

Spring Wheat Variety Screening in the Klamath Basin

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Abstract Spring wheat breeding lines from the Oregon State University (OSU) and other regional breeding programs are evaluated annually in mineral soils at the Klamath Experiment Station (KES). The Oregon Statewide spring wheat screening trials are also evaluated at an organic soil site in the Lower Klamath Lake (LKL) area. Entries evaluated in 2000 included hard red (HR), soft white (SW), hard white (HW), and triticale (Trit) classes. In mineral soil at KES, SW varieties produced higher yields than other classes. Pomerelle and Treasure produced the highest yield of named varieties at 7,410 and 7,400 lb/acre, respectively. High-producing numbered selections included 4950006 (7,880 lb/acre), SDM 50043 (7,830 lb/acre), IDO 540 (7,570 lb/acre), and IDO 526 (7,010 lb/acre). In the organic soil, ML 037A(5-2) (7,130 lb/acre) and Pomerelle (7,080 lb/acre) were the highest yielding selections.

The results for the HR spring wheat lines in the mineral soil showed that the varieties Iona (5,990 lb/acre), McKay (5,920 lb/acre), and Hank (5,860 lb/acre) were the highest yielding. Superior numbered lines in the Western Regional trial were N96-0060 (6,810 lb/acre) and SDM 50040 (6,550 lb/acre). At the KES OSU Elite Nursery top yielders included 4990113 (5,970 lb/acre) and 4990118 (5,940 lb/acre). In the organic soil, Hank (6,510 lb/acre), Zak (6,480

lb/acre), and OR4970039 (6,260 lb/acre) produced high yields.

Winsome was the best HW named variety grown in both the mineral (7,490 lb/acre) and organic soils (7,250 lb/acre). In statewide and regional trials, the highest yielding HW lines were from Idaho. At KES, IDO 533, IDO 560, and IDO 552 yielded 7,480, 7,450, and 6,950 lb/acre, respectively. In the organic soil, IDO 377S looked promising, yielding 6,900 lb/acre.

Introduction

Wheat producers in the Klamath Basin have seen spring frosts at the critical pollination stage totally destroy winter wheat. Although these spring and early fall frosts can affect spring wheat production, it is less likely that total crop loss will occur. In the 2000 growing season, 13,500 acres of spring wheat was produced within the Klamath Irrigation Project. This was less than the 1999 acreage by almost 25 percent. Much of this decline could be attributed to late August frosts in 1999 that resulted in yield and quality losses. Farmers responded to these losses by reducing their 2000 acreage, in contrast to recent trends where increases in wheat acreage at the expense of barley acreage were noted. The longer-term trend for increased wheat production can be attributed to more favorable prices, government subsidies, and the occurrence of barley stripe rust.

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Hard red spring wheat accounts for about 70-80 percent of wheat produced in the Klamath Basin, with the rest mainly being soft white varieties. With the extra fertilizer input necessary to produce high-protein HR wheat, the percentage of SW varieties may increase in future plantings. For HR production, Yecora Rojo and Westbred 936 are the most popular varieties. Alpowa was the most popular SW variety seeded in 2000.

In the 2000 growing season, frosts occurred 12 times between trial planting and harvest. A frost on May 31 fell to 24⁰F at KES. Temperatures were even lower at the LKL site. The LKL wheat was about 4 in tall at this time. Like much of the wheat and barley in the area, plants were frozen back to ground level. In addition to stresses from the cold temperatures, a low incidence of wheat stem maggot occurred at KES, with a limited number of heads dying back and not reaching maturity.

Spring wheat screening trials conducted at KES in 2000 included OSU Elite Nurseries for HR, SW, and HW selections; a Western Regional Nursery Trial including all classes; and an Oregon Statewide Trial including all classes plus triticale. The Statewide Trial was also planted at an LKL organic soil site.

Procedures

KES

All spring wheat-screening trials were conducted on a Poe fine sandy loam soil in a 3-year rotation immediately following potatoes. All trials were arranged in a randomized block design. The OSU HR, SW, and HW trials included four replications while the Statewide and Western Regional trials included three replications. Seed was planted at a 1-in depth at 30 seeds/ft² with a Kincaid (Kincaid

Equipment Manufacturing) plot planter on April 25. Plots were 4.5 ft wide (9 rows at 6-in spacing) and 20 ft long. At ends of plots, 5.5-ft borders were shredded, resulting in 14.5- by 4.5-ft harvest areas.

All plots were fertilized with 50 lb N, 63 lb P₂O₅, and 41 lb S/acre banded at planting (16-20-0-13 at 310 lb/acre) and 50 lb N and 57 lb S/acre broadcast preplant (21-0-0-24 at 240 lb/acre). Weeds were controlled with Buctril® (Bromoxynil, Aventis) at 0.5 lb ai/acre (1.5 pt/acre) and Rhomene® (MCPA, Aventis) at 0.5 lb ai/acre (1 pt/acre), applied with a conventional ground sprayer at the 4-leaf stage. Irrigation was applied with solid-set sprinklers arranged in a 40- by 40-ft pattern in accordance with crop needs.

