

2004 WINTER AND SPRING WHEAT VARIETY TRIALS

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Introduction

Cereals are an important rotational crop for central Oregon. Soft white wheat, in the recent past, has been the most important class for grain production. Since 1998, when soft white wheat accounted for 65 percent of the acreage grown, the hard red wheat class has accounted for 60-70 percent of the total acreage grown in 4 years out of the last 6, and 42-44 percent in the 2 other years, including 2004. Since 1998, wheat acreage has ranged from a high of 13,955 acres in 1998 to a low of 10,283 acres in 2002 in Crook, Deschutes, and Jefferson counties.

Central Oregon is well situated to the markets in Portland, Oregon. Public and private Pacific Northwest plant breeders release new cereal varieties each year. To provide growers with accurate, up-to-date information on variety performance, a statewide variety-testing program was initiated in 1993 with funding provided by the Oregon State University (OSU) Extension Service, OSU Agricultural Experiment Station, Oregon Wheat Commission, and the Oregon Grains Commission. Central Oregon Agricultural Research Center (COARC) has participated in the program every year since 1993. The Oregon Grain Commission budget no longer allows them to contribute to the statewide Oregon Elite Yield Trials, and Oregon Wheat Commission contributions to the trial have diminished because of their budget constraints.

Yield, height, lodging, and heading dates were recorded for Madras, one of nine locations around Oregon that participate in the statewide trials. There used to be trials at 11 sites around Oregon. Results are summarized and extended through extension publications, county extension newsletters such as the Central Oregon Ag Newsletter, as well as in other popular press media. Data are also summarized for all trials and are available on the OSU Cereals Extension web page (<http://cropandsoil.oregonstate.edu/wheat/>). For future reference, use the web page for earliest access to data, as trial results are posted as soon as they are available. Previous cereal variety and other production trial data (1993-2002) are available at the following web site: <http://cropandsoil.oregonstate.edu/cereals/>. Due to budget constraints, this web site is no longer updated, but the information is still available.

Materials and Methods

The entries were planted into plots, 4.5 ft × 20 ft, at the rate of 30 seeds/ft² in six inch rows, eight-inch row spacing with an Oyjord plot drill in a randomized block design, with 3 replications. Winter wheat trial was planted on September 24, 2003 and the spring wheat trial was planted on April 5, 2004.

Soil samples were taken on September 2, 2003 and March 22, 2004 to a depth of 13 inches. The samples were analyzed by Agri-Check Laboratory at Umatilla, Oregon. Soil test results are presented in table 1 and table 2. The nitrogen supply goal for winter wheat was 200 lb N/acre. The nitrogen supply goal for spring wheat was 220 lb N/acre.

Table 1. Soil test results from samples taken on September 2, 2003, for the state-wide Oregon Elite Winter Wheat Variety Trial, at COARC, Madras, Oregon.

Soil Depth	pH	NO ₃	NH ₄	P	K	S
(in)		(lb/acre)	(lb/acre)	(ppm)	(ppm)	(ppm)
0-13	6.8	67	9	44	579	9.8

Table 2. Soil test results from samples taken on March 22, 2004, state-wide Oregon elite spring wheat variety test trial, at COARC, Madras, Oregon.

Soil Depth	pH	NO ₃	NH ₄	P	K	S
(in)		(lb/acre)	(lb/acre)	(ppm)	(ppm)	(ppm)
0-13		96	70	33	496	11.5

The winter wheat variety trial was fertilized with 450 lb/acre of 30-10-0-7 (135 lb N – 45 lb P₂O₅ – 0 lb K₂O – 31.5 lb S per acre) on March 16, 2004. Estimated total nitrogen (soil + fertilizer N) available to the plants was 202 lb/acre. Spring wheat variety trial was fertilized with 500 lb/acre of 30-10-0-7 (150 lb N – 50 lb P₂O₅ - 0 lb K₂O – 35 lb S per acre) on March 29, 2004. Estimated total nitrogen (soil + fertilizer N) in the top 13 inches of soil available to the plants was 246 lb/acre.

