2004 PACIFIC NORTHWEST WINTER CANOLA VARIETY TRIAL RESULTS

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ABSTRACT

A winter rapeseed and canola variety trial with 27 canola (*Brassica napus*) cultivars or advanced breeding lines and three control varieties was planted at twelve locations in Oregon, Washington, Idaho, and Montana. Six locations were lost to winterkill, and one was lost to a combination of herbicide damage and winterkill. Mean yields from the five locations that were harvested ranged from 1840 to 4535 lbs. per acre. Mean yields of individual cultivars across all locations ranged from 2177 to 4088 lbs. per acre. Mean oil content of the cultivars over all locations ranged from 35.9 to 41.4%. For the second year in a row, 'Baldur' was the highest yielding cultivar when averaged across the five sites.

INTRODUCTION

For many years, winter rapeseed has been grown on a few thousand acres in the inland Pacific Northwest 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 twelve years the acreage has increased, and much 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. 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 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 fall of 1995. Both commercial cultivars and advanced breeding lines have been tested. In the last nine years, the project has evaluated 93 winter cultivars or advanced lines representing ten companies. The trial is currently funded in part by the Pacific Northwest Canola Research Program, the Idaho Canola and Rapeseed Commission, and by fees paid by the commercial companies or universities that submit their cultivars or advanced breeding lines to be tested in the PNWWVT.

MATERIALS AND METHODS

Twenty-seven *B. napus* canola cultivars and breeding lines plus three controls, 'Ceres' (*B. napus*), 'Dwarf Essex' (*B. napus*), and 'Salut' (*B. rapa*), were tested during the 2003-2004 crop year at twelve locations (Table 1). Entries ending in "RR" are Roundup Ready® types (resistant to glyphosate herbicide).

Trials were planted during early to mid-September near Pendleton and Hermiston, OR (irrigated); near Rosalia, Lind, and Moses Lake, WA (irrigated); near Moscow (two sites, one tilled and one direct seed), Genesee, Nezperce (direct seed) and Grangeville, ID (two sites); and near Kalispell, MT. All of the above trials except for the Moses Lake site were planted on land that had been previously fallow and tilled unless otherwise noted. Planting dates are listed in Table 1. The Nezperce site and the Moscow direct seed site were direct seeded into fallowed winter wheat stubble. At each location, the trial design 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 date of 50% bloom and plant height at maturity was recorded at the Moscow site. After harvest, the seed was weighed to determine yield. Oil content was estimated using a Nuclear Magnetic Resonance Analyzer (NMR) on a subsample of seed from each plot harvested.

Table 1. Location, tillage regime, and planting date of trials in the 2004 Pacific Northwest Winter Canola Variety Trial.

Location	Tillage Regime	Planting Date
Genesee, ID	conventional fallow	Sept 2, 2003, replanted Sept 23
Grangeville, ID (#1)	conventional fallow	Sept 3, 2003
Grangeville, ID (#2)	conventional fallow	Sept 3, 2003
Hermiston, OR	irrigated	Sept 11, 2003
Kalispell, MT	conventional fallow	Sept 15, 2003
Lind, WA	irrigated	Sept 17, 2003
Moscow, ID	conventional fallow	Sept 4, 2003
Moscow, ID	direct seed fallow	Sept 15, 2003
Moses Lake, WA	irrigated recrop	Sept 12, 2003
Nezperce, ID	direct seed fallow	Sept 12, 2003
Pendleton, OR	conventional fallow	Sept 5, 2003
Rosalia, WA	conventional fallow	Sept 11, 2003

RESULTS AND DISCUSSION

Of the twelve locations planted, five were harvested. The sites at Lind, Moscow (direct seed) Nezperce, Pendleton, and Kalispell were lost to winterkill. Hard freezes in late October and early November after unseasonably warm weather caused much of the winter damage observed. In addition, one of the sites at Grangeville showed symptoms of Pursuit (imazethapyr) damage prior to the freezing damage. The site at Genesee, ID emerged poorly due to dry soil conditions at planting, and was replanted prior to the killing freezes mentioned above.

