2012-2013 PACIFIC NORTHWEST WINTER CANOLA VARIETY TRIAL

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ABSTRACT

A winter rapeseed and canola variety trial with 20 canola or industrial rapeseed (*Brassica napus*) cultivars or advanced breeding lines was grown at six locations in the inland Pacific Northwest. Mean yield by location ranged from 2,167 to 4,450 lbs. per acre, and mean yields of individual cultivars across five uniform locations ranged from 2,688 to 3,926 lbs. per acre.

INTRODUCTION

For many years, winter rapeseed had 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 18 years, the project has evaluated 151 different winter cultivars or advanced lines representing 19 companies. The 2013 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

Sixteen *Brassica napus* canola or rapeseed cultivars and breeding lines plus four control cultivars; 'Athena' canola (*B. napus*), 'Ericka' canola (*B. napus*), 'Dwarf Essex' industrial rapeseed, and 'Bridger' industrial rapeseed (*B. napus*) were planted in the fall of 2012 at eight locations (Table 1). The trial included canola entries from Bayer CropScience, DL Seeds, Winfield LLC, and the University of Idaho Canola, Rapeseed and Mustard Program. All entries are canola-quality cultivars except the two rapeseed controls listed above plus 'Durola' industrial rapeseed (formerly '06UIWH.5.1') and '05.WI.45.2.2,' both from the University of Idaho. The two cultivars entered by Winfield are Roundup Ready® types and are designated with "RR" in their names, and the two Bayer CropScience entries are resistant to imidazolinone class (IMI)

herbicides. Three of the University of Idaho Breeding lines; '05.WC.6.4.3,' '05.WC.15.7.5,' and '05.WI.45.2.2' are also resistant to IMI herbicides.

Table 1. Locations, tillage regimes, and planting dates of sites in the 2012-2013 Pacific Northwest Winter Canola Variety Trial.

Location	Tillage Regime	Planting Date
Odessa, WA	irrigated, conventional recrop	Sept 13, 2012
Davenport, WA	direct seed, chem. fallow	Aug 25, 2012
Reardan, WA	direct seed, chem fallow	Aug 25, 2012
Moscow, ID	conventional fallow	Sept 14, 2012
Genesee, ID	conventional fallow	Aug 30, 2012
Grangeville, ID	conventional fallow	Aug 31, 2012
Pendleton, OR	conventional fallow	Sept 12, 2012
Hermiston, OR	irrigated, conventional recrop	Sept 20, 2012

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 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, except Grangeville and Reardan, were cut with a small plot swather to aid harvest. At Grangeville and Reardan, the plots were harvested directly. 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 Genesee and Reardan sites did not emerge due to dry conditions at planting time and were abandoned. The other sites had good emergence and stands. The Moscow site was damaged by elk during the winter months, leaving the plants completely defoliated. However, all entries survived the winter and regrew in the spring. Some entries at the Odessa site were damage by sulfonylurea (SU) herbicide drift from an adjacent wheat field. The affected plots partially recovered from this damage, but their maturity was delayed. Consequently, the yields of those entries were likely reduced relative to the yields of the IMI resistant cultivars, which showed cross-resistance to the SU drift. For that reason, the yields at Odessa were not included in the overall mean in the data summary (Table 2).

Mean flower date at Moscow was day 128 (days from Jan 1, *i.e.*, May 8). The earliest cultivars were Ericka, Bridger, and 'Rumba,' which flowered at 125 days after January 1. The dates of flowering ranged from day 125 to day 130. The range appeared to be somewhat

compressed due to cool spring weather that delayed the onset of flowering the in early cultivars (Table 2). In addition, flowering time may have been affected by the elk feeding damage described above.

The mean seed yield of the five undamaged sites was 3,271 lbs. per acre, and mean yields from the sites ranged from 2,167 lbs. per acre at the Pendleton site to 4,450 lbs. per acre at the Grangeville site (Table 2). Cultivars yielded from 2,688 to 3,926 lbs. per acre when averaged across the five undamaged sites. The four highest yielding commercially available cultivars were 'Mercedes' (3,926 lbs. per acre), 'Sitro' (3,740 lbs. per acre) and 'Amanda' (3,515 lbs. per acre). The mean oil content across all varieties and sites was 41.2 % (Table 3). The site with the highest oil content was Moscow at 43.3%, while the Odessa site had the lowest oil content, 37.4%. Mean oil contents of the individual varieties ranged from 39.5% to 44.3%. The highest oil content was found in two industrial oil varieties, Durola and 05.WI.45.2.2, which had oil contents that were more than two percentage points above the next highest canola variety. Among canola varieties, 'Mercedes,' '04.WL.4.4.404,' 'Amanda' 'Baldur,' '05.WC.15.7.5,' and Athena had the highest seed oil contents, ranging from 42.0% to 41.1%.

