

# **Final Report**

Arizona Grain Research and Promotion Council

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## Small Grains Variety Testing

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# Small Grains Variety Evaluation at Maricopa, Coolidge, and Yuma, 2008

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## Summary

*Small grain varieties are evaluated each year by University of Arizona personnel. The purpose of these tests is to characterize varieties in terms of yield and other attributes. Variety performance varies greatly from year to year and several site-years are necessary to adequately characterize the yield potential of a variety. A summary of small grain variety trials conducted by the University of Arizona can be found online at <http://ag.arizona.edu/pubs/crops/az1265.pdf>.*

## Introduction

Small grain varieties were tested as part of the on-going effort to assess variety productivity and characteristics. Barley and durum commercial cultivars and experimental lines were tested. The purpose of these tests is to characterize varieties in terms of yield potential, relative maturity, quality, and other characteristics. Small plot variety trials do not substitute for localized on-farm testing of new varieties. Varieties are known to differ in their response to specific management regimes and weather conditions. A summary of small grain variety trials conducted by the University of Arizona is available from your local Cooperative Extension office or online at <http://ag.arizona.edu/pubs/crops/az1265.pdf>.

## Procedure

Barley and durum varieties were evaluated at the following locations: Maricopa by the University of Arizona, Coolidge by World Wide Wheat, durum at Yuma and barley at Arizona City by Western Plant Breeders. The seed was planted with a cone planter in seven rows spaced 7 inches apart and 15-20 ft long. The seeding rate was approximately 100 lbs/acre for durum varieties and 85 lbs/acre for barley varieties. The experimental design was a randomized complete block with 4 replications, 13 core barley entries, and 22 core durum entries, and 7 core wheat entries. Growing conditions at each site are listed in Table 1. The following data was collected: grain yield, test weight, plant height, lodging, heading, and flowering (Maricopa, UA only), grain protein, and HVAC. Grain was harvested with small plot combines and yields are expressed on an "as is" moisture basis. HVAC was determined from 10 g of seed. Grain protein was determined using NIRS and expressed on a 12% moisture basis. Heading is defined as when half of the heads are extended past the leaf collar, and flowering is defined as when about half of the heads are shedding pollen. Abbreviations for the sources of varieties are: APB = Arizona Plant Breeders, UA = University of Arizona, WPB = Western Plant Breeders, WWW = World Wide Wheat, UC = University of California, RSI = Reesource Seeds Inc, Allstar = Allstar Seeds, NSW DPI = New South Wales Division of Plant Industry.

## Discussion

This growing season was relatively cool (Table 2). The early part of the growing season (December, January, and February) had some of the coolest maximum temperatures on record, and the minimum temperatures were generally below average during that time period. The maximum temperatures in March and April were close to average, but the minimum temperature was below average during these months. Both maximum and minimum temperatures were relatively low in May. Rainfall was near average rainfall at Maricopa and below average rainfall at Yuma.

Yield and plant characteristics of the varieties are presented for the various locations in Tables 3-8 and a summary of the grain yields at all locations is presented in Tables 9-10. Wheat and durum data is not presented from UA Maricopa location because of bird damage.

Several locations and years are needed to accurately assess variety performance. The results of this trial are most useful when combined with data from previous years. A summary of small grain variety trials conducted by the University of Arizona can be found online at <http://ag.arizona.edu/pubs/crops/az1265.pdf>.

## Acknowledgments

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Table 1. Cultural practices for the small grains variety trials at the various locations. The durum at Yuma was planted at two dates, two reps early and 2 reps late, but the data is presented as on average of these two dates.

Cultural information	Maricopa (U of A)	Yuma (WPB)	Yuma Late (WPB)	Coolidge (WWW)
Previous crop	Durum and barley	Lettuce	Lettuce	Corn
Soil texture	Sandy clay loam	Clay Loam	Sandy clay loam	Clay loam
Planting date	1/4/08	12/26/07	1/23/08	12/27/07
Irrigations	7 1/4, 2/26, 3/19, 4/3, 4/16, 4/25, 5/5	6 12/26, 2/23, 3/16, 3/31, 4/20, 5/4	6 12/26, 2/23, 3/16, 3/31, 4/20, 5/4	6 12/27, 2/28, 3/18 4/4, 4/17, 5/1
Nitrogen (lbs N/a)	230 1/4: 46 as 46-0-0 2/26: 46 as 46-0-0 3/19: 46 as 46-0-0 4/3: 46 as 46-0-0 4/16: 46 as 46-0-0	170 2/23: 70 as 32-0-0 3/16: 70 as 32-0-0 3/31: 30 as 32-0-0	170 2/23: 70 as 32-0-0 3/16: 70 as 32-0-0 3/31: 30 as 32-0-0	248 11/22: 100 as 11-52-0 12/27: 35 as 32-0-0 2/28: 43 as 32-0-0 3/18: 35 as 32-0-0 4/4: 35 as 32-0-0
Phosphorus (lbs P <sub>2</sub> O <sub>5</sub> /acre)	0	None	None	52 11/20: 52 as 11-52-0
Pesticides	None	None	None	None
Harvest date	6/13	6/4	6/16	5/28