During the growing season, the date to achieve 50 percent heading was noted and just prior to harvest, plant height and lodging percentages were recorded. Grain was harvested and yields recorded on August 24 for the Statewide trial, August 28 for the OSU HW and HR trials, and on August 29 for the OSU SW and the Western Regional trials with a Hege (Hans-Ulrich Hege) plot harvester with a 4.5-ft-wide header.

At KES, test weights were determined for only one replication in the OSU Elite Nurseries and Western Regional Trial. Grain from the Oregon Statewide Trial was sent to Corvallis for determination of test weight, percent protein, and kernel weight. Yield, 50 percent heading date, plant height, and lodging percent data were analyzed statistically with SAS software.

Lower Klamath Lake

The Oregon Statewide Spring Wheat Variety Trial was conducted on an Algoma silt loam soil in a continuous grain rotation. Grain was planted with a Kincaid plot

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planter on May 19. Seed was placed at 1-in depth at a seeding rate of 30 seeds/ft². Fertilizer included 70 lb N/acre shanked in before planting as anhydrous ammonia and 50 lb N, 63 lb P₂O₅, and 41 lb S/acre banded at planting (16-20-0-13 at 310 lb/acre). Weeds were controlled with a tank mix of 2,4-D (Agrilience, LLC) and Express® (tribenuron-methyl, E.I. duPont de Nemours & Co.) applied at recommended rates. Folicur® (tebuconazole, Bayer) was applied aerially in July to control rust associated with the barley in the surrounding field area.

The field was flooded during the winter to restore moisture to the soil profile and received two irrigations during the growing season with an overhead linear move system. During the growing season, the date to achieve 50 percent heading was noted and just prior to harvest, plant height and lodging percentages were recorded. Grain was harvested and yield recorded on September 20 with a Hege (Hans-Ulrich Hege) plot combine with a 4.5-ft-wide header. Samples were evaluated at Corvallis for test weight, percent protein, and kernel weight. All data were analyzed statistically using SAS software.

Results and Discussion

OSU Spring Wheat Elite Nurseries

Five standard varieties and 16 numbered selections were included in the 2000 SW nursery. Five selections yielded over 3.5 ton/acre and did not significantly differ from the highest yielding line, 4950006 (Table 1). Ten selections were included in the previous 2 years of testing. The 3-year average yield for these 10 indicated that 4950006 was the highest producing line and 4950006 was next, significantly out-yielding the other lines (Table 2). All 2000 entries were also tested

in the 1999 SW trial. Averaged over 2 years, yield of 4950006 was significantly higher than all other selections except Pomerelle.

The HR nursery included 3 standard varieties, the HW standard Klasic, and 28 numbered HR selections (Table 3). Mean yields for the HR entries were more than 0.5 ton/acre below mean yields in the SW trial. Only five SW entries numerically yielded less than the top yielding HR line. Among HR selections, 14 lines did not differ from the highest yielding entry, 4990113. These 14 lines included the standards, McKay, Westbred 936, and the HW Klasic. Numerically, the locally common variety, Yecora Rojo, produced the lowest yield, but did not significantly differ in yield from 15 other varieties. Considering lines that had been tested the previous 2 years, 4870410 and 3900362 were not different than the top 3-year average yielding line, McKay (Table 4). For these 3-year averages, Klasic was not different from the second highest yielding line 4870410, while Yecora Rojo was not different from the third highest yielding line 3900362. Among lines tested at least 2 years, 4870410 did not differ from the top 2-year-average yielding line, McKay. In addition, 4970074 and 3900362 yields were not different from 4870410, the second highest 2-year-average yielding line.

The 2000 HW nursery included Winsome and 29 numbered selections. Mean yields were similar to mean yields in the HR trial. The top 10 yielding lines in 2000, led by Winsome, did not significantly differ from each other. The top yielding numbered lines were 4910006 and 4990032 (Table 5). For lines tested in both of the previous years, six did not differ from 4910006, the highest yielding entry over 3 years (Table 6). Winsome, 4910006, and 942834 were among the top in 2-year-average

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yields, while 8 selections were not different from the top line, 4910006.

Western Regional Spring Wheat Nursery

The 2000 Western Regional Trial included 15 HR, 7 HW, and 17 SW selections. Mean yields were higher by about 700 lb/acre for SW and HW entries compared with HR entries (Table 7). Four SW (SDM 50043, IDO 540, WA 7883, IDO 560) and two HW (IDO 541, and IDO 552) selections were the highest producing lines in the 2000 trial. The highest producing HR line, N96-0060, was not different in yield from the six previously mentioned lines, except for SDM 50043. CA1162 (HW) and OR942845 (SW) were the top producers among selections evaluated in 1998, 1999, and 2000 (Table 8). Although not quite as productive as CA1162, 7 lines exhibited 3-year-average yields similar to OR942845. OR4920002 was in this group and was the highest yielding HR line. IDO 541 and Penewawa, both SW lines, and OR4920307 (HW) produced the highest 2-year-average yields for 1999 and 2000. Six lines were similar to Penewawa in 2-year mean yields. Serra and McKay, the highest yielding HR lines, were included in this group.

