

Testing Low Input Barley and Wheat Lines, 2002

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Abstract

This work represents the first year of a 3-year testing program to identify low input wheat and barley entries with higher test weight and less lodging than Solum barley. Twenty lines each of barley and wheat were grown at the Maricopa Agricultural Center with one, two, or seven irrigations. Several barley entries yielded similar to Solum but had much higher test weight and less lodging. None of the wheat entries were as productive as Solum with one or two irrigations this year, but several exhibited good yield potential and lodging resistance with seven irrigations.

Background

The low input barley line, Solum, was released in 1992 by Dr. Tom Ramage. Dr. Ramage continued his breeding work with low input barley after Solum was released, and also worked with low input wheat. Dr. Ramage retired in 1999 and left me with over 200 barley and wheat lines adapted to water stress conditions. These lines were screened in 2001, and 20 selected wheat and barley lines were tested in 2002 grown with one, two, or seven irrigations.

Objectives

Identify low input barley and wheat lines that have less lodging and higher test weight than Solum but have equal or better grain yield.

Description of Work

Low input barley (20 lines) and wheat (20 lines) plus four check varieties were evaluated in Field 106 at the Maricopa Agricultural Center during the 2001-2002 growing season. The soil type was a Casa Grande sandy loam. The previous crop was sudangrass. The surface 6 inches of soil was sampled before planting and contained 6.5 ppm NO₃-N and 3.2 ppm P. Low input barley and wheat lines were planted in 5 ft x 15 ft plots on November 28, 2001. The seeding rate was variable depending on the irrigation regime (Table 1). An irrigation to germinate the seed was applied on November 29 and subsequent irrigations were applied at various times depending on the irrigation regime (Table 1). Phosphorus fertilizer was applied preplant at a rate of 53 lbs P₂O₅/acre as monoammonium phosphate (11-52-0). Nitrogen fertilizer was applied preplant at a rate of 50 lbs N/acre as ammonium sulfate (21-0-0) and monoammonium phosphate (11-52-0). Nitrogen fertilizer was applied at a rate of 50 lbs N/acre as urea (45-0-0) before each irrigation except for the last two irrigations of the seven-irrigation regime (Table 1). Achieve 40DG (0.5 lb ai/acre) and Buctril 2E (0.3 lb ai/acre) were applied on January 24, 2002 to control weeds. Heading, flowering, maturity, plant height, and lodging were noted before harvest. A small plot combine was used to harvest the grain at variable dates depending on the irrigation regime (Table 1). The grain was weighed and yield was estimated. Barley grain samples were cleaned by running through a head thresher twice, and wheat grain samples were cleaned by running through a seed cleaner once. Test weight was determined from these cleaned samples using a 1-pint container. The Federal Grain Inspection Service determined hardness and market class for the wheat. Wheat grain protein was calculated by multiplying 5.7 by N content determined by the combustion method.

Results

The 2002 Solum barley growing season from January through April was dry with an above average maximum temperature and a below average minimum temperature (Table 2). The amount of precipitation in the 2002 growing season at Maricopa was the lowest ever recorded by AZMET since its inception in 1987. The mean daily maximum temperature for the growing season ranked 14 out of 16 and the mean daily minimum temperature ranked the 15 out of

16 seasons. The net effect of the 2002 weather was to produce a crop that did not tiller well due to lack of rainfall and was delayed in development due to the low temperatures.

Grain yield and other characteristics of the entries varied depending on irrigation number (Tables 3 and 4). Grain yields were less than 1000 lbs/acre with one irrigation, and this is a much lower yield level than these entries are intended for. The 2-irrigation regime most accurately reflects the environment intended for these entries. The purpose of the 7-irrigation regime was to be able to screen for lodging and productivity under high yielding conditions, although these entries were not developed for this much water.

When grown with one or two irrigations, Solum was among the highest yielding entries in the barley test and the top yielding entry in the wheat test (Tables 5 and 6). With seven irrigations, however, Solum was a medium to low-yielding entry, and was among the lowest in test weight and highest in lodging. Several barley entries had yields similar to Solum with one or two irrigations, but had much higher test weight and less lodging. The wheat entries were less promising than the barley entries with one or two irrigations, but have a relative advantage when fully irrigated.

Grain protein, hardness, and classification of the wheat entries is presented in Table 5. Most of the entries fall into the hard red category, followed by soft red, hard white, and soft white.

