NORTHWEST CROPS & SOILS PROGRAM

2019 Colored Wheat Variety Trial

Dr. Heather Darby, UVM Extension Agronomist
Rory Malone, Hillary Emick, Haley Jean, and Ivy Luke
UVM Extension Crops and Soils Technicians
802-524-6501

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THE UNIVERSITY OF VERMONT EXTENSION

2019 COLORED WHEAT VARIETY TRIAL

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

There is an interest amongst bakers and the grain industry in the development of colored wheat crosses as a specialty grain that can be marketed outside of commodity markets. Specialty grains can support local farm viability, and well as the viability of small-scale bakers and millers, and can be bred for adaptation to the local climate. Additionally, there is interest in evaluating the antioxidant capacity of colored wheats as they may have potential health benefits due to their antioxidant properties, which could further increase their value as a specialty grain. In 2019, the University of Vermont Extension's Northwest Crops and Soils Program evaluated the performance of twelve new colored wheat crosses from the Washington State University wheat breeding program, in order to examine their performance in organic production systems, and to grow out seed for future variety trials.

MATERIALS AND METHODS

The colored wheat variety trial was initiated at Borderview Research Farm in Alburgh, VT, and at Morningstar Farm in Glover, VT in the 2019 field season. Plots were managed with practices similar to those used by producers in the surrounding area. At the Alburgh site, 57 lbs N, 57 lbs P, 57 lbs K were applied on 25-Apr. Wheat was grown without multiple replicates for each variety. Agronomic data is displayed in Table 1. Plots were seeded with a Carter cone seeder at a rate of 125 lbs ac^{-1} at the Glover location on 15-May and at the Alburgh location on 16-May. Plots were 2.5' x 20'. At the Alburgh location, the previous crop was spring barley and the soil type was Benson rocky silt loam with 8 to 15 percent slopes. At the Glover location, the soil type was Adams loamy sand with 3 to 8 percent slopes. Twelve varieties of blue and red wheat were planted at the Alburgh, VT location, seven of which were also planted at the Glover, VT site. Varieties, parentage, and color are displayed with the harvest results in Tables 3 and 4.

Table 1. Trial agronomic information, 2019.

Trial information	Alburgh, VT Borderview Research Farm	Glover, VT Morningstar Farm
Soil type	Benson rocky silt loam, 8-15% slopes	Adams loamy sand, 3-8% slopes
Previous crop	Spring barley	Dry beans
Seeding rate	125 lbs ac^{-1}	125 lbs ac^{-1}
Row spacing (in)	6	6
Planting date	16-May	15-May
Harvest date	14-Aug	26-Aug
Harvest area (ft)	2.5 x 20	2.5 x 20
Tillage operations	Fall plow, disk & spike tooth harrow	Fall plow, disk & spike tooth harrow

Plots were harvested with an Almaco SPC50 small plot combine on 14-Aug at the Alburgh site and on 26-Aug at the Glover site. The harvest area was 2.5' x 20'. Yields were determined at harvest. Seed was

cleaned by hand on 10-Jan 2020 and test weight was recorded at that time with a Dickey-John mini-GAC moisture meter.

RESULTS

Seasonal precipitation and temperature were recorded onsite at the Alburgh, VT location with a Davis Instruments Vantage Pro2 weather station equipped with a WeatherLink data logger (Table 2). A cooler than average and wet spring led to only 1630 Growing Degree Days (GDDs) accumulated May-June, which was 140 GDDs below average. GDDs ceased to lag behind the 30-year normal in July, which saw higher than average temperatures, less precipitation, and 1286 accumulated GDDs, 88 above the 30-year normal. Overall, there were 4041 GDDs accumulated across the growing season, 66 below the average.

Table 2. Seasonal weather data collected in Alburgh, VT, 2019.

	2019			
	May	**Jun**	**Jul**	**Aug**
Average temperature (°F)	53.3	64.3	73.5	68.3
Departure from normal	-3.11	-1.46	2.87	-0.51
Precipitation (inches)	4.90	3.06	2.34	3.50
Departure from normal	1.45	-0.63	-1.81	-0.41
Growing Degree Days (base 32°F)	660	970	1286	1125
Departure from normal	-96	-44	88	-14

Based on weather data from a Davis Instruments Vantage Pro2 with WeatherLink data logger. Historical averages are for 30 years of NOAA data (1981-2010) from Burlington, VT.

Results of this trial are displayed below in Tables 3 and 4, as well as parentage and coloring. No statistical analysis was performed, and average yields and test weights are presented by variety.

Table 3. Colored wheat varieties and yields, Alburgh, VT, 2019.

Breeding name	**Mother**	**Father**	**Color**	**Yield**	**Test weight**
				lbs ac^{-1}	**lbs bu^{-1}**
5C14C0058	Expresso	CDC Primepurple	Red	1840	55.3
5C14C0024	Dayn	Purple La Prevision	Red	1074	55.2
5C14C0028	Purple Olympic	Edison	Red	814	50.4
5C14C0037	Laval 19	Edison	Red	662	47.9
5C14C0044	Edison	Sebesta Blue 3	Blue	104	51.6
5C14C0062	6177049	UC66049	Blue	1548	50.3
5C14C0032	Gus	Sebesta Blue 3	Blue	1031	46.7
5C14C0047P	CDC Primepurple	Edison	Red	1431	55.7
6J130009	Seahawk	Sebesta Blue 3	Blue	974	51.6
5C14C0019	Sebesta Blue 3	Dayn	Blue	1349	51.3
5C14C0056P	6177049	CDC Primepurple	Red	1427	54.5
AHR-15	Nardo	1159.288.18b.1.2	Red	244	-
Trial mean				1042	51.9

The average trial yield at the Alburgh site was 1042 lbs ac^{-1}, and the average test weight was 51.9 lbs bu^{-1} (Table 3). The top performer in yield was 5C14C0058, yielding 1840 lbs ac^{-1}, and the lowest performer was 5C14C0044, yielding only 104 lbs ac^{-1}. The variety 5C14C0047P had the highest test weight (55.7 lbs bu^{-1}), and 5C14C0032 had the lowest (46.7 lbs bu^{-1}). At the Glover site, 5C14C0044 had the highest yield at 2413 lbs ac^{-1}, and similar to the Alburgh site, 5C14C0032 had the lowest yield of 915 lbs ac^{-1} (Table 4). 5C14C0056P had the highest test weight (53.2 lbs bu^{-1}) at the Glover site as well as the Alburgh site. 5C14C0062 had the lowest test weight at the Glover site (49.4 lbs bu^{-1}). Test weight is the measure of grain density, which is determined by weighing a known volume of grain. Generally, the heavier the wheat is per bushel, the higher the baking quality. None of the varieties reached the industry standard of 56-60 lbs bu^{-1} for test weight.

Table 4. Colored wheat varieties and yields, Glover, VT, 2019.

Breeding name	Mother	Father	Color	Yield	Test weight
				lbs ac^{-1}	lbs bu^{-1}
5C14C0028	Purple Olympic	Edison	Red	1620	50.5
5C14C0044	Edison	Sebesta Blue 3	Blue	2413	51.9
5C14C0062	6177049	UC66049	Blue	1120	49.4
5C14C0032	Gus	Sebesta Blue 3	Blue	915	50.8
5C14C0056P	6177049	CDC Primepurple	Red	2291	53.2
Trial mean				1672	51.2

The trial mean for the yields of both locations was 1357 lbs ac^{-1}, and the average test weight for both locations was 51.6 lbs bu^{-1}.

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