

Research in the Klamath Basin

2010 Annual Report

Wheat and Barley Variety Screening in the Klamath Basin, 2010

Richard J. Roseberg and Rachel A. Bentley¹



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 included both spring and winter cereal types 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. In 2010, spring grain variety trials were only conducted on-site at KBREC on a mineral soil. These trials included the Oregon State University (OSU) Oregon Spring Elite Yield Trial (OSEYT) as well as the second year of the Forage Barley Variety Trial, begun in 2009 to evaluate the seed yield

¹ Associate Professor and Faculty Research Assistant, respectively, Klamath Basin Research & Extension Center, Klamath Falls, OR.

Acknowledgements: These trials were conducted in cooperation with, and were partially supported by, the OSU wheat genetics program (Dr. Jim Peterson, PI), and the OSU barley genetics program (Dr. Pat Hayes, PI).

Reference to a product or company is for specific information only and does not endorse or recommend that product or company to the exclusion of others that may be suitable.

Research in the Klamath Basin

2010 Annual Report

potential of these varieties (not their forage production), with the hope that commercial seed production of forage barley types would be a viable option here.

Procedures

KBREC small grain variety trials were conducted on Poe fine sandy loam soil following potatoes grown in 2009. Both trials were arranged in a randomized complete block design. The OSEYT trial had three replications, and the Forage Barley Variety Trial had four replications. Seed was drilled 0.75 inch deep at 30 seeds/ft² with a Kincaid (Kincaid Equipment Mfg.) plot drill. Both trials were seeded on April 23. 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.



Both the OSEYT and Forage Barley Variety Trial plots were fertilized with 80 lb/ac N, 25 lb/ac P₂O₅, 50 lb/ac K₂O, 105 lb/ac S, and 1 lb/ac Boron banded at seeding (applying a custom-blended 15.5-4.8-9.7-20.4-0.2B fertilizer at 517 lb/ac). On May 25, 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 69 lb/ac N and 79 lb/ac S were applied to the OSEYT trial on June 1 (as granular ammonium sulfate topdressed at 330 lb/ac). No additional fertilizer was applied to the Forage Barley Variety Trial during the growing season.

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, 2010). Both trial areas received a total of 14.84 inches of irrigation during the season, applied on 14 occasions between May 14 and August 6, in addition to 2.73 inches of precipitation during the growing season (mostly in the spring). Plots were harvested using a Hege (Hans-Ulrich Hege) plot combine with a 4.5-ft-wide

Research in the Klamath Basin

2010 Annual Report

header. The OSEYT was harvested on September 7. The Forage Barley Variety Trial was harvested on September 3.

Grain yield, test weight, lodging percentage, plant height, percent bird damage, and maturity (date of 50 percent heading) were measured for both trials. For the Forage Barley Variety Trial, percent plumps (percent above 6/64 and 5.5/64 sieves) and thins (pan) were also measured. 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

Due to timely spring rains, soil moisture was good during seedbed preparation and after seeding, resulting in good germination and stand density. Despite a partial cutoff of irrigation water to the Klamath Reclamation Project in 2010, we were able to obtain a reliable supply of irrigation water for these trials. Despite some below-freezing nights during germination and early vegetative growth, these trials did not seem to be damaged and temperatures were good during pollination. There were relatively few hot days during the season (10 days with daily maximum temperatures above 90°F, with none reaching 100°F) and almost all of those occurred after heading was complete. Overall, good growing conditions and management resulted in higher yields than for similar trials conducted in the past.

OSU Oregon Spring Elite Yield Trial



This trial included 30 entries at the KBREC site only, including 19 named varieties and 11 experimental lines. Differences in all measured parameters, except percent bird damage, were statistically significant at the P=0.05 level. Yields ranged from 4,350 to 7,860 lb/ac with a mean of 6,150 lb/ac (Table 1). Yields were much higher overall in 2010 than the OSEYT trial in 2009. Test weights were greater than the 60 lb/bu industry standard for all but three entries, indicating good moisture, fertility, and weather conditions during the seed-filling phase. The overall mean test weight in 2010 (61.2 lb/bu) was equal to the OSEYT mean test weight in 2009.

