2009

Barley and Oat Trials

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CULTIVATING HEALTHY COMMUNITIES

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2009 VERMONT BARLEY AND OAT VARIETY PERFORMANCE TRIALS

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In 2009, the University of Vermont Extension established malting barley and oat variety trials at the Borderview Research Farm in Alburgh. Several local breweries and distilleries approached us about growing malting barley in the region. One of the interested distillers is located in Hardwick; therefore a second trial site for malting barley was established at High Mowing Seeds in Hardwick

TESTING PROCEDURE

The experimental design at the Alburgh and the Hardwick locations were randomized complete block with either three or four replications depending on the experiment. Barley and oat varieties evaluated are listed in table 1. The seedbed at each location 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 in Alburgh were seeded with a John Deere Seed Drill and a Carter Cone Seeder at the Hardwick site. Grain plots were harvested with an Almaco SP50 plot combine. Yield, moisture, test weight and/or crude protein were recorded. The data collected was analyzed using a mixed model analysis where replicates were considered random effects. The LSD procedure was used to separate treatment means when the F-test was significant ($P< 0.10$).

Table 1. Cereal Grain Varieties used for trials.

Seed Source	Species		Locations	
	Type	Variety	Alburgh	Hardwick
Malting Barley Variety				
Albert Lea Seed House	6 row malting	Robust	X	X
Semican	2 row malting	AC Newport		X
Albert Lea Seed House	6 row malting	Rasmussen	X	X
Albert Lea Seed House	6 row malting	Lacy	X	X
JGL Inc.	6 row malting	SB9259J		X
Oat Variety				
Albert Lea Seed House	Ivory white seed	Spur	X	
Albert Lea Seed House	Ivory seed	Morton	X	
Albert Lea Seed House	Yellow seed	Esker	X	
Albert Lea Seed House	White seed	Excel	X	

Table 2. General plot management of the grain trials in Alburgh and Hardwick, VT.

Trial Information	Malting barley variety trial	Malting barley Variety trial	Oat variety trial
Location	Alburgh Borderview Farm	Hardwick High Mowing Seeds	Alburgh Borderview Farm
Soil type	Silt loam	Sandy loam	Silt loam
Previous crop	Soybeans	Cover crop	Soybeans
Plot size (ft.)	5x20	5x25	5x20
Seeding rate	140 lbs/acre	125 lbs/acre	130 lbs/acre
Replicates	3	4	3
Planting date	4-16-09	4-27-09	4-16-09
Harvest date	7-21-09	8-14-09	8-10-09
Tillage operations	Spring plow	Spring plow	Spring plow

WEATHER DATA

Seasonal precipitation and temperature recorded at a weather station in close proximity to the 2009 site is shown in Table 3. This growing season brought cooler temperatures and higher than normal rainfall patterns across the region. The cooler temperatures and increased precipitation encouraged fungal pathogens and increased weed populations.

Table 3. Temperature and precipitation summary, 2009.

Alburgh	April	May	June	July	August	September	October
Average Temperature	44.9	53.9	62.8	65.9	67.7	57.7	44.1
Departure from Normal	+1.4	-2.7	-3.0	-5.2	-1.3	-2.7	-4.7
Precipitation	2.89	6.32	5.19	8.07	3.59	4.01	5.18
Departure from Normal	+0.38	+3.39	+1.98	+4.66	-0.26	+0.55	+0.79
Growing Degree Days (32˚)	406	680.5	923.5	1052.5	1107	771	395.5
Departure from Normal	+61.0	-82.1	-90.5	-158.1	-40.0	-81.0	-125.3
Hardwick	**April**	**May**	**June**	**July**	**August**	**September**	**October**
Average Temperature	42.3	50.3	58.6	62.1	62.9	52.6	39.3
Departure from Normal	+4.1	0.9	-1.8	-2.8	+0.1	-1.2	-2.8

Precipitation	2.16	5.74	4.69	5.82	4.66	2.62	4.17
Departure from Normal	-0.7	+1.97	+0.38	+1.39	-0.13	-1.35	+0.57
Growing Degree Days (32˚)	366	572.5	796.5	936	964.5	632	296
Departure from Normal	+84.0	-24.3	-55.5	-83.9	+15.6	-23.5	-45.0

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

MALTING BARLEY RESULTS

The highest yielding malting barley variety at the Alburgh site was Lacey yielding 5542 lbs ac^{-1}. Robust had the lowest yield at 4687 lbs ac^{-1} (Table 4 and Figure 1). Loose Smut, *Ustilago nuda*, was observed in all barley variety plots. Contaminated heads were removed by hand in hopes of reducing the observed spread of fungus. There was minimal bird damage but it appeared as though the long awns of the barley provided protection against the birds.

