Wheat Variety Screening, Seeding Rate by Variety, and Seed Treatment Trials in the Klamath Basin, 2011

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Introduction

Grain is produced on upwards of 100,000 acres in the Klamath Basin including nearly 50,000 acres within the Klamath Reclamation Project. Susceptibility to late spring frosts has historically limited winter cereal production and spring cereals have accounted for the majority of production. Klamath Basin Research & Extension Center (KBREC) cereal variety evaluation efforts have focused on spring and winter cereal varieties in the past, but with a shortage of seasonal help, funding, and repeated failures due to bird predation, we discontinued winter wheat trials in 2010.

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In 2011, small grain variety trials were conducted on-site at KBREC on a mineral soil, and at a Lower Klamath Lake (LKL) site on a silty clay loam muck (high organic matter) soil. The OSU Oregon Spring Elite Yield Trial (OSEYT) and a new Wheat Seeding Rate by Variety Trial, measuring the response of different seeding rates on four common wheat varieties, were only seeded at the KBREC site. The seeding rate trial was done to evaluate whether common grower practice of seeding spring wheat at rates upwards of 200 lb/ac was justified, updating results from an earlier trial done at a LKL site in 2001 and at both a LKL site and at KBREC in 2002 (Clark and Smith, 2001 and 2002), but testing more commonly grown, newer varieties. Barley root knot nematode (*Meloidogyne naasi*) can be a problem in small grain fields in the Klamath Basin. Thus, a seed treatment trial, sponsored by Bayer Crop Science, was also done in 2011 to measure the effect of several seed treatments on wheat germination, growth, and yield in a LKL commercial field infested with barley root knot nematode.

Procedures

KBREC Site

KBREC small grain trials were conducted on Poe fine sandy loam soil following experiments evaluating a potential new oilseed crop (*Euphorbia lagascae*) grown in 2010. The OSEYT trial included 36 entries, including 21 named varieties and 15 advanced experimental lines from the Oregon State University and other PNW wheat breeding programs as part of an ongoing, statewide evaluation of potential new variety releases. The variety 'Yecora Rojo' was not part of the official OSEYT list, but was included here due its strong local use, caused by its dependably high protein value. The OSEYT trial was arranged as randomized complete block design with four replications. The Seeding Rate by Variety trial included four commercially available spring wheat varieties (two hard red spring types and two soft white spring types), seeded at four rates (covering the likely range growers typically use in this area). This trial was arranged as a complete factorial with four replications.

For both trials, seed was drilled 0.75 inches deep at with a Kincaid (Kincaid Equipment Mfg.) plot drill. Both trials were seeded on May 12. The plots were 20.0 by 4.5 ft, (9 rows at 6-inch spacing), with a harvested area of 13.5 by 4.5 ft. The OSEYT trial was seeded at 30 seeds/ft^2, our norm for these multi-year trials. The Seeding Rate by Variety trial included a range of seeding rates that includes rates growers typically use in this region, which are often higher than those in other PNW wheat-growing regions. Many growers choose seeding rates based on pounds of seed per acre rather than calculating number of seeds per square foot. Thus the seeding rate trial entries were seeded at 100, 125, 150 and 200 lb/ac, but because of size variation among the varieties, the number of seeds/ft^2 was not equal among varieties (Table 3).

Kincaid Plot Drill

Both the OSEYT and Wheat Seeding Rate by Variety Trial plots were fertilized with 74 lb/ac N, 23 lb/ac P_2O_5, 46 lb/ac K_2O, 98 lb/ac S, and 1 lb/ac B banded at seeding (applying a custom blend of 15.5-4.8-9.7-20.4-0.2B fertilizer at 479 lb/ac). On June 14, both trials were treated with a tank mixture of Rhomene® (MCPA) applied at 0.75 pint/ac (0.35 lb a.i./ac) and Banvel® (dicamba) applied at 0.19 pint/ac (0.1 lb a.i./ac) herbicides, using a conventional ground sprayer. An additional 79 lb/ac N and 83 lb/ac S were applied to both trials as 374 lb/ac of granular ammonium sulfate on June 8. Due to a mechanical error resulting in excessive irrigation immediately after the June 8 fertilization, the area was re-fertilized on June 16 with ammonium sulfate at 225 lb/ac. We estimated 25% of the June 8 fertilizer was still available in the root zone during the growing season. Therefore an estimated total of 67 lb/ac N and 76 lb/ac S were applied to both trials as ammonium sulfate during the growing season, in addition to the fertilizer applied at seeding.