Weeds were controlled with an application of 2 pt/ac Starane[®] +Sabre[®] product, 0.5 oz/ acre Harmony Extra product, 0.0625 oz/acre Express[®] product and 2pt/100 gal of Liberate[®] product, and 2pt/100gal non ionic surfactant on March 17, 2004

The trials were irrigated as needed with a 30 feet x 40 feet spacing, solid-set sprinkler (9/64th inch heads) irrigation system. Date of first irrigation for the winter wheat variety trial occurred on April 19, 2004 and the last irrigation occurred on July 16, 2004. Date of first irrigation for the spring wheat variety trial occurred on May 4, 2004 and the last irrigation was applied on July 26, 2004.

Heading dates were recorded when 50 percent heading occurred. Just prior to harvest, lodging scores (% plot) and plant height (inches) measurement were taken. Harvested area was approximately 10 feet by 4.5 feet to 15 feet by 4.5 feet for the winter wheat variety trial and 15 feet by 4.5 feet for the spring wheat trial. The drill had malfunctioned at times in the winter wheat trial and wider alleys between plots were created before harvest.

A Hege plot combine was used to harvest the entries. Harvest dates for the winter wheat trial was August 12, 2004 and August 20, 2004 for the spring wheat trial. The grain samples were shipped to the OSU Hyslop Farm at Corvallis, Oregon and processed at the Hyslop Farm. Statistical analyses were by analysis of variance, (ANOVA) using general linear model, PROC GLM, of SAS version 9.1 (SAS Institute, 2002). Treatment means were separated by Fisher's protected least significant difference (PLSD) test. Quality analyses were performed at the Western Wheat Quality Laboratory (WWQL), Pullman, Washington.

Results and Discussion

Winter Wheat Trial

The winter wheat trial yield average was slightly more than 136 bu/acre, and the yields range from 88.5 to 172.0 bu/acre (Table 3.). For the top-yielding 12 entries, 'Dune' to 'Weatherford', there was no significant differences between these varieties with a yield range of 172.0 bu/acre to 142.6 bu/acre (PLSD 0.05, 30.8 bu/acre).

Heading dates ranged from 138 days from January 1st (doy) to 153, or a range of 15 days. Two Oregon lines were the earliest to head at 138 (doy), while Dune and Westbred 528 headed at day 139. Finch was the last entry to head.

Average plant height was 40 inches for the trial. Heights ranged from 34 inches (Gene) to 46 inches (Chukar).

Lodging average was 16 percent for the trial. Lodging ranged from 0 percent (6 entries) to 62 percent (Coda). There were 12 entries with 10 percent or less lodging scores.

Quality information data are in Tables 4, 5, and 6. Further information regarding quality measures are available from the WWQL at <http://www.wsu.edu/~wwwql/php/wheat-was-meth.php>

Spring Wheat Trial

The spring wheat trial average yield was almost 109 bu/acre and yields range from 78.5 to 135.9 bu/acre (Table 4.). For the top-yielding 12 entries, 'Jerome' to ML 13-03 (a range of 135.9 bu/acre to 113.6 bu/acre), there was no significant differences (PLSD 0.05, 22.3 bu/acre) between varieties.

Heading date averaged 174 (doy), with a range of 171 (IDO 599) to 179 do (OR 4930230). Interestingly, the highest numerical yielder, Jerome, was one of the earliest heading varieties (172 do).

Average plant height for the trial was 39 inches, with a range of 33 inches (ML32-03) to 48 inches (WA 7925). Jerome and 'Altruas', two relatively new releases and the two highest yielding varieties in the trial, had plant heights of 36 and 40 inches. 'Lolo' and 'Winsome' also were in the same height range of 36 and 39 inches with statistically equal yields.

The average lodging was 31 percent for the trial with a range of 0 percent (3 entries) to 87 percent (Louise). Jerome, Alturas, Lolo and Winsome had lodging scores of 38, 27, 17, and 12 percent, respectively. There were 9 entries with lodging scores of 10 percent or less.

Test weight, thousand kernel weight and protein were not performed due to budget constraints. Therefore there is no calculated grain N uptake, grain protein yield or no future seeding rate data.

