

2007 PACIFIC NORTHWEST WINTER CANOLA VARIETY TRIAL RESULTS

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ABSTRACT

A winter rapeseed and canola variety trial with 22 canola or industrial rapeseed (*Brassica napus*) cultivars or advanced breeding lines and two control varieties was grown at seven locations in the inland Pacific Northwest. Mean yield by location ranged from 2217 to 4311 lbs. per acre, and mean yields of individual cultivars across six uniform locations ranged from 2216 to 4141 lbs. per acre. The highest yielding line was the University of Idaho industrial rapeseed breeding line 06.UIWH5.1 at 4141 lbs. per acre, followed by 'Baldur' canola at 3914 lbs. per acre and 06.UIWC.1 at 3863 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. During the last 15 years the acreage has increased, 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. RoundupReady[®] 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 their performance compares to standard cultivars. In addition, many growers would like to plant winter canola in a recrop situation rather than planting in early August onto summer fallow as is traditional. Late planting is necessitated by recrop production and for a winter canola or rapeseed cultivar to be successful under such conditions, it must be able to establish when planted at a later date, and it must over-winter as a small plant. Pressure from increased flea beetle populations has also pushed optimum planting times to later dates. Plant breeders at the University of Idaho have been working to develop cultivars that are suited to production in a recrop situation, and these new cultivars and other available cultivars need to be tested under recrop and late planted conditions. 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 12 years, the project has evaluated 109 winter cultivars or advanced lines representing 12 companies. The trial is currently funded in part by the Pacific Northwest Canola Research Program and by fees paid by the commercial companies that submit their cultivars or advanced breeding lines to be tested in the PNWWVT.

MATERIALS AND METHODS

Twenty-two *B. napus* canola or rapeseed cultivars and breeding lines plus two controls, 'Dwarf Essex' rapeseed (*B. napus*), 'Salut' canola (*B. rapa*), were planted in the Fall of 2006 at eight locations (Table 1). The trial included canola entries from several commercial companies; Croplan Genetics,

Monsanto Company, and SW Seeds. Additional canola varieties and industrial varieties were entered by the University of Idaho Canola, Rapeseed and Mustard Program.

The trial design was a randomized, complete block with five replications at the Moscow and Genesee sites and four replications at all other sites. 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 dates of 50% bloom and plant height at maturity were recorded at the Moscow site. A lodging score, where a score of 1 indicates a severely lodged plot and a score of 9 indicates a totally upright plot, was taken at the Grangeville site, the only site with serious lodging. After harvest, the seed from each plot was weighed to determine yield, and subsample was taken for oil content estimation with a nuclear magnetic resonance (NMR) analyzer.

Table 1. Location, tillage regime, and planting date of trials in the 2006-07 Pacific Northwest Winter Canola Variety Trial.

Location	Tillage Regime	Planting Date
Moses Lake, WA	irrigated recrop	Sept 6, 2006
Rosalia, WA	conventional fallow	Sept 5, 2006
Dayton, WA	direct seed, chem. fallow	Sept. 18, 2006
Moscow, ID	conventional fallow	Sept 1, 2006
Genesee, ID (#1)	conventional fallow	Sept 24, 2006
Genesee, ID (#2)	direct seed, chem. fallow	Sept 24, 2006
Grangeville, ID	conventional fallow	Sept 1, 2006
Pendleton, OR	conventional fallow	Sept 8, 2006

RESULTS AND DISCUSSION

Dry conditions at planting time resulted in poor stands at several sites. The Genesee conventional site, originally planted on September 2, was replanted on September 24. The resulting plants were quite small at the onset of winter, and some differential winterkill was observed. Two of the five reps were completely lost. Poor stands and herbicide drift resulted in two of the five reps at the Genesee direct seed site being discarded as well. At Rosalia, portions of two reps did not emerge due to dry conditions, and severe damage caused by deer grazing on the plots during the summer months left only one rep usable. The yield data for Rosalia is presented, but no statistics could be run since only one rep was undamaged. The Rosalia data was not included in the overall mean, and the reader should bear in mind that it might not be representative of performance in normal conditions. The Dayton site established fairly well, but was lost to winterkill during a cold, windy period without snow cover.