Table 2. Climatic data from AZMET for Maricopa and Yuma Valley during the 2008 growing season ranked and compared to the long-term average. The rankings of the months are from low to high.

Climate variable	Unit	Year(s)	Dec	Jan	Feb	Mar	Apr	May	Dec-May
<u>Maricopa</u>									
Max Temp.	Rank of 22	2008	1	4	7	13	12	1	2
	°F	2008	62	64	68	77	84	89	74
	°F	1987-2008	66	67	70	76	84	94	76
Min Temp.	Rank of 22	2008	7	16	9	2	2	1	3
	°F	2008	33	37	37	39	43	50	40
	°F	1987-2008	34	35	38	43	48	56	42
Ppt.	Rank of 22	2008	16	14	13	1	1	21	14
	inches	2008	1.10	0.75	0.75	0.00	0.00	0.94	3.54
	inches	1987-2008	0.61	0.72	0.85	0.77	0.27	0.20	3.40
<u>Yuma</u>									
Max Temp.	Rank of 22	2008	5	2	9	17	17	4	5
	°F	2008	65	65	73	81	87	91	77
	°F	1987-2008	68	69	73	79	86	94	78
Min Temp.	Rank of 22	2008	2	8	5	5	4	5	3
	°F	2008	38	41	43	47	52	58	46
	°F	1987-2008	41	42	45	49	53	60	48
Ppt.	Rank of 22	2008	11	15	1	1	1	18	8
	inches	2008	0.01	0.33	0	0	0	0.05	0.39
	inches	1987-2008	0.34	0.3	0.32	0.31	0.14	0.04	1.42

Table 3. Barley variety yield results from **Maricopa (UA)**, 2008.

Entry	Source	Grain	Test	Plant	Lodging	Heading	Flowering
		Yield <sup>a</sup>	Weight	Height			
		lbs/acre	lbs/bu	inches	%		
Baretta	APB	6959	51.1	24	0	4/07	4/07
Nebula	WPB	6207	52.7	22	0	4/02	3/31
Gustoe	WPB	5992	52.2	23	0	4/09	4/09
Cochise	WPB	6250	50.9	23	0	3/28	3/28
Chico	WPB	5916	51.7	23	0	4/05	4/05
Commander	WWW	5535	51.8	23	0	4/09	4/09
Max	WWW	7282	52.5	26	0	4/09	4/09
YU504-256	WPB	4996	52.4	27	0	4/08	4/08
YU500-039	WPB	5383	49.4	25	0	4/09	4/09
YU504-250	WPB	4761	51.8	28	0	4/08	4/08
BOI2087	WWW	4148	51.3	32	0	3/23	3/23
BOI2109	WWW	5480	50.3	28	0	3/24	3/24
BA1129B	WWW	4960	50.6	23	0	4/02	4/02
AVERAGE		5630	51.4	25	0	4/04	4/04

<sup>a</sup> Grain yield: LSD (5%) = 665 lbs/acre and cv = 8.2%.

Table 4. Barley variety yield results from **Arizona City (WPB)**, 2008.

Entry	Source	Grain	Test	Plant
		Yield <sup>a</sup>	Weight	Height
		lbs/acre	lbs/bu	inches
Baretta	APB	9347	53.8	35
Nebula	WPB	8291	53.0	38
Gustoe	WPB	8610	53.6	34
Cochise	WPB	7956	53.1	35
Chico	WPB	8157	53.1	29
Commander	WWW	9146	53.0	35
Max	WWW	10067	53.4	35
YU504-256	WPB	7320	53.5	37
YU500-039	WPB	8643	51.6	37
YU504-250	WPB	7303	53.6	37
BOI2087	WWW	4573	52.5	44
BOI2109	WWW	6633	52.0	41
BA1129B	WWW	8677	51.6	33
Ishi	---	9213	50.5	37
UC 1108	UC	7906	50.6	38
UC1134	UC	7554	62.0	32
AVERAGE		8087	53.2	36

<sup>a</sup> Grain yield: LSD (5%) = 722 lbs/acre and cv = 6.3%.