Solid-set sprinklers arranged in a 40-by-40 ft pattern were used for irrigation. Irrigation rates were based on crop water use estimates calculated from the US Dept. of Reclamation Agricultural Meteorological (AgriMet) weather station at KBREC (US Bureau of Reclamation, 2009). Both trial areas received a total of 12.32 inches of irrigation, applied on 11 occasions, in addition to 1.24 inches of precipitation during the growing season. Plots were harvested using a Hege (Hans-Ulrich Hege) plot combine with a 4.5-ft-wide header. The OSEYT trial was harvested on September 21. The Wheat Seeding Rate Trial was harvested on September 22.

Hege Plot Combine

Grain yield, test weight, lodging percentage, plant height, bird damage, and relative maturity (date of 50 percent heading) were measured at KBREC for both trials. Stand counts were measured in the Wheat Seeding Rate trial only. Grain protein was measured for both trials at the OSU Wheat Genetics Lab in Corvallis, OR.

LKL Site

The Bayer Seed Treatment Trial was conducted on a grower's field (Algoma silt loam soil) in a continuous grain rotation. The field was flooded during the winter to replenish moisture to the entire soil profile. The trial was arranged in a randomized complete block design with seven replications. Seven seed treatments (including an untreated control) were applied to the Alpowa soft white spring wheat seed by Bayer Crop Sciences. Plots were seeded one inch deep at 45 seeds/ft^2 with a Kincaid (Kincaid Equipment Mfg.) plot drill on May 23. The plots were 20.0 by 4.5 ft, (9 rows at 6-inch spacing), with a harvested area of 4.5 by 13.5 ft.

All plots were fertilized with 75 lb/ac N incorporated before seeding (applying urea at 163 lb/ac). An additional 18 lb/ac N, 23 lb/ac P_2O_5, 23 lb/ac K_2O, 15 lb/ac S, and 2 lb/ac Mn, applied as a custom blend of 11.4-14.3-14.3-9.3-1.5Mn fertilizer, was banded at seeding. On June 29, Axial® (pinoxaden) herbicide was applied at 1.0 pint/ac (0.05 lb a.i./ac) to control wild oats and grassy weeds, tank-mixed with Huskie® herbicide applied at 0.75 pint/ac (0.03 lb a.i./ac pyrasulfotole plus 0.16 lb a.i./ac bromoxynil) to control broadleaf weeds, using a conventional ground sprayer. The plots were irrigated by the grower during the season with the center pivot system used for the entire field (approximately 160 acres), based on his judgment of water need. Plots were harvested

using a Hege (Hans-Ulrich Hege) plot combine with a 4.5-ft-wide header on October 13 and October 18.

Grain yield, test weight, stand counts, plant vigor, lodging percentage, plant height, and maturity (date of 50 percent heading) were measured in this trial.

For all trials described here, all measured parameters were analyzed statistically using SAS® for Windows, Release 9.1 (SAS Institute, Inc.) software. Treatment significance was based on the F test at the P=0.05 level. If this analysis indicated significant treatment effects, least significant difference (LSD) values were calculated based on the student's *t* test at the 5% level.

Results and Discussion

Soil moisture was good during seedbed preparation, and resulting germination and stand density were good. There was good availability of irrigation water and relatively few hot days during the season (only two days above 90°F). Although there were nine days with minimum temperatures below freezing during the growing season, all occurred in May or early June, well before wheat pollination, and did not appear to damage crop growth. Overall, yields were higher than yields of similar trials conducted in the past.

