

## 2016 PACIFIC NORTHWEST 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 2016 winter canola and rapeseed variety trial contained 18 cultivars or advanced breeding lines from six companies or breeding programs (plus two control cultivars) and was planted at eight locations in the Inland Pacific Northwest in the late summer of 2015. Cultivar mean yields ranged from 3,637 to 5,679 lbs. per acre. Mean seed yield varied widely between locations, ranging from 2,119 to 6,262 lbs. per acre, with an overall mean of 4,418 lbs. per acre. The five commercial cultivars with highest yields were ‘Mercedes’, ‘Arsenal’, ‘Atenzo’, ‘Edimax CL’, and ‘Amanda’. The 2016 spring trial had 43 spring canola and rapeseed cultivars or advanced breeding lines from thirteen companies or breeding programs (plus three control cultivars) and was planted at seven locations. Cultivar mean yields ranged from 1,715 to 2,883 lbs. per acre when averaged across the five sites with a full complement of entries. Mean seed yield by site ranged from 1,096 to 3,032 lbs. per acre, with an overall mean of 2,401 lbs. per acre. The five cultivars with highest yields were ‘G49733 RR’, ‘HyCLASS 955 RR’, ‘HyCLASS 930 RR’, ‘DKL 70-10 RR’, and ‘NCC 101S’.

### INTRODUCTION

Growers in the Pacific Northwest continue to show a strong interest in canola (*Brassica napus*, *B. juncea*, and *B. rapa*), in part because it offers growers an alternative crop for rotation in an agricultural system predominated by small cereal grains. 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 171 winter varieties from 22 companies and 316 spring varieties from 32 companies submitted for testing over the lifespan of the trials. In 2016, 16 different commercial companies and public breeding programs submitted 61 distinct cultivars. The trials were funded in 2016 by USDA-NIFA Supplemental and Alternative Crops Competitive Grants Program and the commercial companies that submitted their cultivars or advanced breeding lines to be tested in the PNW trials.

### MATERIALS AND METHODS

**Winter Trial.** Eighteen different *Brassica napus* cultivars plus two control cultivars (‘Dwarf Essex’ rapeseed and ‘Athena’ canola) were planted in the fall of 2015 at eight locations across the Inland Pacific Northwest (Table 1). Each of the evaluated cultivars was canola quality, except for two industrial rapeseed cultivars; ‘Durola’, and ‘05.WI.45.2.2’. Both of the industrial rapeseed cultivars have canola-quality, low glucosinolate seed meal. Entries for this year’s 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 sulfonylurea 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 size of an individual plot was 4 feet by 15 feet. A seeding rate of approximately 6 lbs. per acre was used. 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 2015-2016 Pacific Northwest Winter Canola Variety Trial.

Location	Tillage Regime	Planting Date
Odessa, WA	irrigated, conventional	September 9, 2015
Moscow, ID - Early	conventional fallow	August 19, 2015
Moscow, ID - Late	recrop, pre-irrigated	September 3, 2015
Cottonwood, ID	conventional fallow	August 21, 2015
Grangeville, ID	conventional fallow	September 10, 2015
Genesee, ID	conventional fallow	September 11, 2015
Pendleton, OR	conventional fallow	September 23, 2015
Hermiston, OR	conventional irrigated	September 25, 2015

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.

**Spring Trial.** The 2016 spring trials were grown at seven locations throughout Idaho, Washington, and Oregon. Three cultivars, ‘Westar’, ‘Profit’, and ‘Goldrush’, were used as controls in the trial. All entries are *Brassica napus* cultivars with the exception of Goldrush, (*B. rapa*), and ‘Xceed X122’, (*B. juncea*). All entries are canola-quality with the exception of ‘Gem’ and ‘07.SI.8.A10’ which are industrial rapeseed varieties with low glucosinolate meal. Entries ending in “RR” are Roundup Ready® types (resistant to glyphosate herbicide); those with “LL” are Liberty Link® cultivars (resistant to glufosinate herbicide); “SU” indicates resistance to sulfonylurea herbicides, and “CL” denotes Clearfield® canola (resistant to imazamox herbicide) or other cultivars that are resistant to the imidazolinone herbicides. Tillage regimes and planting dates for each site are shown in Table 2.