Oregon Statewide Spring Wheat Trial (KES)

The 2000 Oregon Statewide Trial included 16 SW, 6 HW, 10 HR, and 2 Trit entries. Penewawa was evaluated at three seeding rates. The ranking of class mean yields from high to low was HW, Trit, SW, and HR (Table 9). Yield variability was high in this trial. A rather large difference, 1,560 lb/acre, was required for significance. Sixteen lines were not different from the highest producing line, Winsome. These

lines included 4 HW, 8 SW, 2 HR, and 2 Trit selections. Numerically, the highest lines from each class were Winsome and IDO 533 (HW), Treasure and IDO 526 (SW), Iona (HR), and M94-4393 and Trical 2700 (Trit). The lowest seeding rate for Penawawa (3,990 lb/acre) yielded less than the two higher seeding rates, (5,340 and 5,950 lb/acre).

M94-4393 had higher test weights and reached 50 percent heading ahead of Trical 2700. Winsome had slightly less protein content and lower kernel weight than the other top HW variety, IDO 533. Treasure and IDO 526 were similar in all of the quality assessments within the SW class.

For 3-year-average yields, 7 selections yielded within the 750-lb/acre least significant difference from the numerically highest yielding line (Table 10). IDO 506 and Pomerelle were the highest yielding SW lines and IDO 377S and IDO 533 were the highest HW lines. No HR lines were included in these highest yielding lines. However, Jefferson's yield was not significantly less than yields for Alpowa or Wawawai.

Nine lines yielded within the least significant difference, 890 lb/acre, of the top yielding line for the 2-year yield average. Treasure and Pomerelle were the highest yielding SW lines, Winsome and IDO 533 were the highest yielding HW lines, and M94-4393 (Trit) was among these top nine lines. Scarlet was the highest yielding HR line, producing a yield similar to IDO 533.

Oregon Statewide Spring Wheat Trial (Lower Klamath Lake)

In spite of the hard frost at this site that caused extensive early plant injury, yields were only slightly below those at the mineral soil site (Table 11). The ranking for averages across wheat classes for the

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organic soil site did vary from the mineral soil site. For this site, the ranking from high to low yields was HW, SW, Trit, and HR. Differences in yields for the two sites in class means were 250 (HW), 210 (SW), 1,200 (Trit), and 230 (HR) lb/acre. This indicates that the early frost plus other undefined factors tended to impede triticale lines more than other classes of wheat.

Although not in every case, top-yielding selections in the organic soil also varied from those in the mineral soil. Across all wheat classes, 12 lines did not differ from the highest yielding line. Of these, Winsome (HW), Pomerelle (SW), IDO 377S (HW), Treasure (SW), IDO 560 (HW), IDO 533 (HW), and OR 4970039 (SW) were among the highest yielding group in the mineral soil trial. Those that yielded highest only in the organic soil trial were ML 037A(5-2) (SW), Chalis (SW), Hank (HR), Zak (SW), and ML 455 (HW).

Ten selections in the 2000 organic soil trial were also evaluated in 1999 and 1998 (Table 12). Eight of these were similar to Pomerelle, the highest 3-year-average yielding line. These eight included 5 SW, 2 HW, and 1 HR lines. Numerically, Pomerelle and Treasure were the highest yielding two SW lines, Winsome and IDO 377S were the highest HW lines, and Westbred 936 was the highest yielding HR variety. Over 2 years, ML 455 and IDO 533 (HW) and Zak and Scarlet (HR) also deserve attention. Penawawa tended to yield more at the higher seeding rates, which leads to questions about whether the seeding rates used in the trials were adequate to maximize grain yields.

Summary

Promising new varieties are emerging for all spring wheat classes. Data obtained in these trials over several years indicate performance differences between the KES and LKL sites. Differences in soil type that affect moisture and fertility levels, and differences in frost severity could explain some of this variable variety response.

For mineral soils, promising new SW lines include 4950006, 4850001, SDM 50043, IDO 540, and IDO 526. At the LKL site, good performance was observed for first-year entries ML 037A(5-2) and Chalis. These deserve further evaluation against the standard SW varieties Pomerelle, Alpowa, and Treasure.

Numbered HR lines for further investigation include 4990113, 4990118, 4870410, N96-0060, SDM 50040, OR4920002, and OR4880189. These should be compared with the named varieties Hank, Iona, and Scarlet.

HW numbered lines for further evaluation include 4910006, 4990032, IDO 533, IOD 377S, IDO 560, and ML 455. Winsome performed best of the named standard lines and should be used as the standard in these evaluations.

The number of triticale lines investigated should be increased. The local knowledge base for this hybrid cereal used as a grain or as forage is limited. Positive results from other areas of the country need to be confirmed under local growing conditions.

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Table 1. OSU Soft White Spring Wheat Nursery: agronomic and grain quality data for spring wheat varieties and lines established on April 24, 2000, at KES, Klamath Falls, OR.

