10.9**
Rockford	440	40.7*	1451	14.5	36.0	10.1
Jim	477	38.6*	1405	12.9*	34.5	10.7
Nice	403	39.3*	1303	14.3	31.5	10.3
Morton	472	**42.4***	1142	12.5*	34.5	9.9
Shadow	383	39.2*	916	16.7	33.5	9.9
Reeves	432	41.8*	844	12.9*	**36.8**	8.3
Trial mean	454	38.7	1393	13.4	34.4	10.1
LSD (0.10)	NS	4.2731	NS	1.9287	NS	NS

*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.

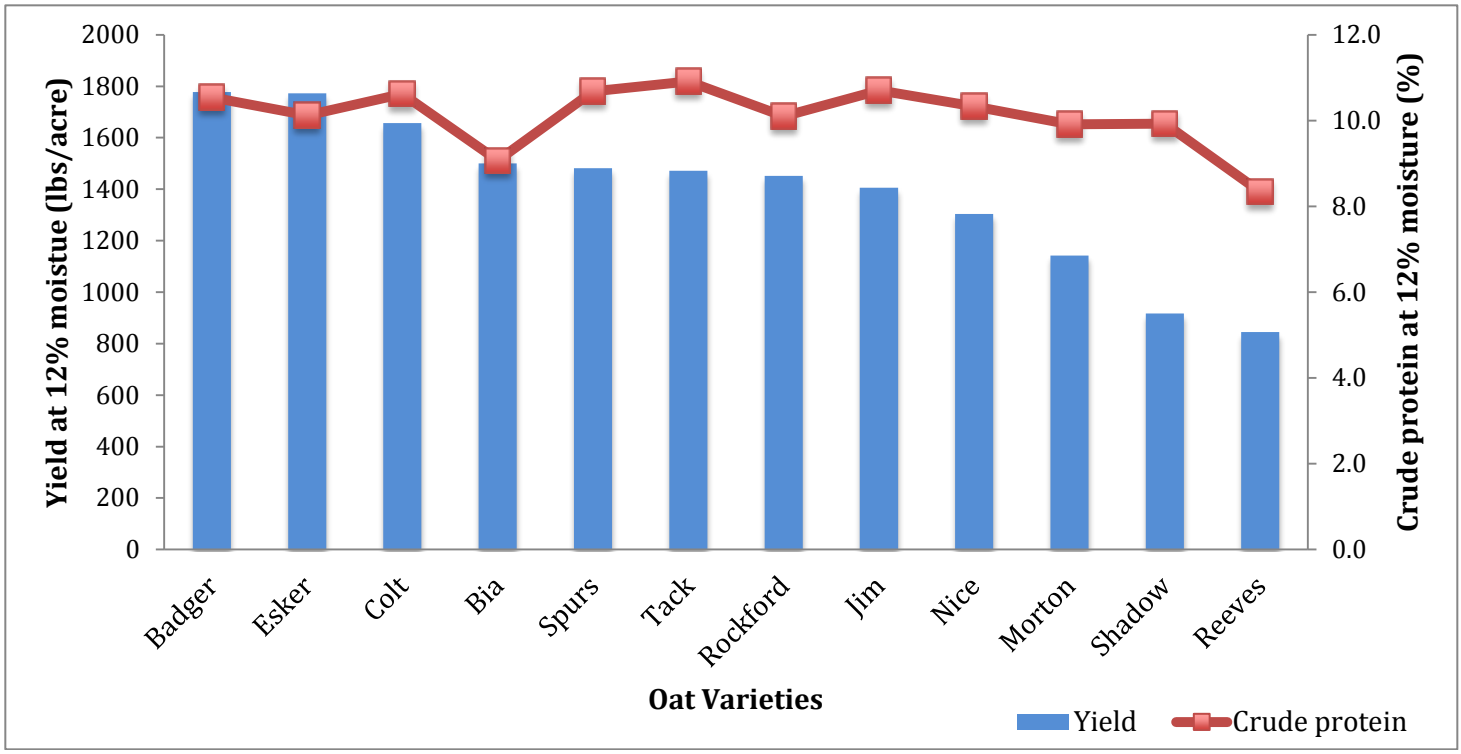

Figure 1. Yield and crude protein of 12 oat varieties evaluated in Alburgh, VT. ***There were no significant differences among varieties.***

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