Several entries arrived after the Washington and Oregon sites had already been planted. These entries do not have data for those sites, and their overall average yield is not presented.

For each site, a randomized complete block design with 4 replicates, and plot dimensions were 4 feet by 16 feet. The seeding rates were approximately 6 lbs. of seed per acre for *B. napus* cultivars and 5 lbs. per acre for *B. rapa* cultivars; although lower seeding rates were used for cultivars with small seed size to achieve approximately 450,000 plants per acre. Seed from each variety was treated with either Helix<sup>®</sup> Xtra, Helix<sup>®</sup> Vibrance, Prosper<sup>™</sup> Evergol or Prosper<sup>™</sup> 400 prior to planting for control of flea beetles and seedling diseases. All trials were grown on recrop ground and were fertilized according to local practice. The companies that entered varieties for testing are shown in Table 3.

**Table 2.** Location, tillage regime, and planting date of trials in the 2016 Pacific Northwest Spring Canola Variety Trial.

Location	Tillage Regime	Planting Date
Moscow, ID	tilled	May 10
Craigmont, ID	no till	April 11
LaCrosse, WA	no till	April 06
Fairfield, WA	tilled	April 30
Dayton, WA	no till	April 18
Pendleton, OR	tilled	March 31
Hermiston, OR	tilled, irrigated	March 17

The date of flower onset and plant height at maturity was recorded for each plot at the Moscow location. Flowering date was recorded when 50% of the plot was in bloom and is presented as days from planting to flowering. Heat tolerance was scored at Dayton on June 6, 2016, when the temperature was approximately 100°F. The degree of wilting was recorded on a scale of 1 to 9, with 1 indicating severely wilted plots and 9 indicating plots without wilting. Little or no lodging was observed at any site, so plots were not scored for that trait. 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 Trial.** ‘06.WC.1’ was the earliest flowering cultivar at 111 days after January 1 (April 21); however, all but one of the other varieties flowered within 3 days of that date. The overall mean flowering date was 113 days after January 1 (Table 3). The latest cultivar in the trial was ‘05.WC15.7.5’ with a flower date of 116 days after January 1 (April 26). These flower dates were about two weeks early than average, which can probably be attributed to the warmer than average late winter and early spring seen in 2016. Plant canopy height at maturity varied between 61 and 70 inches with an average height of 66 inches. ‘KSR 07363’ was the shortest cultivar, and ‘Arsenal’ and ‘Atenzo’ were the tallest.

The 2016 growing season was ideal for winter canola production. Early flowering and good moisture and temperatures during flowering resulted in a long flowering period and high yields. The mean seed yield for the trial was 4,418 pounds per acre across all sites and entries

(Table 3). Mean yields for individual cultivars ranged from 3,637 to 5,679 lbs. per acre. The highest yielding site was Genesee, ID with a mean yield of 6,262 lbs. per acre, while the lowest yielding site was Pendleton, OR, with a mean yield of 2,119 lbs. per acre. The five highest yielding commercial cultivars overall were from highest to lowest; ‘Mercedes’, ‘Arsenal’, ‘Atenzo’, ‘Edimax’ and ‘Amanda’.

The average seed oil content for all cultivars was 41.9%, and the oil content of individual cultivars ranged from 39.9% to 44.9% (Table 4) average across sites. Average oil content by site ranged from 39.6% at Grangeville, ID, to 46.0% in Moscow, ID. The five varieties with the highest oil content are as follows, from highest to lowest: Durola, 05.WI.45.2.2, Mercedes, Atenzo and Arsenal. Note that three of these varieties are also among the top five for seed yield.

**Spring Trial.** An unseasonably warm period with daytime temperatures well over 90°F in early June threatened spring canola crops just prior to flower onset. This provided a good opportunity to evaluate the spring entries for tolerance to heat stress. On June 6 with the temperature at about 100°F, differential wilting was observed and scored at the Dayton, WA site (Table 5). Scores ranged from 3.5 to 8.0 with a mean of 5.9. Cultivars with high scores tended those that have been casually observed to have good stress resistance and tended to be high yielding.