Variety or line	Yield	Test weight	Lodging	Height	50% head
	lb/acre	lb/bu	%	in	Julian
4950006	7880	63.0	0	35	177
Pomerelle	7410	63.0	0	37	180
Alpowa	7210	64.0	0	36	179
Whitebird	7050	62.0	0	35	179
4850001	7020	62.0	0	38	178
942845	6820	61.5	0	38	178
Dirkwin	6800	59.0	0	36	178
4970039	6650	62.0	0	36	179
4950027	6500	63.0	0	40	178
9640085	6490	63.0	0	38	178
Penawawa	6490	61.0	0	39	181
942838	6240	61.5	0	36	178
4970062	6140	64.0	0	39	179
WA 7831	6090	63.0	0	38	177
4970063	6030	61.5	0	39	178
4970001	5970	58.5	0	34	177
4880013	5850	61.0	0	39	181
9640078	5840	61.0	0	36	178
942885	5790	62.5	0	37	177
942889	5640	62.5	0	39	178
9640089	4840	61.0	0	36	177
Mean	6420	61.7	0	37	178
CV (%)	11	--	0	4	1
LSD (.05)	990	--	0	2	1

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Table 2. OSU Soft White Spring Wheat Elite Nursery at KES: 3-year yield summary, 1998-2000.

Variety or line	Yield			2-year average		3-year average	
	2000	1999	1998	yield	rank	yield	rank
	lb/acre	lb/acre	lb/acre	lb/acre		lb/acre	
4950006	7880	6930	5930	7400	1	6910	1
4850001	7020	5640	6300	6330	4	6320	2
4950027	6500	5750	5210	6130	8	5820	3
942845	6820	5690	4930	6250	5	5810	4
Dirkwin	6800	5490	4900	6140	7	5730	5
4880013	5850	5510	5550	5680	14	5640	6
942838	6240	5640	4750	5940	11	5540	7
942889	5640	5440	5150	5540	17	5410	8
WA 7831	6090	5490	4320	5790	12	5300	9
942885	5790	5030	4940	5410	19	5250	10
Pomerelle	7410	6680		7040	2		
Alpowa	7210	5910		6560	3		
Whitebird	7050	5280		6170	6		
Penewawa	6490	5720		6110	9		
9640085	6490	5500		6000	10		
4970001	5970	5580		5780	13		
4970062	6140	5090		5620	15		
4970039	6650	4490		5570	16		
9640078	5840	5180		5510	18		
4970063	6030	4800		5410	19		
9640089	4840	4950		4890	20		
Mean	6420	5510	5200	5970		5770	
CV (%)	11	5	8	6		5	
LSD (.05)	990	410	620	550		430	

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Table 3. OSU Hard Red Spring Wheat Nursery: agronomic and grain quality data for spring wheat varieties and lines established April 24, 2000, at KES, Klamath Falls, OR.

Variety or line	Yield	Test weight	Lodging	Height	50% head
	lb/acre	lb/bu	%	in	Julian
4990113	5970	64.0	0	32	177
4990118	5940	62.5	0	32	180
McKay	5920	62.0	0	35	177
4870410	5720	63.5	0	36	177
4970074	5640	62.5	0	35	177
4990094	5540	64.0	0	29	176
4990106	5540	66.0	0	33	176
4990098	5450	65.0	0	29	176
4990128	5400	63.0	0	31	178
4990126	5370	62.0	0	34	177
3900362	5350	64.0	0	29	175
Westbred 936	5340	63.0	0	31	175
4990112	5260	66.0	0	32	177
Klasic	5260	65.5	0	24	173
4970003	5230	65.0	0	32	177
4990099	5190	64.0	0	30	177
4990117	5060	66.0	0	31	177
4880189	5050	63.5	0	30	175
4990095	5050	63.0	0	31	176
4895011	5040	64.0	0	32	176
4990123	5010	65.0	0	23	173
4990114	4870	66.0	0	31	178
4990103	4850	62.0	0	31	175
4990115	4840	65.0	0	33	178
4990122	4830	63.0	0	31	175
4990120	4780	63.0	0	28	175
4990101	4770	62.0	0	30	179
4990110	4750	66.0	0	33	177
4990119	4660	60.0	0	26	175
4990111	4660	65.0	0	32	176
WA 7824	4630	63.0	0	33	173
Yecora Rojo	4450	64.0	0	24	172
Mean	5210	64	0	31	176
CV (%)	10	--	0	5	1
LSD (.05)	710	--	0	2	2

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Table 4. OSU Hard Red Spring Wheat Elite Nursery at KES: 3-year yield summary, 1998-2000.

Variety or line	Yield			2-year average		3-year average	
	2000	1999	1998	yield	rank	yield	rank
	————	lb/acre	————	lb/acre		lb/acre	
McKay	5920	5850	5830	5880	1	5870	1
4870410	5720	5670	5360	5700	2	5590	2
3900362	5350	4870	5410	5110	4	5210	3
4880189	5050	4460	4580	4760	8	4700	4
Klasic	5260	4640	3890	4950	6	4600	5
Yecora Rojo	4450	4370	4310	4410	10	4370	6
4970074	5640	4600		5120	3		
4895011	5040	4920		4980	5		
WPB 936	5340	4490		4920	7		
4970003	5230	4140		4690	9		
4990113	5970						
4990118	5940						
4990094	5540						
4990106	5540						
4990098	5450						
4990128	5400						
4990126	5370						
4990112	5260						
4990099	5190						
4990117	5060						
4990095	5050						
4990123	5010						
4990114	4870						
4990103	4850						
4990115	4840						
4990122	4830						
4990120	4780						
4990101	4770						
4990110	4750						
4990111	4660						
4990119	4660						
WA 7824	4630						
Mean	5170	4800	4900	4780		4920	
CV (%)	10	8	22	10		14	
LSD (.05)	710	540	NS	710		1070	

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Table 5. OSU Hard White Spring Wheat Nursery: agronomic and grain quality data for spring wheat varieties and lines established April 24, 2000, at KES, Klamath Falls, OR.