The barley and wheat entries will be tested for two more years before selecting entries for potential release.

Acknowledgments

The technical assistance of Melinda Main is greatly appreciated.

Table 1. Cultural information for the various irrigation regimes.

	One irrigation	Two irrigations	Seven irrigations
Seeding rate (lbs/acre)	20	40	80
Nitrogen rate (lbs N/A)	50	100	250
Irrigation dates	29 Nov 01	29 Nov 01 22 Feb 02	29 Nov 01 25 Jan 02 22 Feb 02 14 Mar 02 28 Mar 02 11 Apr 02 27 Apr 02
Harvest dates	1 May 02	8 May 02	18 May 02

Table 2. Climatic data for Maricopa during the 2002 growing season compared to the long-term average. The climate data was obtained from AZMET.

Climate variable	Unit	Year(s)	Jan	Feb	Mar	Apr	Jan-Apr
Max Temp. (°F)	°F	2002	67	74	77	88	76
	Rank of 16	2002	12	15	9	13	14
	°F	1987-2002	66	70	76	85	74
Min Temp. (°F)	°F	2002	34	35	40	54	41
	Rank of 16	2002	7	1	1	16	2
	°F	1987-2002	36	39	44	51	42
Ppt. (in)	°F	2002	0.04	0.00	0.00	0.00	0.04
	Rank of 16	2002	3	1	1	1	1
	°F	1987-2002	0.66	0.78	0.81	0.28	2.53

Table 3a. Grain yield and other characteristics of the barley lines grown with one irrigation.

Crop	Irrigations	Entry	Grain	Test	Plant	Lodging	Heading	Anthesis	Maturity
			yield	weight	height				
			lbs/A	lbs/bu	inches	%			
Barley	1	1	1042	52.5	21	0	6-Mar	9-Mar	12-Apr
Barley	1	2	1422	53.2	25	0	10-Mar	9-Mar	13-Apr
Barley	1	3	516	53.5	29	0	10-Mar	11-Mar	9-Apr
Barley	1	4	975	52.8	23	0	---**	---	18-Apr
Barley	1	5	1122	53.0	27	0	8-Mar	9-Mar	5-Apr
Barley	1	6	901	54.8	21	0	4-Mar	5-Mar	11-Apr
Barley	1	7	1161	51.3	26	0	10-Mar	13-Mar	8-Apr
Barley	1	8	945	51.9	24	0	10-Mar	14-Mar	13-Apr
Barley	1	9	1258	54.3	22	0	---	---	20-Apr
Barley	1	10	1236	50.2	21	0	12-Mar	16-Mar	12-Apr
Barley	1	11	1191	52.1	24	0	5-Mar	12-Mar	6-Apr
Barley	1	12	871	51.1	28	0	5-Mar	6-Mar	11-Apr
Barley	1	13	1228	51.5	23	0	7-Mar	10-Mar	4-Apr
Barley	1	14	1050	52.7	24	0	25-Mar	---	21-Apr
Barley	1	15	1273	54.0	22	0	22-Mar	22-Mar	17-Apr
Barley	1	16	1035	52.4	24	0	25-Mar	25-Mar	19-Apr
Barley	1	17	1258	52.6	19	0	25-Mar	---	18-Apr
Barley	1	18	1124	54.3	27	0	12-Mar	15-Mar	8-Apr
Barley	1	19	1198	48.3	27	0	14-Mar	12-Mar	14-Apr
Barley	1	20	1109	52.4	24	0	28-Feb	28-Feb	9-Apr
Barley	1	Solum	1399	50.1	23	0	8-Mar	8-Mar	6-Apr
Barley	1	Barcott	819	48.9	15	0	10-Mar	11-Mar	10-Apr
Barley	1	Xeric	752	---	28	0	20-Mar	21-Mar	21-Apr
Barley	1	Y. rojo*	238	---	21	0	16-Mar	18-Mar	16-Apr
Avg.			1052	52.2	23	0	10-Mar	11-Mar	12-Apr
LSD(5%)			428	1.64	3.3	0	4.2	4.5	4.0

* Yecora rojo had poor stand establishment in the barley test due to low germination planting seed.

** Some barley entries did not extend the head past the leaf collar under the 1-irrigation regime, so heading and anthesis were not possible to determine. A few entries shed pollen before heading, so anthesis was not possible to determine for these entries.