Goldrush was the earliest cultivar, flowering at 37 days after planting on June 16 (Table 5). That was expected, because Goldrush is a *B. rapa* cultivar, and *B. rapa* cultivars typically flower earlier than cultivars of *B. napus*. The next earliest cultivar was 07.SI.8.A10 rapeseed, which flowered at 45 days (June 24). The rest of the flowering dates ranged from 46 to 52 days after planting (June 25 to July 1), with an average flowering time of 49 days after planting, which is typical for the eastern Palouse region. The latest cultivars were ‘CS2200’ and ‘C5513.’ Plant height at maturity ranged from 39 to 49 inches by cultivar with an average of 44 inches.

The average seed yield across the entire trial was 2,401 lbs. per acre. Individual entries ranged from 1,715 to 2,883 lbs. per acre (Table 5). The lowest yielding site was the Pendleton, OR site with an average yield of 1,096 lbs. per acre. Hermiston, OR, which was an irrigated site, had the highest yield with an average of 3,032 lbs. per acre. The highest yielding dryland site was in Dayton, WA with an average yield of 2,755 lbs. per acre. The top five yielding varieties, from highest to lowest, were; ‘G49733 RR’, ‘HyCLASS 955 RR’, ‘HyCLASS 930 RR’, ‘DKL 70-10 RR’, and ‘NCC 101S’. The average oil content for all cultivars across all sites was 41.6%, and the average oil content of individual cultivars ranged from 37.7% for ‘NCC.16-713’ to 44.7% for ‘Star.402 RR’ (Table 6). Mean oil content by site ranged from 36.4% in Pendleton, OR to 44.9% in Fairfield, WA.

### Using These Tables

When using these tables, choose the site that most resembles your own in regards to region, annual rainfall, tillage practices, etc. and compare the best performing varieties at that site. The overall highest yielding varieties 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.

**Table 3.** Results of the 2016 Pacific Northwest Winter Variety Trial including mean yield and yield by location (pounds per acre), flower start, (days from January 1) and plant height at maturity (inches).