OSU Oregon Spring Elite Yield Trial

There was no lodging and no observed bird damage in the OSEYT trial in 2011.Differences between varieties were statistically significant at the P=0.05 level for all other measured parameters. Yields ranged from 4,152 to 8,364 lb/ac with a mean of

6,370 lb/ac (Table 1). Test weights were greater than the 60 lb/bu industry standard for all but one entry (UC1617, which also had the lowest grain yield), indicating good moisture, fertility, and weather conditions during the seed-filling phase. The overall mean test weight in 2011 (61.9 lb/bu) was slightly higher than the mean test weight in 2010 (61.2 lb/bu).

Multiple-year yield means for all entries that were seeded in the 2009, 2010, and 2011 trials at KBREC were calculated (Table 2). Yields were higher overall in 2011 than the OSEYT trials in both 2009 and 2010. Twelve entries were seeded all three years, nine of which were named varieties. For those twelve entries, overall mean yields were greatest in 2011, followed by 2010, with 2009 yields the lowest. For some varieties the yield was highest in 2010, and in others it was highest in 2011. Yields were lowest in 2009 for all entries.

Wheat Seeding Rate x Variety Trial

This trial included the four most common wheat varieties grown in the Klamath Basin: Alpowa, Bullseye, Yecora Rojo, and Twin. Each variety was seeded at four different seeding rates: 100 lb/ac, 125 lb/ac, 140 lb/ac, and 200 lb/ac. Because seed size is not equal among varieties, the actual seeding rate expressed as number of seeds/ft^2 varied between varieties (Table 3). For example, the 200 lb/ac seeding rate resulted in a range of 46.7 to 54.3 seeds/ft^2 due to this size difference. These differences will be included in the discussion below. The lowest seeding rate for Bullseye was 110 lb/ac instead of 100 lb/ac, due to a calculation error prior to seeding.

Differences between varieties were statistically significant at the P=0.05 level for all parameters measured (Table 3). Yields ranged from 4,598 to 7,976 lb/ac, with a mean of 6,372 lb/ac. These yields were similar to or slightly higher than other wheat trials conducted at KBREC in recent years. Overall, Twin had the highest yields, and Alpowa had the lowest. Test weights were higher than the 60 lb/bu standard for all varieties except Twin, which had test weights between 57 and 58 lb/bu. Bullseye had the highest test weights. Based on previous trials at KBREC, these results are not surprising (Figs. 1 and 2).

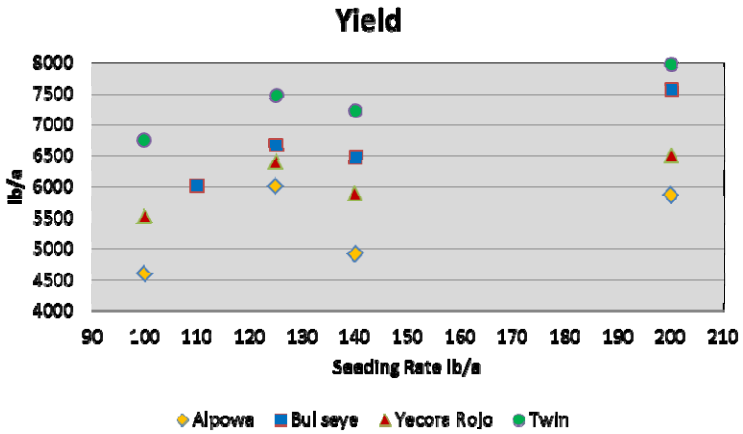

Fig. 1 Seeding Rate x Variety Trial Yield (seeding rate expressed as lb/ac).

