

2010-2011 PACIFIC NORTHWEST WINTER CANOLA VARIETY TRIAL

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ABSTRACT

A winter rapeseed and canola variety trial with 24 canola or industrial rapeseed (*Brassica napus* or *B. rapa*) cultivars or advanced breeding lines was grown at eight locations in the inland Pacific Northwest. Mean yield by location ranged from 2,461 to 5,430 lbs. per acre, and mean yields of individual cultivars across all locations ranged from 2,542 to 4,456 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. Roundup Ready[®] winter canola cultivars were available commercially for the first time in the PNW in the fall of 2005 and are now widely available, and growers need to know how the performance of newly released cultivars including herbicide resistance types compares 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 16 years, the project has evaluated 140 different winter cultivars or advanced lines representing 16 companies. The 2011 trial was funded by the 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

Nineteen *Brassica napus* canola or rapeseed cultivars and breeding lines plus five control cultivars; ‘Athena’ canola (*B. napus*), ‘Ericka’ canola (*B. napus*), ‘Dwarf Essex’ industrial rapeseed (*B. napus*), ‘Bridger’ industrial rapeseed (*B. napus*), and ‘Salut’ canola (*B. rapa*), were planted in the fall of 2010 at eight locations (Table 1). The trial included canola entries from DL Seeds, Monsanto Company, and the University of Idaho Canola, Rapeseed and Mustard Program. All entries were canola-quality cultivars except the two rapeseed controls listed above and ‘Durola’ industrial rapeseed, formerly ‘06UIWH.5.1,’ from the University of Idaho. Two of the cultivars entered were Roundup Ready[®] types, and these are designated with “RR” in their names.

Table 1. Location, tillage regime, and planting date of trials in the 2010-2011 Pacific Northwest Winter Canola Variety Trial.

Location	Tillage Regime	Planting Date
Odessa, WA	irrigated, conventional recrop	Sept 10, 2010
Davenport, WA	direct seed, chem fallow	Sept 8, 2010
Moscow, ID	conventional fallow	Sept 6, 2010
Moscow, ID	direct seed, chem fallow	Sept 9, 2010
Genesee, ID	conventional fallow	Sept 9, 2010
Grangeville, ID	conventional fallow	Sept 13, 2010
Pendleton, OR	conventional fallow	Sept 13, 2010
Hermiston, OR	irrigated, conventional recrop	Sept 14, 2010

The trial design used in the regional trials 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. Trials were fertilized according to local practice. The dates of 50% bloom and plant canopy heights were recorded at the Moscow and Genesee sites. Prior to harvest, all plots at each site were cut with a small plot swather to allow the plant stems to dry to aid harvest. Once dry, the plots were harvested with a small plot combine, and the seed from each plot was weighed to determine yield. Finally, a subsample was taken from each plot for oil content estimation with a nuclear magnetic resonance (NMR) analyzer.

RESULTS

The plots at all sites established well due to timely late summer rains and responded well throughout the growing season. The early flowering cultivars at the Davenport site were damaged by sulfonylurea (SU) herbicide drift at the beginning of the bloom period. Later flowering cultivars escaped damage due to their growth stage and shorter height at the time of the drift.

Mean flower date was day 142 (days from Jan 1, i.e., May 16), which was somewhat later than previous years resulting from a cool spring weather. The earliest cultivar was 'Salut' at 137 days after January 1, followed by 'Ericka,' 'Bridger' and '06.UIWC.1, which all flowered on day 140. The date of flowering ranged from day 137 to day 144. This range was compressed as compared to previous years due to cool spring weather that delayed flowering in the early cultivars (Table 2). Mean plant height was 59 inches, with 'DKW 44-10 RR' and Ericka being the shortest cultivars at 54 and 55 inches, respectively, and 'Dwarf Essex rapeseed being the tallest at 65 inches. Other tall cultivars included 'Balduur,' 'Visby,' and several University of Idaho breeding lines.

The trial mean was 3,861 lbs. per acre, and mean yields from the sites ranged from 2,461 lbs. per acre at the Pendleton site to 5,430 lbs. per acre at the Grangeville site (Table 2). Cultivars yielded from 2,542 to 4,456 lbs. per acre when averaged across all locations. The highest yielding line was 'Visby' (4,456 lbs. per acre) for the fourth year in a row, followed by

‘Athena’ at 4,367 lbs. per acre, Durola rapeseed at 4,267 lbs. per acre, and Amanda at 4,215 lbs. per acre.