Cultivar	Mean Yield		Odessa	Moscow	Moscow	Genesee	Cottonwood	Grangeville	Hermiston	Pendleton	Flower Start	Plant Height
	lbs. / acre	rank	WA	ID - Early	ID - Late	ID	ID	ID	OR	OR	- days -	- inches -
<b>Controls</b>												
Athena	4,357	10	5,078	4,704	4,157	5,870	6,179	5,671	1,695	1,505	112	63
Dwarf Essex Rapeseed	3,637	20	3,996	4,769	3,199	5,236	4,034	4,416	1,825	1,621	113	68
<b>Kansas State University</b>												
KSR 07363 RR	3,948	16	4,469	4,739	4,153	5,373	4,587	4,005	2,292	1,965	112	61
<b>Limagrain Cereal Seeds</b>												
Arsenal	5,357	2	5,364	6,113	5,475	7,676	7,195	5,979	2,539	2,514	111	69
Atenzo	5,238	3	4,423	6,604	5,380	7,610	6,741	6,260	2,107	2,778	112	70
<b>Rubisco</b>												
Edimax CL	5,078	4	5,186	5,928	5,324	7,168	6,340	5,224	2,655	2,798	113	67
Mercedes	5,679	1	5,535	6,590	5,629	8,593	7,187	5,970	3,062	2,863	112	68
<b>Star Specialty Seed, Inc.</b>												
Star 915W RR+SURT	4,163	14	4,610	4,061	4,355	5,529	5,233	4,705	2,319	2,492	114	67
<b>Croplan by Winfield</b>												
HyCLASS 115W RR+SURT	4,065	15	4,281	4,892	3,809	5,699	5,381	4,623	1,903	1,930	113	64
HyCLASS 125W RR+SURT	4,171	13	4,714	4,414	3,841	6,108	5,811	4,825	1,994	1,660	112	65
<b>University of Idaho</b>												
Amanda	4,438	7	4,956	5,290	4,416	6,166	5,728	5,001	2,603	1,347	114	64
06.WC.1	4,280	12	3,839	4,858	3,737	6,629	5,985	5,038	2,439	1,711	111	64
15.WC.1	4,372	9	5,085	5,355	3,915	6,566	5,756	4,462	1,983	1,857	113	65
UI.05.6.33 SU	4,543	6	5,506	5,125	3,883	6,564	5,483	5,036	2,544	2,199	112	63
04.WL.4.4.404	4,665	5	4,959	5,258	3,978	6,997	5,929	5,327	2,281	2,592	113	67
05.WC.6.4.3 IMI	3,815	19	4,599	4,581	3,666	5,405	4,606	4,054	1,734	1,873	112	64
05.WC.9.7.5.7 IMI	3,922	17	4,245	4,922	3,738	5,461	5,278	4,185	1,854	1,691	112	67
05.WC.15.7.5 IMI	4,357	11	4,136	5,110	4,679	5,816	5,463	4,593	2,690	2,370	116	67
Durola Rapeseed	4,386	8	4,547	5,085	3,779	6,405	6,314	5,026	1,570	2,361	113	63
05.WI.45.2.2 IMI Rapeseed	3,891	18	3,974	5,078	4,686	4,374	4,764	4,098	1,901	2,252	112	67
<b>Mean</b>	<b>4,418</b>		<b>4,675</b>	<b>5,174</b>	<b>4,290</b>	<b>6,262</b>	<b>5,700</b>	<b>4,925</b>	<b>2,200</b>	<b>2,119</b>	<b>113</b>	<b>66</b>
<b>LSD (p = 0.05)</b>	<b>375</b>		<b>1,018</b>	<b>732</b>	<b>760</b>	<b>1,035</b>	<b>955</b>	<b>1,283</b>	<b>763</b>	<b>627</b>	<b>1</b>	<b>3</b>
<b>C.V.</b>	<b>15.4</b>		<b>16.1</b>	<b>12.0</b>	<b>13.0</b>	<b>12.1</b>	<b>12.1</b>	<b>19.2</b>	<b>24.6</b>	<b>20.8</b>	<b>0.7</b>	<b>5.7</b>

**Table 4.** Seed oil content (%) of entries in the 2016 PNW Winter Canola Variety Trial determined by NMR analysis including mean oil content over all sites, and oil content of varieties at individual sites.

