

# IRRIGATED WINTER WHEAT VARIETY TRIALS FOR 1991

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## Abstract

**Winter soft white wheat and triticale, and hard red and white wheat variety trials were planted at COARC, Madras and Powell Butte sites in 1990. Identical trials were planted at the two sites. More hard red and soft white cultivars were tested compared to experimental lines being tested in the past.**

## Introduction

This year's winter variety trials were set out as uniform trials at both sites to test location effects, but a number of unforeseen circumstances prevailed. An attempt was made to test more of the released cultivars rather than continue to test more experimental lines. The experiment station receives no outside resources to fund these trials, but will continue them until budgets are stretched too far. There are a number of new releases in both the trials.

## Materials and Methods

Identical hard red winter and soft white winter wheat variety trials were planted at COARC, Madras and Powell Butte sites. The soft white wheat and triticale trial and hard red wheat trial were planted on October 23 and 24, 1990 at Madras and Powell Butte, respectively. Seeding rate was based on 30 seeds/ft<sup>2</sup> (see data tables for actual lb/ac seeding rate). Fertilizer applied was 125 lb N/ac and 60 lb S/ac at the Madras site. The soil test at Madras revealed that 101 lbs/N per acre was in the top one foot of soil. The hard red trial had 50 lb/ac additional N applied at heading. Fertilizer applied at Powell Butte was 150 lb N/ac and 40 lb S/ac. The first date of irrigation at Madras and Powell Butte were April 29 and 18, respectively and the last date of irrigation as July 25 and August 7 at Madras and Powell Butte, respectively. The plots were planted with a cone type experimental drill on 8-inch rows. Plot size was 5 x 20 feet and 5 x 15 feet of the plot was harvested with a Hege plot combine. Harvest date was August 20 at Madras and August 22 at Powell Butte.

Data collected included yield, percent relative yield of Stephens, test weight, percent protein, hardness factor, protein yield, 50 percent flower date (Madras only), height, lodging, percent chaff, grain N uptake, and seeding rate (30 seeds/ft<sup>2</sup>) in lb/ac. Percent

protein and hardness factor were predicted with near infrared reflectance spectrometry (NIRS) by the Oregon State University Crop and Soil Science Department. Percentage chaff was determined by subtracting the chaff and cleanout from the total uncleaned grain weight and then dividing by the uncleaned weight. The plots were harvested with the Hege combine on one setting and represents a measure of threshability based on only one setting for the plot harvester.

## Results and Discussion

### Powell Butte: Hard Red Winter Wheat Trial

The data for this trial are in Table 1 and 2. Stephens, the SW check, was the highest yielding cultivar at 127.4 bu/ac. Of the released hard red cultivars, Andrews and Hoff yielded 89 percent of Stephens. The experimental line OR 8522 was the top yielder at 134.7 bu/ac. The yields were very good in general, as were the test weights. Percent protein was very low for hard red quality, almost a full 2.0 percent less than the 12 percent desired. There were no significant differences in percent protein. The same fertility management program for hard reds (see Madras hard red trial) was not followed through because of volunteer wheat in the trial. That is the reason no flower dates were recorded. The trial was abandoned in late spring and then a decision was made to harvest the trial. There is a lot of information on the varieties in Table 1 and 2. The average grain N uptake was 116 lb/ac. The seeding rate (30 seeds per square foot) is interesting, because the range for pounds per acre was 85 to 155 lb/ac.

### Madras: Hard Red Winter Wheat Trial

The data are presented in Tables 3 and 4. Low yields in this trial may be attributed to winter injury and a possible missed last irrigation. Stephens, SW check variety, outyielded all the hard reds. Ute, Monopole, OR 830282 and Hoff yielded 98, 95, 95, and 92 percent of Stephens, respectively. Hatton and Hoff test weights were the highest at 60.5 and 59.4 lb/bu. The mean percent protein was 13.7, with Monopole and Hoff having proteins of 14.1 and 14.2 percent. Ute is a short (32 inches) variety that did not lodge much, and Monopole, for a tall variety, had little lodging. Hoff was close to 50 percent lodged. There were large differences in lodging for the entries. Grain N uptake mean was 128 lb/ac for the trial. Seeding rate varied from 85 to 155 lb/ac to achieve 30 seeds/ft<sup>2</sup>.

