2012

Winter Canola Variety Trial

Heather Darby
University of Vermont, heather.darby@uvm.edu

Katie Blair
University of Vermont

Erica Cummings
University of Vermont

Hannah Harwood
University of Vermont

Rosalie Madden
University of Vermont

See next page for additional authors

Authors
Heather Darby, Katie Blair, Erica Cummings, Hannah Harwood, Rosalie Madden, and Susan Monahan

NW CROPS & SOILS PROGRAM

UNIVERSITY OF VERMONT EXTENSION
CULTIVATING HEALTHY COMMUNITIES

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Dr. Heather Darby, UVM Extension Agronomist
Katie Blair, Erica Cummings, Hannah Harwood, Rosalie Madden and Susan Monahan
UVM Extension Crops and Soils Technicians
(802) 524-6501

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The UNIVERSITY of VERMONT EXTENSION

2012 WINTER CANOLA VARIETY TRIAL

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

In 2012, the University of Vermont Extension Northwest Crops and Soils Program initiated a winter canola variety trial in Alburgh, VT as part of the 2011-2012 National Winter Canola Variety Trial. In the past few years, many farms in the Northeast have been engaged in on-farm fuel production; farmers must be able to reliably produce a high-yielding crop in order for this to be economically feasible. Growing winter canola holds many possible advantages for Vermont farms since it is sown in the early fall, allowing it to easily fit into rotations following short-season grain or corn. Winter canola is a relatively new crop for the Northeast, and varietal selection is one of the most important aspects of production since it significantly influences seed and oil yield potential. The goal of this trial was to evaluate varieties that can survive the harsh winters of our region and ultimately produce high yields.

MATERIALS AND METHODS

The experimental design was a randomized complete block with three replications. Fifteen winter canola varieties were evaluated for fall establishment, winter survival, stand characteristics, seed yield and oil content (Table 1). The winter canola was planted on 2-Sep 2011 at a rate of 5 lbs per acre with a Kincaid cone seeder. The research plots were 6' x 20'. The seeds were treated with Herculex, a systemic insecticidal seed treatment. The previous crop was spring wheat, and the seedbed was prepared with moldboard plow and disk. The soil was a Benson rocky silt loam. Winter survival percentages were measured on 10-Apr 2012, after the danger of further winter loss had passed. Ammonium sulfate (21-0-0) and starter fertilizer (10-20-20) were applied as a topdress to equal 50 lbs N, 50 lbs P, and 40 lbs K per acre on 10-Apr 2012. On 8-Jun 2012, bird netting was secured over the winter canola in order to help prevent significant bird damage. Immediately prior to harvest data, average plant height and number of pods per plant was collected. Plots were harvested on 13-Jul 2012 with an Almaco SP50 plot combine. Seeds were pressed with a Kern Kraft Oil Press KK40, and the amount of oil and meal were measured to determine oil content.

Table 1. Trial information for the winter canola variety trial.

Location	**Borderview Research Farm Alburgh, VT**
Soil type	Benson rocky silt loam
Previous crop	Spring wheat
Plot size (ft.)	6 x 20
Seeding rate (lbs ac^{-1})	5
Replicates	3
Planting date	2-Sep 2011
Harvest date	13-Jul 2012
Tillage operations	Moldboard plow, disk harrow
Topdress fertilizer	10-Apr 2012; 50 lbs ac^{-1}N, 40 lbs ac^{-1}P, 40 lbs ac^{-1}K

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

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 the example above, 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. This means that the yields of these treatments were significantly different from one another.

RESULTS

Temperature and precipitation data for the 2011-2012 winter canola growing season were collected with an on-site Davis Instruments Vantage Pro2 weather station (Table 2). Less than average precipitation throughout the entire trial may have led to poor yields of the canola crop. However, above-average temperatures in the winter of 2011-2012 may have played a role in canola overwintering successfully. Growing Degree Days (GDDs) were calculated with a minimum temperature of 32°F and maximum temperature of 90°F. There was a total of 5956 Growing Degree Days (GDDs) accumulated, 897 more GDD's than the 30-year average.

Table 2. Temperature, precipitation, and GDD data by month for Alburgh, VT.

Alburgh, VT	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Average temperature (°F)	62.8	50.1	43.4	29.5	22.2	26.0	39.7	44.9	60.5	67.0	71.4
Departure from normal	2.2	1.9	5.2	3.6	3.4	4.5	8.6	0.1	4.1	1.2	0.8
Precipitation (inches)	5.6	3.5	1.4	2.2	1.5	0.7	1.5	2.6	3.9	3.2	3.8
Departure from normal	1.9	-0.1	-1.7	-0.1	-0.6	-1.1	-0.8	-0.2	0.5	-0.5	-0.4
Growing Degree Days (base 32°F)	932	578	344	110	55	59	331	396	884	1046	1221
Departure from normal	74	76	142	91	55	59	205	12	128	32	23

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

*Precipitation data from June and July 2012 are based on Northeast Regional Climate Center data from an observation station in Burlington, VT.