Variety	Mean		Oil Content by Location							
	Oil Content		Odessa	Moscow	Moscow	Genesee	Cottonwood	Grangeville	Hermiston	Pendleton
	and Rank		WA	ID - Early	ID - Late	WA	ID	ID	OR	OR
	<i>percent</i>	<i>rank</i>	<i>percent</i>							
<b>Control Varieties</b>										
Athena	42.3	8	40.3	46.3	43.0	41.5	43.7	42.2	40.0	41.8
Dwarf Essex Rapeseed	42.7	7	40.1	47.3	43.0	41.4	45.9	40.1	40.6	43.6
<b>Kansas State University</b>										
KSR 07363 RR	41.2	17	39.3	44.9	42.8	39.9	44.3	38.3	39.7	40.3
<b>Limagrain Cereal Seeds</b>										
Arsenal	43.5	4	39.6	48.4	44.9	43.6	47.1	39.6	41.0	43.5
Atenzo	43.4	5	40.1	48.0	43.5	42.5	45.7	42.1	41.0	44.3
<b>Rubisco Seeds</b>										
Edimax CL	41.9	10	41.8	45.8	41.5	41.0	43.8	38.6	40.1	42.7
Mercedes	44.2	3	41.9	48.1	46.1	44.0	47.1	40.1	41.8	44.2
<b>Star Specialty Seed, Inc.</b>										
Star 915W RR+SURT	41.6	12	39.1	45.2	42.7	40.6	45.4	38.6	40.5	41.2
<b>Croplan by Winfield</b>										
HyCLASS 115W RR+SURT	41.7	11	39.0	45.5	41.8	40.8	46.0	38.7	40.1	41.5
HyCLASS 125W RR+SURT	41.5	14	39.4	45.4	42.4	41.9	43.4	37.9	40.7	41.3
<b>University of Idaho</b>										
Amanda	42.1	9	39.8	45.2	44.2	41.3	43.5	41.7	40.0	40.8
06.WC.1	40.4	20	38.4	44.5	41.7	40.2	41.8	37.9	39.2	39.7
15.WC.1	41.6	13	42.1	44.7	42.0	40.9	44.2	38.5	39.5	40.9
UI.05.6.33 SU	41.4	15	39.4	44.1	42.6	41.7	44.6	38.7	40.1	40.2
04.WL.4.4.404	42.7	6	40.2	45.8	44.2	43.4	45.7	39.8	40.7	42.3
05.WC.6.4.3 IMI	40.4	19	39.0	44.3	42.2	40.6	43.9	37.8	35.0	40.4
05.WC.9.7.5.7 IMI	41.0	18	38.8	44.6	42.4	40.5	44.4	38.6	38.2	40.7
05.WC.15.7.5 IMI	41.3	16	39.6	44.9	42.5	40.3	44.8	38.6	38.7	41.3
Durola Rapeseed	45.3	1	43.5	49.2	47.7	45.1	48.1	42.1	41.8	45.2
05.WI.45.2.2 IMI Rapeseed	44.9	2	43.2	49.0	45.0	44.2	49.2	41.8	42.3	45.0
<b>Mean</b>	42.3		40.2	46.0	43.3	41.8	45.1	39.6	40.0	42.0
<b>LSD (p = 0.05)</b>	0.6		2.2	0.9	1.8	1.1	1.2	2.5	2.2	1.3
<b>C.V.</b>	2.8		3.9	1.6	3.0	1.9	1.9	4.5	3.8	2.1

**Table 5.** Results of the 2016 PNW Spring Canola Variety Trial including mean yield and yield by location (pounds per acre), flower start (days from planting), heat tolerance (1 to 9, 1 indicates extreme wilting and 9 indicates no wilting) and plant height at maturity (inches).

