

2011-2012 PACIFIC NORTHWEST WINTER CANOLA VARIETY TRIAL

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ABSTRACT

A winter rapeseed and canola variety trial with 22 canola or industrial rapeseed (*Brassica napus* or *B. rapa*) cultivars or advanced breeding lines was grown at seven locations in the inland Pacific Northwest. Mean yield by location ranged from 2,172 to 6,086 lbs. per acre, and mean yields of individual cultivars across all locations ranged from 2,365 to 5,235 lbs. per acre.

INTRODUCTION

For many years, winter rapeseed has been grown on a few thousand acres in the inland Pacific Northwest (PNW) region of the U.S.A. Until the 1990s, this production had been exclusively industrial rapeseed with high levels of erucic acid in its oil. The acreage has increased during the last 20 years, and most of this new production has been with cultivars that produce canola-quality oil and meal. New cultivars are being introduced continually, and yield trials throughout the region are needed to evaluate these and to identify more areas in the region that are suited to winter canola or rapeseed production. Growers need to know how the yields of newly released cultivars compare to that of existing cultivars. In addition, cultivars need to be tested using direct seed technology to determine varietal responses to tillage method.

To address these issues, the University of Idaho founded the Pacific Northwest Winter Canola Variety Trial (PNWWVT) in the fall of 1995. Both commercial cultivars and advanced breeding lines have been tested. In the last 17 years, the project has evaluated 144 different winter cultivars or advanced lines representing 18 companies. The 2012 trial was funded by the NIFA (National Institute of Food and Agriculture) PNW Canola Research Program, the University of Idaho, and fees paid by the commercial companies that submit their cultivars or advanced breeding lines to be tested in the PNWWVT.

MATERIALS AND METHODS

Eighteen *Brassica napus* canola or rapeseed cultivars and breeding lines plus four control cultivars; ‘Athena’ canola (*B. napus*), ‘Ericka’ canola (*B. napus*), ‘Bridger’ industrial rapeseed (*B. napus*), and ‘Salut’ canola (*B. rapa*), were planted in the fall of 2011 at eight locations (Table 1). The trial included canola entries from DL Seeds, Monsanto Company, Winfield Solutions LLC, and the University of Idaho Canola, Rapeseed and Mustard Program. All entries were canola-quality cultivars except Bridger, ‘Rossini’ industrial rapeseed from Technology Crops International (TCI), and ‘Durola’ industrial rapeseed (formerly ‘06UIWH.5.1’) from the University of Idaho. Four of the cultivars entered were Roundup Ready[®] types and are designated with “RR” in their names. These genetically engineered, Roundup Ready cultivars were not planted at the Genesee site in order to keep the research farm there GMO-free.

Table 1. Locations, tillage regimes, and planting dates of trial sites in the 2011-2012 Pacific Northwest Winter Canola Variety Trial.

Location	Tillage Regime	Planting Date
Odessa, WA	irrigated, conventional recrop	Sept 12, 2011
Davenport, WA	direct seed, chem fallow	Sept 12, 2011
Moscow, ID	conventional fallow	Sept 2, 2011
Genesee, ID	conventional fallow	Sept 9, 2011
Craigmont, ID	direct seed, chem fallow	Sept 11, 2011
Grangeville, ID	conventional fallow	Sept 13, 2011
Pendleton, OR	conventional fallow	Sept 12, 2011
Hermiston, OR	irrigated, conventional recrop	Sept 14, 2011

The trial design used was a randomized, complete block with four replications. Plot size was 4 by 15 ft., and the seeding rate was approximately 7 lbs. per acre. The direct seed sites (See Table 1.) were planted using a plot drill with Flexi-Coil Stealth openers that places fertilizer below paired-rows. The trial at Grangeville was planted with a newly constructed deep furrow plot drill converted from a John Deere HZ drill, which allowed the trial to be established in conditions that were not conducive to planting with a conventional drill. Trials were fertilized according to local practice, and the typical site received at least 100 lbs. of nitrogen per acre.

The dates of 50% bloom and plant canopy heights were recorded at the Moscow site. Prior to harvest, all plots at each site were cut with a small plot swather to aid harvest. Some lodging occurred at the Moscow site and was scored as the plots were swathed. Once dry, the plots were harvested with a small plot combine, and the seed from each plot was weighed to determine yield. After weighing, a subsample was taken from each plot for oil content estimation with a nuclear magnetic resonance (NMR) analyzer.

RESULTS

The Davenport site had poor emergence due to dry conditions at planting time and was abandoned. The other sites had fair to good emergence with acceptable stands. Some entries at the Craigmont site were damaged by Roundup herbicide drift from the adjacent Roundup Ready canola field. Most plots recovered from this damage, but their maturity was delayed. Consequently, the yield of those entries could be reduced relative to the yield of the Roundup Ready cultivars. For that reason, the yields at Craigmont were not included in the overall mean in the data summary (Table 2). Yields from Genesee were also omitted from the overall means, because of the incomplete set of entries at that site.