### Powell Butte: Soft White Winter Wheat and Triticale Trial

The data for this trial are in Tables 5 and 6. MacVicar and Dusty, significantly, yielded more than Stephens. Malcolm outyielded Stephens, although not significantly. The yields were very good for the year. Rohde, a club type, yielded 114.8 bu/ac. Flora was the top yielding triticale as usual, although it was not significantly higher than Whitman.

Test weights were very good with Nugaines and Rohde having the highest test weights. The average percent protein was 9.1 percent and there were no significant differences between cultivars. Basin, Nugaines, and Gene had heights of 32, 34, and 35 inches, respectively. The range in seeding rates was 83 to 159 lb/ac for the cultivars to obtain 30 seed/ft<sup>2</sup> for equal plant populations. The mean grain N uptake was 116 lb/ac, the same as the hard red trial at Powell Butte, but the mean yield was 10.8 bu/ac more.

#### Madras: Soft White Winter Wheat and Triticale Trial

The data for this trial are presented in Tables 7 and 8. Winter injury averaged 39 percent for the trial, contributing to decreased yields. There may have been a missed irrigation at the end of the trial also, as the test weights are low. Protein percentages were high as well (averaging 13.8 percent), too high for soft white quality. Basin was the top yielding cultivar at 104.3 bu/ac and had the lowest percent protein at 11.7, which was significantly different from the majority of the entries. Stephens only yielded 84.0 bu/ac but sustained 47 percent winter injury. Rohde yielded within 4 percent of Stephens, and MacVicar outyielded Stephens though not significantly. Some of the entries sustained heavy winter damage and yet still yielded fair to good for the amount of injury. Flora triticale outyielded Whitman, but had much lower test weight. Flora had the least amount of winter injury in the trial. Triticale usually needs another irrigation over the wheat and the low test weights of the triticale and wheats indicate that a major stress happened. The mean flowering date was 3.5 days behind the hard red trial. Grain N uptake averaged 109 lb N/ac, 19 lb less than the hard red trial.

Table 1. 1991 hard red winter wheat variety trial data for yield, percent relative yield to Stephens, test weight, percent protein, hardness factor, and protein yield for plots established in 1990 at COARC. Powell Butte, OR.

Variety	Yield lb/ac	% Rel. Yield of Stephens	Test Weight lb/bu	Protein	Hardness Factor	Protein Yield lb/ac
Wanser	84.1	66	60.0	11.5	69.2	557
Hatton	95.5	75	62.1	10.3	71.8	588
Batum	104.4	82	59.1	10.2	65.8	641
Stephens	127.4	100	59.1	8.9	36.2	681
Federation	105.6	83	59.8	10.2	34.8	639
Ute	106.9	84	59.0	9.3	57.7	593
Buchannon	91.0	71	58.1	10.0	64.8	538
Andrews	113.2	89	60.5	9.8	53.5	666
Monopole	107.0	84	61.7	10.3	76.1	659
Hoff	113.3	89	61.5	10.3	64.2	702
ORCR8602	107.2	84	60.0	10.2	60.0	655
OR830282	112.2	88	59.9	10.7	72.8	722
ORCR8718	122.9	96	61.3	9.4	57.7	693
ORCR8617	125.3	98	60.4	10.1	52.8	764
ORCR8601	115.8	91	61.0	9.6	54.9	671
OR8300027	99.2	78	60.8	10.7	60.7	638
OR8302306	113.3	89	59.4	10.3	50.4	696
OR8522	134.7	106	59.1	10.3	56.7	833
Mean	110.0	86	60.2	10.1	58.9	66.3
PLSD .10	15.7		1.2	NS	9.9	126
PLSD .05	18.8		1.4	NS	11.9	151
CV%	10.3		1.4	10.0	12.2	13.7

Table 2. 1991 hard red winter wheat variety trial data for flowering date, height, lodging, chaff, grain N uptake, and seeding rate for plots established in 1990 at COARC, Powell Butte, OR.