Table 3. Yield, heading, height, and lodging data for the statewide Oregon elite winter wheat variety testing program at the COARC, Madras, OR, 2004.

Variety or line	Class	Yield (bu/acre)	Heading (doy)	Height (in)	Lodging (%)	Grain N Uptake (lbs/ac)
Dune	SWW	172.0	139	37	5	148.5
Stephens	SWW	162.1	143	39	3	180.9
Simon	SWW	158.0	146	41	0	139.7
ORH010918	SWW	154.0	138	37	17	155.6
Rod	SWW	149.3	151	39	3	121.0
Tubbs	SWW	147.9	145	41	0	123.0
ORH010920	SWW	147.5	139	37	17	159.9
Brundage 96	SWW	147.2	149	38	10	137.9
Westbred 528	SWW	145.2	138	37	2	120.8
Mohler	SWW	144.0	144	41	25	127.3
OR12010007	SWW-Clearfield	142.9	146	43	0	--
Weatherford	SWW	142.6	149	42	0	126.1
OR9900553	SWW	136.6	145	37	11	153.9
Chukar	Club	136.4	151	46	25	146.5
Madsen	SWW	135.8	150	39	0	145.8
ORCF-101	SWW-Clearfield	132.3	149	39	2	121.2
Finch	SWW	131.8	153	43	13	112.4
IDO0587CL	SWW-Clearfield	130.4	144	39	28	156.5
ID92-22407A	SWW	126.1	149	40	32	106.2
Gene	SWW	124.2	146	34	0	--
OR9801757	SWW	122.2	145	44	31	111.9
OR941611	SWW	121.7	142	42	35	--
Coda	Club	110.2	151	44	62	118.3
Mel	Club-Clearfield	100.1	150	42	17	--
Clearfirst	SWW-Clearfield	88.5	150	40	33	--
Mean		136.4	146	40	16	135.7
PLSD (0.05)		30.8	1.8	7.1	--	--
CV%		20.4	0.8	4.3	--	--

Table 4. 2004 Oregon winter elite yield trial preliminary quality data for Madras, OR. Analysis performed at the Western Wheat Quality Laboratory (WWQL), Pullman, WA.

Variety	Class	Test Weight (lbs/bu)	Grain Hardness NIR	Pertin Single Kernel Characterization						Grain protein (%)
				Hardness Index	Hardness (std. dev.)	Kernel Weight	Kernel Weight (std. dev.)	Kernel Diameter	Kernel Diameter (std. dev.)	
Stephens	SWW	60.7	34	22.6	14.0	50.3	11.1	3.06	0.62	10.6
Madsen	SWW	--	36	31.5	14.9	42.4	8.3	2.74	0.45	10.2
Weatherford	SWW	60.2	34	27.4	15.2	45.4	8.6	2.93	0.54	8.4
Tubbs	SWW	59.6	34	28.4	13.8	50.8	8.1	3.10	0.51	7.9
Finch	SWW	61.8	34	23.1	16.1	40.4	8.0	2.61	0.50	8.1
Rod	SWW	60.4	37	30.8	15.3	42.7	8.4	2.67	0.52	7.7
Brundage 96	SWW	59.7	29	11.8	16.8	41.5	9.1	2.56	0.48	8.9
Simon	SWW	59.8	34	29.8	13.5	45.4	7.7	2.87	0.48	8.4
Dune	SWW	60.7	39	22.0	14.3	47.2	8.7	2.99	0.55	8.2
ID9222407A	SWW	60.4	21	17.6	15.2	39.8	7.4	2.72	0.45	8.0
Mohler	SWW	60.4	29	24.3	15.4	47.4	8.4	2.97	0.50	8.4
WB528	SWW	61.8	36	23.7	14.6	44.1	8.4	2.66	0.50	9.8
Coda	CLUB	61.9	37	43.5	14.7	35.1	6.5	2.56	0.40	10.2
Chukar	CLUB	60.1	36	30.9	15.2	37.1	7.2	2.51	0.47	10.2
ID587CF	SWW	58.7	39	32.1	17.1	43.0	9.7	2.77	0.55	12.2
ORCF-101	SWW	60.8	44	41.5	17.7	40.0	8.6	2.77	0.53	11.4
OR9801757	SWW	59.6	28	16.2	21.9	38.0	9.2	2.41	0.46	8.7
OR9900553	SWW	61.0	35	8.4	17.7	45.1	6.4	2.60	0.39	10.7
OR9901619	SWW	57.7	37	35.5	20.3	31.2	9.9	2.23	0.52	12.2
ORH010918	SWW	60.7	33	26.8	17.6	44.2	8.1	3.03	0.49	9.6
ORH010920	SWW	60.7	35	35.7	19.9	39.4	10.7	2.79	0.61	10.3
ORH011481	SWW	59.6	31	28.2	16.3	40.4	8.0	2.74	0.51	9.2
Mean		60.3	34	26.9	16.3	42.3	8.5	2.74	0.50	9.5