Mean yields from the sites ranged from 1840 lbs. per acre at the Rosalia site to 4535 lbs. per acre at the Grangeville site (Table 2). Cultivar yields ranged from 2177 lbs. per acre to 4088 lbs. per acre average across all locations. The trial mean was 3215 lbs. per acre, and eleven cultivars yielded above 3500 lbs. per acre. The cultivar with the highest mean yield was 'Baldur.' 'Athena,' 'Californium,' and several University of Idaho breeding lines were also strong performers.

Mean flower date at Moscow was day 124 (from Jan 1). The *B. rapa* cultivar Salut was the earliest, flowering on day 118. The date of flowering for *B. napus* cultivars ranged from day 119 to day 128 (Table 2). Warm weather in late May/early June ended flowering on all cultivars nearly simultaneously, which is not unusual. Mean plant height by cultivar ranged from 51 inches to 66 inches (Table 2). Mean oil content across all varieties and locations was 39.1% and ranged from 36.8 to 40.8% by variety (Table 3). Seed from the Hermiston site had the highest mean oil content, 42.1%, and seed from the site at Moscow had the lowest, 35.7%.

Most cultivars produced acceptable yields at sites where traditional fallow ground was used and the varieties survived the winter. Planting later than traditional dates generally resulted in complete winterkill. Winterkill occurred at all sites planted after Sept 4, with the exception of Moses Lake, where only some portions of the adjacent commercial field were killed. New varieties are showing improved performance; 'Ceres' and 'Dwarf Essex,' which have been top yielders in the past, are not performing as well as some of the newer releases. This indicates that plant breeders are making progress towards higher yields in winter canola, but the high degree of winterkill at some sights suggests that more work is needed to increase freezing tolerance in small plants to facilitate late planting in recrop systems.

Table 2. Yield results for 30 cultivars in the 2004 Pacific Northwest Winter Canola Variety Trial including mean yield, rank by mean yield, yield by location, mean flower start, and mean plant height at maturity.

Variety	Mean Yield	Rank	Yield by Location					Flower Date	Plant Height
			MOSC	GRAN	MSLK	ROSA	HERM		
	lbs. / acre		lbs. / acre					days after Jan. 1	inches
Trial Controls									
Ceres	3384	14	2870	5269	2995	1678	4110	124	64
Dwarf Essex	3291	16	3302	4001	3421	2265	3467	125	64
Salut	2177	30	2136	2809	2847	1033	2062	118	64
Cargill Specialty Oils									
Californium	3587	9	3498	4477	4393	1647	3918	119	57
Cando	2807	22	1844	4075	3475	1239	3403	124	54
Contact	2612	25	2229	2838	3062	1504	3428	126	59
Explus	2712	24	2644	3943	2654	648	3672	123	58
MCH.89	2599	26	2021	3862	2762	1027	3321	127	56
MSP.06	2327	29	1695	2882	2860	876	3322	122	51
Croplan Genetics									
Baldur	4088	1	3014	6818	4380	2199	4026	123	64
Kronos	3390	15	3110	4301	4074	2531	3005	123	66
Integra Seed Ltd.									
Int 0345 RR	3051	19	2646	3893	3264	2109	3343	124	63
Int 0362 RR	2531	28	2047	2488	3157	1099	3863	124	61
Int 0386 RR	2994	20	2046	4019	3664	1526	3715	125	59
Quincy Farm Chemical									
Herkules	3470	12	3067	4501	4147	2069	3565	122	62
Vectra	3548	10	2766	4485	4050	2095	4342	122	65
University of Idaho									
Athena	3771	4	3300	5577	3679	2410	3887	122	58
UIC-02.2	2978	21	2273	4827	3051	873	3866	126	60
UIC-03.1	3877	3	2749	6069	4025	2474	4067	126	61
UIC-03.2	3407	13	2426	5720	3186	1913	3790	122	61
UIC-04.1	3629	7	2884	5155	4010	2037	4058	126	64
UIC-04.2	3957	2	3291	5743	4172	2323	4258	125	64
UIC-04.3	3735	5	3090	5550	3668	2517	3852	125	61
UIC-04.4	3156	18	2650	4414	3448	1325	3943	124	65
UIC-04.5	3532	11	3109	5350	3466	1918	3816	122	61
UIC-04.6	2597	27	1939	3603	2752	1554	3135	125	60
UIC-04.7	3163	17	2154	4256	3283	2455	3667	125	57
UIC-04.8	3718	6	2976	5890	3705	2164	3854	123	67
UIR-03.2	2735	23	2123	3608	3402	1449	3092	128	66
UIR-03.5	3615	8	2519	5769	3779	2055	3951	123	64
Mean	**3215**		**2608**	**4535**	**3487**	**1840**	**3633**	**124**	**61**
LSD			**705**	**1037**	**726**	**1063**	**930**	**2.4**	**6.3**
C.V.			**19**	**16**	**15**	**41**	**18**	**1.4**	**7.3**