DISCUSSION

As in past years, we were unable to establish winter canola at some sites. This year dry fallow at Genesee, Idaho and Davenport, Washington was problematic. To minimize this problem in the 2013-2014 cropping season, several sites were planted earlier than traditional. All 2014 sites established; although stands at Grangeville, Idaho were poor and that site was replanted. The success of earlier planting dates will be discussed in the 2014 report. A separate web-based report will be written detailing the results of other planting date studies.

Progress in cultivar development is being made; new cultivars tested in 2013 continued to show high yielder potential compared to older cultivars. However, no new Roundup Ready winter canola varieties were entered in the trial, and yields of those tested still lag somewhat behind conventional varieties. This year marked the first entry of imidazolinone herbicide resistant, or Clearfield®, canola varieties into the trial. Results were mixed, with two IMI-resistant cultivars yielding in the top four entries but others yielding in the middle of the yield range. This does show that IMI-resistant cultivars can have high yield potential in the PNW. These cultivars have the potential to help growers handle herbicide residue issues as well as herbicide drift problems, since IMI-resistant cultivars are typically show cross resistance to both IMI herbicides and sulfonylurea herbicides.

Table 2. Results of the 2012-2013 PNW Winter Canola & Rapeseed Variety Trial including mean yield* (lbs. per acre) and rank,* yield by site (lbs./acre), flower date at Moscow, (days after January 1), and herbicide damage score at Odessa (1 to 9, 9 = no damage).

Varieties Tested	Mean Yield*		Yield by Location						Flower Date	Herbicide Damage
			Odessa WA*	Reardan WA	Moscow ID	Grangeville ID	Pendleton OR	Hermiston OR		
	lbs per acre	*rank*				*lbs per acre*			*days after Jan. 1*	*score*
Controls										
Athena	3,439	7	4,780	3,031	3,258	4,817	2,214	3,875	128	8.3
Ericka	2,788	18	3,729	3,232	2,667	3,610	1,598	2,832	125	6.3
Dwarf Essex Rapeseed	3,357	9	3,006	3,542	3,607	4,129	2,207	3,301	128	5.3
Bridger Rapeseed	2,688	20	2,805	2,405	2,697	3,842	1,981	2,513	125	4.0
Bayer CropScience										
RG 29101 IMI	3,924	2	5,956	4,249	4,420	4,953	2,314	3,685	128	8.8
RG 29102 IMI	3,681	4	5,005	3,923	3,879	4,411	2,623	3,568	127	8.8
DL Seeds/ Rubisco Seeds										
Baldur	3,449	6	3,539	2,975	4,123	5,172	2,091	2,882	128	4.8
Mercedes	3,926	1	3,674	2,847	4,115	6,340	2,999	3,330	127	4.5
Rumba	2,853	17	4,253	2,867	3,180	3,714	2,062	2,442	125	4.8
Sitro	3,740	3	2,820	3,728	3,688	5,099	2,781	3,402	127	4.0
Winfield										
CROPLAN 115W RR	2,932	16	3,753	2,846	2,669	3,896	2,259	2,992	128	4.8
CROPLAN 125W RR	2,773	19	3,149	2,534	2,728	3,896	2,010	2,699	128	4.0
University of Idaho										
Amanda	3,515	5	5,770	4,459	3,329	4,228	1,698	3,859	129	8.0
Durola Rapeseed	3,139	13	3,797	2,516	3,377	4,489	1,929	3,386	129	5.0
06.UIWC.1	3,177	12	5,121	3,041	3,305	4,431	2,097	3,013	127	8.5
UI.05.6.33	3,383	8	5,569	3,570	2,955	4,534	2,331	3,525	128	8.5
04.WL.4.4.404	3,228	11	4,456	3,374	2,980	4,498	1,941	3,346	128	5.5
05.WC.6.4.3 IMI	3,093	14	4,581	3,372	3,067	4,210	1,823	2,993	129	8.3
05.WC.15.7.5 IMI	3,267	10	5,508	2,969	3,054	4,802	2,107	3,402	130	8.5
05.WI.45.2.2 IMI	3,078	15	4,692	3,211	2,624	3,929	2,271	3,355	128	7.3
Mean	3,271		4,298	3,235	3,286	4,450	2,167	3,220	128	6.3
LSD (*p = 0.05*)	304		917	816	580	653	606	739	0.7	0.9
C.V.	15.3		15.4	17.6	12.7	10.5	19.6	16.2	0.4	10.1