Oil content was determined on all plots (Table 3) except those at Davenport Washington, and the mean oil content across all varieties and sites was 42.4%. The site with the highest oil content was Hermiston, Oregon at 44.9%, while the Odessa, Washington site had the lowest oil content, 36.2%. Mean oil contents of the individual varieties ranged from 39.8% to 45.8%, with lowest content found in ‘Salut,’ a *B. rapa* variety, and the highest content found in ‘Durola’ industrial rapeseed. As is typical, the industrial rapeseed cultivars generally had the highest oil contents, but a few canola varieties also performed well with oil contents above 40 %.

DISCUSSION

Even though planting dates were somewhat later than typical for the PNW, all sites established well due to timely summer rains. A mild winter resulted in little to no winter kill, and all sites were in good shape after the winter months. A perennial problem for canola production in the PNW is sulfonyl urea herbicide drift, and the site at Davenport, Washington was damaged by drift from a nearby wheat field as discussed previously in the Materials and Methods section.

Progress in cultivar development is being made; newer cultivars tested in 2011 continued to show high yield potential compared to those tested in previous years. However, Roundup Ready winter cultivars continue to lag behind conventional open-pollinated and hybrid cultivars in yield. This season, the best Roundup Ready cultivar had a yield that was 12% less than the average of the top five commercially available cultivars and nearly 22% less than the highest yielding cultivar.

Several new University of Idaho breeding lines have continued to produce 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, the performance of cultivars needs to be evaluated when they are planted at earlier than typical dates.

Table 2. Mean yield (lbs. per acre), rank by mean yield, yield by site (lbs. per acre), flower start date (days after Jan. 1), and plant height (inches) of varieties entered in the 2010-2011 PNW Winter Canola Variety Trial.

Varieties Tested	Mean Yield and rank of complete sites		Yield by location								Flower Start	Plant Height
	lbs per acre	rank	Moscow ID	Moscow Notill	Genesee ID	Grangeville ID	Pendleton OR	Hermiston OR	Odessa WA	Davenport WA		
			lbs per acre									
Controls												
Athena	4,367	2	4,476	4,331	4,352	6,249	3,169	3,624	5,494	2,564	141	59
Erica	3,431	21	3,213	3,466	3,513	4,832	1,776	3,784	4,272	1,894	140	55
Salut	2,542	24	2,131	2,509	2,665	4,788	942	2,215	3,802	*	137	57
Dwarf Essex Rapeseed	3,917	15	4,177	4,311	3,640	4,817	2,904	3,652	4,248	*	143	65
Bridger Rapeseed	2,968	23	2,282	3,497	3,128	4,140	2,024	2,737	4,382	*	140	56
Monsanto Co												
DKW 44-10 RR	3,493	20	3,611	4,451	3,693	3,201	2,220	3,779	*	*	143	54
DKW 46-15 RR	3,212	22	2,953	3,410	3,444	4,550	1,840	3,077	*	*	143	57
DL Seeds/ Rubisco Seeds												
Baldur	3,936	14	3,860	3,826	4,328	5,578	2,306	3,719	4,601	*	141	61
Visby	4,456	1	3,120	4,693	5,367	6,938	3,067	3,553	5,114	*	142	60
Sitro	4,006	13	3,738	4,042	3,458	5,723	3,351	3,725	4,796	*	142	58
University of Idaho												
Amanda Canola	4,215	4	4,573	4,650	4,475	5,624	2,509	3,458	4,551	2,316	143	59
Durola Rapeseed	4,267	3	4,154	4,392	4,199	6,410	2,340	4,108	4,628	*	142	58
06UIWC.1	4,203	5	4,769	4,600	3,862	5,727	2,557	3,705	4,779	3,311	140	57
UI.05.6.33	4,099	9	4,262	4,237	3,534	6,194	2,633	3,736	4,536	3,351	142	58
03.WC.4.226.8	4,125	7	4,561	4,543	4,112	5,192	2,725	3,617	4,755	3,019	142	61
03.WC.6.103.8	4,149	6	4,299	4,270	4,403	5,336	2,566	4,022	4,351	2,491	141	59
03.WC.6.106.10	3,733	18	3,641	3,914	3,734	4,960	2,724	3,426	4,840	2,656	143	60
03.WC.7.239.8	3,895	16	4,056	3,952	3,606	5,509	2,234	4,012	4,515	*	144	59
03.WC.15.319.3	4,092	10	3,635	4,324	3,934	6,060	2,721	3,877	4,308	*	144	62
03.WDB.29.327.4	4,056	11	3,643	4,158	3,875	6,576	2,492	3,591	4,961	*	143	62
03.WDB.29.330.8	3,825	17	3,842	4,298	3,137	5,408	2,709	3,558	5,449	2,420	144	61
03.WL.4.2.104.1	3,527	19	3,415	3,742	3,463	4,819	2,358	3,367	4,300	*	142	60
03.WL.4.4.404	4,104	8	4,183	4,104	4,228	5,849	2,554	3,703	3,897	*	142	59
03.WL.4.4.414	4,047	12	3,920	3,932	4,392	5,828	2,337	3,871	4,706	*	142	56
Mean	3,861		3,771	4,069	3,856	5,430	2,461	3,580	4,604	2,669	142	59
LSD ($p = 0.05$)	349		1,002	732	963	1,013	796	622	717	-	0.6	2.2