Variety	Mean		Fairfield WA		LaCrosse WA		Dayton WA		Moscow ID		Craigmont ID		Hermiston OR		Pendleton OR		Flower	Heat	Plant			
	Yield	Rank	Yield	Rank	Yield	Rank	Yield	Rank	Yield	Rank	Yield	Rank	Yield	Rank	Yield	Rank	Start	Tolerance	Height			
<b>Controls</b>																	----- pounds per acre -----			- days -	- score-	- inches-
Westar	2,026	33	2,635	36	1,272	27	2,359	36	1,995	35	1,870	38	2,860	19	883	35	49	4.8	43			
Profit	2,016	34	2,607	37	954	37	2,554	29	1,911	41	2,053	35	2,499	27	1,029	23	49	5.5	44			
Goldrush	1,715	35	2,231	43	911	38	1,592	39	1,325	46	2,514	26	2,540	26	711	37	37	6.3	39			
<b>Bayer CropScience LP</b>																						
InVigor L130 LL	2,677	8	3,008	18	1,658	12	2,953	10	2,613	4	3,151	6	2,928	18	1,072	19	50	5.8	48			
InVigor L140P LL	2,621	10	3,096	14	1,689	10	2,836	15	2,571	5	2,913	16	3,860	4	1,172	12	50	5.8	46			
InVigor 5440 LL	2,531	12	3,091	16	1,344	24	2,783	21	2,363	14	3,072	9					51	6.0	47			
<b>BrettYoung Seeds</b>																						
BY 15-677 CL	2,614	11	2,889	24	1,548	15	3,140	7	2,429	12	3,064	11			1,215	10	50	6.3	46			
BY 5535 CL	2,459	16	2,847	25	1,530	16	2,842	14	2,384	13	2,692	24	2,848	20	1,287	5	50	6.5	49			
BY 16-768 RR	2,402	18	2,996	19	1,516	17	2,643	25	2,030	32	2,827	20			1,380	2	49	6.5	43			
BY 6080 RR	2,262	22	3,285	10	1,309	26	2,650	24	2,144	20	1,922	36			1,290	4	49	6.5	44			
<b>Canterra Seeds</b>																						
CS2200 CL	2,208	24	2,769	30	1,384	22	2,671	23	1,967	38	2,247	30			1,118	17	52	8.0	48			
<b>Cargill Specialty Seeds and Oils</b>																						
V12-1 RR	2,291	21	2,974	20	1,068	35	2,408	35	2,196	18	2,811	21	3,271	12	908	34	50	6.5	46			
V12-3 RR	2,457	17	3,203	11	1,229	29	2,680	22	2,080	27	3,093	7	2,985	17	1,011	27	50	5.8	46			
V22-1 RR	2,131	27	2,718	32	1,066	36	2,427	34	1,853	42	2,589	25	2,737	22	943	33	51	6.0	44			
<b>Croplan by Winfield</b>																						
HyCLASS 930 RR	2,838	3	3,382	6	1,703	8	3,407	2	2,435	10	3,265	4	3,260	13	1,350	3	47	6.8	43			
HyCLASS 955 RR	2,863	2	3,397	5	1,660	11	3,515	1	2,668	1	3,073	8	3,894	3	1,417	1	47	6.5	43			
HyCLASS 970 RR	2,514	14	3,197	12	1,502	19	2,941	11	2,017	33	2,911	17	2,718	23	1,142	16	48	5.5	43			
<b>Monsanto Company</b>																						
DKL 70-10 RR	2,799	4	3,506	2	1,810	4	3,195	5	2,535	7	2,948	13	2,621	25	1,240	8	48	7.3	45			
G35153 RR	2,738	7	3,289	9	1,641	13	3,369	3	2,485	8	2,906	18	3,481	7	1,200	11	48	6.3	45			
G49720 RR	2,743	6	3,420	3	1,579	14	3,235	4	2,617	3	2,863	19	3,456	9	1,217	9	48	7.0	47			
G49733 RR	2,883	1	3,717	1	1,706	7	3,094	8	2,648	2	3,251	5	3,566	6	1,253	7	49	6.0	44			
<b>Nuseed</b>																						
GT50 RR	2,480	15	3,092	15	1,724	6	2,472	31	2,042	30	3,070	10	3,803	5	951	30	49	8.0	43			