Multiple-year yield means for all entries that were grown in the 2007, 2009,

Research in the Klamath Basin

2010 Annual Report

and 2010 trials at KBREC were calculated (Table 2). Nine entries were grown all three years, eight of which were named varieties. Mean yields for all nine entries were greatest in 2010, while most entries had a similar yield when comparing their 2009 to 2007 results.

Forage Barley Variety Trials

Unlike 2009, the 2010 Forage Barley Variety Trial was conducted on only one mineral soil location. Entries included three named awnless barley varieties and eight experimental lines. Differences in all parameters measured were statistically significant at the $P=0.05$ level (Table 3). Yields ranged from 3,654 to 6,718 lb/ac, with a mean of 5,224 lb/ac. These yields were much higher than the 2009 Forage Barley Variety Trial at KBREC.

Test weights ranged from 45.4 to 52.2 lb/bu, with a mean of 48.5 lb/bu. Test weights were greater than the 48 lb/bu industry standard for only six of the eleven entries, indicating less-than-ideal adaptation of these varieties to the moisture, fertility, and weather conditions experienced at this location during the seed-filling phase. The overall mean test weight in 2010 (48.5 lb/bu) was slightly higher than in 2009 at this site (47.3 lb/bu). Percent bird damage ranged from 1.3 to 26.3%, with a mean of 7.7%. These numbers were much lower than in 2009. In 2010 we grew additional non-plot border areas around the perimeter in an attempt to deter bird damage.

Only four entries experienced lodging, which ranged from 3.0 to 62.5%. As in 2009, Belford had significantly more lodging than all other entries. Heights ranged from 35.0 to 44.8 inches, with a mean of 40.4 inches. The date of 50% heading ranged from 185 to 189 days, with a mean of 187 days, which was about two weeks later than in 2009, just about matching the delay in seeding date in 2010 compared to 2009.

Summary

In 2010, the OSEYT had the highest yield it has in recent years. The Forage Barley Variety Trial also produced very high yields compared to the 2009 trial grown at KBREC. These higher yields could have been partially due to less bird damage, better N management, and general very good growing conditions. Forage (awnless) barley types seem more susceptible to bird damage than standard feed types, and differences in this factor (as well as lodging tendency) should be considered when attempting seed production of these types.

Crop rotation has some influence on the results of these trials and with grain production in the Klamath Basin in general. Spring grains can easily 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.