Fall establishment was evaluated on 24-Oct 2011 by calculating plant population (Table 3). There was no significant difference in population by variety, though populations ranged from 259,926 to 457,111 plants per acre. The trial average for population was 360,909 plants. Winter survival estimates were taken on 10-Apr 2012. Winter survival was rated on a 0 to 100 scale, where 100 represented excellent winter survival and 0 indicates complete winter kill. There were no significant differences among varieties. All fifteen varieties tested had acceptable winter survivability, with a trial average of 100% survival.

Table 3. Winter canola variety trial pre-harvest results.

Variety	Fall population Plants ac^{-1}	Winter survival %	Pod count Pods $plant^{-1}$	Height in
Amanda	367481	98	114	49.0
Baldur	403333	**100**	169	53.6*
Chrome	322667	**100**	156	49.2
Dynastie	322667	**100**	204	52.4
Flash	286815	**100**	101	51.1
Hornet	340593	**100**	**244**	**60.1***
Riley	439185	97	82	48.7
Rossini	394370	92	97	46.0
Rumba	259926	**100**	135	45.2
Safran	331630	**100**	227	46.3
Sitro	394370	**100**	179	52.0
Ulura	322667	**100**	78	51.7
Virginia	430222	**100**	116	44.4
Visby	340593	**100**	234	46.6
Wichita	**457111**	**100**	125	52.5
LSD (0.10)	NS	NS	NS	16.5
Trial mean	360909	100	151	49.9

NS- Treatments were not significantly different from one another.
Treatments indicated in **bold** had the top observed performance in a particular column.

'Hornet' had the greatest pod count (244 pods per plant), which was recorded for the first time this year, while 'Ulura' had the lowest pod count (78 pods per plant). The trial average was 151 pods per plant. Bloom date was noted when at least 50% of the plot had one or more open flowers. The average bloom date was 12-May 2012, though the variety 'Amanda' bloomed on 16-May 2012, significantly later than 12 other varieties. The height of the winter canola was measured on 13-Jul 2012, with the top performer being Hornet (60.1 inches). The trial average for height was 49.9 inches (Figure 1).

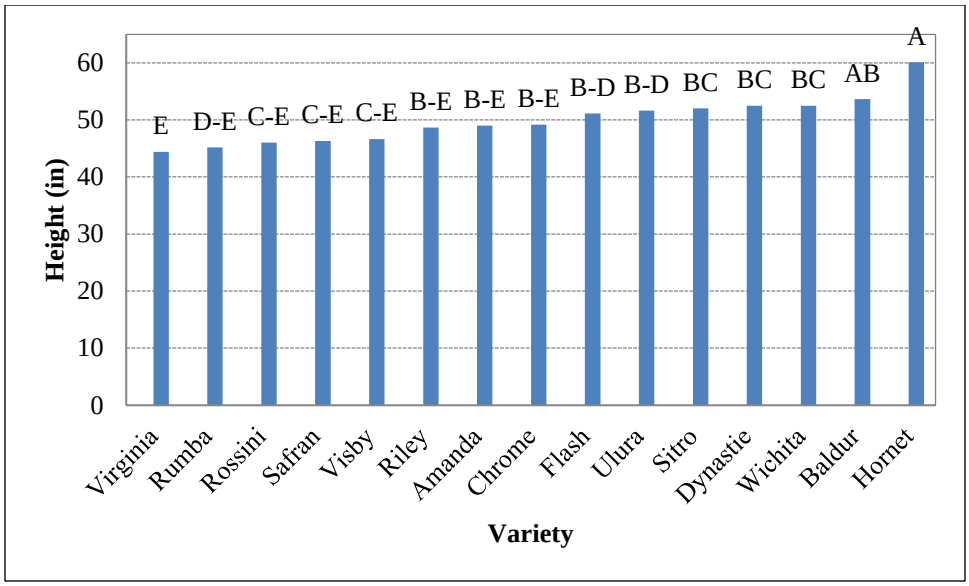

Figure 1. Height of 15 winter canola varieties.

The average seed moisture at harvest was 11.9%. Seed yields were adjusted to 8% seed moisture and reported accordingly. There were no significant differences in seed yield between winter canola varieties (Table 4, Figure 2). The average seed yield across varieties was 482 lbs per acre. The test weight of all canola varieties was close to the standard 50 pounds per bushel, with the average being 47.9 lbs per bushel. The pressing moisture average was 7.15%. Weights of 100 seeds were measured, with the average being 0.32 grams. This was not significant by variety. The oil content of the winter canola ranged from 32.0 to 41.8% extraction. Oil yields were reported at a standard 7.5% pressing moisture. The oil yield, which was statistically significant by variety, averaged 16.7 gallons per acre, or 127 lbs per acre.

Table 4. Winter canola variety trial harvest and pressing data.