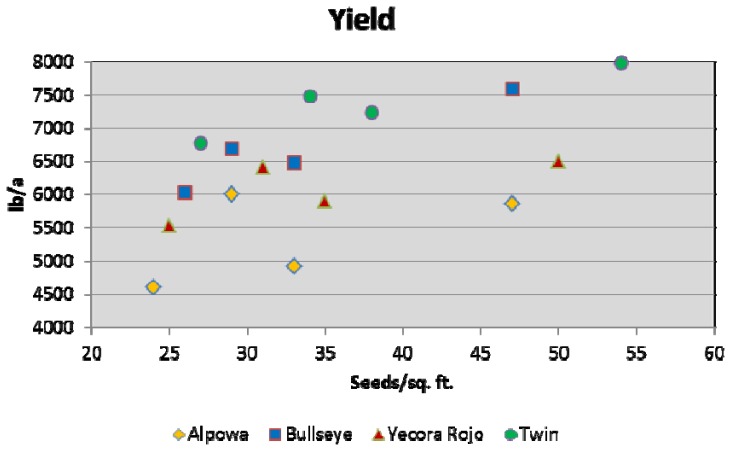

Fig. 2 Seeding Rate x Variety Trial Yields (seeding rate expressed as seeds/ft^2).

Heights ranged from 26.8 to 42.5 inches, with a mean of 34.8 inches. Alpowa was the tallest variety and Yecora Rojo was the shortest, again, similar to past results with these varieties. The date of 50% heading ranged from about day 193 to 203, with a mean of day 198. Yecora Rojo matured earliest, followed by Bullseye, Twin, and Alpowa. Stand counts were taken shortly after germination. Among varieties, Alpowa produced thinned stands for all seeding rates, suggesting poorer germination or less seedling vigor. Percent protein ranged from 11.1 to 14.2%, with a mean of 12.4%. Not surprisingly, the hard red wheat varieties had the highest proteins, especially Yecora Rojo, a variety grown mainly for its consistently high protein content.

Differences between seeding rates were significant at the P=0.05 level for all parameters measured except for test weight and protein content (Table 3). For every variety, yields increased as seeding rate increased from the lowest to the highest seeding rate, but for each variety the yield took a slight 'yield dip' when going from the 125 lb/ac to 140 lb/ac seeding rate. This pattern was also seen in plant stand (for Bullseye and Yecora Rojo only), but to a much smaller degree than the dip observed in yield (Figs. 1 and 2). The reason for this 'yield dip' was not obvious. It may be that plants in the 140 lb/ac seeding rate treatment were slightly more crowded, with less resulting tillering than those in the 125 lb/ac seeding treatment. However, if that were true, we would expect the plant stand to be consistently higher where the 'yield dip' occurred, but this was not consistently true. It will be interesting to see if this 'yield dip' phenomenon repeats in a similar trial planned for the 2012.

The effect of seeding rate on date of 50% heading was statistically significant (with the lowest seeding rate maturing slightly later), but the small LSD value (less than 1 day) and tightly grouped data suggest that these differences may not have a practical consequence on crop management.

As would be expected, stand counts generally increased as seeding rate increased, with the highest seeding rate resulting in a significantly higher stand count for all varieties. Alpowa and Twin consistently followed this trend of increasing stand count

with each level increased seeding rate. However, as noted above, Bullseye and Yecora Rojo had a dip in stand count at the 140 lb/ac seeding rate as was observed for yield (though the effect in stand count was much less pronounced than for yield) (Figs. 3 and 4).