Variety or line	Yield	Test weight	Lodging	Height	50% heading
	lb/acre	lb/bu	%	in	Julian
Winsome	6140	63.5	0	31	177
4910006	6060	63.0	0	33	172
4990032	6020	64.0	0	33	175
4970044	5840	64.0	0	33	175
942834	5730	65.0	0	34	177
4990021	5730	65.0	0	29	175
4920307	5530	63.0	0	32	175
4990030	5480	64.0	0	27	175
4920311	5420	64.0	0	32	173
4990025	5320	64.0	0	29	175
942505	5260	63.0	0	35	176
4940139	5170	64.0	0	32	175
4990039	5130	63.5	0	31	175
4990033	5110	61.0	0	26	175
4990028	5020	65.0	0	29	175
4990038	4990	63.0	0	30	175
4990040	4970	65.0	0	30	175
4990041	4890	63.5	0	31	175
9640151	4890	64.0	0	32	173
4970025	4880	63.5	0	34	175
9640081	4870	65.0	0	33	177
4990037	4860	63.0	0	29	175
4990014	4800	64.0	0	31	175
4990009	4800	65.0	0	32	175
4870255	4790	66.0	0	32	175
4990034	4710	65.0	0	27	175
4970018	4600	66.0	0	34	175
9640074	4560	64.0	0	32	175
4930230	4370	66.0	0	36	180
3940124	3970	64.5	0	29	175
Mean	5130	64.1	0	31	175
CV (%)	850	--	0	6	0.3
LSD (.05)	12	--	0	3	0.8

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Table 6. OSU Hard White Spring Wheat Elite Nursery at KES: 3-year yield summary, 1998-2000.

Variety or line	Yield			2-year average		3-year average	
	2000	1999	1998	yield	rank	yield	rank
	lb/acre			lb/acre		lb/acre	
4910006	6060	5360	4110	5710	1	5180	1
942834	5730	5590	3380	5660	3	4900	2
4940139	5170	5210	4230	5190	8	4870	3
942505	5260	5580	3690	5420	4	4840	4
Winsome	6140	5200	2830	5670	2	4720	5
9640151	4890	4790	4250	4840	12	4640	6
4920307	5530	4950	2920	5240	7	4470	7
9640081	4870	4850	3350	4860	11	4360	8
4920311	5420	5160	2460	5290	6	4340	9
4870255	4790	4820	2910	4810	13	4170	10
4930230	4370	4420	2830	4400	15	3870	11
4970044	5840	4780		5310	5		
4970025	4880	5060		4970	9		
9640074	4560	5300		4930	10		
4970018	4600	4550		4580	14		
4990032	6020						
4990021	5730						
4990030	5480						
4990025	5320						
4990039	5130						
4990033	5110						
4990028	5020						
4990038	4990						
4990040	4970						
4990041	4890						
4990037	4860						
4990009	4800						
4990014	4800						
4990034	4710						
3940124	3970						
Mean	5130	5040	3360	5120		4580	
CV (%)	12	9	23	9		9	
LSD (.05)	850	660	1100	680		580	

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Table 7. Western Regional Spring Wheat Nursery: agronomic and grain quality data for spring wheat varieties and lines established on April 24, 2000, at KES, Klamath Falls, OR.