Mean flower date was day 131 (days from Jan 1, *i.e.*, May 11). The earliest cultivar was Salut, which flowered at 126 days after January 1, followed by Ericka, Bridger and '06.UIWC.1,' which flowered on day 128, 128, and 129, respectively. The dates of flowering ranged from day 126 to day 133. This range was compressed as compared to some years due to cool spring weather that delayed the onset of flowering in the early cultivars (Table 2). Mean plant height was 70 inches, with Salut, Ericka, Bridger and 'DKW 44-10 RR' being the shortest

cultivars at 65, 66, 67 and 67 inches, respectively. The U of I breeding line '04.WL.4.2.104' was the tallest entry at 76 inches.

The mean seed yield of the entire trial was 3,792 lbs. per acre, and mean yields from the sites ranged from 2,172 lbs. per acre at the Pendleton site to 6,086 lbs. per acre at the Genesee site (Table 2). Cultivars yielded from 2,365 to 5,235 lbs. per acre when averaged across all locations. The highest yielding line was 'Rossini' industry rapeseed followed by 'Sitro' canola at 4,829 lbs. per acre. Oil content was determined on all harvested plots (Table 3). The mean oil content across all varieties and sites was 39.2%. The site with the highest oil content was Pendleton at 41.0%, while the Odessa site had the lowest oil content, 37.8%. Mean oil contents of the individual varieties ranged from 37.2% to 42.1%. As is typical, the industrial rapeseed cultivars had the highest oil contents, but most canola varieties also performed well with oil contents near 40 %.

DISCUSSION

These trials demonstrated again that establishing winter canola can be difficult at some sites, especially in direct seed situations. In fact, the only site that was abandoned this year was the direct seed site at Davenport that failed to establish. Cropping systems with irrigation or traditional fallow in intermediate to high rainfall zones continue to provide the best chance for establishing a winter canola crop. With a focus on expanding the acreage of winter canola, recent discussions in the PNW canola-growing community about how to better establish the crop have centered on earlier planting times to take advantage of the greater amount of moisture available in fallow soils during the early summer. The first attempts with early planting in 2008-2009 suggested that this might be feasible, but after some failures due to extremely hard freezes the winter of 2009-2010, additional early planted trials are needed. At this time, an early planted variety is in the ground at Moscow, ID and near LaCrosse, WA.

Progress in cultivar development is being made; newer cultivars tested in 2012 continued to show high yield potential compared to those tested in previous years. However, Roundup Ready winter canola varieties tested still lag somewhat behind conventional varieties. The best Roundup Ready variety in the trial, 'HyCLASS 125W' yielded 20% less than the best commercial hybrid, Sitro and 6% less than the best open pollinated (OP) breeding line. It did produce an equivalent yield to the best commercially available OP cultivar, Amanda, which is an improvement over previously tested Roundup Ready cultivars.

Several new breeding lines from the University of Idaho, some of which had not been tested regionally in the past, produced promising results. However, work needs to continue to develop cultivars that are better adapted to direct seed systems and that have increased winter hardiness, especially in the seedling stage to allow later planting when required. In addition, cultivars that are adapted to early or mid-summer planting dates are needed as well.

Table 2. Results from the 2011-2012 PNW Winter Canola Variety Trial including mean yield of all sites (lbs./acre), yield rank, yield by site (lbs./acre), flower date, (days after January 1), plant height (inches), and lodging score (1 to 9, with 9 being best). Flower start, lodging and height were scored at Moscow.