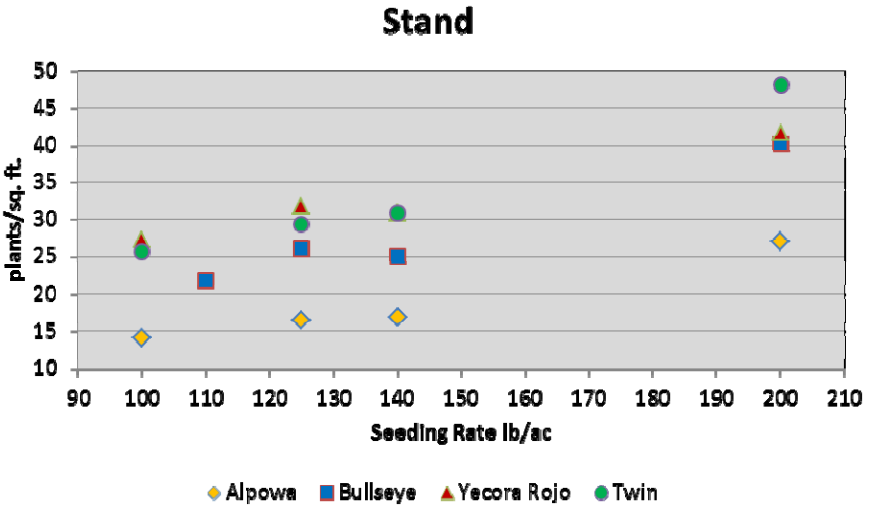

Fig. 3 Wheat Seeding Rate x Variety Trial Stand Counts (seeding rate expressed as lb/ac)

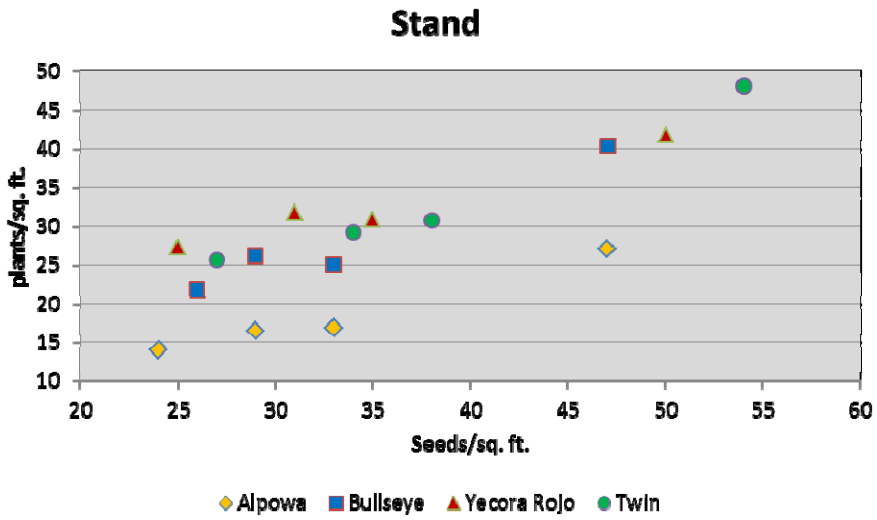

Fig. 4 Seeding Rate x Variety Trial Stand Counts (seeding rate expressed as seeds/ft^2)

Bayer Seed Treatment Trial

Alpowa wheat was treated with the seven different seed treatments and then seeded in soil that was infested with barley root knot nematode (visual symptoms were observed the previous year). Soil samples were collected just before seeding and analyzed in the lab of Dr. Russ Ingham at the Oregon State University main campus in

Corvallis, OR. Each analyzed sample was a bulked composite from each replication including 25 individual samples randomly collected from the surface 8 inches of soil. These samples confirmed the presence of the nematodes in the trial area. The seven root-knot nematode counts ranged from 9 to 154 nematodes per 250g of dry soil, with a median of 28. The 'stunt nematode' (*Tylenchorynchus sp.*) was also present, ranging from 751 to 4,033 nematodes per 250g of dry soil, with a median of 1,333.