Variety or line	Type ¹	Yield	Test weight	Lodge	Height	50% heading
		lb/acre	lb/bu	%	in	Julian
N96-0060	HR	6810	64.0	0	34	176
SDM 50040	HR	6550	66.0	0	32	176
IDO 557	HR	6320	63.0	0	33	177
Serra	HR	6230	63.0	0	33	176
McKay	HR	6070	63.0	0	35	178
CA 1161	HR	6040	57.0	0	33	178
OR 4920002	HR	5960	62.0	0	30	177
IDO 529	HR	5840	64.0	0	33	174
IDO 559	HR	5750	64.0	0	30	175
N96-0144	HR	5550	64.0	0	34	176
Norpro	HR	5540	62.0	0	32	176
Nora	HR	5150	63.5	0	30	176
WA 7839	HR	5150	64.0	0	34	174
XKW940W01	HR	5120	63.0	0	33	176
WA 7859	HR	3820	62.5	0	42	176
Mean		5730	63.0	0	33	176
IDO 560	HW	7270	62.0	0	35	178
IDO 552	HW	6950	63.0	0	32	181
OR 4920307	HW	6610	63.0	0	33	180
IDO 533	HW	6290	61.5	0	34	176
OR 4920311	HW	6110	64.5	0	34	177
CA 1162	HW	5980	64.0	0	35	176
Klasic	HW	5930	64.0	0	29	172
Mean		6450	63.1	0	33	177
SDM 50043	SW	7830	63.5	0	35	177
IDO 540	SW	7570	64.5	0	39	178
WA 7883	SW	7440	66.0	0	35	177
IDO 541	SW	7210	61.5	0	31	179
IDO 553	SW	6750	62.5	0	34	175
ML 66A-14-4	SW	6640	62.0	0	38	180
WA 7877	SW	6590	64.0	0	39	178
ML 037A-6-8	SW	6480	63.5	0	33	180
ML 037C-6-2	SW	6460	64.0	0	35	180
OR 942845	SW	6450	63.0	0	36	178
IDO 556	SW	6400	65.5	0	30	179
OR 942889	SW	6020	64.5	0	37	176
IDO 563	SW	5830	66.0	0	31	173
Penewawa	SW	5800	63.0	0	30	177
WA 7864	SW	5490	63.5	0	37	176
WA 7867	SW	5130	62.0	0	32	176
Federation	SW	4840	60.0	0	45	181
Mean		6410	63.5	0	35	178
Grand Mean		6150	63.0	0	34	177
CV (%)		9	--	0	6	1
LSD (.05)		940	--	0	3	2

¹SW denotes soft white, HW denotes hard white, HR denotes hard red.

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Table 8. Western Regional Spring Wheat Nursery: grain yield of spring wheat varieties and lines established at KES, Klamath Falls, OR, 1998-2000.

Variety or line	Type ¹	Yield			2-year average		3-year average	
		2000	1999	1998	yield	rank	yield	rank
		lb/acre			lb/acre		lb/acre	
CA1162	HW	5980	5810	7070	5900	6	6290	1
OR942845	SW	6450	5360	5530	5910	4	5780	2
OR4920002	HR	5960	4970	6090	5460	8	5670	3
Penewawa	SW	5800	6510	4700	6160	2	5670	4
Serra	HR	6230	5590	5150	5910	5	5660	5
IDO533	HW	6290	5010	5550	5650	7	5620	6
McKay	HR	6070	4810	5030	5440	9	5300	7
CA1161	HR	6040	4750	4810	5400	10	5200	8
Klasic	HW	5930	4390	4370	5160	12	4900	9
Federation	SW	4840	4510	4210	4680	15	4520	10
IDO541	SW	7210	5720		6470	1		
OR4920307	HW	6610	5420		6020	3		
OR942889	SW	6020	4710		5360	11		
WA7839	HR	5150	4450		4800	13		
XKW940W01	HR	5120	4380		4750	14		
SDM50043	SW	7830						
IDO540	SW	7570						
WA7883	SW	7440						
IDO560	HW	7270						
IDO552	HW	6950						
N96-0060	HR	6810						
IDO553	SW	6750						
ML66A-14-4	SW	6640						
WA7877	SW	6590						
SDM50040	HR	6550						
ML037A-6-8	SW	6480						
ML037C-6-2	SW	6460						
IDO556	SW	6400						
IDO557	HR	6320						
OR4920311	HW	6110						
IDO529	HR	5840						
IDO563	SW	5830						
IDO559	HR	5750						
N96-0144	HR	5550						
Norpro	HR	5540						
WA7864	SW	5490						
Nora	HR	5150						
WA7867	SW	5130						
WA7859	HR	3820						
Mean		6150	5090	5250	5540		5460	
CV (%)		9	9	13	5		6	
LSD (.05)		940	810	1180	490		610	

¹SW denotes soft white, HW denotes hard white, HR denotes hard red.

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Table 9. Oregon Statewide Spring Wheat Trial: mineral soil, agronomic and grain quality data for spring wheat varieties and lines established on April 24, 2000, at KES, Klamath Falls, OR.