NCH 13G046 RR	2,526	13	3,318	7	1,741	5	2,506	30	2,124	22	2,939	14	3,419	10	950	31	49	7.0	44			
<b>Star Specialty Seed, Inc</b>																						
Star 402 RR	2,671	9	3,309	8	1,515	18	3,184	6	2,433	11	2,914	15	3,277	11	1,164	13	47	6.0	46			
<b>University of Idaho</b>																						
Empire	2,319	20	2,698	33	1,206	30	2,785	20	2,185	19	2,719	23	3,119	15	1,150	14	47	6.3	39			
Cara	2,092	30	2,461	42	1,079	34	2,593	27	2,009	34	2,319	28	2,206	32	1,045	22	47	4.8	43			
07SC17.20.B4	2,087	31	2,505	41	1,395	21	2,793	17	1,844	43	1,899	37	2,992	16	991	28	50	5.3	43			
07SC27.19.B3	2,095	29	2,554	39	1,325	25	2,459	32	1,953	40	2,186	32	2,642	24	945	32	50	4.3	44			
07.IR.5.5.5	2,200	25	3,010	17	1,116	32	2,808	16	1,971	36	2,097	33	2,493	28	985	29	50	5.8	48			
07.IR.7.8.8	2,130	28	2,919	22	1,098	33	2,439	33	2,110	25	2,086	34	2,035	33	1,026	24	50	6.5	44			
10.SN.22.8	2,168	26	2,973	21	1,372	23	2,165	38	1,970	37	2,359	27	2,821	21	1,071	20	48	4.8	39			
Gem Rapeseed	2,075	32	2,542	40	1,198	31	2,337	37	2,036	31	2,263	29	2,304	31	815	36	48	5.5	41			
07.SI.8.A10 Rapeseed	2,246	23	2,640	35	1,478	20	2,788	18	2,089	26	2,233	31	2,458	29	1,058	21	45	4.5	39			
<b>Photosyntech</b>																						
NCC 101S	2,774	5	3,111	13	1,953	3	2,912	13	2,443	9	3,451	2	3,468	8	1,283	6	46	8.0	41			
NCC 16-015					2,035	1			2,131	21	3,453	1	3,903	2	1,146	15	49		40			
NCC 16-017					1,976	2			2,563	6	3,349	3	3,960	1	1,018	26	49		42			
NCC 16-713					1,694	9			1,811	44	3,053	12	2,441	30	1,022	25	50		45			
<b>Cibus</b>																						
C1511 SU	2,376	19	2,818	27	1,265	28	2,925	12	2,075	28	2,799	22	3,181	14	1,090	18	50	4.8	44			
C5507 SU			2,817	28			2,969	9	2,121	24							50	4.0	45			
C5513 SU			2,652	34			2,788	18	1,956	39							52	3.8	45			
C5522 SU			2,748	31			2,636	26	2,123	23							50	4.8	45			
<b>Crop Production Services</b>																						
DG 200 CL			2,906	23					2,218	17							51		47			
DG 531G RR			2,598	38					2,265	15							48		45			
DG 533G RR			3,413	4					2,225	16							49		46			
Xceed X122 CL			2,834	26					1,699	45							41		46			
<b>Dow AgroSciences</b>																						
Nexera 2020 CL			2,775	29			2,591	28	2,067	29							51	3.5	46			
<b>Mean</b>	<b>2,401</b>		<b>2,952</b>		<b>1,454</b>		<b>2,755</b>		<b>2,168</b>		<b>2,716</b>		<b>3,032</b>		<b>1,096</b>		<b>49</b>	<b>5.9</b>	<b>44</b>			
<b>LSD (p=0.05)</b>			<b>314</b>		<b>225</b>		<b>387</b>		<b>326</b>		<b>360</b>		<b>751</b>		<b>220</b>		<b>1</b>	<b>0.9</b>	<b>2.5</b>			
<b>C.V.</b>			<b>7.6</b>		<b>11.2</b>		<b>10.0</b>		<b>10.9</b>		<b>9.5</b>		<b>17.6</b>		<b>14.3</b>		<b>1.7</b>	<b>10.9</b>	<b>4.1</b>			

