NORTHWEST CROPS & SOILS PROGRAM

2017 Winter Canola Variety Trial

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UNIVERSITY OF VERMONT EXTENSION
CULTIVATING HEALTHY COMMUNITIES

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Winter canola is a relatively new crop to the Northeast. The majority of the canola grown in North America is grown in the Midwestern U.S. and Canada for both culinary oil as well as biodiesel production. Winter canola is planted in the late summer where it grows through the fall before entering a period of dormancy for the winter. The following spring the plants resume growth and seed is harvested during the summer months. Winter canola could potentially be a useful crop to growers in the Northeast for diversifying rotations, farm products and markets, and producing fuel on farm. However, for winter canola to be a viable crop in our region, we must identify the varieties that can survive the winter months. To do this, the Northwest Crops and Soils Team conducted a variety trial in 2016-2017. This trial was initiated as part of the National Winter Canola Variety Trial.

MATERIALS AND METHODS

A trial was conducted during the 2016-2017 season at Borderview Research Farm in Alburgh, VT. The experimental design was a randomized block with four replicates and fifteen varieties as treatments. Plots were 5'x 20' and were seeded with a Great Plains grain drill (5' wide) at a rate of 400,000 live seeds ac^{-1} on 6-Sep 2016 (Table 1). The soil was a Benson rocky silt loam and the previous crop was potatoes. Plots were covered with bird netting on 22-Jun 2017.

Table 1. Trial information and agronomic information 2016-2017.

Location	Borderview Research Farm - Alburgh, VT
Soil type	Benson rocky silt loam
Previous crop	Potatoes
Plot size (ft.)	5 x 20
Seeding rate (live seeds ac^{-1})	400,000
Replicates	4
Planting date	6-Sep 2016
Harvest date	1-Aug 2017
Pressing date	7-Aug 2017
Tillage operations	Fall chisel plow, disk and spring-toothed harrow

Canola seed was harvested using an Almaco SPC50 plot combine on 1-Aug 2017. At harvest, moisture and test weight were determined using a DICKEY-john Mini-GAC plus moisture and test weight meter. Oil was extruded from the seeds with an AgOil M70 oil press on 7-Aug 2017, and the amount of oil captured was measured to determine oil content.

All data was analyzed using a mixed model analysis where replicates were considered random effects and varieties were considered fixed 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 treatments is real or whether it might have occurred due to other variations in the field. All data were analyzed using a mixed model analysis where replicates were considered random effects. At the bottom of each table a LSD value is presented for each variable (e.g. yield). Least Significant Differences (LSDs) at the 10% level (0.10) of probability are shown. Where the difference between two treatments 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 values. Treatments listed in bold had the top performance in a particular column; treatments that did not perform significantly lower than the top-performer in a particular column are indicated with an asterisk. In this example, treatment A is significantly different from treatment C but not from treatment B. The difference between A and B is equal to 400, which is less than the LSD value of 500. This means that these treatments did not differ significantly in yield. The difference between A and C is equal to 650, which is greater than the LSD value of 500 indicating that the yields of these treatments were significantly different.

Variety	Yield
A	**1600***
B	1200*
C	950
LSD (0.10)	500

RESULTS

Weather data was collected with an onsite Davis Instruments Vantage Pro2 weather station equipped with a WeatherLink data logger. Temperature, precipitation, and accumulation of Growing Degree Days (GDDs) are consolidated for the 2016-2017 growing season (Table 2). Historical weather data are from 1981-2010 at cooperative observation stations in Burlington, VT, approximately 45 miles from Alburgh, VT.

Table 2. Weather data and GDDs for winter canola in Alburgh, VT 2016-2017.

	2016				2017						
Alburgh, VT	September	October	November	December	January	February	March	April	May	June	July
Average temperature (°F)	63.6	50.0	40.0	26.8	27.0	27.0	25.1	47.2	55.7	65.4	68.7
Departure from normal	3.03	1.80	1.82	0.89	8.23	5.47	-6.05	2.37	-0.75	-0.39	-1.90
Precipitation (inches)	2.50	5.00	3.00	1.60	1.00	1.50	1.60	5.20	4.10	5.60	4.90
Departure from normal	-1.17	1.39	-0.13	-0.82	-1.05	-0.29	-0.63	2.40	0.68	1.95	0.73
Growing Degree Days (base 32°F)	949	559	270	72	66	99	98	459	733	1001	1138
Departure from normal	91	57	85	72	66	99	98	75	-23	-13	-60

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.

