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2018 OAT VARIETY TRIAL

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Oats (*Avena sativa* L.) have a long history of production in the Northeast. Although most oats are planted for a cover crop or forage, grain oats may be 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 ac⁻¹. 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 Northwest Crops and Soils Program 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 seventeen oat varieties.

MATERIALS AND METHODS

In 2018, an oat variety performance trial was conducted at Borderview Research Farm in Alburgh, VT. Seventeen oat varieties were evaluated for yield and quality (Table 1).

Table 1. Seventeen oat varieties planted in Alburgh, VT, 2018.

Variety	Seed source
Keuka	Lakeview Organics
Leonard	Lakeview Organics
Jim	Welter Seed & Honey Co.
Kame	Lakeview Organics
Jerry	Welter Seed & Honey Co.
Reins	Albert Lea Seed House
Antigo	Albert Lea Seed House
Hayden	Albert Lea Seed House
Richmond	Seedway
Streaker	Albert Lea Seed House
Sumo	Albert Lea Seed House
Marin	Atlantic Maritime Heirloom Oat
Pringles Progress	Vermont Heirloom Oat
AC Gehl	Semican
Betogene	Albert Lea Seed House
Deon	Albert Lea Seed House
Shelby 427	Albert Lea Seed House

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 three replications. The previous crops were summer annuals and sunflowers. 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 5-May with 6" row spacing at a rate of 125 lbs ac⁻¹. Pre-harvest plant measurements of heights and lodging were taken to better understand how factors affect yield. Plots were harvested on 8-Aug with an Almaco SPC50 plot combine. A subsample was taken for quality testing and has yet to be completed.

Table 2. Agronomic practices for the 2018 oat variety trial, Borderview Research Farm, Alburgh, VT.

Location	Borderview Research Farm, Alburgh VT
Soil type	Benson rocky silt loam
Previous crop	Summer annuals and Sunflowers
Tillage operations	Spring plow, disc, and spike tooth harrow
Row spacing (in)	6
Plot size (ft)	5 x 20
Seeding rate (lbs ac ⁻¹)	125
Replicates	3
Planting date	5-May
Harvest date	8-Aug

All data were analyzed using a mixed model analysis where replicates were considered random effects. The Least Significant Difference (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). 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, 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.

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

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 2018 growing season (Table 3). The 2018 growing season had below average temperature and above average precipitation. Growing Degree Days (GDDs) were calculated at a base temperature of 32° F. From planting to harvest, there was an accumulation of 3981 GDDs. This is 126 less GDDs than the 30-year average.

Table 3. Temperature, precipitation, and growing degree days (GDD's) for Alburgh, VT in 2018.

Alburgh, VT	May	June	July	August
Average temperature (°F)	55.7	65.4	68.7	67.7
Departure from normal	-0.75	-0.39	-1.90	-1.07
Precipitation (inches)	4.1	5.6	4.9	5.5
Departure from normal	0.68	1.95	0.73	1.63

Growing Degree Days (base 32°F)	733	1002	1138	1108
Departure from normal	-23	-12	-60	-31

Weather data was collected from Wunderground.com via the West Berkshire weather station.

When daily weather data was unavailable from this weather station, the station at Highgate Center Dam was used.

Historical averages are for 30 years of NOAA data (1981-2010) for Enosburg Falls, VT.

The 2018 oat variety trial showed that ‘*Reins*’ (2569 lbs ac⁻¹) was the highest yielding variety, ‘*AC Gehl*’, ‘*Betagen*’, ‘*Hayden*’, and ‘*Shelby*’ all had statistically similar yields (Table 4, Figure 1). All varieties meet or exceeded the ideal test weight of 32 lbs bu⁻¹. The variety ‘*Streaker*’, a hulless variety, had the highest test weight and no other variety was statistically similar. There was a significant difference between harvest moisture of the varieties, though all varieties had a moisture below the ideal storage moisture at harvest and none had to be dried down. ‘*Reins*’ (10.6%) had the lowest moisture, ‘*Richmond*’ (10.9%), ‘*Kame*’ (11.0%), and ‘*Marin*’ (11.1%) were not statistically different.

Height, lodging, and bird damage were recorded for each oat variety before harvest (Table 4). The tallest variety was ‘*Jerry*’ (97.4 cm) but there was no significant difference between ‘*Jerry*’ and any other variety. All varieties suffered bird damage, and the variety ‘*Streaker*’ had significantly more damage than all other varieties at 6.67 on a scale of 0-9. Some lodging was observed but varieties did not differ significantly in the incidence of lodging.

Table 4. Harvest measures, Alburgh, VT, 2018.