Table 3b. Grain yield and other characteristics of the barley lines grown with two irrigations.

Crop	Irrigations	Entry	Grain	Test	Plant	Lodging	Heading	Anthesis	Maturity
			yield	weight	height				
			lbs/A	lbs/bu	inches	%			
Barley	2	1	2367	50.1	24	0	5-Mar	6-Mar	15-Apr
Barley	2	2	2992	51.4	31	0	9-Mar	9-Mar	13-Apr
Barley	2	3	1913	51.2	35	0	8-Mar	8-Mar	7-Apr
Barley	2	4	2144	50.8	30	0	20-Mar	22-Mar	15-Apr
Barley	2	5	2151	51.1	30	0	7-Mar	6-Mar	8-Apr
Barley	2	6	2218	50.6	25	0	5-Mar	6-Mar	16-Apr
Barley	2	7	1980	49.8	31	0	9-Mar	10-Mar	8-Apr
Barley	2	8	2032	49.5	28	0	6-Mar	7-Mar	14-Apr
Barley	2	9	2643	51.9	29	0	21-Mar	23-Mar	15-Apr
Barley	2	10	2814	48.6	24	0	10-Mar	11-Mar	15-Apr
Barley	2	11	2598	49.5	26	0	4-Mar	8-Mar	9-Apr
Barley	2	12	2486	49.5	33	0	2-Mar	5-Mar	15-Apr
Barley	2	13	2658	50.0	24	0	7-Mar	6-Mar	9-Apr
Barley	2	14	1958	51.6	29	0	23-Mar	26-Mar	15-Apr
Barley	2	15	2211	52.2	31	0	20-Mar	22-Mar	15-Apr
Barley	2	16	2099	51.1	31	0	21-Mar	24-Mar	16-Apr
Barley	2	17	2397	51.6	30	0	21-Mar	24-Mar	15-Apr
Barley	2	18	2196	52.8	30	0	8-Mar	8-Mar	7-Apr
Barley	2	19	2367	45.5	34	0	12-Mar	11-Mar	12-Apr
Barley	2	20	2479	51.8	28	0	27-Feb	28-Feb	11-Apr
Barley	2	Solum	2628	45.8	26	0	6-Mar	7-Mar	6-Apr
Barley	2	Barcott	2047	46.6	16	0	8-Mar	7-Mar	8-Apr
Barley	2	Xeric	1928	56.9	33	0	19-Mar	23-Mar	21-Apr
Barley	2	Y. rojo*	841	54.1	23	0	20-Mar	27-Mar	22-Apr
Avg.			2256	50.5	28	0	11-Mar	13-Mar	13-Apr
LSD(5%)			493	0.98	2.6	0	3.1	2.8	2.2

* Poor stand establishment due to low germination planting seed.

Table 3c. Grain yield and other characteristics of the barley lines grown with seven irrigations.

Crop	Irrigations	Entry	Grain	Test	Plant	Lodging	Heading	Anthesis	Maturity
			yield	weight	height				
			lbs/A	lbs/bu	inches	%			
Barley	7	1	4831	54.6	34	6	3-Mar	4-Mar	22-Apr
Barley	7	2	4973	54.8	40	1	8-Mar	9-Mar	24-Apr
Barley	7	3	3551	54.0	41	6	7-Mar	8-Mar	12-Apr
Barley	7	4	5025	56.3	38	4	20-Mar	22-Mar	22-Apr
Barley	7	5	3625	54.6	40	9	6-Mar	6-Mar	12-Apr
Barley	7	6	4794	53.2	32	0	1-Mar	3-Mar	23-Apr
Barley	7	7	4050	53.0	41	4	8-Mar	9-Mar	10-Apr
Barley	7	8	5002	54.3	37	8	5-Mar	8-Mar	22-Apr
Barley	7	9	5221	56.1	38	8	21-Mar	24-Mar	26-Apr
Barley	7	10	4779	51.8	33	0	8-Mar	11-Mar	22-Apr
Barley	7	11	4533	53.0	34	11	28-Feb	28-Feb	9-Apr
Barley	7	12	3573	53.3	43	8	1-Mar	6-Mar	21-Apr
Barley	7	13	4526	53.5	31	6	2-Mar	4-Mar	10-Apr
Barley	7	14	5628	56.1	37	1	20-Mar	23-Mar	20-Apr
Barley	7	15	5489	57.1	41	5	19-Mar	22-Mar	22-Apr
Barley	7	16	5114	56.7	39	4	20-Mar	22-Mar	22-Apr
Barley	7	17	4846	56.1	38	3	21-Mar	24-Mar	28-Apr
Barley	7	18	4958	54.8	38	6	7-Mar	9-Mar	12-Apr
Barley	7	19	4228	51.3	39	23	12-Mar	11-Mar	21-Apr
Barley	7	20	4667	54.7	36	14	28-Feb	28-Feb	12-Apr
Barley	7	Solum	4474	51.8	37	23	6-Mar	7-Mar	9-Apr
Barley	7	Barcott	6089	53.0	27	0	8-Mar	9-Mar	11-Apr
Barley	7	Xeric	5985	62.5	42	0	24-Mar	26-Mar	6-May
Barley	7	Y. rojo*	3246	61.8	27	0	25-Mar	28-Mar	7-May
Avg.			4693	54.9	37	6	10-Mar	12-Mar	19-Apr
LSD(5%)			1139	1.18	2.3	7.8	3.1	3.5	2.6