* Note that the Odessa, WA site had sulfonylurea herbicide drift during early flowering, and some varieties were affected more than others, so that site is not included in the overall mean or rank.

Table 3. Mean seed oil content (percent of seed weight) estimated by NMR, rank by mean oil content, mean oil content (percent of seed weight) by site, and herbicide damage score (at Odessa, 1 to 9, 9 = no damage) of varieties entered in the 2012-2013 PNW Winter Canola Variety Trial.

Varieties Tested	Mean Oil Content		Oil Content by Location						Herbicide Damage
			Odessa WA*	Reardan WA	Moscow ID	Grangeville ID	Pendleton OR	Hermiston OR	
	lbs per acre	*rank*	----------	----------	----------	*lbs per acre*	----------	----------	*score*
Controls									
Athena	41.1	11	38.4	42.3	43.2	40.8	39.7	42.5	8.3
Ericka	40.0	16	36.8	40.5	41.6	39.4	39.7	42.1	6.3
Dwarf Essex Rapeseed	41.8	5	36.6	43.3	43.7	39.8	43.2	44.4	5.3
Bridger Rapeseed	41.8	6	37.2	42.5	44.0	41.2	42.2	43.8	4.0
Bayer CropScience									
RG 29101 IMI	39.7	19	35.8	40.9	42.6	39.1	39.2	40.6	8.8
RG 29102 IMI	39.8	18	35.8	41.5	42.3	39.4	39.5	40.1	8.8
DL Seeds/ Rubisco Seeds									
Baldur	41.2	10	36.2	43.1	43.7	40.9	39.9	43.5	4.8
Mercedes	42.0	3	36.6	41.3	45.8	42.5	41.9	43.8	4.5
Rumba	41.6	7	38.5	42.5	43.3	42.6	41.6	41.4	4.8
Sitro	40.8	12	36.1	41.2	44.2	40.9	40.4	42.4	4.0
Winfield									
CROPLAN 115W RR	40.5	14	38.0	40.8	42.0	39.8	40.9	41.4	4.8
CROPLAN 125W RR	40.2	15	36.5	41.4	42.1	39.8	40.7	41.0	4.0
University of Idaho									
Amanda	41.6	8	38.2	42.7	43.4	40.4	41.5	43.2	8.0
Durola Rapeseed	44.1	2	38.8	44.8	46.3	43.2	45.0	46.3	5.0
06.UIWC.1	39.5	20	36.5	41.1	41.8	38.5	40.2	39.3	8.5
UI.05.6.33	40.6	13	37.8	41.3	42.5	40.1	40.3	42.0	8.5
04.WL.4.4.404	41.8	4	37.6	43.8	43.4	41.2	40.8	44.2	5.5
05.WC.6.4.3 IMI	39.9	17	37.5	42.5	41.1	36.9	38.9	42.3	8.3
05.WC.15.7.5 IMI	41.2	9	37.9	42.5	42.0	40.1	41.1	43.7	8.5
05.WI.45.2.2 IMI	44.3	1	41.3	46.2	46.7	43.9	43.5	44.2	7.3
Mean	41.2		37.4	42.3	43.3	40.5	41.0	42.6	6.3
LSD (*p = 0.05*)	0.6		1.6	1.5	0.9	2.0	1.4	1.2	0.9
C.V.	2.5		3.0	2.5	1.5	3.5	2.5	1.9	10.1

* Note that the Odessa, WA site had sulfonylurea herbicide drift during early flowering, and some varieties were affected more than other