Variety	Harvest moisture	Yield @ 8% moisture	Test weight	Pressing moisture	100-Seed weight	Oil content	Oil yield	
	%	lbs ac^{-1}	lbs bu^{-1}	%	g	%	lbs ac^{-1}	gal ac^{-1}
Amanda	11.9	615	48.2	**7.63***	0.30	**41.8**	124	16.3
Baldur	10.7	562	49.3	7.40*	0.33	33.9	136*	17.9*
Chrome	9.9	**744**	48.8	7.40*	0.31	35.5	125	16.4
Dynastie	12.1	520	**49.5**	6.93	0.34	34.7	134	17.6
Flash	12.1	330	49.0	7.23*	0.34	35.0	130	17.1
Hornet	11.6	752	48.8	7.53*	0.33	32.0	**153***	**20.0***
Riley	12.9	366	45.7	6.73	0.31	33.6	125	16.3
Rossini	12.2	552	46.0	6.70	0.33	36.3	118	15.4
Rumba	12.6	308	44.7	6.50	0.31	35.0	116	15.2
Safran	12.7	330	47.7	7.17*	0.33	33.0	118	15.5
Sitro	12.5	462	48.0	7.23*	0.33	32.1	133	17.4
Ulura	11.9	426	47.3	6.83	0.33	38.2	132	17.3
Virginia	11.3	429	49.0	7.33*	0.31	35.5	113	14.8
Visby	**12.9**	373	47.7	7.20*	**0.35**	34.1	119	15.6
Wichita	10.8	454	49.2	7.47*	0.30	34.0	133	17.5
LSD (0.10)	NS	NS	NS	0.61	NS	NS	17	2.2
Trial Mean	11.9	482	47.9	7.15	0.32	35.0	127	16.7

NS- Treatments were not significantly different from one another.
Treatments indicated in **bold** had the top observed performance in a particular column.

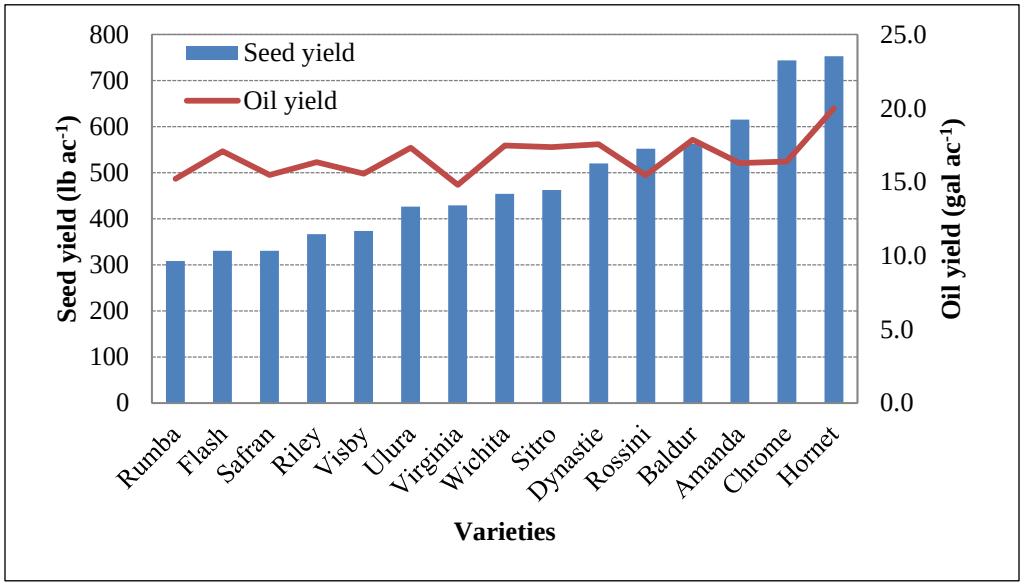

Figure 2. Seed and oil yields of 15 winter canola varieties. There was no significant difference in seed yield by variety.

DISCUSSION

Twelve of the 15 varieties assessed had a 100% winter survival rate. The above-average winter temperatures in 2011-2012 may have attributed to the ability of the canola to survive the winter months. This is the third year that winter canola has successfully overwintered. Improved survivability could also be attributed to earlier planting dates, as planting winter canola in late August and early September allows the plants to be better established prior to winter conditions. This is the first year that pod counts have been taken on winter canola. There was no significant difference in pod counts by variety. Plant height varied significantly by variety; the tallest variety was Hornet (60.1 inches). Though not statistically significant, Hornet was also the variety with the most pods per plant and the highest oil yields.

Though there were no significant differences by variety in seed yields in this year's trial, average seed yields were very low. Interestingly, the 2011 trial average for seed yield was 1630 lbs per acre. The lower yields observed in 2012 (average 482 lbs per acre) may have been due to poor fall stand establishment, soil compaction, poor fertility and/or poor weather conditions. The oil yields, just like the seed yields from this year, were much lower than usual. The 2011 trial average for oil yield was 22.1 gal per acre. In 2012, the lower yields observed (16.7 gal per acre) may have been due to the less than average precipitation throughout the entire trial. Oil yields often decrease in drier years. Interestingly, oil content was highest (41.8%) in the variety Amanda, which also bloomed latest in the season (16-May).

It is important to evaluate oilseed varieties in terms of both seed and oil yields, since varieties with high seed yields do not necessarily have the highest oil yields. It is also important to note that this research represents results only from one season and in one location. More research should be considered before making varietal selections.

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