In general, the 2016-2017 season was wetter and cooler than normal. The fall and winter months in 2016 were warmer than normal. January and February were 8.23 and 5.47 degrees above average respectively. Precipitation was below average in the fall and winter but then above average for the 2017 growing season. Warm temperatures and moderate precipitation led to decent establishment going into the winter. A

relatively mild winter allowed most of the trial to survive. Overall, there were 5444 GDDs at a base temperature of 32° F accumulated during this season.

Winter canola varieties differed significantly in terms of harvest characteristics (Table 4). Moisture contents at harvest ranged from 12.8% to 23.7% with the lowest moisture being produced by the variety Torrington. However, these differences were not statistically significant. Yields corrected to 8% moisture ranged from 1022 lbs ac^{-1} to 1519 lbs ac^{-1} with the highest yield produced by the variety Riley. However, yield differences were not statistically significant either. Varieties did differ statistically in terms of test weight. Test weights ranged from 41.6 lbs bu^{-1} to 48.0 lbs bu^{-1} with the highest test weight produced by the variety Torrington. This was statistically similar to eleven other varieties. All varieties produced seed with test weights below the industry standard of 50 lbs bu^{-1}. Varieties also differed in oil content which ranged from 12.1% to 27.2%. The highest oil content was produced by the variety Plurax CL which was statistically similar to nine other varieties. These levels were lower than oil contents previously obtained in trials at this location. Despite differing oil contents, oil yields were not statistically different across varieties. Oil yield averaged 34.3 gal ac^{-1} across the trial which is also considerably lower than previous years' oil yields obtained from the same location.

Table 4. Harvest characteristics for 15 winter canola varieties.

Variety	Harvest moisture	Seed yield at 8% moisture	Test weight	Oil content	Oil yield at 7.5% moisture	
	%	lbs ac^{-1}	lbs bu^{-1}	%	lbs ac^{-1}	gal ac^{-1}
15.WC.05633	18.0	1107	41.6	27.0*	294	38.5
15.WC.1	15.4	1261	44.4	22.1*	281	36.7
Edimax CL	15.8	1278	46.4*	25.0*	**332**	**43.5**
Einstein	23.7	1025	45.5*	26.1*	269	35.2
Hekip	21.7	1046	47.0*	20.4*	219	28.7
Inspiration	16.3	1332	45.4*	23.1*	305	39.9
Kuga	14.2	1289	45.2*	19.1	262	34.4
Mercedes	15.9	1323	45.7*	15.0	213	27.9
Plurax CL	17.1	1151	47.1*	**27.2***	303	39.6
Popular	19.7	1278	43.8	23.3*	301	39.5
Quartz	16.2	1356	45.5*	18.7	248	32.4
Riley	13.5	**1519**	47.5*	15.2	211	27.7
Torrington	**12.8**	1391	**48.0***	12.1	154	20.2
WC.15.7.5	14.9	1197	47.6*	26.9*	320	42.0
WC.9.7.5.7	17.2	1022	46.9*	20.6*	211	27.7
LSD (p= 0.10)	NS	NS	3.06	7.88	NS	NS
Trial mean	16.8	1238	45.8	21.4	262	34.3

Values followed by an asterisk* performed statistically similarly to the top performer in **bold.**
NS- No significant difference.

DISCUSSION

Due to mild winter conditions, all canola varieties successfully overwintered and were harvestable in the summer of 2017. All varieties produced yield over 1000 lbs ac^{-1}, however no variety reached the target test weight of 50 lbs bu^{-1}. Furthermore, oil contents for canola are typically expected to be greater than 40%. In our trials, however, we have commonly seen levels of 30-35% and therefore, an average oil content of 21.4% is quite lower than ideal. Low test weight, oil content may be related to poor weather conditions throughout the season. These data indicate that winter canola, when it survives winters in the Northeast, can produce decent yields but may have a lower potential compared to the common canola growing regions of the country. By participating in the National Winter Canola Variety Trial, we hope to provide data and encouragement for the development of hardier, high yielding winter canola varieties suitable for this region.

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