The seven treatments were as follows: 'Treatment 1'-PC; 'Treatment 2'-P+PC; 'Treatment 3'-BCS Exp+PC; 'Treatment 4'-P+BCS Exp2a+PC; 'Treatment 5'-P+BCS Exp2b+PC; 'Treatment 6'-P+BCS Exp2c+PC; and 'Treatment 7'-control (no seed treatment) (Table 4). Results were not statistically significant for any of the measured parameters at the P=0.05 level. Yields ranged from 7,818 to 8,392 lb/ac, with a mean of 8,046 lb/ac. The yield throughout this trial was good overall, and was much higher than the most recent wheat trial we did on LKL soil in 2008. All plots seemed to be very uniform, visual symptoms of nematode damage were not evident, and thus it did not appear that the seed treatment had any beneficial effect on the wheat in this case.

Summary

In 2011, growing conditions and management were good, and the OSEYT had higher yields than we have observed in recent years. Results for the Wheat Seeding Rate by Variety Trial were somewhat surprising. We expected that as seeding rate increased, that yield would increase to a certain point, level off, and perhaps even decrease with the highest seeding rates. However, this was not the case. Yields continued to increase throughout the range studied (up to 200 lb/ac seed), except there was a consistent dip in yield when seeding rate increased from 125 lb/ac to 140 lb/ac. The reason for this 'yield dip' was not obvious It would be useful to conduct this trial again to see if this response is repeatable, or was it due to some unexplained anomaly. Repeating the trial would also confirm whether the higher seeding rates are truly justified for spring wheat in this region. The Bayer Seed Treatment Trial showed no difference in seed treatments vs. the control seed, indicating either that the treatments did not significantly affect the barley root knot nematode population and/or the barley root knot nematode was not harmful to the wheat at these population levels.

Crop rotation has some influence on the results of these trials and with grain production in the Klamath Basin in general. In grower's fields, spring grains often follow potatoes grown the previous year, benefiting from typical potato management such as high rates of fertilization and common use of fumigants, which also reduce weed seeds. Even where spring grain follows grain the year before, spring moisture, tillage, and use of grain herbicides often results in good stands with low weed pressure levels, but monoculture of continuous wheat or barley may be more susceptible to buildup of certain weeds and other pests. It is thought that the winter flooding commonly practiced in the Klamath Basin may ameliorate some of the disadvantages of a continuous small grain crop rotation.

Acknowledgements

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Special thanks also to Dr. Russ Ingham and his staff for conducting the barley root knot nematode counts in the pre-seeding soil samples in the Bayer seed treatment trial.

References

Clark, D.R. and J.E. Smith. 2001. Spring small grain seeding rate trial at Lower Klamath Lake. Oregon Agricultural Experiment Station Special Report 1042: 55-63. http://oregonstate.edu/dept/kbrec/publicationsannual-reports.

Clark, D.R. and J.E. Smith. 2002. Spring small grain seeding rate study. Oregon Agricultural Experiment Station Special Report 1049: 39-43. http://oregonstate.edu/dept/kbrec/publicationsannual-reports.

US Bureau of Reclamation, 2010. Agrimet: The Pacific Northwest cooperative agricultural weather network. http://www.usbr.gov/pn/agrimet/.

Table 1. 2011 OSU Oregon Spring Elite Yield Trial (OSEYT), seeded in mineral soil (ranked by yield). Klamath Basin Research & Extension Center, Klamath Falls, OR.