Mean flower date at Moscow was day 125 (days from Jan 1 *i.e.* May 5). The earliest cultivars were ‘Salut’ (*B. rapa*) and ‘Ericka,’ flowering on day 119. The date of flowering ranged from day 119 to day 128 (Table 2). Mean plant height was 68 inches, with ‘Gospel’ being the shortest commercial cultivar at 65 inches, and Dwarf Essex being the tallest at 71 inches. The only site with lodging was Grangeville, where all cultivars lodged to some degree. Most cultivars had little to moderate lodging with scores above 5.0; although one cultivar, SW.013154, had fairly severe lodging with a score of 2.5.

The trial mean was 3386 lbs. per acre, and mean yields from the sites ranged from 2217 lbs. per acre at the Genesee conventional site to 4311 lbs. per acre at the Grangeville site (Table 2). The yields at Genesee were lower than in previous years due to the late replanting date and the subsequent winter damage. Individual cultivars yielded from 2216 lbs. per acre to 4141 lbs. per acre when averaged across all

locations. The highest yielding line was the University of Idaho industrial rapeseed breeding line 06.UIWH5.1 at 4141 lbs. per acre, followed by 'Baldur' canola at 3914 lbs. per acre and 06.UIWC.1 at 3863 lbs. per acre. The RoundupReady[®] cultivars and breeding lines entered by Monsanto and SW Seed yielded somewhat less than the best University of Idaho material, but some still performed acceptably with mean yields in the 3200 to 3600 lbs. per acre range. Newer RoundupReady[®] material appears to have improved yields compared to the earlier cultivars of this type.

Oil content was determined on all plots from selected sites (Table 3). The mean oil content across all varieties at the selected sites was 39.4%. The site with the highest oil content was Moscow at 42.4%, while the Genesee site had the lowest oil content, 38.1%. Mean oil contents of the individual varieties ranged from 37.4% to 42.0%. The industrial rapeseed cultivars had the highest oil content; this is thought to be in part an artifact caused by the higher molecular weight of the industrial oil compared to edible canola oil. Cultivars with the lowest mean oil contents also tended to be low yielding in this year's trial, indicating that they are likely not as well adapted to conditions in the PNW as other cultivars in the trial.

This crop year demonstrated that in a dry fall season, establishing winter canola can be difficult, especially in direct seed systems. Cropping systems with traditional fallow or irrigation continue to provide the best chance for establishing a winter canola crop. This year also showed that new breeding lines and cultivars continue to show promise for higher yields, and progress is being made to bring RoundupReady[®] cultivars to yield par with traditional cultivars. However, work needs to continue to develop cultivars that are better adapted to direct seed systems and that have increased winter hardiness in the seedling stage to allow later planting during dry falls and in recrop situations.

Table 2. 2006-2007 Winter Canola Variety Trial results including mean yield (lbs. per acre), rank by mean yield, yield by location, mean flower start data (days from January 1), mean plant height (inches), and mean lodging score (1 - 9, with 1 indicating severe lodging and 9 indicating a totally upright stand).

