



# 2020 Organic Spring Barley Variety Trial

Dr. Heather Darby, UVM Extension Agronomist  
Hillary Emick, Henry Blair and Rory Malone  
UVM Extension Crop and Soil Technicians  
(802) 524-6501

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**Dr. Heather Darby, University of Vermont Extension**  
**heather.darby[at]uvm.edu**

With the revival of the small grains industry in the Northeast and the strength of the locavore movement, craft breweries and distilleries are interested 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. Both two- and six-row barley can be used for malting. In 2020, 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 26 varieties. Some varieties that had not performed well or are no longer commercially available were dropped from the trial and new varieties have been added.

### MATERIALS AND METHODS

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

**Table 1. Twenty-six spring barley varieties trialed at Borderview Research Farm in Alburgh, VT, 2020.**

Spring barley variety	Type	Seed source
2ND32184	2-row	North Dakota State University
2ND32529	2-row	North Dakota State University
2ND36638	2-row	North Dakota State University
2ND36642	2-row	North Dakota State University
2ND37111	2-row	North Dakota State University
2ND37130	2-row	North Dakota State University
2ND37568	2-row	North Dakota State University
AAC Connect	2-row	Agriculture and Agri-Food Canada (Brandon)
AAC Synergy	2-row	Agriculture and Agri-Food Canada (Brandon)
Accordine	2-row	Ackermann (Germany)
Barbarella	2-row	Limagrain Cereal Seeds
Brunilda	2-row	Ackermann (Germany)
Eifel	2-row	Secobra (France)
Esma	2-row	Ackermann (Germany)
Explorer	2-row	Secobra (France)
Focus	2-row	Secobra (France)
Klarinette	2-row	Secobra (France)
KWS Fantex	2-row	KWS (Germany)
KWS Jessie	2-row	KWS (Germany)
KWS Willis	2-row	KWS (Germany)
LCS Genie	2-row	Limagrain Cereal Seeds
ND Genesis	2-row	North Dakota State University

Newdale	2-row	Agriculture and Agri-Food Canada
Pinnacle	2-row	North Dakota State University
Sangria	2-row	Agriculture and Agri-Food Canada (Brandon)
Tradition	6-row	Busch Agricultural Resources, LLC

All plots were managed with practices similar to those used by producers in the surrounding areas (Table 2). The previous crop planted at the site was soybeans. In April, the trial area was plowed, disked and spike tooth harrowed to prepare for planting. The plots were seeded with a Great Plains NT60 Cone Seeder at a seeding rate of 350 live seeds m<sup>-2</sup> into a Benson rocky silt loam on 17-Apr. The plot size was 5' x 20'.

**Table 2. Agronomic and trial information for spring barley variety trial, 2019**

using the Perten Inframatic 8600 Flour Analyzer. Falling number for all barley varieties were determined using the AACC Method 56-81B, AACC Intl., 2000 on a Perten FN 1500 Falling Number Machine. The 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 2/3 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 Soritmat 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

**Table 3**



tend to flourish in hot, dry conditions. 70% of plants scouted showed damage by mites. Thrips were the second most common pest noted, with 51% of plants showing damage from thrips. Damage from cereal leaf beetle, European corn borer, and slugs were also noted during scouting. Tradition had the most arthropod damage, with the average plant of this variety having 25% of the foliar surface damaged by arthropod pests. 2ND36638 had the least pest damage, with just over 8% of the foliar surface damaged by pests. There is sometimes a trend noted with an inverse relationship between disease pressure and insect pressure, where those varieties with higher disease burden tending to have lower arthropod pest pressure. This was not necessarily the case in this year's trial, with the variety 2ND36638 having both the lowest prevalence of disease symptoms and the lowest arthropod damage.

Heights and lodging were measured prior to harvest. Taller plants can be desirable for better competition against weeds; however very tall plants can be prone to lodging. Tradition was the tallest variety at 71.4 cm. This variety did experience some lodging (an average of 5% of these plots were too lodged to harvest), however this was not statistically different from the varieties that did not have any lodging. Barbarella had the most lodging at 63.3%. This was statistically similar to the variety LCS Genie with 47.6% lodging. Neither of these were in the tallest group statistically.

### **Spring Barley Yield and Quality**

Yield and quality varied significantly between varieties of spring barley (Table 5, Figure 1).

