

2017 PACIFIC NORTHWEST WINTER CANOLA VARIETY TRIAL RESULTS

Jim B. Davis, Megan Wingerson, Ashley Job, and Jack Brown

PSES Dept., University of Idaho, Moscow, ID 83844-2339

ABSTRACT

The 2017 winter canola and rapeseed variety trial contained 24 cultivars or advanced breeding lines from six companies or breeding programs' including three control cultivars, and was planted at eight locations in the Inland Pacific Northwest in the late summer of 2016. Cultivar mean yields ranged from 3,562 to 4,427 lbs per acre. Mean seed yield varied widely between locations, ranging from 2,093 to 5,486 lbs per acre, with an overall mean of 3,910 lbs. per acre. The highest yielding sites were Genesee and Grangeville, ID, and the five highest yielding cultivars were 'Mercedes', 'Plurax CL', 'Edimax CL', 'Arsenal', and 'Atenzo'.

INTRODUCTION

The acreage of canola (*Brassica napus*, *B. juncea*, and *B. rapa*) in the Pacific Northwest continues to slowly increase as more growers show an interest in the crop. This is due in part to canola offering growers an alternative crop for rotations in an agricultural system that is predominated by small cereal grains with few rotation options. Currently depressed prices for wheat, caused by a worldwide surplus, have also contributed to the increased interest in canola.

To support the grower community, comprehensive yield trials are needed to evaluate new cultivars throughout the varied environments found in the Inland Pacific Northwest (PNW). With this objective in mind, researchers at the University of Idaho established the PNW Canola Variety Trial (PNWCVT) in 1994 and the PNW Winter Canola Variety Trial (PNWWVT) in the fall of 1995. These trials have successfully attracted cultivar entries from a number of seed companies, with 176 winter varieties from 22 companies and 326 spring varieties from 33 companies submitted for testing over the lifespan of the trials.

In 2017, 13 different commercial companies and public breeding programs submitted 52 distinct cultivars or breeding lines for testing, 21 winter types and 31 spring types. The 2017 trials were funded by USDA-NIFA Supplemental and Alternative Crops Competitive Grants Program and by the commercial companies that submitted their cultivars or advanced breeding lines to be tested in the PNW trials.

MATERIALS AND METHODS

Twenty-one different *Brassica napus* cultivars plus three control cultivars ('Dwarf Essex' rapeseed, 'Ericka' and 'Athena' canola) were planted in the fall of 2016 at eight locations across the Inland Pacific Northwest (Table 1). Each of the test cultivars was canola quality, except for two industrial rapeseed cultivars; 'Durola', and '05.WI.45.2.2'. Both of these industrial rapeseed cultivars have canola-quality, low glucosinolate seed meal. Entries for the 2017 trial came from Limagrain Cereal Seeds, Kansas State University, Star Specialty Seed, Rubisco Seeds, Croplan

by Winfield, and University of Idaho. Entries with a RR at the end of their name are Roundup Ready[®] types, while CL or IMI denotes a Clearfield[®] canola or other varieties with resistance to imidazolinone herbicides. The sulfoylurea residual tolerance trait is designated with the SURT suffix, and SU indicates full sulfonylurea tolerance. Seeds of all varieties were treated with Helix[™] XTra or Helix Vibrance[™] for control of flea beetles and seedling diseases.

The experimental design used in the PNWWVT was a randomized complete block with four replications, and the individual plot size was 4 feet by 15 feet. A seeding rate of approximately 6 lbs. per acre was used with adjustments made for seed size and germination percentage. Trials were fertilized and managed according to local practices. Tillage regimes and planting dates are shown in Table 1.