Location Key:

MOSC: Moscow, ID
GRAN: Grangeville, ID
MSLK: Moses Lake, WA
ROSA: Rosalia, WA
HERM: Hermiston, OR

Table 3. Mean oil content and oil content by location of 30 cultivars in the 2004 Pacific Northwest Winter Canola Variety Trial.

Cultivar	Mean Oil Content	Oil Content by Location				
		MOSC	GRAN	MSLK	ROSA	HERM
		%				
Trial Controls						
Ceres	37.4	35.5	37.9	34.9	36.4	42.3
Dwarf Essex	39.6	36.5	40.3	36.2	41.7	43.2
Salut	35.9	33.8	35.6	35.3	36.4	38.5
Cargill Specialty Oils						
Californium	37.6	34.9	35.8	35.4	41.1	41.1
Cando	36.7	33.5	35.4	35.4	38.1	41.4
Contact	38.7	36.3	38.0	36.1	39.8	43.4
Explus	37.3	35.0	37.3	35.7	36.6	41.8
MCH.89	38.9	35.4	39.1	35.8	40.3	43.8
MSP.06	37.8	34.4	37.0	35.6	40.3	41.8
Croplan Genetics						
Baldur	38.7	35.7	40.1	35.9	38.6	43.0
Kronos	37.2	34.9	37.7	34.5	38.6	40.4
Integra Seed Ltd.						
Int.1	37.9	36.2	37.1	36.4	38.5	41.3
Int.2	38.0	36.3	37.7	35.9	37.7	42.5
Int.3	38.0	35.0	37.9	35.9	39.0	41.9
Quincy Farm Chemical						
Herkules	38.0	35.6	37.4	36.6	39.3	41.3
Vectra	37.7	35.7	37.2	36.2	38.1	41.5
University of Idaho						
ATHENA	39.1	36.5	40.3	36.0	40.3	42.3
ATHENA.5	38.4	35.9	39.7	36.4	38.0	41.8
UIC-02.2	38.5	35.9	39.4	36.6	38.3	42.7
UIC-03.1	38.9	36.0	39.0	37.0	40.2	42.2
UIC-03.2	39.1	36.7	40.3	36.4	39.4	42.7
UIC-04.1	39.4	36.5	42.1	36.7	39.1	42.6
UIC-04.2	38.4	35.7	39.2	36.2	38.7	42.2
UIC-04.3	38.8	35.7	39.7	36.5	39.9	42.4
UIC-04.4	38.6	35.1	39.1	36.4	41.0	41.3
UIC-04.5	39.2	36.1	40.4	36.9	40.4	42.1
UIC-04.6	38.1	35.8	37.6	36.0	38.9	42.2
UIC-04.7	38.6	36.4	38.6	36.9	39.1	41.9
UIC-04.8	38.1	36.0	39.0	35.8	38.2	41.6
UIR-03.2	39.5	36.6	39.9	36.6	40.9	43.7
UIR-03.5	41.4	38.1	42.6	39.1	42.6	44.8
Mean		**35.7**	**38.6**	**36.1**	**39.2**	**42.1**
LSD		**1.1**	**1.6**	**1.0**	**2.3**	**1.1**
C.V.		**2.1**	**2.9**	**1.9**	**4.2**	**1.9**

Location Key:

MOSC: Moscow, ID
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