Yields in this year's trial were overall very good. The variety 2ND36638 had the highest yield at 4830 lbs ac<sup>-1</sup>. This was statistically similar with 19 other varieties with yields over two tons ac<sup>-1</sup>. The varieties Newdale and Eifel had low yields (2903 and 3404 lbs ac<sup>-1</sup> respectively), statistically different from all other varieties. As noted above, these two varieties were also statistically different from all other varieties in terms of spring populations and suffered from poor germination in the dry spring weather.

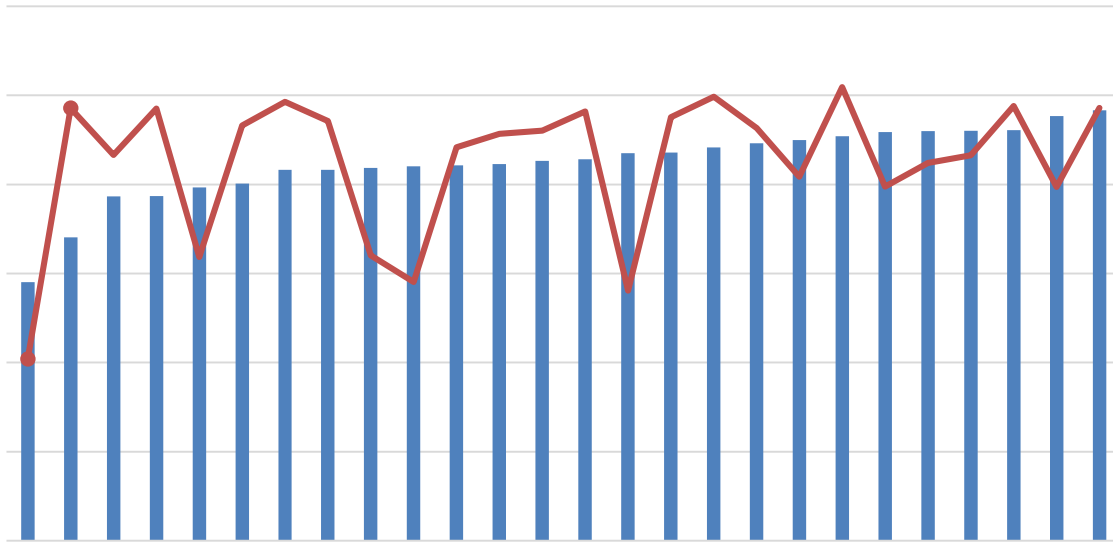
Harvest moisture was variable between varieties. Most varieties required drying down for storage.

AAC Connect had the highest test weight at 47.8 lbs bu<sup>-1</sup>. No variety's test weights met the industry standard of 48 lbs bu<sup>-1</sup>.

**Table 5. Harvest and quality for 26 spring barley varieties trialed in Alburgh, VT, 2020.**

Variety	Yield @ 13.5% moisture content	Harvest moisture	Test Weight	Crude Protein @ 12% moisture content	Falling Number
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**Figure 1. Yield and plumpness for the spring barley varieties trialed in Alburgh, VT, 2020.**

*Varieties with the same capital letter did not differ significantly by yield. Varieties with the same lower case letter did not differ significantly by plumpness.*

Despite a very dry growing season, particularly challenging with suppressing germination in the spring, 2020 was overall a fairly good year for growing spring barley. Quality parameters were very good for most varieties. Yields were generally very good across the trial.

In terms of quality parameters, the test weight, crude protein, plumpness, germination, DON concentrations, and falling number were all very good, with almost all barley varieties meeting or exceeding industry standards.

We intend to continue this research in 2021.

## **ACKNOWLEDGEMENTS**

Thank you to the American Malting Barley Association, Brewers Association and the U.S. Wheat and Barley Scab Initiative for their financial contribution to this project. The UVM Extension Crops and Soils Team would like to thank Roger Rainville and the staff at Borderview Research Farm for their generous help with this research. We would also like to acknowledge John Bruce, Catherine Davidson, Scott

Lewins, Ivy Luke, Lindsey Ruhl, and Sara Ziegler for their assistance with data collection and entry. This information is presented with the understanding that no product discrimination is intended and neither endorsement of any product mentioned, nor criticism of unnamed products, is implied.

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