Table 3. Mean seed oil content (%) estimated by NMR, rank by mean oil content, and mean oil content (%) by site of varieties entered in the 2010-2011 PNW Winter Canola Variety Trial.

Varieties Tested	Mean oil content and rank		Oil Content by Location						
			Moscow ID	Moscow Notill	Genesee ID	Grangeville ID	Pendleton OR	Hermiston OR	Odessa WA
	percent	rank	-----		percent	-----			
Controls									
Athena	43.1	8	44.0	42.4	43.8	39.5	43.0	45.6	37.3
Ericka	40.7	22	42.3	40.7	42.4	37.4	38.7	42.9	35.9
Salut	39.8	24	39.7	38.4	40.9	36.2	41.1	42.4	36.3
Dwarf Essex Rapeseed	43.6	2	45.0	43.8	44.7	38.0	43.6	46.8	36.5
Bridger Rapeseed	43.3	4	43.9	44.0	43.9	39.2	43.0	45.6	37.7
Monsanto Co									
DKW 44-10 RR	40.4	23	42.0	41.4	41.4	35.2	39.3	43.0	*
DKW 46-15 RR	43.2	5	44.5	43.3	45.2	38.2	42.0	46.1	*
DL Seeds/Rubisco Seeds									
Baldur	42.3	14	43.5	42.5	44.0	36.7	41.6	45.7	35.9
Visby	42.4	13	44.1	42.4	43.9	37.5	40.9	45.5	36.3
Sitro	42.5	11	44.3	42.6	44.1	35.4	42.3	46.0	35.6
University of Idaho									
Amanda Canola	42.8	10	44.2	43.1	44.0	38.9	41.4	45.2	35.6
Durola Rapeseed	45.8	1	47.0	46.4	46.2	42.1	45.5	47.4	39.3
06UIWC.1	41.6	21	42.4	41.6	43.6	37.0	40.9	44.1	35.7
UI.05.6.33	42.1	16	43.6	42.0	44.0	38.6	40.4	43.8	35.9
03.WC.4.226.8	42.4	12	43.2	42.1	43.1	38.5	42.3	45.0	36.0
03.WC.6.103.8	41.8	20	43.4	41.9	42.9	38.2	40.9	43.5	35.9
03.WC.6.106.10	41.8	19	42.8	42.3	42.6	37.9	40.9	44.3	35.5
03.WC.7.239.8	42.3	15	43.6	42.3	43.8	37.6	41.9	44.6	35.1
03.WC.15.319.3	43.2	6	43.9	43.1	44.4	39.5	42.6	45.6	36.0
03.WDB.29.327.4	43.1	7	43.0	43.6	44.2	40.2	42.7	45.0	36.2
03.WDB.29.330.8	41.8	17	42.4	42.3	42.7	38.4	41.2	44.1	36.9
03.WL.4.2.104.1	41.8	18	42.9	42.4	42.6	37.4	41.2	44.6	35.5
03.WL.4.4.404	43.6	3	44.5	44.4	45.1	39.4	42.1	46.3	36.3
03.WL.4.4.414	42.8	9	44.0	42.8	44.1	38.4	42.3	45.5	36.3
Mean	42.4		43.5	42.6	43.6	38.1	41.7	44.9	36.2
LSD ($p = 0.05$)	0.5		1.2	0.9	1.1	1.4	1.8	1.0	0.8