Table 1. Location, tillage regime, and planting date of trials in the 2016-2017 Pacific Northwest Winter Canola Variety Trial.

| Location | Tillage Regime | Planting Date |
|-----------------|-------------------------|----------------------|
| Odessa, WA | irrigated, conventional | September 13, 2016 |
| LaCrosse, WA | no till | August 11, 2016 |
| Moscow, ID | conventional fallow | August 15, 2016 |
| Craigmont, ID | conventional fallow | August 12, 2016 |
| Grangeville, ID | conventional fallow | September 7, 2016 |
| Genesee, ID | conventional fallow | August 16, 2016 |
| Pendleton, OR | conventional fallow | September 15, 2016 |
| Hermiston, OR | irrigated, conventional | September 28, 2016 |

The date of flower onset and plant height at maturity was recorded for each plot at the Moscow and Genesee locations. Flowering date was recorded when 50% of the plot was in bloom and is presented as days from January 1 until flowering. After harvest, the seed was weighed to determine yield, and a cleaned subsample from each plot was saved for oil content analyses. Seed oil content was estimated using a Nuclear Magnetic Resonance (NMR) analyzer after samples were dried to approximately 2% moisture.

RESULTS AND DISCUSSION

Winter survival was generally good except at the LaCrosse, WA site. This site was subject to low temperatures and wind without snow cover, resulting in the death of some plants. Winter survival was rated in April by scoring plots with on a 1 to 9 scale where 1 indicates complete winter kill with no surviving plants, and 9 indicates no visible winter damage. The mean survival score of all cultivars in the trial was 6.2 (Table 2). The cultivars with the highest survival rate were two developed at Kansas State University, ‘Surefire’ (KSUR 1211) and ‘Star 930W RR’ (KSR 07363), both with a score of 8.0. ‘HyClass 220W RR’ performed similarly with a score of 7.8. The cultivars with the lowest survival rate were ‘Atenzo’ and ‘Arsenal’ with scores of 3.0 and 3.3, respectively. However, Arsenal was still in the top ten highest yielding

cultivars at the site, which indicates that the surviving plants were able to compensate for the low plant density caused by winterkill.

'Ericka' and 'Arsenal' were the earliest flowering cultivars at 126 days after January 1 (May 6). 'Plurax CL' and '06.WC.1' were also early, flowering one day later on May 7. The overall mean flowering date was 130 days after January 1 (Table 2). The latest cultivar in the trial was '05.WC15.7.5' with a flower date of 133 days after January 1 (May 13), one week later than the earliest cultivars. Plant canopy height at maturity varied between 69 and 78 inches with an average height of 73 inches. Plurax CL and 06.WC.1 were the shortest cultivars, and 'Torrington' and Atenzo were the tallest.

Other than the winter damage seen at LaCrosse, the 2017 growing season was ideal for winter canola production. A long, wet spring provided ample time and moisture for plant growth resulting in tall, highly branched plants with good yields. The mean seed yield for the trial was 3,910 pounds per acre (Table 2) across all sites and entries. Mean yields for individual cultivars ranged from 3,562 to 4,427 lbs per acre. The highest yielding site was Genesee, ID with a mean yield of 5,486 lbs per acre, while the lowest yielding site was Hermiston, OR, with a mean yield of 2,093 lbs per acre. The five highest yielding commercial cultivars overall were from highest to lowest; 'Mercedes', 'Plurax CL', 'Edimax CL', 'Arsenal', and 'Atenzo'.

The average seed oil content for all cultivars was 40.0%, and the oil content of individual cultivars ranged from 38.7% to 43.0% (Table 3) averaged across sites. Average oil content by site ranged from 35.6% at Hermiston, OR, to 43.8% in Moscow, ID. The five varieties with the highest oil content are, from highest to lowest: 'Durola', '05.WI.45.2.2', 'Plurax CL', 'Mercedes', and Athena.

Using These Tables

When examining this data, keep in mind that the yields shown might not reflect the average yield potential across an entire field, since the trials are relatively small in area and might be placed in areas that are not representative of the field as a whole. The relative performance of the cultivars should remain fairly constant however, and can be used to make valid comparisons. When comparing performance, be sure to note the LSD (least significant difference), because cultivars that do not differ by the LSD amount are not considered to be statistically different based on the precision of the trial.

When choosing a cultivar, growers should examine the data from the site that most resembles their own farm in regards to region, annual rainfall, etc. and compare the performance of cultivars at that site in addition to examining the overall means. The overall highest yielding cultivars are not necessarily the highest yielding at each site. Conversely, varieties that performed very well at certain sites may not have performed well at others, contributing to a lower mean. Examining performance over a period of several years will indicate the stability of individual cultivars and also aid in the choice of a cultivar. Some cultivars in the trial have been tested for multiple years, and data summaries from previous years are available on the UI *Brassica* Breeding website at <http://www.cals.uidaho.edu/brassica/>.