Variety	Yield @ 13.5% moisture	Harvest moisture	Test weight	Height @ harvest	Bird damage	Lodging
	lbs ac ⁻¹	%	lbs bu ⁻¹	cm	0-9 Scale	0-9 Scale
AC Gehl	2333*	11.2	34.6	87.6	2.67	1.00
Antigo	1387	11.2	37.8	72.00	3.33	1.00
BetaGene	2186*	11.3	34.5	82.7	2.33	0.00
Deon	1564	11.3	35.6	77.9	3.33	0.00
Hayden	1954*	11.5	35.3	85.8	2.00	0.67
Jerry	1815	11.4	36.4	97.4	4.67	1.00
Jim	1449	11.2	34.6	79.1	2.67	0.00
Kame	1767	11.0*	34.6	71.9	3.33	0.00
Keuka	1769	11.3	33.7	77.1	2.00	0.67
Leonard	1777	11.4	34.0	80.1	2.67	0.33
Marin	1441	11.1*	34.2	79.2	2.33	0.33
Pringles Progress	1250	11.2	34.7	84.1	4.67	1.00
Reins	2569*	10.6*	35.9	68.1	1.67	0.00
Richmond	1770	10.9*	32.6	89.4	3.67	0.00
Shelby 427	1918*	11.3	36.9	80.9	2.67	0.33
Streaker	641	12.6	43.4*	86.4	6.67*	1.00
Sumo	912	11.3	32.4	68.1	3.33	0.00
LSD (<0.1)	740	0.53	3.04	NS	1.95	NS
Trial mean	1676	11.3	35.4	80.5	3.18	0.43

*Treatments with an asterisk are not significantly different than the top performer in **bold**.

NS- Not Significant.

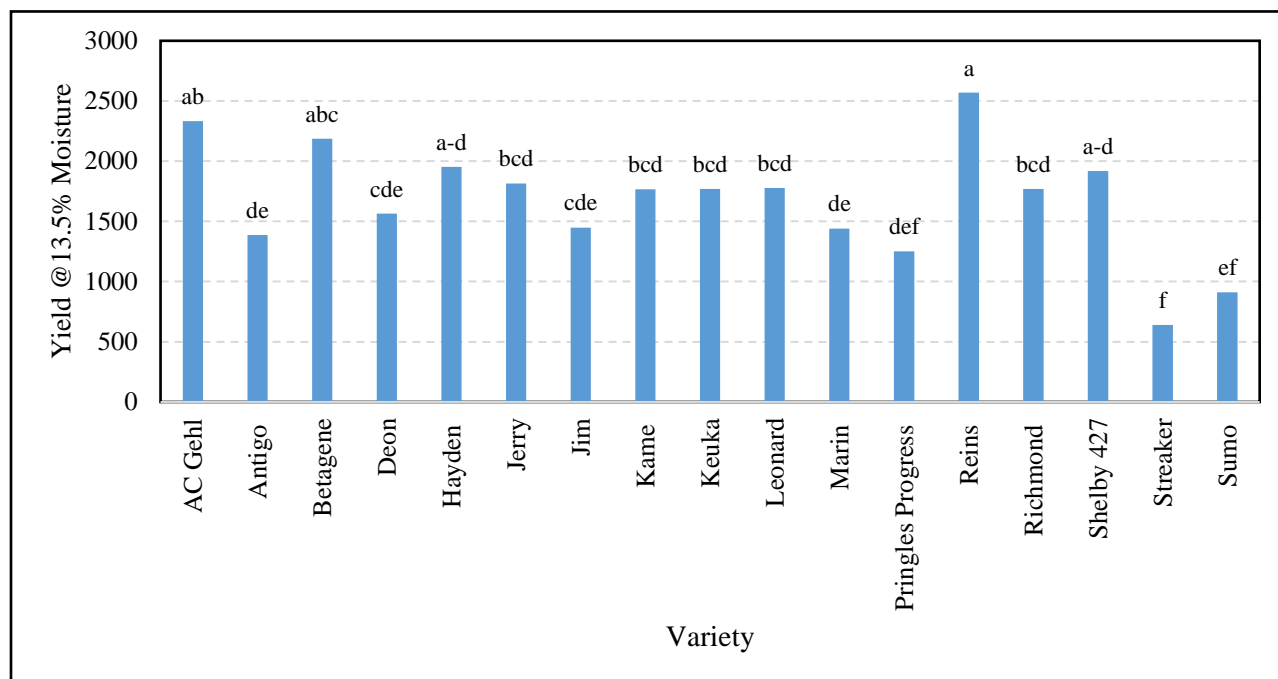


Figure 1. Yield of 17 oat varieties evaluated in Alburgh, VT, 2018.

DISCUSSION

It is important to remember that the results only represent one year of data. In the 2018 oat variety trial, the mean yield was 954 lbs ac⁻¹ lower than the mean yield in 2017, 2360 lbs ac⁻¹. The difference in yield was likely due to significant bird damage. ‘Reins’ had the highest yield and low harvest moisture, though all varieties meet industry standards for test weight and moisture. The heirloom varieties, Pringle Progress and Marin performed similarly in yield but tended to be lowering yielding compared to many of the newer varieties. Quality testing has not been completed on the 2018 oats so DON (deoxynivalenol) levels and protein are not reported at this time. As you make variety choices on your farm, it is important that you evaluate data from test sites that are as similar to your region as possible.

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