Table 5. 2004 Oregon winter elite yield trial preliminary quality data for Madras, OR. Analysis performed at the Western Wheat Quality Laboratory (WWQL), Pullman, WA.

Variety	Class	Polyphenol Oxidase LDOPA (units)**	Break Flour Yield (%)	Flour Yield (%)	Flour Ash (%)	Milling Score	Flour Protein (%)	Flour SDS Sedimentation (mm)	Flour Swelling Volume (mL/g)	RVA Starch Viscosity (RVU)
Stephens	SWW	0.675	42.5	65.9	0.36	82.1	8.6	44.7	21	148
Madsen	SWW	0.893	--	--	--	--	--	--	--	--
Weatherford	SWW	0.815	45.1	66.4	0.39	80.8	6.3	30.2	22.2	126
Tubbs	SWW	0.976	44.2	66.0	0.40	79.7	6.7	24.4	21.3	129
Finch	SWW	1.139	48.1	66.7	0.40	80.6	6.1	33.1	20.7	138
Rod	SWW	1.079	44.8	64.9	0.36	80.8	6.2	30.2	21.0	128
Brundage 96	SWW	1.118	48.8	66.5	0.39	81.0	7.0	30.2	19.2	136
Simon	SWW	0.800	47.0	65.8	0.39	80.1	6.7	36.0	20.4	126
Dune	SWW	1.201	46.2	66.4	0.37	82.1	6.6	36.0	21.9	113
ID9222407A	SWW	0.863	50.9	66.8	0.37	82.6	6.4	30.2	22.2	154
Mohler	SWW	0.579	46.1	64.2	0.38	78.7	6.7	30.2	23.4	148
WB528	SWW	0.836	45.9	65.2	0.37	80.6	7.9	53.4	22.5	162
Coda	CLUB	0.459	48.5	67.4	0.38	82.7	8.2	27.3	23.1	172
Chukar	CLUB	1.155	49.4	68.7	0.39	83.8	8.2	36.0	22.5	193
ID587CF	SWW	0.635	43.5	66.3	0.41	79.4	10.3	82.4	18.6	99
ORCF-101	SWW	0.728	43.0	66.1	0.40	79.8	9.4	44.7	19.8	147
OR9801757	SWW	0.826	48.0	65.1	0.37	80.4	6.6	27.3	23.1	174
OR9900553	SWW	0.705	49.2	68.0	0.39	82.9	8.4	73.7	22.2	177
OR9901619	SWW	0.747	46.9	66.3	0.41	79.4	9.8	59.2	18.9	170
ORH010918	SWW	1.348	45.0	65.3	0.40	78.8	7.8	44.7	21.9	164
ORH010920	SWW	1.612	44.8	65.8	0.40	79.4	8.2	53.4	21.6	171
ORH011481	SWW	1.796	44.4	65.9	0.42	78.3	7.5	36.0	23.1	168
Mean		0.953	44.4	63.3	0.39	80.7	7.9	41.1	21.5	158

**One unit of PPO activity is defined as a change in absorbance of 0.001/min in a 1cm path at 475 nm.

Table 6. 2004 Oregon winter elite yield trial preliminary quality data for Madras, OR. Analysis performed at the Western Wheat Quality Laboratory (WWQL), Pullman, WA.