Variety or line	Type ¹	Yield	Test		1,000 Kernel		50%	
			weight	Protein	weight	Height	heading	Lodging
		lb/acre	lb/bu	%	grams	in	Julian	%
M94-4393	Trit	6640	54.0	11.8	41.9	33	176	0
Trical 2700	Trit	6340	48.3	11.5	43.7	33	180	0
Mean		6490	51.1	11.6	42.8	33	178	0
Iona	HR	5990	62.3	14.3	41.9	32	176	0
Hank	HR	5860	60.0	14.4	44.7	33	176	0
OR 4880189	HR	5630	61.7	13.7	37.0	29	176	0
Scarlet	HR	5590	61.0	14.4	42.8	33	176	0
OR 4870410	HR	5490	60.5	13.8	36.9	35	176	0
Jefferson	HR	5430	62.1	13.8	40.8	30	174	0
Yecora Rojo	HR	5310	62.3	14.7	41.5	30	174	0
WA 7869	HR	5180	60.5	13.9	45.7	33	174	0
WA 7824	HR	4580	59.8	14.9	44.3	31	174	0
Westbred 936	HR	4140	59.1	16.2	43.7	30	174	0
Mean		5320	60.9	14.4	41.9	32	175	0
Winsome	HW	7490	60.4	12.2	39.5	31	180	0
IDO 533	HW	7480	62.1	13.0	47.4	31	176	0
IDO 560	HW	7450	62.2	11.7	40.1	33	178	0
IDO 377S	HW	6630	62.0	13.1	41.6	33	176	0
ML 455	HW	5760	60.1	13.0	44.2	33	178	0
OR 4920311	HW	5200	60.4	12.9	32.3	28	176	0
Mean		6670	61.2	12.7	41	31	178	0
Treasure	SW	7400	61.0	11.1	41.1	31	178	0
IDO 526	SW	7010	60.9	11.2	39.9	30	177	0
OR 4970039	SW	6870	60.1	11.6	41.1	32	177	0
Pomerelle	SW	6760	62.2	11.0	39.1	30	178	0
Wawawai	SW	6720	59.0	12.1	50.1	31	176	0
Whitebird	SW	6600	60.4	11.2	36.4	30	179	0
IDO 506	SW	6180	61.2	11.7	38.6	33	176	0
OR 4970062	SW	6110	59.9	12.4	43.3	26	177	0
Penawawa (40 seeds/ft ²)	SW	5950	60.1	12.4	41.0	35	178	0
IDO 525	SW	5730	61.8	11.7	37.1	30	177	0
ML 037A(5-2)	SW	5590	59.4	12.4	38.9	28	180	0
Zak (WA7850)	SW	5400	61.1	12.0	41.2	30	178	0
Alpowa	SW	5490	61.8	12.2	41.5	28	177	0
Penawawa (30 seeds/ft ²)	SW	5340	58.8	13.0	39.7	30	178	0
OR 942885	SW	5260	61.8	13.4	38.4	32	176	0
OR 4970025	SW	5050	61.8	13.2	42.2	30	176	0
Chalis	SW	4700	59.8	12.1	36.3	30	176	0
Penawawa (20 seeds/ft ²)	SW	3990	58.2	13.1	37.3	35	177	0
Mean		5900	60.5	12.1	40.2	31	177	0
Grand Mean		5900	60.2	12.7	41.0	36	177	0
CV (%)		16	2	4	5	9	1	0
LSD (.05)		1560	1.7	0.7	3.1	5	2	0

¹SW denotes soft white, HW denotes hard white, HR denotes hard red, and Trit denotes triticale.

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Table 10. OSU Statewide Spring Wheat Trial: mineral soil, grain yield of spring wheat varieties and lines established at KES, Klamath Falls, OR, 1998-2000.

Variety or line	Type ¹	Yield			2-year average		3-year average	
		2000	1999	1998	yield	rank	yield	rank
		lb/acre			lb/acre		lb/acre	
IDO 506	SW	6180	6380	6700	6280	11	6420	1
Pomerelle	SW	6760	6730	5690	6750	2	6390	2
IDO 377S	HW	6630	6060	5810	6340	8	6160	3
Whitebird	SW	6600	6020	5770	6310	9	6130	4
IDO 533	HW	7480	5480	5320	6480	4	6090	5
Alpowa	SW	6270	5860	5450	6070	12	5860	8
Wawawai	SW	6720	5870	4660	6290	10	5750	9
Jefferson	HR	5430	4570	5480	5000	20	5160	10
Yecora Rojo	HR	5310	4780	4410	5050	19	4830	11
Westbred 936	HR	4140	5590	4430	4860	21	4720	12
Treasure	SW	7400	6320		6860	1		
Winsome	HW	7490	6000		6750	3		
M94-4393	Trit	6640	6270		6460	5		
IDO 526	SW	7010	5760		6390	7		
Scarlet	HR	5590	5990		5790	14		
Penawawa	SW	5340	5890		5620	15		
ML 455	HW	5590	5540		5560	16		
Zak (WA7850)	SW	5400	5690		5540	17		
IDO 525	SW	5730	5340		5530	18		
IDO 560	HW	7450						
OR 4970039	SW	6870						
Trical 2700	Trit	6340						
OR 4970062	SW	6110						
Iona	HR	5990						
Hank	HR	5860						
ML 037A(5-2)	SW	5760						
OR 4880189	HR	5630						
OR 4870410	HR	5490						
OR 942885	SW	5260						
OR 4920311	HW	5200						
WA 7869	HR	5180						
OR 4970025	SW	5050						
Chalis	SW	4700						
WA 7824	HR	4580						
Mean		5980	5800	5370	6000		5750	
CV (%)		16	10	11	9		8	
LSD (.05)		1560	980	960	890		750	

¹SW denotes soft white, HW denotes hard white, HR denotes hard red, and Trit denotes triticale.

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Table 11. Oregon Statewide Spring Wheat Trial: organic soil, agronomic and grain quality data for spring wheat varieties and lines established on May 19, 2000, at Klamath County, OR.