**Table 6.** Seed oil content (%) of entries in the 2016 PNW Spring Canola Variety Trial determined by NMR analysis including mean oil content over all sites except Hermiston, Oregon (due to missing entries) of varieties grown at all sites, and oil content of varieties at individual sites.

Variety	Mean		Oil Content by Location						
	Oil Content and Rank		Fairfield	LaCrosse	Dayton	Moscow	Craigmont	Hermiston	Pendleton
	percent	rank	WA	WA	WA	ID	ID	OR	OR
<b>Control Varieties</b>	<i>percent</i>	<i>rank</i>	-----						
Westar	40.7	27	44.3	37.2	41.3	41.3	44.1	43.3	36.2
Profit	41.9	12	45.2	38.4	42.8	42.6	44.9	44.2	37.3
Goldrush	40.5	28	43.3	35.6	40.7	42.1	44.7	41.4	36.7
<b>Bayer CropScience</b>									
InVigor L130 LL	41.0	22	44.2	36.9	41.5	41.7	45.7	41.1	36.0
InVigor L140P LL	41.0	22	44.3	36.1	41.7	42.8	44.9	42.1	36.2
InVigor L120 LL	41.0	21	44.9	36.4	41.6	41.4	46.0	42.8	35.8
<b>BrettYoung Seeds</b>									
BY 15-677 CL	42.0	10	44.6	37.8	42.2	42.6	46.7		38.1
5535 CL	40.9	24	44.7	36.4	43.3	41.3	44.1	43.5	35.5
BY 16-768 RR	42.5	7	45.0	37.4	44.2	43.7	46.6		37.9
BY 6080 RR	42.0	11	45.2	36.9	43.5	43.1	45.6		37.5
<b>Canterra Seeds</b>									
CS 2200 CL	41.8	13	45.1	37.1	43.2	42.3	45.8		37.5
<b>Cargill Specialty Seeds and Oils</b>									
V12-1 RR	40.9	25	45.5	36.7	42.8	40.9	44.2	42.2	35.0
V12-3 RR	40.5	29	44.5	37.0	42.5	40.2	43.6	41.6	34.9
V22-1 RR	41.7	14	45.8	37.5	43.2	41.6	45.1	42.1	37.1
<b>Cibus</b>									
C 1511 SU	39.7	33	42.9	35.0	41.8	39.9	44.2	39.7	34.2
C5507 SU			45.3		41.9	43.7			
C5513 SU			45.1		42.2	41.9			
C5522 SU			44.8		41.8	43.2			
<b>Crop Production Services</b>									
DG 200 CL			45.0			42.5			
DG 531G RR			45.0			42.5			
DG 533G RR			46.0			40.4			
Xceed X122 CL			44.2			39.7			
<b>Croplan by Winfield</b>									
HyCLASS 930 RR	44.3	2	47.3	39.9	45.6	45.2	48.1	46.2	39.6
HyCLASS 955 RR	43.5	3	47.0	39.2	45.7	43.7	46.8	45.9	38.8
HyCLASS 970 RR	42.5	5	46.6	37.7	43.5	43.3	47.1	43.9	36.8
HyCLASS 972 RR	41.5	18	45.5	36.9	41.8	40.9	46.2		37.5
<b>Dow AgroSciences</b>									
Nexera 2020 CL			45.2		43.4	42.3			
<b>Monsanto Company</b>									
DKL 70-10 RR	42.5	4	45.1	38.0	43.4	44.1	46.9	42.9	37.7
G35153 RR	42.3	8	46.4	37.6	42.5	43.3	47.3	45.2	36.8
G49720 RR	41.6	15	44.9	36.5	43.0	43.0	46.0	43.1	36.2
G49733 RR	42.2	9	46.3	37.5	43.7	42.6	46.0	43.6	37.0
<b>Nuseed</b>									
GT50	39.3	36	42.9	34.5	40.4	39.6	44.0	42.1	34.1
NCH 13G046	39.6	34	43.3	35.4	40.6	40.0	44.1	41.8	34.1
<b>Photosyntech</b>									
NCC 101S	39.4	35	43.3	34.9	40.1	40.0	44.5	41.1	33.5
NCC 16-015				36.1		38.0	44.0	42.1	35.0
NCC 16-017				35.4		39.3	43.8	42.6	34.6
NCC 16-713				34.7		38.3	42.5	40.0	33.0
<b>Star Specialty Seed, Inc.</b>									
Star 402	44.4	1	47.7	40.5	45.1	44.7	48.7	46.2	39.7
<b>University of Idaho</b>									
Empire	40.8	26	43.7	36.8	41.8	40.2	44.9	43.2	37.4
Cara	41.1	20	44.6	36.7	43.0	40.5	45.2	43.7	36.7
07SC17.20.B4	41.2	19	44.8	36.2	42.8	41.2	45.8	43.6	36.3
07SC27.19.B3	41.6	17	45.5	37.3	42.5	41.9	45.5	42.8	36.7
07.IR.5.5.5	39.8	32	44.3	35.8	41.6	38.4	43.8	42.7	34.8
07.IR.7.8.8	40.4	30	44.6	35.9	41.8	41.7	43.6	41.8	34.5
10.SN.22.8	40.2	31	43.3	37.7	41.0	40.2	43.4	40.9	35.6
Gem Rapeseed	42.5	6	44.8	39.9	42.8	43.2	46.1	44.1	38.1
07.SI.8.A10 Rapeseed	41.6	16	44.0	38.5	41.3	43.2	44.9	43.2	37.5
<b>Mean</b>	41.4		44.9	37.0	42.5	41.7	45.3	42.8	36.4
<b>LSD (p=0.05)</b>			1.2	0.8	1.7	2.0	1.4	1.7	1.4
<b>C.V.</b>			1.9	1.5	2.9	3.4	2.1	2.9	2.7