* Poor stand establishment due to low germination planting seed.

Table 4a. Grain yield and other characteristics of the wheat lines grown with one irrigation.

Crop	Irrigations	Entry	Grain	Test	Plant	Lodging	Heading	Anthesis	Maturity
			yield	weight	height				
			lbs/A	lbs/bu	inches	%			
Wheat	1	1	856	59.6	27	0	12-Mar	17-Mar	16-Apr
Wheat	1	2	397	---	32	0	11-Mar	12-Mar	13-Apr
Wheat	1	3	437	---	32	0	12-Mar	14-Mar	15-Apr
Wheat	1	4	491	---	29	0	10-Mar	12-Mar	13-Apr
Wheat	1	5	506	---	25	0	11-Mar	13-Mar	12-Apr
Wheat	1	6	529	---	26	0	12-Mar	16-Mar	15-Apr
Wheat	1	7	543	---	30	0	14-Mar	16-Mar	15-Apr
Wheat	1	8	258	---	27	0	11-Mar	13-Mar	12-Apr
Wheat	1	9	367	---	30	0	11-Mar	13-Mar	12-Apr
Wheat	1	10	447	---	27	0	10-Mar	12-Mar	13-Apr
Wheat	1	11	854	59.9	24	0	13-Mar	15-Mar	14-Apr
Wheat	1	12	506	---	24	0	12-Mar	14-Mar	13-Apr
Wheat	1	13	238	---	32	0	11-Mar	14-Mar	12-Apr
Wheat	1	14	566	---	31	0	11-Mar	12-Mar	12-Apr
Wheat	1	15	402	---	25	0	13-Mar	17-Mar	12-Apr
Wheat	1	16	288	---	25	0	11-Mar	12-Mar	13-Apr
Wheat	1	17	.	---	31	0	10-Mar	11-Mar	12-Apr
Wheat	1	18	1102	58.3	27	0	17-Mar	19-Mar	16-Apr
Wheat	1	19	402	---	28	0	10-Mar	13-Mar	15-Apr
Wheat	1	20	208	---	29	0	10-Mar	12-Mar	13-Apr
Wheat	1	Solum	1280	50.7	24	0	7-Mar	8-Mar	5-Apr
Wheat	1	Barcott	491	50.3	16	0	10-Mar	11-Mar	7-Apr
Wheat	1	Xeric	782	58.6	27	0	19-Mar	22-Mar	21-Apr
Wheat	1	Y. rojo	588	61.4	21	0	20-Mar	24-Mar	21-Apr
Avg.			583	56.1	27	0	12-Mar	14-Mar	13-Apr
LSD(5%)			257	0.94	2.4	0	2.1	2.5	2.8

* Low yield did not allow enough grain for test weight determination.

Table 4b. Grain yield and other characteristics of the wheat lines grown with two irrigations.

