2009-2010 PACIFIC NORTHWEST WINTER CANOLA VARIETY TRIAL

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ABSTRACT

A winter rapeseed and canola variety trial with 23 canola or industrial rapeseed (*Brassica napus* or *B. rapa*) cultivars or advanced breeding lines was grown at six locations in the inland Pacific Northwest. Mean yield by location ranged from 1,771 to 4,558 lbs. per acre, and mean yields of individual cultivars across all locations ranged from 1,551 to 3,589 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 last decade, this production had been exclusively industrial rapeseed with high levels of erucic acid in its oil. The acreage has increased during the last 15 years, and most of this new production has been with cultivars that produce canola-quality oil and meal. Many new cultivars are now available, and yield trials throughout the region are needed to evaluate these new cultivars 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 on a limited basis 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 standard cultivars. In addition, cultivars need to be tested using new 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 15 years, the project has evaluated 131 winter cultivars or advanced lines representing 16 companies. The 2010 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

Twenty-three *Brassica napus* canola or rapeseed cultivars and breeding lines plus three control cultivars; 'Dwarf Essex' industrial rapeseed (*B. napus*), 'Bridger' industrial rapeseed (*B. napus*), and 'Salut' canola (*B. rapa*), were planted in the fall of 2009 at eight locations (Table 1). The trial included canola entries from several sources; DL Seeds, Monsanto Company, Alternative Ag Products (AAP) and the University of Idaho Canola, Rapeseed and Mustard Program. All entries were canola-quality cultivars except the two rapeseed controls and 'Durola' industrial

rapeseed, formerly '06UIWH.5.1,'from the University of Idaho. Five 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 2009-2010 Pacific Northwest Winter Canola Variety Trial.

Location	Tillage Regime	Planting Date
Moses Lake, WA	irrigated, conventional till	Sept 4, 2009
Reardan, WA	direct seed, chem fallow	Aug 21, 2009
Moscow, ID	conventional fallow	Aug 19, 2009
Moscow, ID	direct seed, chem fallow	Aug 19, 2009
Lewiston, ID	conventional fallow	Aug 28, 2009
Craigmont, ID	conventional fallow	Aug 20, 2009
Pendleton, OR	conventional fallow	Sept 14, 2009
Hermiston, OR	irrigated, conventional till	Sept 17, 2009

The trial design used in the regional trials was a randomized, complete block with four replications. Plot size was 4 by 16 ft., and the seeding rate was approximately 8 lbs. per acre. Trials were fertilized according to local practice. The plots at six sites established and grew well throughout the growing season. However, dry conditions at planting time resulted in no or poor seedling emergence at Lewiston and the Moscow direct seed site. At Moscow direct seed site, the established plants were killed by unusually cold freezes in October and December. Other sites showed differential winter kill from these freezes, and winter survival notes were taken. The dates of 50% bloom and plant canopy heights were recorded at the Moscow 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. After harvest, the seed from each plot was weighed to determine yield, and a subsample was taken for oil content estimation with a nuclear magnetic resonance (NMR) analyzer.

RESULTS

Mean flower date was day 131 (days from Jan 1, i.e., May 16). The earliest cultivars were 'Salut' and 'Ericka,' flowering on day 116 and 126, respectively. The date of flowering ranged from day 116 to day 138, or about two week's difference (Table 2). The latest flowering cultivar was DKW 41-10 RR. Mean plant height was 55 inches, with '06UIWC.1'and Ericka being the shortest cultivars at 52 and 53 inches, and '03.WC.9.302.3' being the tallest at 59 inches. Other tall cultivars included 'Baldur,' '06UIWC.4,' 'UI.07.15,' and '03.WBD.63.R-10' The only site with a significant amount of lodging was at Grangeville, where all cultivars exhibited severe lodging.

The trial mean was 3,039 lbs. per acre, and mean yields from the sites ranged from 1,796 lbs. per acre at the Pendleton site to 4,586 lbs. per acre at the Moses Lake site (Table 2). Cultivars yielded from 1,551 lbs. per acre to 3,589 lbs. per acre when averaged across all locations. The highest yielding line was 'Visby' (3,589 lbs. per acre) for the third year in a row, followed by 'Amanda' (formerly '06UIWC.5') at 3584 lbs. per acre, and 'UI.05.6.33' at 3,533 lbs. per acre.