Variety	Mean*	Yield Rank	Moscow	Genesee	Genesee No-Till	Grangeville	Moses Lake	Rosalia	Pendleton	Flower Start	Plant Height	Lodging Score
Trial Controls												
Salut	2216	24	1926	1503	2690	2996	2922	1384	1260	128	68	5.3
Dwarf Essex	3637	5	4510	3058	3539	3934	4097	4369	2683	119	71	5.5
Croplan Genetics												
Virginia	2956	22	3937	998	2137	4258	3569	5839	2837	124	68	6.8
Baldur	3914	2	4412	2113	4485	5011	3776	4205	3684	124	69	6.3
Monsanto												
Exp.3269.RR	3212	17	3425	2095	3266	4537	3489	4307	2462	124	69	6.0
DKW.13.62.RR	2980	21	4086	1354	2410	4157	3004	3819	2866	127	69	6.3
DKW.13.86.RR	3230	16	4401	2221	2632	4354	3033	2989	2738	124	68	6.8
SW Seeds												
Gospel	2941	23	3838	769	2495	4845	2837	3368	2860	121	67	7.5
SW Falstaff	3609	6	5263	1340	3328	4844	3742	4323	3135	124	68	7.3
SW.023168.RR	3110	18	3942	660	3285	4253	3637	4103	2883	127	69	7.0
SW.023344.RR	3499	11	3719	2566	3639	3981	4076	3947	3012	127	67	6.3
SW.013154.RR	3354	15	4193	2810	2864	3805	3123	4703	2389	127	68	2.5
SW.023181.RR	3601	9	3844	2460	3993	4628	3576	3856	2638	125	68	6.8
University of Idaho Canola												
Athena	3431	14	4809	1614	3011	4647	3449	3542	3055	125	68	6.8
Ericka	3054	20	3847	1919	3249	3252	3410	3460	2647	119	65	6.3
06.UIWC.1	3863	3	4516	3135	3847	4094	4267	3942	3328	127	70	5.5
06.UIWC.2	3452	12	4039	1482	2532	4869	4171	3955	3103	126	69	7.5
06.UIWC.4	3609	6	4740	2593	3731	4495	4008	3869	3321	127	69	5.3
06.UIWC.5	3761	4	3658	2477	3990	5163	4150	4323	3621	127	68	6.8
University of Idaho Industrial Rapeseed												
06.UIWH.1	3107	19	3137	2076	3216	3973	2967	3443	2086	129	69	5.5
06.UIWH.3	3602	8	4222	2871	3582	3976	4219	3737	3126	126	68	6.8
06.UIWH.5	3557	10	4023	3618	3227	4417	3374	2718	3271	126	67	6.3
06.UIWH.5.1	4141	1	4301	4293	3571	4874	3667	3003	2739	125	68	6.5
06.UIWH.5.2	3439	13	4268	3194	2930	4095	3295	4364	2681	128	70	5.5
Mean	3386		4044	2217	3235	4311	3577	3815	2851	125	68	6.2
LSD p=0.05%	407		851	1257	NS	804	686	NA	264	2	3	1.6
C.V.	20.5		16.8	34.5	26.6	13.2	13.6	NA	18.5	1.0	3.2	18.4

* does not include Rosalia

Table 3. 2006-2007 Winter Canola Variety Trial results including mean oil content (%), rank by mean oil content, and oil content (%) by location.

Variety	Mean Oil Content	Oil Content Rank	Moses Lake	Moscow	Genesee	Genesee No-Till	Grangeville
Trial Controls							
Salut	37.5	23	36.7	40.2	36.3	36.9	37.6
Dwarf Essex	40.2	6	40.0	43.5	39.8	39.4	38.3
Croplan Genetics							
Baldur	39.4	10	39.6	42.0	38.0	38.6	38.8
Virginia	37.4	24	38.5	41.3	34.8	36.7	35.8
Monsanto Co.							
Exp.3269.RR	38.7	17	39.6	41.7	36.3	38.2	37.6
DKW.13.62.RR	39.0	13	38.8	42.9	37.0	38.0	38.2
DKW.13.86.RR	39.0	13	39.6	42.0	38.0	37.5	38.2
SW Seeds							
Gospel	39.2	11	40.5	42.9	36.9	37.9	37.9
SW Falstaff	40.0	7	40.8	42.6	38.2	39.5	39.1
SW.023168.RR	38.2	20	39.1	41.6	36.1	37.2	36.8
SW.023344.RR	38.3	19	37.8	41.7	37.3	37.4	37.2
SW.013154.RR	39.5	8	39.6	42.6	38.6	38.4	38.2
SW.023181.RR	38.9	15	39.6	41.5	37.6	37.2	38.6
University of Idaho Canola							
Athena	39.5	8	40.0	42.5	37.8	38.2	38.9
Erica	38.2	20	38.1	40.8	37.0	37.5	37.6
06UIWC.1	38.6	18	39.3	41.3	37.4	37.3	37.5
06UIWC.2	38.2	20	39.5	41.1	37.0	36.6	37.0
06UIWC.4	38.9	15	39.9	41.5	37.9	37.1	37.9
06UIWC.5	39.2	11	40.1	41.8	38.2	38.4	37.7
University of Idaho Industrial Rapeseed							
06UIWH.1	40.7	5	40.5	44.1	40.4	39.3	39.2
06UIWH.3	42.0	1	41.8	44.8	41.6	41.1	40.7
06UIWH.5	41.4	3	41.1	43.9	41.0	40.5	40.5
06UIWH.5.1	42.0	1	41.1	44.6	41.5	41.5	41.1
06UIWH.5.2	41.1	4	40.1	44.3	41.0	39.9	40.1
Mean	39.4		39.6	42.4	38.1	38.4	38.3
LSD $p=0.05\%$	0.6		1.6	0.9	1.2	1.2	1.3
C.V.			2.9	1.7	1.9	2.3	2.4