Variety or line	Type ¹	Test			50%		Lodging
		Yield	weight	Protein	Height	heading	
		lb/acre	lb/bu	%	In	Julian	%
Trical 2700	Trit	5580	43.0	11.8	45	203	0
M94-4393	Trit	4990	51.6	11.4	37	200	0
Mean		5290	47.3	11.6	41	201	0
Hank	HR	6510	59.5	14.5	32	196	0
OR 4880189	HR	5780	60.6	13.8	32	199	0
OR 4870410	HR	5540	55.9	14.1	32	197	5
Iona	HR	5280	59.9	14.5	31	200	13
Scarlet	HR	5100	58.1	15.5	32	197	12
Jefferson	HR	4800	61.7	14.1	30	196	3
WA 7824	HR	4670	61.4	14.8	34	196	0
Yecora Rojo	HR	4640	60.6	14.3	24	196	0
Westbred 926	HR	4440	57.9	15.5	30	196	0
WA 7869	HR	4130	55.9	15.0	30	197	8
Mean		5090	59.1	14.6	31	197	4
Winsome	HW	7250	59.3	11.9	32	202	2
IDO 377S	HW	6900	59.3	12.7	33	199	0
IDO 560	HW	6440	61.0	11.9	33	200	0
IDO 533	HW	6330	59.4	12.9	34	197	0
ML 455	HW	6280	58.4	12.1	33	203	3
OR 4920311	HW	5290	56.6	12.2	28	201	5
Mean		6420	59.0	12.3	32	200	2
ML 037A(5-2)	SW	7130	59.8	11.3	32	201	7
Pomerelle	SW	7080	56.1	11.8	32	201	0
Treasure	SW	6870	51.3	11.6	32	202	8
Chalis	SW	6760	59.7	11.3	33	199	5
Zak (WA7850)	SW	6480	55.4	11.9	35	200	8
OR 4970039	SW	6260	55.2	11.9	35	201	7
Penawawa (40 seeds/ft-2)	SW	6000	60.1	11.4	30	200	0
Penawawa (30 seeds/ft-2)	SW	5680	58.8	11.9	31	199	3
Whitebird	SW	5460	59.7	11.8	33	201	0
OR 4970025	SW	5460	60.9	12.5	32	199	3
OR 942885	SW	5360	61.2	12.8	34	197	0
Wawawai	SW	5330	56.8	12.3	33	196	60
IDO 525	SW	5290	57.6	11.3	32	200	2
IDO 506	SW	5220	57.9	11.8	32	201	0
OR 4970062	SW	4940	60.4	13.9	35	197	3
IDO 526	SW	4930	59.6	11.3	32	200	3
Alpowa	SW	4140	57.9	12.8	30	199	8
Penawawa (20 seeds/ft-2)	SW	4070	58.8	11.5	30	200	20
Mean		5690	58.2	11.9	32	200	8
Grand Mean		5660	58.1	12.6	32	199	5
CV (%)		12	4	3	6	1	136
LSD (.05)		1110	3.5	0.7	3	1	12

¹SW denotes soft white, HW denotes hard white, HR denotes hard red, and Trit denotes triticale.

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Table 12. OSU Statewide Spring Wheat Trial: 3-year yield summary for organic soil site in Klamath County, OR, 2000, 1999, and 1997.

Variety or line	Type ¹	Yield			2-year average		3-year average	
		2000	1999	1997	yield	rank	yield	rank
		lb/acre			lb/acre		lb/acre	
Pomerelle	SW	7080	4270	8790	5670	5	6710	1
Treasure	SW	6870	4850	8090	5860	4	6600	2
Penawawa (40 seeds/ft ²)	SW	6000	4930	8820	5470	6	6590	3
Winsome	HW	7250	4720	7460	5990	2	6480	4
IDO377S	HW	6900	3940	7700	5420	7	6180	5
Westbred 936	HR	4440	5440	8570	4940	10	6150	6
Alpowa	SW	4140	5630	8360	4890	11	6040	7
Whitebird	SW	5460	3680	7060	4570	14	5400	8
Wawawai	SW	5330	3680	6820	4510	16	5280	9
Yecora Rojo	HR	4640	3050	7330	3840	19	5010	10
ML 455	HW	6280	6010		6140	1		
IDO533	HW	6330	5450		5890	3		
Zak (WA7850)	HR	6480	4090		5290	8		
Scarlet	HR	5100	4980		5040	9		
IDO526	SW	4930	4840		4880	12		
Penawawa (30 seeds/ft ²)	SW	5680	4000		4840	13		
IDO525	SW	5290	3820		4560	15		
IDO506	SW	5220	3340		4280	17		
Jefferson	HR	4800	3580		4190	18		
Penawawa (20 seeds/ft ²)	SW	4070	3310		3690	20		
ML037A(5-2)	SW	7130						
Chalis	SW	6760						
Hank	HR	6510						
IDO560	HW	6440						
OR4970039	HR	6260						
OR4880189	HR	5780						
Trical 2700	Trit	5580						
OR4870410	HR	5540						
OR4970025	SW	5460						
OR942885	SW	5360						
OR4920311	HW	5290						
Iona	HR	5280						
M94-4393	Trit	4990						
OR4970062	SW	4940						
WA 7824	HR	4670						
WA 7869	HR	4130						
Mean		5620	4380	7900	5000		6040	
CV (%)		12	28	9	14		13	
LSD (.05)		1110	NS	1240	1190		1390	

¹SW denotes soft white, HW denotes hard white, HR denotes hard red, and Trit denotes triticale.