Table 2. 2017 Pacific Northwest Winter Canola and Rapeseed Variety Trial results including mean yield (lbs. per acre) and rank across all locations, yield (lbs. per acre) at individual locations, winter survival score at LaCrosse WA (1 to 9 scale where a score of 1 indicates complete winter kill and 9 indicates no winter damage), date of 50% flower (days after January 1) , and plant canopy height (inches).

| Variety | Mean Yield and Rank | | Yield by Location | | | | | | | | Winter Survival | Flower Start | Canopy Height |
|----------------------------------|------------------------|----------|---------------------------|---------------|-----------------|-------------------|--------------|----------------|-----------------|-----------------|--------------------|-------------------------|------------------|
| | | | Moscow ID | Genesee ID | Craigmont ID | Grangeville ID | Odessa WA | LaCrosse WA | Pendleton OR | Hermiston OR | | | |
| | -lbs. per acre - | - rank - | ----- lbs. per acre ----- | | | | | | | | - score - | - days after Jan 1 - | - inches - |
| Control Varieties | | | | | | | | | | | | | |
| Athena | 3,805 | 14 | 4,564 | 5,815 | 4,308 | 5,058 | 2,911 | 3,012 | 2,450 | 2,322 | 6.8 | 130 | 74 |
| Dwarf Essex Rapeseed | 3,678 | 20 | 4,479 | 5,102 | 4,278 | 4,971 | 3,398 | 2,796 | 2,793 | 1,608 | 5.5 | 131 | 70 |
| Ericka | 3,716 | 18 | 4,952 | 5,062 | 4,241 | 4,623 | 3,320 | 3,015 | 2,793 | 1,722 | 7.3 | 126 | 71 |
| Kansas State University | | | | | | | | | | | | | |
| Star 915W RR (KSR.07363) | 3,748 | 15 | 4,429 | 4,851 | 4,240 | 4,809 | 3,096 | 3,789 | 2,689 | 2,084 | 8.0 | 131 | 71 |
| Surefire SURT (KSUR.1211) | 3,937 | 11 | 4,566 | 5,314 | 3,637 | 5,582 | 3,624 | 3,709 | 2,519 | 2,545 | 8.0 | 132 | 75 |
| Torrington | 3,957 | 9 | 4,806 | 5,404 | 3,836 | 4,926 | 4,221 | 3,055 | 3,156 | 2,250 | 7.0 | 131 | 78 |
| Lima Grain Cereal Seeds | | | | | | | | | | | | | |
| Arsenal | 4,307 | 4 | 4,675 | 6,017 | 4,642 | 6,519 | 3,403 | 3,282 | 3,357 | 2,563 | 3.3 | 126 | 75 |
| Atenzo | 4,285 | 5 | 5,522 | 7,014 | 4,179 | 6,152 | 2,931 | 2,888 | 2,739 | 2,851 | 3.0 | 128 | 77 |
| Rubisco Seeds | | | | | | | | | | | | | |
