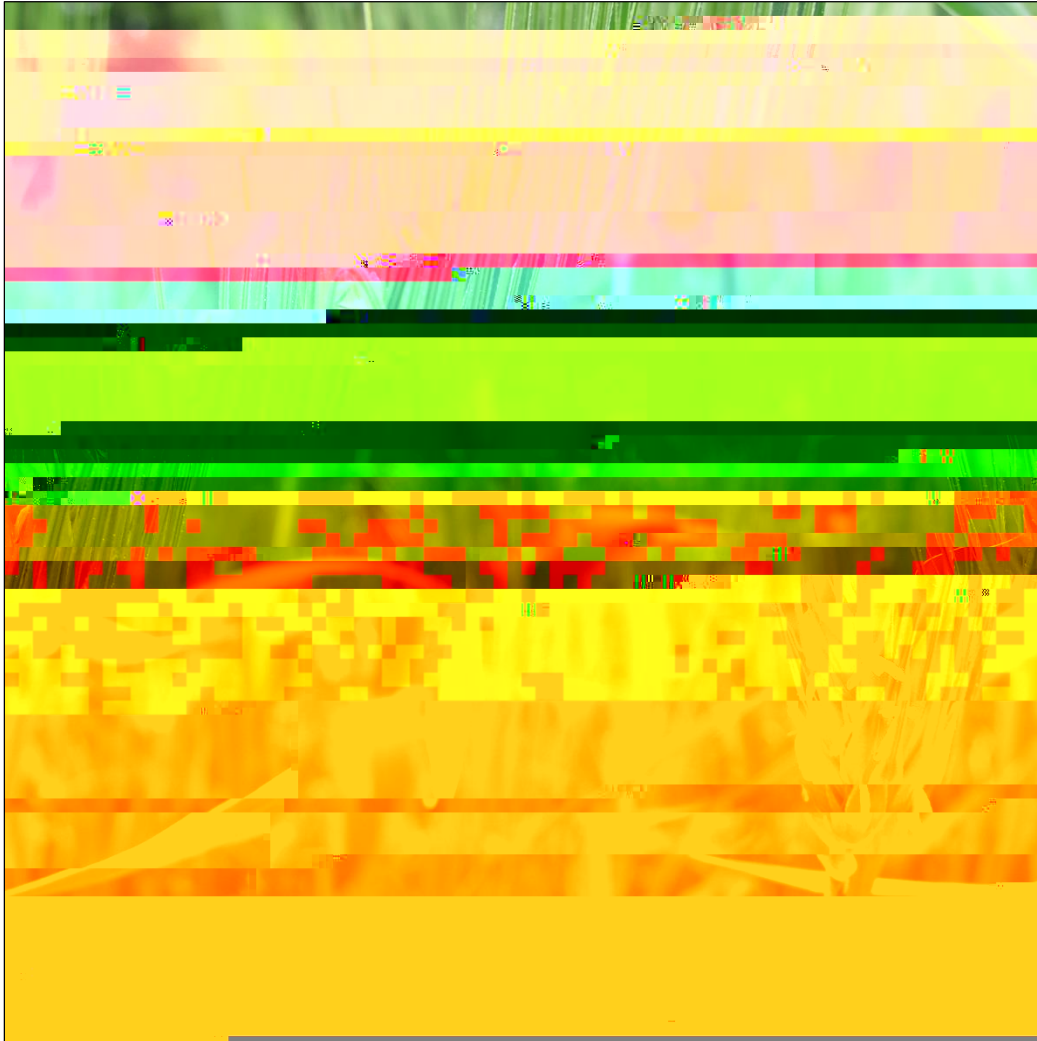


# 2018 Organic Spring Barley Variety Trial



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With the revival of the small grains industry in the Northeast and the strength of the locavore movement, craft breweries and distilleries have expressed an interest in sourcing local barley for malting. Malting barley must meet specific quality characteristics such as low protein content and high germination. Depending on the variety, barley can be planted in either the spring or fall, and both two- and six-row barley can be used for malting. In 2018, UVM Extension in collaboration with the Eastern Spring Malting Barley Nursery (ESBN) testing network conducted a spring malting barley trial to evaluate yield and quality of 25 varieties. Some varieties that had not performed well or are no longer commercially available were dropped from the trial and new varieties were added.

### MATERIALS AND METHODS

In 2018, a spring barley variety trial was initiated at Borderview Research Farm in Alburgh, VT. The experimental plot design was a randomized complete block with three replications. The treatments were twenty-five spring malting barley varieties, listed in Table 1.

**Table 1. Twenty-five spring barley varieties trialed at Borderview Research Farm in Alburgh, VT, 2018.**

Spring barley variety	Type	Seed source
2ND28065	6-row	North Dakota State University
2ND32529	2-row	North Dakota State University
2ND33757	2-row	North Dakota State University
2ND33760	2-row	North Dakota State University
2ND33821	2-row	North Dakota State University
2ND34954	2-row	North Dakota State University
2ND34999	2-row	North Dakota State University
2ND35001	2-row	North Dakota State University
AAC Synergy	2-row	Agriculture and Agri-Food Canada
Accordine	2-row	Ackermann (Germany)
Crescendo	2-row	Secobra (France)
Eifel	2-row	Secobra (France)
Esma	2-row	Ackerman, Germany
Expo	2-row	Secobra (France)
KWS Beckie	2-row	KWS Cereals USA LLC, Germany
KWS Fantex	2-row	KWS Cereals USA LLC, Germany
KWS Tinka	2-row	KWS Cereals USA LLC, Germany
LCS Genie	2-row	Limagrain Cereal Seeds
LCS Odyssey	2-row	Limagrain Cereal Seeds
ND Genesis	2-row	North Dakota State University
Newdale	2-row	Agriculture and Agri-Food Canada