Entry	Type[1]	Yield (lb/ac)	Test Wt (lb/bu)	Lodge (%)	Height (inch)	50% Heading (Day of Year)
IDO671	SWS	8364	62.7	0	40	198
Alpowa	SWS	7847	63.6	0	43	204
Alturas	SWS	7740	62.4	0	39	200
Merrill II	SWS	7501	61.7	0	41	203
IDO 686	SWS	7376	63.3	0	42	200
IDO 687	SWS	7343	63.6	0	40	198
HL 550	SWS	7296	60.7	0	39	197
Babe	SWS	7244	63.1	0	40	200
Diva	SWS	7096	61.2	0	42	198
IDO 702	HRS	7042	61.4	0	40	198
IDO644	SWS	6762	60.3	0	35	193
IDO 599	SWS	6707	61.1	0	40	196
WA 8124	SWS	6636	62.6	0	40	200
WA 8074	HRS	6632	62.6	0	39	197
JD	Club	6578	62.6	0	40	201
Louise	SWS	6519	61.3	0	44	199
OR4051328	HWS	6491	61.0	0	37	204
Whit	SWS	6389	61.5	0	37	198
Buck Pronto	HRS	6352	63.9	0	41	198
Kelse	HRS	6285	62.0	0	39	200
10 Fx Inc1	HRS	6238	62.5	0	38	198
Bullseye	HRS	6158	63.2	0	34	197
OR4041268	SWS	6131	61.0	0	35	202
Jefferson	HRS	6051	61.6	0	40	197
Winchester	HRS	6039	63.0	0	37	196
UC 1618	HRS	6023	61.2	0	31	198
Capstone (RSI 10348)	HWS	5855	61.9	0	32	194
Lassik	HRS	5781	61.8	0	31	199
Cataldo	SWS	5641	60.1	0	36	196
Cabernet	HRS	5471	61.8	0	28	198
Yecora Rojo	HRS	5314	62.4	0	28	196
Cerere	HRS	5237	61.2	0	34	204
Malbec	HRS	5156	61.8	0	33	198
YS-11	HRS	5115	63.5	0	37	198
Patwin	HWS	4742	61.6	0	28	201
UC 1617	HRS	4152	58.4	0	26	201
Mean		6370	61.9	0	36.7	198.6
***P* value**		<0.001	<0.001	na	<0.001	<0.001
LSD (0.05)		1082	1.3	na	2.1	1.5
CV (%)		12.1	1.5	na	4.1	0.5

[1]HRS = hard red spring; HWS = hard white spring; SWS = soft white spring.

Grain yields shaded in gray are not significantly different from the highest yield in this trial.

Table 2. 2009, 2010, & 2011 Three-year yield summary, OSU Oregon Spring Elite Yield Trial (OSEYT) seeded in mineral soil (ranked by 2-yr mean yield). Klamath Basin Research & Extension Center, Klamath Falls, OR.

		Yield (lb/ac)			2-yr mean		3-yr mean	
Entry	Type[1]	2009	2010	2011	Yield (lb/ac)	Rank	Yield (lb/ac)	Rank
IDO671	SWS	5340	7860	8364	8112	1	7188	1
Alturas	SWS	6000	7190	7740	7465	2	6977	2
IDO644	SWS	4950	7680	6762	7221	3	6464	3
Alpowa	SWS	4790	5650	7847	6749	4	6096	5
Diva	SWS	-	6180	7096	6638	5	-	-
Whit	SWS	5590	6510	6389	6450	6	6163	4
Bullseye	HRS	4670	6710	6158	6434	7	5846	7
Winchester	HRS	4580	6480	6039	6260	8	5700	9
Babe	SWS	-	5160	7244	6202	9	-	-
Kelse	HRS	4300	6040	6285	6163	10	5542	11
OR4041268	SWS	-	6190	6131	6160	11	-	-
OR4051328	HWS	5610	5810	6491	6150	12	5970	6
Jefferson	HRS	5210	6220	6051	6136	13	5827	8
Lassik	HRS	-	6120	5781	5951	14	-	-
Cataldo	SWS	5000	6260	5641	5950	15	5634	10
Cabernet	HRS	3240	5970	5471	5721	16	4894	12
JD	Club	-	4860	6578	5719	17	-	-
Malbec	HRS	-	5830	5156	5493	18	-	-
Patwin	HWS	-	5710	4742	5226	19	-	-
Mean		**4940**	**6233**	**6419**	**6326**		**6025**	

[1]HRS = hard red spring; HWS = hard white spring; SWS = soft white spring.

Table 3. 2011 Response of four spring wheat varieties to seeding rate.
Klamath Basin Research & Extension Center, Klamath Falls, OR.