Oil content was determined on all harvested plots (Table 2). The mean oil content across all varieties and sites was 40.7%. The site with the highest oil content was Pendleton at 44.6%, while the Reardan site had the lowest oil content, 37.5%. Mean oil contents of the individual varieties ranged from 37.4% to 43.4%. As expected, the industrial rapeseed cultivars had the highest oil contents, but a few canola varieties also performed well with oil contents above 40 %.

DISCUSSION

As in previous years these trials demonstrated that even with timely late summer rains, establishing winter canola can be difficult at some sites, especially in direct seed situations. In fact, the only direct seed site was abandoned this year because of poor emergence and winterkill. 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.

Recent discussions of winter canola establishment within the PNW canola-growing community have focused on earlier planting times to take advantage of the greater amount of moisture available in fallow soils in midsummer. Several growers in the region planted winter canola in early and mid July, 2009. In general, the crop established well at this time; although some problems were encountered. The problems included severe aphid pressure in late August and early September, premature bolting of at least one cultivar, and some drought-stressed patches. Two early-planted variety trials were planted as well, one near Dusty, Washington that was managed by University of Idaho personnel, and one near Davenport, Washington that was managed by Washington State University personnel. Unfortunately, most of the early planted winter canola was killed by two unusually hard freezes. The first freeze occurred in mid-October, 2009 when temperatures dropped from near 40^{o}F to around 15^{o}F in less than 24 hours. This was the first frost in most locations in the PNW, and plants had not acclimated to temperatures below freezing. A second hard freeze occurred in early December, 2009 with temperatures around 0^{o}F accompanied by high winds and no snow cover. Most canola planted at traditional times survived these freezes, although differential winter kill was observed in the variety trials. The early canola plants were quite lush at the time of the first freeze, and perhaps this lush growth and subsequent drought stress and insect pressure limited the plants' ability to acclimate or harden to cold temperatures. Additional early planted trials are underway to gain further insight.

Progress in cultivar development is being made; newer cultivars tested in 2010 continued to show high yield potential compared to those tested in previous years. In addition, several new breeding lines, 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.

Table 2. Results from the 2009-2010 PNW Winter Canola Variety Trial including mean yield of all sites (lbs./acre), yield rank, yield by site (lbs./acre), winter survivial score, flower date, (days after planting), plant height (inches), and lodging score.

			Yield by Site									
Variety	Mean Yield	Rank	Moscow	Craigmont	Reardan	Moses Lake	Pendleton	Hermiston	Winter Survival[1]	Flower Start[2]	Plant Height[2]	Lodging[3]
	lbs. per acre		---------- *lbs. per acre* ----------						*score*[4]	*days*	*inches*	*score*[4]
Controls												
Salut	1551	23	238	2525	720	3128	422	2272	6.2	116	50	8.3
Bridger Rapeseed	2743	21	1647	3901	1023	3924	1923	4042	5.9	131	53	4.0
Dwarf Essex Rapeseed	3126	10	2102	4257	1598	4301	2465	4035	5.9	129	55	5.8
DL Seeds												
Visby **(Rubisco Seeds)**	3589	1	2346	5199	1871	5799	1844	4473	6.5	133	55	8.8
Sitro **(Rubisco Seeds)**	3438	4	2335	4559	1992	4416	1911	5415	7.1	134	55	7.8
Baldur **(Rubisco Seeds)**	3230	6	2177	4277	2033	4686	1914	4291	5.5	129	58	9.0
HyCLASS 154W RR	3090	13	2226	3945	2106	4258	2005	3997	4.9	133	57	8.8
Monsanto												
DKW 41-10 RR	2375	22	1678	4021	1475	2411	1784	2882	6.2	138	49	6.0
DKW 46-15 RR	2896	17	1686	4693	1963	4006	1513	3513	6.4	131	55	9.0
DKW 47-15 RR	2785	20	1426	3270	1422	4236	1954	4400	3.9	130	54	7.5
Alternative Ag Products (AAP)/University of Idaho												
Amanda	3584	2	2215	5057	2624	5245	1679	4682	6.8	133	56	8.8
Durola Rapeseed	3108	12	1532	4572	1931	5226	1472	3912	5.6	133	56	8.5
University of Idaho												
Athena	2893	18	1962	4210	1225	4203	1547	4210	5.4	134	55	9.0
Ericka	2866	19	1621	3966	2282	4348	1349	3628	7.1	126	53	8.5
06UIWC.1	3074	14	1687	3914	2722	4851	1602	3665	7.0	127	52	7.0
06UIWC.4	2980	15	2150	4229	1629	4543	1994	3334	5.2	135	58	7.8
03WC.4.226.8	3184	8	2402	3019	1643	5835	1862	4345	4.1	133	55	7.5
03WC.8.316.1	3109	11	2204	2893	1780	5066	2371	4338	4.1	133	56	8.5
03WC.9.302.3	3198	7	2262	4534	2448	4208	1968	3767	6.7	133	59	9.0
03WC.29.327.4	3413	5	2105	4306	2410	5172	2237	4245	5.0	133	56	8.5
03WL.4.2.104.1	3162	9	1832	3833	1700	5502	1838	4268	5.4	133	55	8.0
03WDB.63-R.10	2963	16	1902	3588	2061	4460	1642	4128	4.1	133	58	8.5
UI.05.6.33	3533	3	2288	4390	2853	5651	2022	3993	7.2	130	55	7.5
Mean	3039		1914	4050	1892	4586	1796	3993	5.7	131	55	7.9
LSD (p=0.05)	299		396	811	919	965	495	718	1.6	2.5	3.3	1.1
C.V. (%)	18.4		14.6	14.2	34.2	15.0	19.8	12.8	17.5	1.4	4.2	9.7