Crop	Irrigations	Entry	Grain	Test	Plant	Lodging	Heading	Anthesis	Maturity
			yield	weight	height				
			lbs/A	lbs/bu	inches	%			
Wheat	2	1	2002	56.9	32	0	11-Mar	17-Mar	16-Apr
Wheat	2	2	1667	57.4	36	0	10-Mar	11-Mar	14-Apr
Wheat	2	3	1697	58.6	36	0	11-Mar	15-Mar	15-Apr
Wheat	2	4	1926	61.0	35	0	9-Mar	11-Mar	14-Apr
Wheat	2	5	1638	58.8	30	0	11-Mar	16-Mar	14-Apr
Wheat	2	6	1690	58.0	31	0	11-Mar	14-Mar	15-Apr
Wheat	2	7	1578	57.6	34	0	16-Mar	18-Mar	16-Apr
Wheat	2	8	1429	61.2	29	0	9-Mar	13-Mar	16-Apr
Wheat	2	9	2002	59.9	34	0	10-Mar	13-Mar	13-Apr
Wheat	2	10	1839	58.1	32	0	9-Mar	11-Mar	11-Apr
Wheat	2	11	2069	56.3	28	0	12-Mar	16-Mar	14-Apr
Wheat	2	12	2010	58.8	27	0	11-Mar	14-Mar	13-Apr
Wheat	2	13	1737	61.1	35	0	12-Mar	15-Mar	16-Apr
Wheat	2	14	1787	59.2	36	0	9-Mar	12-Mar	14-Apr
Wheat	2	15	2035	59.5	31	0	11-Mar	18-Mar	13-Apr
Wheat	2	16	1824	60.4	27	0	10-Mar	13-Mar	15-Apr
Wheat	2	17	1868	62.0	35	0	10-Mar	12-Mar	15-Apr
Wheat	2	18	2017	53.0	34	0	16-Mar	19-Mar	17-Apr
Wheat	2	19	1608	60.2	32	0	9-Mar	11-Mar	16-Apr
Wheat	2	20	1419	60.1	32	0	9-Mar	12-Mar	15-Apr
Wheat	2	Solum	2777	45.9	30	0	8-Mar	7-Mar	9-Apr
Wheat	2	Barcott	2025	47.5	17	0	8-Mar	7-Mar	6-Apr
Wheat	2	Xeric	1995	57.1	34	0	20-Mar	23-Mar	22-Apr
Wheat	2	Y. rojo	1854	60.4	25	0	19-Mar	22-Mar	22-Apr
Avg.			1862	57.8	31	0	11-Mar	14-Mar	15-Apr
LSD(5%)			456	1.28	2.8	0	2.5	3.5	3.3

Table 4c. Grain yield and other characteristics of the wheat lines grown with seven irrigations.

Crop	Irrigations	Entry	Grain	Test	Plant	Lodging	Heading	Anthesis	Maturity
			yield	weight	height				
			lbs/A	lbs/bu	inches	%			
Wheat	7	1	5963	63.4	38	0	17-Mar	20-Mar	30-Apr
Wheat	7	2	2055	60.6	47	0	12-Mar	16-Mar	23-Apr
Wheat	7	3	3613	64.0	48	1	13-Mar	18-Mar	26-Apr
Wheat	7	4	2829	63.4	44	0	12-Mar	16-Mar	24-Apr
Wheat	7	5	4518	63.4	38	1	14-Mar	16-Mar	29-Apr
Wheat	7	6	4824	63.4	37	0	13-Mar	19-Mar	27-Apr
Wheat	7	7	3603	62.5	46	0	19-Mar	22-Mar	28-Apr
Wheat	7	8	3670	64.4	36	0	12-Mar	17-Mar	28-Apr
Wheat	7	9	3662	64.0	40	0	13-Mar	16-Mar	29-Apr
Wheat	7	10	3432	62.4	43	0	9-Mar	14-Mar	29-Apr
Wheat	7	11	5829	62.3	37	0	19-Mar	22-Mar	29-Apr
Wheat	7	12	5816	63.9	35	0	16-Mar	20-Mar	28-Apr
Wheat	7	13	1965	63.1	46	0	13-Mar	17-Mar	22-Apr
Wheat	7	14	3134	63.3	45	0	11-Mar	14-Mar	22-Apr
Wheat	7	15	5218	65.4	37	1	17-Mar	20-Mar	28-Apr
Wheat	7	16	4846	65.0	34	0	13-Mar	16-Mar	28-Apr
Wheat	7	17	2164	64.4	45	0	11-Mar	14-Mar	24-Apr
Wheat	7	18	5635	62.5	42	19	20-Mar	23-Mar	2-May
Wheat	7	19	3551	62.0	41	0	11-Mar	13-Mar	27-Apr
Wheat	7	20	3499	63.7	38	0	11-Mar	15-Mar	29-Apr
Wheat	7	Solum	4109	52.3	37	25	8-Mar	9-Mar	10-Apr
Wheat	7	Barcott	5025	53.6	29	0	7-Mar	7-Mar	11-Apr
Wheat	7	Xeric	6312	63.0	43	0	24-Mar	26-Mar	6-May
Wheat	7	Y. rojo	5791	64.1	30	0	25-Mar	28-Mar	5-May
Avg.			4357	62.5	40	2	14-Mar	17-Mar	26-Apr
LSD(5%)			1078	0.64	2.6	3.8	2.3	3.0	4.0