Variety	Flower Date	Height in	Lodging %	Chaff %	Grain N Uptake lb/ac	Seeding Rate lb/ac
Wanser	No	48	80	6.9	98	109
Hatton	Notes	47	83	4.5	103	111
Batum	Taken	39	50	7.6	113	122
Stephens		36	0	4.2	120	155
Federation		48	52	4.6	112	123
Ute		28	0	3.1	104	85
Buchannon		46	88	8.7	94	120
Andrews		35	50	3.6	117	101
Monopole		42	0	6.6	116	105
Hoff		41	15	4.1	123	121
ORCR8602		32	0	3.0	115	124
OR830282		39	3	3.8	127	126
ORCR8718		42	0	4.5	122	114
ORCR8617		36	3	4.4	134	93
ORCR8601		42	0	4.1	118	124
OR8300027		42	13	4.4	112	126
OR8302306		35	7	3.3	122	123
OR8522		37	12	3.0	146	121
Mean		40	25.4	4.7	116	117
PLSD .10		2.3	26.8	1.3	22	range
PLSD .05		2.7	32.2	1.6	NS	85-155
CV%		4.1	76.6	20.6	13.7	

Table 3. 1991 hard red winter wheat variety trial data for yield, percent relative yield to Stephens, test weight, percent protein, hardness, and protein yield for plots established in 1990 at COARC, Madras, OR.

Variety	Yield lb/ac	% Rel. Yield of Stephens	Test Weight lb/bu	Protein	Hardness Factor	Protein Yield lb/ac	Winter Kill %
Wanser	64.0	57	58.2	13.3	91.9	509	7
Hatton	72.0	64	60.5	13.0	109.5	561	7
Batum	71.5	64	55.4	13.7	97.2	588	32
Stephens	112.5	100	57.8	11.9	52.0	801	13
Federation	79.4	71	57.7	13.4	63.9	637	57
Ute	110.8	98	56.4	12.9	94.1	855	47
Buchannon	80.6	72	56.5	13.2	100.0	637	5
Andrews	100.2	89	57.7	13.7	90.7	826	30
Monopole	106.5	95	59.3	14.1	103.1	900	8
Hoff	103.8	92	59.4	14.2	96.4	887	12
ORCR8602	102.9	91	57.3	13.8	106.4	849	18
OR830282	106.7	95	58.6	13.9	109.8	891	33
ORCR8718	70.3	62	59.0	14.0	103.1	588	93
ORCR8617	95.5	85	58.3	13.9	97.7	795	47
ORCR8601	78.5	70	58.4	14.2	106.9	666	82
OR8300027	81.5	72	57.5	14.6	106.4	713	58
OR8302306	77.6	69	52.7	13.8	76.5	638	35
OR8522	88.8	79	54.0	14.2	75.4	748	38
Mean	89.1	79	57.5	13.7	93.4	727	35
PLSD .10	16.7		2.0	0.9	6.3	120	22
PLSD .05	20.1		2.4	1.0	7.6	144	26
CV%	13.6		2.5	4.5	4.9	11.9	45.7

Table 4. 1991 hard red winter wheat variety trial data for flowering date, height, lodging, chaff, grain N uptake, and seeding rate on plots established in 1990 and COARC, Madras, OR.