Notes: 1. Survival scored at Moscow, Craigmont, and Reardan. 2. Flower Start and Height scored at Moscow. 3. Lodging scored at Craigmont. 4. Scores are 1 to 9, with 9 being best.

Table 3. Mean seed oil content (%) estimated by NMR, rank by meal oil content, and mean oil content (%) by site of varieties entered in the 2009-2010 PNW Winter Canola Variety Trial.

Variety	Mean Oil Content	Oil Rank	Oil Content by Site					
			Moscow	Craigmont	Moses Lake	Reardan	Pendleton	Hermiston
	%		%					
Controls								
Salut	37.4	23	33.0	39.7	38.9	33.3	40.5	38.9
Bridger Rapeseed	41.4	6	39.7	42.4	39.1	38.1	45.8	43.3
Dwarf Essex Rapeseed	42.0	2	39.7	43.0	40.1	39.4	48.0	42.1
DL Seeds								
Visby**(RubiscoSeeds)**	40.6	16	38.0	42.5	39.6	37.2	44.3	41.9
Sitro**(RubiscoSeeds)**	40.7	15	38.7	41.4	39.6	36.3	45.6	42.8
Baldur**(RubiscoSeeds)**	41.1	10	39.6	41.9	39.2	37.9	45.3	42.8
HyCLASS 154W RR	40.6	17	39.1	42.7	38.8	36.6	44.1	42.2
Monsanto								
DKW 41-10 RR	38.7	22	37.6	40.2	35.9	36.5	41.9	40.1
DKW 46-15 RR	41.3	7	38.4	43.5	39.7	38.0	44.9	43.3
DKW 47-15RR	38.9	21	36.7	40.3	37.9	33.4	44.1	41.3
Alternative Ag Products (AAP) / University of Idaho								
Amanda	41.1	8	39.1	42.7	39.7	39.0	44.5	41.8
Durola Rapeseed	43.4	1	41.6	45.4	41.8	39.6	46.9	45.0
University of Idaho								
Athena	40.5	18	38.9	42.5	39.7	36.0	44.2	41.8
Ericka	39.8	19	37.2	40.8	38.5	39.0	43.2	40.0
06UIWC.1	39.0	20	35.7	41.2	38.3	36.7	42.0	40.1
06UIWC.4	40.7	14	40.3	41.5	39.1	38.0	44.0	41.6
03WC.4.226.8	41.0	12	39.7	41.0	40.2	38.0	45.0	41.9
03WC.8.316.1	41.4	5	40.1	41.9	40.8	38.1	45.8	41.9
03WC.9.302.3	41.0	11	39.6	42.8	39.7	37.8	44.7	41.6
03WC.29.327.4	41.5	4	39.6	42.5	40.4	39.0	46.2	41.7
03WL.4.2.104.1	41.1	9	39.8	42.4	40.9	36.3	45.0	42.4
03WDB.63-R.10	41.6	3	40.2	42.2	40.4	38.7	45.4	42.6
UI.05.6.33	40.8	13	39.0	42.0	40.0	38.8	43.7	41.1
Trial Mean	40.7		38.7	42.0	39.5	37.5	44.6	41.8
LSD (p = 0.5%)	0.5		1.0	1.2	1.3	2.8	1.1	0.6
C.V. (%)	2.4		1.8	2.0	2.3	5.3	1.7	1.1