Table 5. Grain protein, hardness, and classification for wheat lines.

Crop	Entry	Grain protein				Hardness score	Class	Color
		1 irrigation	2 irrigations	7 irrigations	Average			
Wheat	1	9.0	12.6	12.9	11.5	38	Soft	Red
Wheat	2	10.1	13.2	14.8	12.7	56	Hard	Red
Wheat	3	12.6	11.9	13.8	12.8	36	Soft	Red
Wheat	4	12.0	11.0	15.0	12.7	67	Hard	Red
Wheat	5	10.8	12.8	13.8	12.5	85	Hard	White*
Wheat	6	9.4	13.4	13.5	12.1	68	Hard	Red
Wheat	7	9.7	11.6	12.8	11.4	38	Soft	White
Wheat	8	10.5	12.0	15.5	12.7	71	Hard	Red
Wheat	9	12.8	11.2	12.9	12.3	40	Soft	Red
Wheat	10	10.1	12.9	14.2	12.4	37	Soft	Red
Wheat	11	8.2	10.3	12.6	10.4	80	Hard	Red
Wheat	12	10.9	10.9	12.8	11.5	95	Hard	Red
Wheat	13	10.7	14.1	13.3	12.7	64	Hard	Red
Wheat	14	8.8	11.8	13.5	11.4	73	Hard	Red/White
Wheat	15	9.5	13.1	13.4	12.0	72	Hard	White*
Wheat	16	9.0	11.4	12.8	11.1	80	Hard	White
Wheat	17	8.8	11.3	14.6	11.6	50	Mixed	White
Wheat	18	7.8	12.5	12.0	10.8	78	Hard	White
Wheat	19	13.3	14.5	12.1	13.3	74	Hard	White*
Wheat	20	10.0	13.0	14.5	12.5	64	Hard	White*
Wheat	Xeric	10.1	13.3	12.2	11.9	42	Soft	Red
Wheat	Y. rojo	8.8	12.4	13.1	11.4	79	Hard	Red
	Average	10.1	12.3	13.5	12.0	63	Hard	Red

* Darker than white wheat standard.

Table 6. Ranking of barley entries for grain yield, test weight, lodging, physiological maturity, and all these characteristics combined. The entries are sorted by average yield ranking and were grown with various numbers of irrigations. This data is from 2002, except for the column designated '2*', which is from 2001. Xeric was not included in the 2001 barley trial, and numbers were extrapolated from 2002 for the purposes of this table.