Table 5. Barley variety yield results from **Coolidge (WWW)**, 2008.

Entry	Source	Grain Yield <sup>a</sup>	Test Weight	Plant Height
		lbs/acre	lbs/bu	inches
Baretta	APB	7747	49.1	35
Nebula	WPB	6631	48.5	36
Gustoe	WPB	7485	49.0	32
Cochise	WPB	7903	48.1	30
Chico	WPB	6753	47.2	26
Commander	WWW	7420	48.8	32
Max	WWW	8493	50.4	32
YU504-256	WPB	7096	48.7	36
YU500-039	WPB	8062	46.5	34
YU504-250	WPB	7133	48.1	37
BOI2087	WWW	6335	49.9	44
BOI2109	WWW	6391	48.5	38
BA1129B	WWW	8671	48.2	34
BA1129A	WWW	8202	---	36
Spaulding	---	8167	---	46
Patti	WWW	8129	---	32
CA603	WWW	6876	---	38
CA476	WWW	6743	---	42
AVERAGE		7458	48.5	36

<sup>a</sup> Grain yield: LSD (5%) = 1046 lbs/acre and cv = 8.5%.

Table 6. Wheat variety yield results from **Yuma (WPB)**, 2008.

Entry	Source	Grain Yield <sup>a</sup>	Test Weight	Plant Height	Lodging	Heading	Grain Protein	HVAC
		lbs/acre	lbs/bu	inches			%	%
Blanca Royale	RSI	7172	62.5	32	25	4/04	13.7	100
Blanca Fuerte	RSI	7621	65.4	30	0	4/07	12.5	100
Blanca Grande	RSI	8180	65.7	37	38	3/31	13.8	99
Yecora Rojo	UC	7425	63.3	29	5	3/31	14.5	100
Kronos	APB	6783	---	33	0	4/01	.	.
Sagittario	Allstar	7070	63.0	28	0	4/12	13.5	96
Vaiiolet	Allstar	6661	62.8	26	0	4/11	14.1	96
AVERAGE		7273	63.8	31	10	4/05	13.7	98

<sup>a</sup> Grain yield: LSD (5%) = 862 lbs/acre and cv = 8.2%.

Table 7. Durum variety yield results from **Yuma (WPB)**, 2008.

Entry	Source	Grain Yield <sup>a</sup> lbs/acre	Test Weight lbs/bu	Plant Height inches	Lodging %	Heading	Grain Protein %	HVAC %
Duraking	WWW	7995	63.3	32	0	4/03	12.8	100
Crown	WWW	7539	60.8	36	13	4/05	14.1	99
Q-Max	WWW	7186	61.0	37	0	4/08	13.9	100
WPB 881	WPB	7484	62.3	36	53	4/01	14.3	100
Alamo	WPB	7259	63.9	35	35	4/01	14.3	100
Orita	WPB	7596	61.3	34	15	4/06	14.7	100
Havasu	WPB	7684	64.3	35	23	3/31	13.6	100
Kronos	APB	8047	63.1	32	35	3/30	13.6	100
Sky	APB	6624	61.8	31	33	3/30	13.4	100
Ocotillo	APB	7616	63.0	35	58	3/31	14.4	100
Westmore	APB	7572	63.6	32	63	3/31	13.5	100
D8270-4	WWW	7592	64.6	32	30	4/07	13.2	99
CHD1126B	WWW	6471	61.1	36	5	4/06	14.4	99
CHD1177	WWW	6662	64.1	33	3	4/03	14.0	99
ARGD3661	WWW	7664	62.8	32	18	3/29	14.7	100
YU803-52	WPB	7244	64.2	34	28	3/29	13.9	100
YU803-54	WPB	7675	64.2	32	0	3/31	14.2	99
YU802-89	WPB	7945	64.0	32	15	4/02	13.6	99
YU802-4	WPB	8142	62.6	36	0	4/08	14.0	100
Fotissimo	RSI	7152	62.5	32	0	4/04	14.9	100
Expt 14	RSI	7844	64.5	30	0	4/03	13.2	99
Expt 59	RSI	8111	63.1	33	3	4/07	13.9	99
Maestrале	Allstar	7564	64.1	36	88	4/01	14.6	100
Saragolla	Allstar	7770	65.0	34	10	4/02	12.8	97
Levante	Allstar	7953	62.5	39	25	4/11	13.9	99
AVERAGE		7535	63.1	34	22	4/03	13.9	99

<sup>a</sup> Grain yield: LSD (5%) = 862 lbs/acre and cv = 8.2%.