falling number is related to the level of sprout damage that has occurred in the grain. It is measured by the time it takes, in seconds, for a stirrer to fall through a slurry of flour and water to the bottom of the tube. Falling numbers greater than 350 indicate low enzymatic activity and sound quality sample. A falling number lower than 200 indicates high enzymatic activity and poor quality. Deoxynivalenol (DON) analysis was analyzed using Veratox DON 5/5 Quantitative test from the NEOGEN Corp. This test has a detection range of 0.5 to 5 ppm. Samples with DON values greater than 1 ppm are considered unsuitable for human consumption. Percent germination (germination energy) was determined by incubating 100 seeds in 4.0 ml of water for 72 hours and counting the number of seeds that did not germinate. Each sample was run in duplicate. Grain assortment or plumpness was determined using the Pfeuffer Sorimat using 100g of clean seed, and was determined by the combining the amount of seed remaining on the 2.78mm and 2.38mm sieves.

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 ( $p < 0.10$ ).

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 Differences at the 10% level of probability are 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. In this example, 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	<b>4615*</b>
<b>LSD</b>	<b>889</b>

## RESULTS

Seasonal precipitation and temperature recorded at a weather station at Borderview Research Farm are displayed in Table 3. The growing season this year was marked by cool, wet conditions in April and June, and warm, dry weather in May and July. Overall temperature throughout the growing season was slightly higher than average, and total precipitation was 1.57 inches less than normal. From April to July, there was an accumulation of 3402 Growing Degree Days (GDDs), which was 50 GDDs above the 30-year average.

**Table 3. Temperature and precipitation summary for Alburgh, VT, 2018.**

<b>Alburgh, VT</b>	<b>April</b>	<b>May</b>	<b>June</b>	<b>July</b>
Average temperature (°F)	39.2	59.5	64.4	74.1
Departure from normal	-5.58	3.10	-1.38	3.51
<hr/>				
Precipitation (inches)	4.4	1.9	3.7	2.4
Departure from normal	1.61	-1.51	0.05	-1.72
<hr/>				
Growing Degree Days (32-95°F)	272	853	973	1305
Departure from normal	-112	97	-42	107

Thrips (various species) were the most common insect pest. Thrips are small insects with fringed wings that feed on a variety of plants by puncturing the cells and sucking up the contents. Damage caused by thrips includes discoloration and leaf scarring, reduced growth of the plant, and they can also act as a disease vector. Thrips damage was present in all plots, but at low severity. Mites (various species) were also common, and also at low severity. Some minor damage from cereal leaf beetle and leaf miner was noticed in very few plots.

**Table 4. 2018 spring barley agronomic characteristics in Alburgh, VT.**

Variety	Height	Lodging	Bird damage	Arthropod damage	Foliar disease
	cm	rating (0-9) ,	rating (0-9) ,	rating (0-9) ,	rating (0-9) ,
2ND28065	58.1	<b>0.00*</b>	1.00*	2.00	2.67
2ND32529	65.4*	<b>0.00*</b>	1.00*	1.67*	1.67
2ND33757	63.1*	<b>0.00*</b>	0.67*	1.67*	4.33
2ND33760	57.1	<b>0.00*</b>	2.00	2.33	2.00
2ND33821	60.8*	<b>0.00*</b>	0.33*	2.00	4.33
2ND34954	58.7	<b>0.00*</b>	3.00	2.67	2.67
2ND34999	57.1	<b>0.00*</b>	2.67	1.67*	3.00
2ND35001	65.1*	<b>0.00*</b>	2.33	1.67*	5.33
AAC Synergy	63.2*	0.67			







## DISCUSSION

Despite some notable challenges, 2018 was overall a fairly good year for growing spring barley. Yields were moderate and most quality parameters were excellent. The average yield for the trial was 2395 lbs ac<sup>-1</sup>, which is slightly higher than the grand mean yield from 2011-2017 spring barley variety trials at Horticulture Research Farm in Maize (2389 lbs ac<sup>-1</sup>). The lower yield was severely impacted by bird damage and likely hot and dry conditions. Varieties with most bird damage showed a strong effect in reduced yields, and it is important to note this when comparing yields. High incidence and severity of powdery mildew may have affected yield and quality in the varieties most affected. Insect damage was minimal.

In terms of quality parameters, the plumpness, germination, DON concentrations, and falling number were all very good, with almost all barley varieties meeting or exceeding industry standards. All varieties performed below the industry standard for test weight, and 21 out of the 25 varieties were below the industry standard for crude protein. This again may have been attributed to the hot and dry conditions experienced during the growing season,

There were no varieties that across the board out-performed the others. All varieties that were statistically similar as high yielding varieties were in the highest category for some quality parameters but not for others. It is important to note that these results represent only one year of data. As farmers make variety selections, they should make sure to evaluate data from test sites that are as similar to their own region as possible. It is our intention to continue this research in 2019.

## ACKNOWLEDGEMENT