Varieties Tested	Yield by location											
	Mean yield and rank of complete sites		Moses Lake WA	Moscow ID	Genesee ID*	Craigmont ID**	Grangeville ID	Pendelton OR	Hermiston OR	Flower Start	Plant Height	Lodging Resistance
	<i>lbs per acre</i>	<i>rank</i>	-----			<i>lbs per acre</i>	-----			<i>days after Jan. 1</i>	<i>inches</i>	<i>1 to 9 score</i>
Controls												
Athena	3,682	13	5,825	4,508	5,574	2,439	4,690	1,901	2,728	130	69	8.50
Ericka	3,289	20	4,541	4,576	5,276	2,650	3,579	1,797	2,592	128	66	6.75
Salut	2,365	22	3,743	1,993	4,780	1,507	3,974	1,680	1,294	126	65	7.50
Bridger Rapeseed	3,283	21	4,758	4,558	5,038	2,621	3,876	1,660	2,225	128	67	3.25
Monsanto Company												
DKW 44-10 RR	3,656	15	4,763	4,348	-	3,909	4,473	2,262	2,178	133	67	4.50
DKW 46-15 RR	3,631	17	4,913	4,360	-	4,511	4,187	2,162	1,654	133	69	6.00
DL Seeds/ Rubisco Seeds												
Baldur	4,327	3	5,135	6,085	6,254	3,486	5,250	2,850	3,155	132	74	5.75
Sitro	4,829	2	6,457	6,653	7,160	3,750	5,519	3,071	3,524	131	73	6.00
Winfield Solutions, LLC												
HyCLASS 115W RR	3,379	18	4,727	3,823	-	3,575	4,273	1,787	2,087	131	73	4.25
HyCLASS 125W RR	3,825	10	4,828	5,158	-	4,846	4,659	1,416	2,044	131	73	7.75
Technology Crops Int'l												
Rossini Rapeseed	5,235	1	6,918	7,089	8,115	4,570	5,827	3,007	4,000	129	73	5.50
University of Idaho												
Amanda	3,833	9	5,845	4,866	5,596	3,354	4,039	2,143	2,748	133	70	6.50
Durola Rapeseed	3,674	14	5,149	4,757	5,958	3,312	4,957	1,828	2,041	131	69	6.50
06.UIWC.1	4,058	5	5,582	4,919	6,405	3,502	4,503	2,619	3,220	129	66	7.50
UI.05.6.33	4,000	6	5,115	4,866	6,306	3,258	5,808	2,098	2,856	131	70	8.75
03.WC.4.226.8	3,958	7	4,975	5,020	5,803	3,697	4,746	2,693	2,614	131	74	7.75
03.WC.6.103.8	3,699	12	4,676	4,875	5,606	2,841	4,726	2,177	2,898	130	70	8.00
03.WDB.29.330.8	4,090	4	5,454	4,865	6,440	3,890	4,840	2,329	3,164	133	70	6.25
04.WL.4.2.104	3,294	19	4,634	4,412	6,292	2,484	4,228	1,757	2,249	130	76	7.50
04.WL.4.4.404	3,868	8	5,620	4,300	6,627	2,847	5,254	2,199	2,987	131	68	9.00
04.WL.4.4.414	3,819	11	5,065	4,960	6,391	3,238	5,504	1,947	2,197	131	71	6.75
03.WC.9.302.3	3,637	16	4,112	4,624	5,919	4,081	4,064	2,410	2,528	131	70	7.75
Mean	3,792		5,129	4,801	6,086	3,380	4,681	2,172	2,590	131	70	6.73
LSD (<i>p</i> = 0.05)	359		794	1,055	1,902	1,120	924	749	630	1.2	6	2.96

* The data from Genesee is not included in overall means or LSD due to incomplete set of cultivars at that location.

** The Craigmont site was damaged by Roundup herbicide drift, so the yields of the Roundup Ready varieties are relatively inflated at that site.

Table 3. Mean seed oil content (percent of seed weight) estimated by NMR, rank by mean oil content, and mean oil content (percent of seed weight) by site of varieties entered in the 2011-2012 PNW Winter Canola Variety Trial.

Varieties Tested	Mean oil content and rank of complete sites		Oil Content by location					
			Odessa	Moscow	Genesee	Grangeville	Pendelton	Hermiston
	%	rank	WA	ID	ID	ID	OR	OR
Controls								
Athena	39.7	6	39.0	39.7	40.8	39.8	41.3	38.8
Ericka	38.2	20	37.3	39.1	39.3	37.5	39.7	37.3
Salut	37.2	22	36.7	37.3	38.6	35.8	39.9	36.3
Bridger Rapeseed	40.6	3	38.9	41.4	41.3	40.1	42.2	40.4
Monsanto Company								
DKW 44-10 RR	37.3	21	35.6	38.2	-	36.3	40.0	36.6
DKW 46-15 RR	39.9	5	38.5	40.7	-	38.8	42.4	39.2
DL Seeds /Rubisco Seeds								
Baldur	39.0	13	38.0	40.8	39.6	38.5	40.0	37.9
Sitro	38.4	17	36.8	40.6	41.3	35.7	40.9	38.3
Winfield Solutions, LLC								
HyCLASS 115W RR	38.6	16	37.1	38.9	-	38.9	40.2	37.9
HyCLASS 125W RR	39.0	14	37.4	40.1	-	38.7	41.0	37.9
Technology Crops Int'l								
Rossini Rapeseed	42.0	2	39.5	43.3	43.0	43.2	44.1	40.0
University of Idaho								
Amanda	39.1	10	38.1	40.4	40.1	38.0	40.3	38.8
Durola Rapeseed	42.1	1	40.8	43.6	43.8	42.2	43.3	40.7
06.UIWC.1	38.2	19	36.8	38.5	38.1	37.7	40.4	37.9
UI.05.6.33	39.3	8	37.8	40.0	40.0	40.3	40.5	38.1
03.WC.4.226.8	39.3	9	37.4	40.0	39.4	39.0	41.9	38.3
03.WC.6.103.8	38.4	18	36.8	39.5	39.6	37.8	40.1	37.9
03.WDB.29.330.8	39.0	15	37.8	39.6	40.0	38.0	41.3	38.3
04.WL.4.2.104	39.1	11	37.4	39.9	40.6	39.2	40.9	38.1
04.WL.4.4.404	40.3	4	38.2	41.0	41.3	41.7	41.6	38.8
04.WL.4.4.414	39.7	7	38.1	40.7	40.7	40.6	40.4	38.6
03.WC.9.302.3	39.1	12	38.2	39.6	40.1	38.8	40.9	37.8
Mean	39.2		37.8	40.1	40.4	38.9	41.0	38.3
LSD ($p = 0.05$)	0.6		0.8	1.0	1.9	2.2	2.3	0.9