Table 8. Durum variety yield results from **Coolidge (WWW)**, 2008.

Entry	Source	Grain Yield <sup>a</sup> lbs/acre	Test Weight lbs/bu	Plant Height inches	Grain Protein %	HVAC %
Duraking	WWW	8783	64.6	40	12.8	97
Crown	WWW	7978	62.1	40	13.0	95
Q-Max	WWW	8479	62.1	38	13.3	99
WPB 881	WPB	7560	62.5	36	13.7	99
Alamo	WPB	7490	63.7	44	14.4	99
Orita	WPB	8715	62.7	48	14.3	96
Havasu	WPB	7758	63.7	44	12.9	99
Kronos	APB	8204	62.8	42	12.8	92
Sky	APB	8010	61.8	37	13.2	100
Ocotillo	APB	7483	63.2	44	13.4	98
Westmore	APB	8150	63.9	42	12.7	90
D8270-4	WWW	8906	64.3	44	13.0	96
CHD1126B	WWW	8391	62.1	42	13.6	98
CHD1177	WWW	8050	65.3	44	13.0	98
ARGD3661	WWW	7803	62.7	35	13.7	99
YU803-52	WPB	8211	64.0	40	12.9	99
YU803-54	WPB	8034	63.3	38	13.4	100
YU802-89	WPB	6127	62.4	40	14.7	100
YU802-4	WPB	9385	65.0	42	13.4	100
Fotissimo	RSI	8332	62.2	42	13.7	96
Expt 14	RSI	8556	64.6	44	12.0	96
Expt 59	RSI	9347	64.1	42	12.9	95
Yallaroi	NSW DPI	7586	---	40	---	---
Ria	WWW	8696	---	42	---	---
Candura	WWW	8321	---	42	---	---
Bravadur-9	WWW	8783	---	44	---	---
Utopia	WWW	7609	---	44	---	---
AVERAGE		8176	63.3	41	13.3	97

<sup>a</sup> Grain yield: LSD (5%) = 838 lbs/acre and cv = 6.2%.



Table 9. Summary of barley variety yield results for 2008 from Maricopa (U of A), Arizona City (WPB), and Coolidge (WWW).

Entry	Source	Grain yield (% of location average for these entries)			Mean	Standard Deviation
		Maricopa (U of A)	Arizona City (WPB)	Coolidge (WWW)		
Baretta	APB	124	116	104	114	10
Nebula	WPB	110	103	89	101	11
Gustoe	WPB	106	107	100	104	3
Cochise	WPB	111	98	106	105	6
Chico	WPB	105	101	91	99	8
Commander	WWW	98	113	100	104	8
Max	WWW	129	125	114	123	8
YU504-256	WPB	89	91	95	91	3
YU500-039	WPB	96	107	108	104	7
YU504-250	WPB	85	90	96	90	6
BOI2087	WWW	74	57	85	72	14
BOI2109	WWW	97	82	86	88	8
BA1129B	WWW	88	107	116	104	14

Table 10. Summary of durum variety yield results for 2008 from Yuma (WPB) and Coolidge (WWW).

Entry	Source	Grain yield (% of location average for these entries)			Mean	Standard Deviation
		Maricopa (U of A)	Yuma (WPB)	Coolidge (WWW)		
Duraking	WWW	---	106	107	107	1
Crown	WWW	---	100	98	99	2
Q-Max	WWW	---	95	104	100	6
WPB 881	WPB	---	99	93	96	5
Alamo	WPB	---	96	92	94	3
Orita	WPB	---	101	107	104	4
Havasu	WPB	---	102	95	98	5
Kronos	APB	---	107	100	104	5
Sky	APB	---	88	98	93	7
Ocotillo	APB	---	101	92	96	7
Westmore	APB	---	101	100	100	1
D8270-4	WWW	---	101	109	105	6
CHD1126B	WWW	---	86	103	94	12
CHD1177	WWW	---	88	99	93	7
ARGD3661	WWW	---	102	95	99	4
YU803-52	WPB	---	96	100	98	3
YU803-54	WPB	---	102	98	100	3
YU802-89	WPB	---	105	75	90	22
YU802-4	WPB	---	108	115	111	5
Fotissimo	RSI	---	95	102	98	5
Expt 14	RSI	---	104	105	104	0
Expt 59	RSI	---	108	114	111	5