Variety	Class	Test Weight (lb/bu)	Solvent Retention Capacity			Mixograph Absorption (%)	Mixograph Type	Cookie Diameter (cm)
			Carbonate (%)	Water (%)	Sucrose (%)			
Stephens	SWW	60.7	72.3	54.6	99.2	55.5	2M	9.29
Madsen	SWW	--	--	--	--	--	--	--
Weatherford	SWW	60.2	73.3	55.6	103.2	54.8	6M	9.27
Tubbs	SWW	59.6	77.9	62.8	96.6	57.3	5M	9.24
Finch	SWW	61.8	71.9	55.7	96.8	57.2	4M	9.73
Rod	SWW	60.4	76.7	57.2	97.2	59.0	7M	9.42
Brundage 96	SWW	59.7	69.1	51.6	90.3	54.7	2M	9.76
Simon	SWW	59.8	71.9	55.2	94.3	56.2	1L	9.34
Dune	SWW	60.7	70.5	53.8	94.0	56.1	5M	9.39
ID9222407A	SWW	60.4	69.5	51.9	94.1	55.2	6M	9.76
Mohler	SWW	60.4	72.9	55.8	94.2	56.2	6M	9.36
WB528	SWW	61.8	70.7	54.4	94.4	55.5	5M	9.60
Coda	CLUB	61.9	69.3	54.3	93.8	52.8	1M	9.39
Chukar	CLUB	60.1	66.2	51.9	86.5	52.8	2M	9.60
ID587CF	SWW	58.7	74.0	57.0	99.8	57.3	2M	9.31
ORCF-101	SWW	60.8	73.8	57.8	99.4	56.4	1M	9.18
OR9801757	SWW	59.6	69.1	52.4	95.4	56.2	2M	9.75
OR9900553	SWW	61.0	69.3	52.1	96.1	55.9	4M	9.57
OR9901619	SWW	57.7	71.4	55.3	97.8	56.9	2M	9.34
ORH010918	SWW	60.7	71.2	55.3	100.1	54.9	3M	9.35
ORH010920	SWW	60.7	70.5	56.3	100.0	56.0	2M	9.34
ORH011481	SWW	59.6	70.2	54.9	96.9	55.3	3M	9.48
Mean		60.3	71.5	55.0	96.2	55.8	--	9.45

Table 7. Yield, heading, height, and lodging data for the statewide Oregon elite spring wheat variety testing program at the COARC, Madras, OR, 2004.

Variety or line ¹	Class	Yield (bu/acre)	Heading (doy)	Height (in)	Lodging (%)
Jerome	HR	135.9	172	36	38
Alturas	SW	131.7	175	40	27
IDO 592	HR	130.9	174	39	2
WA 7930	HW	130.3	175	41	67
IDO 593	HR	126.1	173	37	0
WA 7931	HW	122.7	175	41	23
IDO 599	SW	120.9	171	38	0
Lolo	HW	120.5	174	39	17
Winsome	HW	115.1	172	36	12
IDO 597	HW	114.9	173	39	3
OR 4880189	HR	114.3	174	37	0
ML13-03	HW	113.6	174	37	3
ML14-03	HW	111.6	173	38	28
OR4870532	SW	111.6	171	38	22
IDO377S	HW	107.0	171	37	45
ML32-03	SW	106.4	176	33	10
Jefferson	HR	99.6	173	38	5
Alpowa	SW	96.6	176	41	40
Nick	SW	94.7	171	39	65
ML37-03	SW	91.5	178	38	5
OR4930230	HW	91.3	179	41	10
Macon	HW	90.0	173	39	70
Challis	SW	84.3	175	39	60
Louise (WA 7921)	SW	80.5	174	36	87
WA 7925	HR	78.5	173	48	87
Mean		108.7	174	39	31
PLSD (0.05)		22.3	NS	1.9	36
CV%		15	NS	3	2