Research in the Klamath Basin

2010 Annual Report

References

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

Research in the Klamath Basin

2010 Annual Report

Table 1. 2010 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)	Bird Damage (%)	Height (inch)	50% Heading (Day of Year)
IDO671	SWS	7860	61.9	3.3	33.3	187
IDO644	SWS	7680	59.9	0.0	32.7	183
Nick	SWS	7660	61.6	0.0	34.3	186
IDO668	SWS	7340	62.0	0.0	35.0	186
Alturas	SWS	7190	61.4	1.7	33.7	188
IDO669	SWS	6970	62.0	1.7	34.7	187
Bullseye	HRS	6710	63.6	0.0	29.3	187
Hank	HRS	6590	60.4	0.0	32.0	186
Whit	SWS	6510	61.0	1.7	33.0	186
Winchester	HRS	6480	61.1	1.7	34.3	186
IDO665	HRS	6420	60.3	0.0	32.0	186
Cataldo	SWS	6260	59.9	0.0	32.0	184
Jefferson	HRS	6220	61.3	0.0	33.7	186
OR4041268	SWS	6190	61.4	3.3	30.7	190
Diva	SWS	6180	61.4	1.7	34.7	187
OR4990114	HRS	6170	60.1	0.0	31.3	187
Lassik	HRS	6120	61.3	1.7	27.7	187
Kelse	HRS	6040	61.5	1.7	34.0	187
Cabernet	HRS	5970	61.8	6.7	27.3	186
BZ901-717	HRS	5970	61.3	0.0	34.3	185
Malbec	HRS	5830	61.1	1.7	29.7	186
OR4051328	HWS	5810	60.6	3.3	29.3	190
Patwin	HWS	5710	60.4	1.7	25.3	187
Alpowa	SWS	5650	62.9	13.3	35.7	191
Babe	SWS	5160	62.7	13.3	34.3	186
OR4061191	HWS	5090	61.6	15.0	31.3	188
Kern	HWS	5070	60.0	8.3	24.0	186
JD	Club	4860	62.3	5.0	35.3	188
OR4031177	HRS	4430	62.8	6.7	35.0	188
Clear White	HWS	4350	58.0	0.0	29.0	183
Mean		6150	61.2	3.1	32.0	186
P value		<0.001	<0.001	0.393	<0.001	<0.001
LSD (0.05)		1375	0.9	NSD	2.1	1
CV (%)		13.7	0.9	229.5	4.0	0.4

¹HRS = 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.

Research in the Klamath Basin

2010 Annual Report

Table 2. 2007, 2009, & 2010 Three-year yield summary, OSU Oregon Spring Elite Yield Trial (OSEYT), seedec in mineral soil (ranked by 2-yr mean yield). Klamath Basin Research & Extension Center, Klamath Falls, OR.

Entry	Type ¹	Yield (lb/ac)			2-yr mean		3-yr mean	
		2007	2009	2010	Yield (lb/ac)	Rank	Yield (lb/ac)	Rank
Alturas	SWS	4320	6000	7190	6595	1	5837	2
Nick	SWS	5202	5380	7660	6520	2	6081	1
Jefferson	HRS	4704	5210	6220	5715	3	5378	4
Cataldo	SWS	5772	5000	6260	5630	4	5677	3
Hank	HRS	4572	4490	6590	5540	5	5217	6
Winchester	HRS	4506	4580	6480	5530	6	5189	7
OR4990114	HRS	4866	4820	6170	5495	7	5285	5
Alpowa	SWS	4626	4790	5650	5220	8	5022	8
Cabernet	HRS	4158	3240	5970	4605	9	4456	9
Mean		4747	4834	6466	5650		5349	

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

Table 3. 2010 Forage (Awnless) Barley Variety Trial (ranked by yield). Klamath Basin Research & Extension Center, Klamath Falls, OR.

Entry	Yield (lb/ac)	Test Wt (lb/bu)	Bird Damage (%)	Lodging (%)	Height (inch)	Plump (%)	50% Heading (Day of Year)
T/S 50	6718	45.2	5.0	0.0	37.3	91.3	187
T/S 11	6363	46.0	1.3	0.0	35.0	93.6	188
T/S 4	6072	46.2	3.8	3.8	38.8	92.1	188
Stockford	5571	50.2	15.0	0.0	37.0	95.7	189
Belford	5507	45.4	1.3	62.5	41.8	90.8	188
16-2RH	5436	50.9	5.0	0.0	40.3	97.8	188
68-2RH	5165	52.2	3.8	0.0	39.3	96.3	187
14-2RH	4633	51.8	10.0	0.0	41.8	96.9	186
Sara	4292	45.6	26.3	3.8	44.3	94.8	185
38-2RH	4051	50.1	8.8	1.3	44.5	96.7	186
61-2RH	3654	50.4	5.0	0.0	44.8	97.2	185
Mean	5224	48.5	7.7	6.5	40.4	94.8	187
P value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
LSD (0.05)	790	0.9	7.4	8.5	2.7	1.5	1.1
CV (%)	10.5	1.3	66.0	91.2	4.7	1.1	0.4

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