		Grain yield					Test weight					Lodg- ing	Maturity				All
Crop	Entry	Irrigations					Irrigations					Irriga- tions	Irrigations				Avg.
		2*	1	2	7	Avg.	2*	1	2	7	Avg.		7	1	2	7	
Barley	2	5	1	1	9	1	6	8	9	9	7	7	14	11	20	13	1
Barley	9	3	5	4	5	2	7	5	5	8	5	17	22	18	21	22	4
Barley	13	1	7	3	17	3	19	18	16	16	17	13	1	7	4	2	5
Barley	10	7	6	2	14	4	10	21	21	23	19	4	13	14	15	12	13
Barley	17	6	5	9	11	5	9	12	8	6	9	8	20	18	22	21	6
Barley	11	4	9	6	16	6	22	17	20	21	21	21	3	8	2	3	12
Barley	15	20	3	13	4	7	3	6	4	3	3	12	18	18	15	16	3
Barley	Solum	22	2	5	18	8	23	22	23	22	24	24	4	1	2	1	18
Barley	16	9	16	17	6	9	2	15	11	4	8	9	21	22	15	20	11
Barley	19	12	8	11	19	10	16	24	24	24	23	23	16	10	12	11	24
Barley	1	14	15	10	12	11	20	13	15	13	15	16	13	14	18	14	21
Barley	4	11	17	16	7	12	8	10	13	5	10	10	20	18	15	19	14
Barley	12	2	20	7	22	13	17	20	18	17	18	18	11	14	12	10	22
Barley	14	13	14	21	3	14	4	11	8	8	6	6	24	18	10	18	7
Barley	18	16	11	14	10	15	5	4	3	10	4	14	6	2	8	6	2
Barley	20	17	13	8	15	16	14	14	6	11	12	22	7	9	9	9	10
Barley	6	10	19	12	13	17	15	3	14	18	14	3	10	22	19	17	16
Barley	5	15	12	15	21	18	13	9	12	12	13	20	3	5	7	5	9
Barley	8	18	18	19	8	19	12	16	19	14	16	19	15	12	18	15	23
Barley	Barcott	23	21	18	1	20	18	23	22	19	22	5	9	6	5	8	19
Barley	Xeric	22	22	22	2	21	1	1	1	1	1	1	24	23	23	24	8
Barley	7	19	10	20	20	22	21	19	17	21	20	11	5	5	4	4	20
Barley	3	8	23	23	23	23	11	7	10	15	11	15	8	3	7	7	15
Barley	Y. rojo*	21	24	24	24	24	1	2	2	2	2	2	17	24	24	23	17

* Poor stand establishment due to low germination planting seed.

Table 7. Ranking of wheat entries for grain yield, test weight, lodging, physiological maturity, and all these characteristics combined. The entries are sorted by average yield ranking and were grown with various numbers of irrigations. This data is from 2002, except for the column designated '2*', which is from 2001. Xeric and Barcott were not included in the 2001 wheat trial, and numbers were extrapolated from 2002 for the purposes of this table.

Crop	Entry	Grain yield					Test weight					Lodg- ing	Maturity				All
		2*	1	2	7	Avg.	2*	1	2	7	Avg.	7	1	2	7	Avg.	Avg.
Wheat	1	3	3	7	2	1	20	13	20	11	16	13	22	20	21	21	14
Wheat	18	4	2	5	6	2	21	13	22	17	22	23	21	22	22	22	19
Wheat	11	13	4	2	3	3	12	13	21	20	18	15	16	8	18	15	11
Wheat	Xeric	9	5	9	1	4	19	13	19	16	19	16	24	24	24	24	21
Wheat	Barcott	4	13	4	8	5	23	13	23	23	23	19	2	1	2	2	9
Wheat	15	6	16	3	7	6	16	13	10	1	8	20	4	5	13	4	3
Wheat	12	12	11	6	4	7	10	13	12	8	11	10	13	6	13	9	4
Wheat	Solum	22	1	1	12	8	22	13	24	24	24	24	1	2	1	1	12
Wheat	Y. rojo	21	6	12	5	9	9	13	6	5	4	4	24	24	23	23	13
Wheat	4	1	13	10	21	10	3	13	4	13	5	5	13	8	7	6	2
Wheat	5	8	11	20	11	11	17	13	13	11	14	22	8	11	18	13	15
Wheat	14	9	7	15	20	12	4	13	11	14	9	8	8	8	4	3	5
Wheat	6	16	9	18	10	13	14	13	16	12	15	12	18	16	10	17	16
Wheat	16	11	21	14	9	14	6	13	5	2	3	3	13	12	13	14	6
Wheat	9	15	19	8	14	15	13	13	9	7	10	9	4	5	18	5	8
Wheat	17	5	20	11	22	16	1	13	1	4	1	1	8	16	7	8	1
Wheat	3	14	15	17	15	17	11	13	14	6	12	21	20	14	8	16	17
Wheat	10	19	14	13	19	18	18	13	15	19	17	14	13	3	18	11	20
Wheat	13	2	23	16	24	19	2	13	3	15	6	6	8	20	4	10	10
Wheat	7	20	8	22	16	20	19	13	17	18	20	17	20	18	13	20	24
Wheat	2	7	18	19	23	21	15	13	18	22	21	18	13	11	5	7	22
Wheat	8	10	22	23	13	22	5	13	2	3	2	2	5	17	13	12	7
Wheat	19	18	17	21	17	23	8	13	7	21	13	11	18	21	10	19	23
Wheat	20	17	24	24	18	24	7	13	8	9	7	7	13	14	18	18	18