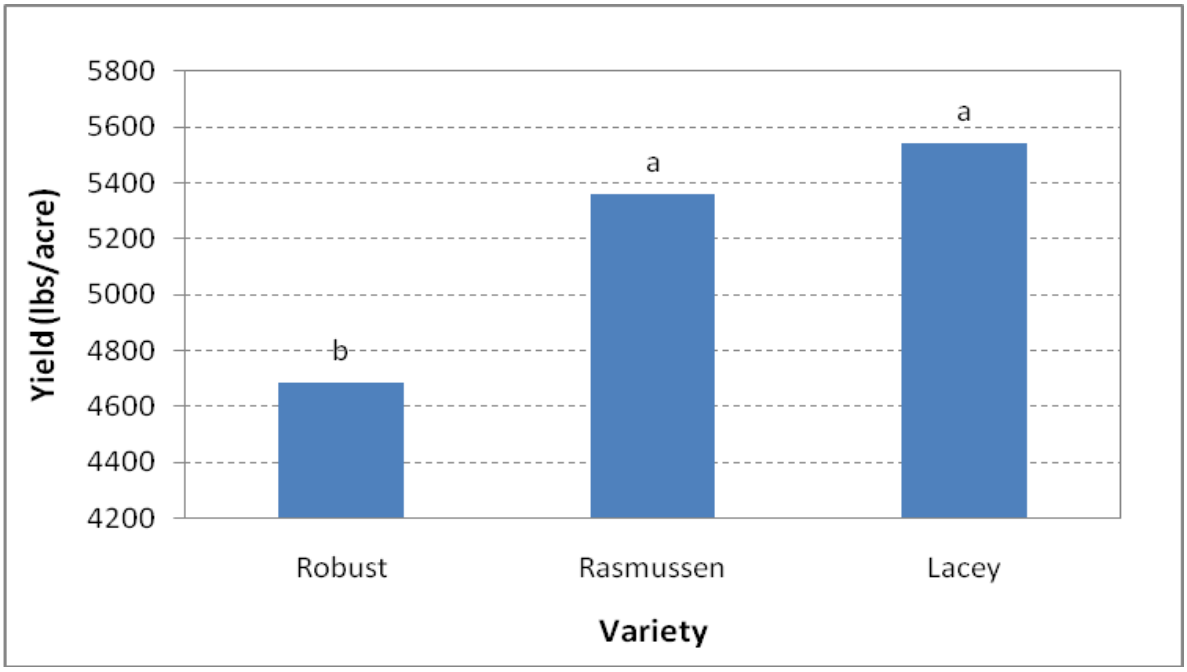
Table 4. Harvest moisture, yield, and test weight of malting varieties.

Location	Variety	Harvest moisture	Yield @ 13.5% moisture		Test weight
		%	bu/acre	lbs/acre	bu/acre
Alburgh					
	Lacey	18.0	**115***	**5542***	**48.0**
	Rasmussen	17.7	112*	5360*	47.8
	Robust	**18.1**	97.7	4687	**48.0**
Trial mean		17.9	108	5196	47.9
LSD (0.10)		NS	12.6	603	NS
Harwick					
	Lacey	14.4	32.1	1539	45.1
	Newport	13.2	39.0	1871	**46.1**
	Rasmussen	14.9	32.6	1566	45.2
	Robust	14.1	39.6	1902	44.3
	SB 9259j	**9.10***	**40.5**	**1945**	44.3
Trial mean		13.1	36.8	1764	45.0
LSD (0.10)		1.40	NS	NS	NS

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

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

Figure 1. Yields of barley varieties- Alburgh



Hybrids with the same letter do not differ significantly in yield.

At the Hardwick site barley varieties were not significantly different in yield (Table 4). Loose Smut, *Ustilago nuda*, was found in all of the barley plots at this location. We manually removed all the visibly contaminated heads. Bird damage was not an issue at the Hardwick site.

From the trials we determined several malting barley varieties that could be adequate for Vermont conditions. However, before optimal varieties are recommended to growers we must characterize their potential malting quality. Currently, our group is learning about malting quality and hopes to begin screening varieties next season.

Image 1. Barley Harvest at High Mowing Seeds

OAT RESULTS

While not significantly different, the oat variety Eskers was the highest yielding 3546.9 lbs $ac^{-1}$and Morton was the lowest yielding 2704.0 lbs ac^{-1}. The test weights however were significantly different. Spur had the highest test weight at 36 bu $ac^{-1}$and Morton had the lowest test weight at 32.8 bu ac^{-1} (Table 5). Weeds in the oat trial did not appear to significantly impact plant growth. Out of all the small grains trialed at the Alburgh site, the oats were the least affected by the birds and no plant pathogens were observed. Oats are exceptionally well suited for Vermont growing conditions. The most significant challenge and often expense in producing oats is the equipment used to de-hull them.

Table 5. Yield analysis of oats

Variety	Yield @ 12% Moisture		Test Weight
	bu/acre	lbs/acre	bu/acre
Esker	**111**	**3547**	34.2
Excel	94.5	3024	34.1
Morton	84.5	2704	32.8
Spur	103	3283	**36.0***
Trial Mean	98.1	3140	34.3
LSD (0.10)	NS	NS	1.56

* Oat that did not perform significantly lower than the top performing variety in a particular column are indicated with an asterisk.
NS - None of the varieties were significantly different from one another.

UVM Extension would like to thank the Rainville family and High Mowing Seeds for their generous help with the trials.

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