| Edimax CL | 4,362 | 3 | 4,873 | 5,890 | 4,286 | 6,325 | 4,001 | 3,910 | 2,929 | 2,683 | 5.5 | 131 | 74 |
| Mercedes | 4,427 | 1 | 5,114 | 6,373 | 4,474 | 5,755 | 3,830 | 3,803 | 3,341 | 2,728 | 6.3 | 130 | 74 |
| Plurax CL | 4,397 | 2 | 5,322 | 6,689 | 4,877 | 5,457 | 3,991 | 3,394 | 3,122 | 2,320 | 6.0 | 127 | 69 |
| Star Specialty Seed, Inc. | | | | | | | | | | | | | |
| Star 915W RR | 3,741 | 16 | 4,231 | 5,247 | 5,000 | 4,379 | 3,347 | 3,631 | 2,344 | 1,752 | 7.3 | 131 | 73 |
| Croplan by Winfield | | | | | | | | | | | | | |
| HyCLASS 115W RR | 3,589 | 23 | 4,644 | 4,658 | 4,405 | 4,447 | 2,699 | 3,947 | 2,243 | 1,672 | 7.3 | 130 | 71 |
| HyCLASS 220W RR | 3,720 | 17 | 4,568 | 4,942 | 3,261 | 4,702 | 2,853 | 4,278 | 3,002 | 2,156 | 7.8 | 130 | 72 |
| HyCLASS 225W RR | 3,951 | 10 | 4,862 | 5,311 | 4,312 | 4,937 | 3,783 | 3,858 | 2,260 | 2,288 | 6.5 | 130 | 74 |
| University of Idaho | | | | | | | | | | | | | |
| Amanda | 3,978 | 8 | 4,666 | 5,347 | 3,521 | 5,431 | 3,967 | 3,692 | 3,046 | 2,157 | 6.0 | 132 | 71 |
| UI.05.6.33 SU | 3,594 | 22 | 3,944 | 4,844 | 4,443 | 4,617 | 3,221 | 3,113 | 2,259 | 2,313 | 5.8 | 131 | 71 |
| 06.WC.1 | 3,562 | 24 | 4,530 | 4,761 | 3,886 | 4,426 | 3,148 | 3,117 | 2,821 | 1,805 | 5.0 | 127 | 69 |
| 15.WC.1 | 4,053 | 6 | 5,405 | 5,781 | 4,614 | 5,312 | 4,205 | 2,657 | 3,109 | 1,341 | 4.8 | 132 | 75 |
| 05.WC.6.4.3 IMI | 3,679 | 19 | 4,723 | 5,625 | 3,918 | 4,782 | 3,386 | 2,988 | 2,604 | 1,404 | 6.5 | 132 | 75 |
| 05.WC.9.7.5.7 IMI | 3,647 | 21 | 4,444 | 4,766 | 3,990 | 5,037 | 3,350 | 3,048 | 2,621 | 1,920 | 6.0 | 131 | 74 |
| 05.WC.15.7.5 IMI | 3,832 | 13 | 4,874 | 5,371 | 4,250 | 4,987 | 3,094 | 3,330 | 2,673 | 2,077 | 7.0 | 133 | 75 |
| Durola Rapeseed | 4,020 | 7 | 5,027 | 6,000 | 4,005 | 5,164 | 3,761 | 3,384 | 2,995 | 1,826 | 6.3 | 129 | 72 |
| 05.WI.45.2.2 IMI Rapeseed | 3,842 | 12 | 4,730 | 5,470 | 4,937 | 5,111 | 3,299 | 3,092 | 2,253 | 1,844 | 5.5 | 131 | 75 |
| Mean | 3,910 | | 4,748 | 5,486 | 4,231 | 5,146 | 3,452 | 3,366 | 2,755 | 2,093 | 6.2 | 130 | 73 |
| LSD (p=0.05) | 285 | | NS | 793 | 552 | 554 | 687 | 601 | NS | 858 | 1.7 | 0.9 | 3.5 |
| C.V. (%) | 15.0 | | 14.3 | 10.2 | 9.3 | 10.9 | 14.1 | 12.4 | 23.1 | 29.0 | 19.8 | 0.7 | 4.8 |