Variety	Type[1]	Seeding Rate (lb/ac)	Seeding Rate (seeds/ft^2)	Yield (lb/ac)	Test Wt (lb/bu)	Height (inch)	50% Heading (Day of Year)	Stand (plant/ft^2)	Protein (%)	Yield Rank
Alpowa	SWS	100	23.5	4598	60.1	40.5	202.5	14.0	12.0	16
		125	29.4	6009	60.4	38.8	201.0	16.5	11.7	11
		140	33.0	4914	60.7	38.5	202.0	17.0	12.1	15
		200	47.0	5864	61.0	42.5	202.0	27.1	11.7	13
Bullseye	HRS	110	25.7	6031	62.6	34.0	197.8	21.8	12.7	10
		125	29.2	6681	62.7	34.3	197.5	26.1	12.8	6
		140	32.7	6476	63.1	33.0	197.3	25.0	12.3	8
		200	46.7	7584	63.2	34.3	196.8	40.3	12.4	2
Yecora Rojo	HRS	100	25.0	5526	62.3	27.3	195.8	27.3	14.2	14
		125	31.4	6410	62.5	28.3	195.0	31.8	13.4	9
		140	35.0	5895	62.8	26.8	193.0	30.9	14.1	12
		200	50.0	6503	62.6	31.0	195.3	41.7	13.6	7
Twin	SWS	100	27.0	6770	57.8	37.0	199.8	25.6	11.3	5
	(awnless)	125	34.0	7480	57.7	37.3	199.0	29.3	12.0	3
		140	38.0	7233	57.2	36.8	198.8	30.8	11.3	4
		200	54.3	7976	57.6	37.3	199.5	48.1	11.1	1
Mean				6372	60.9	34.8	198.3	28.3	12.4	
***P* (Variety)**				**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	
***P* (Seeding Rate)**				**<0.001**	**0.498**	**0.003**	**0.009**	**<0.001**	**0.419**	
***P* (Variety X Seeding Rate Interaction)**				**0.921**	**0.812**	**0.289**	**0.091**	**0.560**	**0.217**	
LSD (0.05)				498	0.5	1.3	0.7	3.2	0.4	
CV (%)				11.0	1.2	5.2	0.5	15.7	4.5	

[1]HRS = hard red spring; SWS = soft white spring.

Table 4. 2011 Effect of seed treatment on wheat germination, growth, and yield in field infested with barley root knot nematode, seeded in Lynn Long Farms organic soil. Klamath Basin Research & Extension Center, Klamath County, OR.

Seed Treatment	Yield (lb/ac)	Test Wt (lb/ac)	Stand (plant/ft^2)		Vigor		Lodging (%)	Height (inch)	50% Heading (Day of Year)	Yield Rank
			June 13	June 20	June 13	June 20				
PC	8073	61.9	40.5	38.8	4.0	4.0	24.3	38.7	209.1	4
P+PC	7828	61.9	40.5	40.6	4.3	4.0	20.0	38.1	209.1	6
BCS Exp+PC	8187	62.0	43.6	40.2	4.4	4.1	25.7	38.6	209.3	2
P+V240a+PC	8392	62.1	42.6	40.1	4.3	3.8	19.3	39.3	209.1	1
P+V240b+PC	8097	62.1	43.0	37.1	4.3	3.8	27.1	38.6	209.1	3
P+V240c+PC	7818	62.0	40.5	38.6	3.7	3.8	23.6	37.4	209.0	7
Control	7923	62.1	39.4	35.8	4.3	4.3	20.7	38.0	209.3	5
Mean	8046	62.0	41.4	38.8	4.2	4.0	23.0	38.4	209.2	
***P* (Treatment)**	**0.636**	**0.895**	**0.307**	**0.309**	**0.156**	**0.176**	**0.936**	**0.116**	**0.933**	
LSD (0.05)	NSD	NSD	NSD	NSD	NSD	NSD	NSD	NSD	NSD	
CV (%)	8.0	0.6	9.1	10.9	11.9	8.6	64.2	3.0	0.2	