Variety	Flower Date	Height in	Lodging	Chaff	Grain N Uptake lb/ac	Seeding Rate lb/ac
Wanser	173	48	97	10.8	89	109
Hatton	472	46	93	8.4	99	111
Batum	174	42	78	11.6	103	122
Stephens	175	42	23	7.6	141	155
Federation	175	50	7	9.4	112	123
Ute	177	32	15	5.8	150	85
Buchannon	178	47	92	12.0	112	120
Andrews	172	35	52	7.1	144	101
Monopole	175	45	7	9.3	258	105
Hoff	171	40	48	6.9	156	121
ORCR8602	168	34	25	6.9	156	124
OR830282	169	40	0	8.9	156	126
ORCR8718	172	46	0	10.0	103	114
ORCR8617	174	36	26	7.3	139	93
ORCR8601	170	45	2	11.2	117	124
OR8300027	171	44	20	9.6	125	126
OR8302306	170	36	41	9.2	112	123
OR8522	171	38	33	6.7	131	121
Mean	172.6	41	37	8.8	128	117
PLSD .10	one	2.6	20	1.9	21	range
PLSD .05	rep	3.2	25	2.3	25	85-155
CV%	only	4.6	40.2	15.4	11.9	

Table 5. 1991 soft white winter wheat and triticale variety trial data for yield, percent relative yield to Stephens, test weight, percent protein, hardness, and protein yield on plots established in 1990 at COARC, Powell Butte, OR.

Variety	Yield lb/ac	% Rel. Yield of Stephens	Test Weight lb/bu	Protein	Hardness Factor	Protein Yield lb/ac
Malcolm	142.5	108	60.2	8.9	25.7	761
Stephens	131.8	100	60.2	9.3	29.4	736
Hill 81	120.8	92	60.5	8.7	32.5	631
Basin	118.7	98	59.1	8.5	20.6	605
Yamhill	103.8	79	57.4	9.6	30.9	599
Oveson	119.3	91	61.0	8.9	19.6	648
Dusty	150.4	114	59.0	8.9	21.3	807
Tres	106.3	81	60.3	9.4	29.1	599
Daws	130.2	99	59.9	9.2	24.5	718
Hyak	108.6	82	59.5	9.1	23.3	595
Madsen	117.0	89	60.1	9.5	27.9	665
KMor	128.6	98	58.9	9.1	28.9	703
Elten	124.2	94	58.5	9.3	25.9	691
OR8302784	105.1	80	60.3	9.7	24.8	609
Nugaines	107.3	81	61.7	8.7	23.6	566
Gene	103.6	79	58.1	9.3	24.0	582
Rohde	114.8	87	61.1	9.1	20.8	623
MacVicar	151.0	115	59.9	8.4	25.1	761
OR8632	115.1	87	59.8	9.1	29.6	632
W301	127.9	97	60.1	9.1	33.6	696
Whitman Trit.	109.6	83	54.6	9.3	49.5	611
Flora Trit.	120.2	91	49.1	9.4	27.7	678
Mean	120.8	92	59.1	9.1	27.2	660
PLSD .10	15.5		1.0	NS	8.7	126*
PLSD .05	18.6		1.3	NS	10.5	NS
CV%	9.4		13	9.1	23.4	14.0

\* P .105 level



Table 6. 1991 soft white winter wheat and triticale variety trial data for flowering date, height, lodging, chaff, grain N uptake and seeding rates on plots established in 1990 at COARC, Powell Butte, OR.

Variety	Flower Date	Height in	Lodging	Chaff	Grain N Uptake lb/ac	Seeding Rate lb/ac
Malcolm	Notes	37	0	3.4	133	137
Stephens	Not Taken	38	7	4.7	129	129
Hill 81		38	0	2.5	111	108
Basin		32	0	4.2	106	90
Yamhill		45	0	4.9	105	111
Oveson		36	0	5.0	114	102
Dusty		37	2	3.7	142	102
Tres		40	22	5.9	105	98
Daws		38	12	4.1	126	127
Hyak		40	8	7.1	104	107
Madsen		37	0	3.2	117	109
KMor		38	0	3.2	117	103
Elten		39	95	4.1	121	83
OR8302784		37	0	4.4	107	102
Nugaines		34	0	3.0	99	111
Gene		35	0	4.6	102	107
Rohde		37	0	5.4	109	99
MacVicar		37	0	3.6	134	135
OR8632		37	0	5.2	111	132
W301		38	0	4.6	122	106
Whitman Trit.		53	3	4.0	107	159
Flora Trit.		38	0	4.5	119	102
Mean		38	7	4.4	116	112
PLSD .10		1.7	11	1.3	22*	range
PLSD .05		2.0	13	1.6	NS	83-159
CV%		3.2	119.3	23.0	14.0	

\* = P = .105 level

Table 7. 1991 soft white winter wheat and triticale variety trial data for yield, percent relative yield of Stephens, test weight, percent protein, hardness factor, and protein yield on plots established in 1990 at COARC, Madras, OR.