Table 3. 2017 PNW Winter Canola & Rapeseed Variety Trial seed oil content estimations (percent) determined by NMR analysis including mean oil content over all sites and oil content at individual sites.

| Variety | Mean | | Oil Content by Location | | | | | | |
|----------------------------------|----------------|-------------|-------------------------|---------|-----------|-------------|--------|-----------|-----------|
| | Oil Content | | Moscow | Genesee | Craigmont | Grangeville | Odessa | Pendleton | Hermiston |
| | and Rank | | ID | WA | ID | ID | WA | OR | OR |
| | <i>percent</i> | <i>rank</i> | ----- | | | ----- | | | |
| Control Varieties | | | | | | | | | |
| Athena | 40.6 | 5 | 43.3 | 42.4 | 39.3 | 40.2 | 39.5 | 43.1 | 36.3 |
| Dwarf Essex Rapeseed | 40.0 | 8 | 43.3 | 41.3 | 37.1 | 39.4 | 39.6 | 43.7 | 35.5 |
| Ericka | 39.1 | 21 | 41.9 | 40.3 | 36.4 | 39.1 | 38.9 | 42.3 | 34.8 |
| Kansas State University | | | | | | | | | |
| Star 930W RR (KSR.07363) | 39.7 | 12 | 43.1 | 40.9 | 37.9 | 38.6 | 39.4 | 42.5 | 35.6 |
| Surefire SURT (KSUR.1211) | 39.4 | 14 | 43.1 | 41.3 | 38.0 | 38.9 | 38.8 | 40.9 | 35.2 |
| Torrington | 39.7 | 10 | 43.8 | 41.3 | 38.3 | 38.9 | 38.8 | 42.3 | 34.9 |
| Lima Grain Cereal Seeds | | | | | | | | | |
| Arsenal | 40.4 | 7 | 46.6 | 43.1 | 37.9 | 39.9 | 37.7 | 42.1 | 35.8 |
| Atenzo | 40.4 | 6 | 45.6 | 42.6 | 37.9 | 40.2 | 37.7 | 43.7 | 35.5 |
| Rubisco Seeds | | | | | | | | | |
| Edimax CL | 39.0 | 22 | 43.4 | 40.5 | 36.1 | 38.5 | 38.7 | 41.7 | 34.5 |
| Mercedes | 41.5 | 4 | 45.7 | 44.7 | 38.9 | 41.1 | 39.2 | 44.9 | 36.2 |
| Plurax CL | 42.3 | 3 | 46.4 | 44.7 | 40.6 | 43.2 | 40.9 | 44.1 | 35.9 |
| Star Specialty Seed, Inc. | | | | | | | | | |
| Star 915W RR | 39.3 | 19 | 43.0 | 41.5 | 36.8 | 39.2 | 38.6 | 41.3 | 34.8 |
| Croplan by Winfield | | | | | | | | | |
| HyCLASS 115W RR | 39.8 | 9 | 43.2 | 41.5 | 38.0 | 39.2 | 38.6 | 42.4 | 35.6 |
| HyCLASS 220W RR | 39.3 | 18 | 42.9 | 41.1 | 37.6 | 38.7 | 38.0 | 42.0 | 34.9 |
| HyCLASS 225W RR | 39.7 | 11 | 43.1 | 41.5 | 37.5 | 39.6 | 38.8 | 41.9 | 35.7 |
| University of Idaho | | | | | | | | | |
| Amanda | 39.6 | 13 | 42.8 | 42.4 | 36.8 | 39.0 | 39.1 | 42.3 | 35.0 |
| UI.05.6.33 SU | 39.2 | 20 | 42.0 | 41.3 | 36.3 | 39.6 | 38.7 | 41.1 | 35.6 |
| 06.WC.1 | 38.7 | 24 | 42.7 | 40.6 | 36.8 | 38.9 | 37.6 | 37.7 | 36.5 |
| 15.WC.1 | 39.3 | 17 | 42.4 | 41.7 | 37.2 | 38.9 | 39.0 | 42.1 | 34.2 |
| 05.WC.6.4.3 IMI | 38.9 | 23 | 41.8 | 41.7 | 36.2 | 38.9 | 38.4 | 40.8 | 34.6 |
| 05.WC.9.7.5.7 IMI | 39.4 | 15 | 43.7 | 40.2 | 37.3 | 38.9 | 38.8 | 42.4 | 34.8 |
| 05.WC.15.7.5 IMI | 39.4 | 16 | 43.3 | 40.9 | 37.3 | 38.2 | 39.1 | 42.2 | 35.0 |
| Durola Rapeseed | 43.0 | 1 | 47.5 | 44.8 | 40.1 | 42.6 | 41.6 | 45.9 | 38.4 |
| 05.WI.45.2.2 IMI Rapeseed | 42.3 | 2 | 46.4 | 44.7 | 39.6 | 41.2 | 42.4 | 43.5 | 38.5 |
| Mean | 40.0 | | 43.8 | 42.0 | 37.7 | 39.6 | 39.1 | 42.4 | 35.6 |
| LSD (p = 0.05) | 0.6 | | 1.6 | 1.1 | 1.9 | 0.9 | 1 | 2.6 | 1.8 |
| C.V. (%) | 2.8 | | 2.7 | 1.8 | 3.6 | 2.2 | 1.8 | 4.3 | 3.5 |