Variety	Yield lb/ac	% Rel. Yield of Stephens	Test Weight lb/bu	Protein %	Hardness Factor	Protein Yield lb/ac	Winter Kill %
Malcolm	82.8	99	53.9	13.5	36.3	670	8
Stephens	84.0	100	54.2	15.3	55.2	769	47
Hill 81	77.2	92	55.3	14.4	40.8	657	50
Basin	104.3	124	55.7	11.7	21.9	730	18
Yamhill	66.5	79	51.9	15.4	40.7	608	67
Oveson	56.5	67	52.4	14.5	27.6	488	60
Dusty	74.2	88	54.5	13.2	25.5	574	41
Tres	60.3	72	56.7	13.2	53.4	465	30
Daws	81.9	98	54.6	13.0	38.4	628	12
Hyak	68.2	81	54.7	13.1	47.6	537	27
Madsen	79.9	95	53.6	14.7	40.5	707	55
KMor	64.4	77	53.2	13.6	33.0	520	50
Elten	62.4	74	54.6	13.8	34.3	512	10
OR8302784	69.0	82	55.0	14.2	41.0	580	60
Nugaines	72.4	86	54.2	13.7	34.0	580	25
Gene	78.6	94	54.9	13.9	43.8	651	25
Rohde	80.5	96	57.2	13.4	44.8	633	78
MacVicar	88.5	105	53.0	13.3	40.5	704	28
OR8632	98.4	117	54.3	14.2	41.6	837	35
W301	88.9	106	54.3	14.3	42.5	752	48
Whitman Trit.	57.9	69	46.3	15.3	65.0	528	83
Flora Trit.	78.9	94	39.4	13.0	28.3	596	3
Mean	76.2	91	53.4	13.8	39.8	624	39
PLSD .10	15.9		2.0	1.4	7.2	110	28
PLSD .05	19.1		2.4	1.7	8.6	132	34
CV%	15.2		2.7	7.2	13.1	12.9	52.5

Table 8. 1991 soft white winter wheat and triticale variety trial data for flowering date, height, lodging, chaff, grain N uptake, and seeding rate on plots established in 1990 at COARC, Madras, OR.

Variety	Flower Date	Height in	Lodging %	Chaff %	Grain N Uptake lb/ac	Seeding Rate lb/ac
Malcolm	175	37	25	8.8	117	137
Stephens	176	39	23	8.1	135	129
Hill 81	174	41	13	7.4	115	108
Basin	177	34	72	6.9	128	90
Yamhill	175	44	3	8.2	107	111
Oveson	174	37	32	16.4	86	102
Dusty	179	39	45	15.4	101	102
Tres	180	40	78	11.6	82	98
Daws	177	39	70	10.3	110	127
Hyak	176	39	93	11.8	94	107
Madsen	174	39	0	6.3	124	109
KMor	177	38	40	13.6	91	103
Elten	175	40	92	10.7	90	83
OR8302784	175	41	3	8.7	102	102
Nugaines	178	36	60	13.2	102	111
Gene	173	36	7	9.6	114	107
Rohde	173	35	28	12.4	111	99
MacVicar	177	40	8	10.1	123	135
OR8632	175	38	23	7.5	147	132
W301	175	37	18	8.0	132	106
Whitman Trit.	173	49	0	14.3	93	159
Flora Trit.	174	39	2	12.9	105	102
Mean	175.5	39	33	11	109	112
PLSD .10	one	2.5	35	2.6	19	range 83-159
PLSD .05	rep	2.9	42	3.2	23	
CV%	only	4.6	76.9	18.2	12.9	