

# Small Grains Variety Evaluation at Arizona City, Maricopa, and Yuma, 2002

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## Summary

*Small grain varieties are evaluated each year by University of Arizona personnel at one or more locations. 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 from previous years 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, durum, and wheat commercial cultivars were tested. The purpose of these tests was to characterize new 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.

## Procedure

Barley, durum, and wheat varieties were evaluated at the following locations: Arizona City by Arizona Plant Breeders, Maricopa by the University of Arizona, Maricopa by World Wide Wheat, and Yuma 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 wheat and durum varieties and 85 lbs/acre for barley varieties. The experimental design was a randomized complete block with 4 replications (3 in Yuma), and a variable number of entries depending on the crop. Growing conditions at each site are listed in Table 1. The following data was collected at least one location: grain yield, test weight, kernel weight, plant height, lodging, heading, flowering, physiological maturity, grain protein, and HVAC. Grain was harvested with small plot combines and yields are expressed on an "as is" moisture basis. Kernel weight and HVAC were determined from 10 g of hand picked seed. Grain protein was determined with a NIR whole grain analyzer and expressed on a 12% moisture basis. Flowering is defined as when about half of the heads are shedding pollen. Physiological maturity is noted when the glumes turn brown. Abbreviations for the sources of varieties are: APB = Arizona Plant Breeders, UA = University of Arizona, UC = University of California, WPB = Western Plant Breeders, and WWW = World Wide Wheat.

## Discussion

The growing season was dry with above average maximum temperature and below average minimum temperature (Table 2). The period from December to May was the second driest out of 16 years for Maricopa and Yuma and the third driest out of 14 years for Eloy (near Arizona City). The average monthly maximum temperature was above average particularly in February and April. The average monthly minimum temperature was below average in February and March, and these low temperatures slowed crop development.

Yield and plant characteristics of the varieties are presented for the various locations in Tables 3-6 and a summary of the grain yields at all locations is presented in Table 7. 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 from previous years can be found online at <http://ag.arizona.edu/pubs/crops/az1265.pdf>.

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Table 1. Cultural practices for the small grains variety trials at the various locations.

Cultural information	Arizona City (APB)	Maricopa (U of A)	Maricopa (WWW)	Yuma (WPB)
Previous crop	Cotton	Sudangrass	Barley	Cotton
Soil texture	---	Sandy clay loam	Clay loam	Clay loam
Planting date	15 Nov 01	29 Nov 01	08 Dec 01	07 Dec 01
Irrigations	5	7	6	8
Nitrogen (lbs/a)	300	250	295	280
Herbicide	No	Achieve/Buctril	Buctril	No
Harvest date	01 June 02	20 May 02	06 June 02	30 May 02

Table 2. Climatic data from AZMET for Eloy (near Arizona City), Maricopa, and Yuma Valley during the 2002 growing season ranked and compared to the long-term average.

Climate variable	Unit	Year(s)	Dec	Jan	Feb	Mar	Apr	May	Dec-May
<u>Eloy</u>									
Max Temp.	Rank of 14	2002	4	8	13	10	14	9	12
	°F	2002	63	67	75	77	89	95	78
	°F	1987-2002	66	67	71	76	84	94	77
Min Temp.	Rank of 14	2002	6	4	1	1	13	5	4
	°F	2002	33	32	34	39	53	55	41
	°F	1987-2002	34	35	39	43	49	57	43
Ppt.	Rank of 14	2002	8	3	1	2	1	1	3
	inches	2002	1.09	0.09	0.00	0.06	0.00	0.00	1.24
	inches	1987-2002	1.00	0.74	1.00	0.74	0.30	0.12	3.82
<u>Maricopa</u>									
Max Temp.	Rank of 16	2002	4	12	15	9	13	11	13
	°F	2002	63	67	74	77	88	95	77
	°F	1987-2002	65	66	70	76	85	94	76
Min Temp.	Rank of 16	2002	6	7	1	1	16	7	4
	°F	2002	33	34	35	40	54	58	42
	°F	1987-2002	35	36	39	44	51	59	44
Ppt.	Rank of 16	2002	10	3	1	1	1	1	2
	inches	2002	0.67	0.04	0.00	0.00	0.00	0	0.71
	inches	1987-2002	0.68	0.66	0.78	0.81	0.28	0.16	3.33
<u>Yuma</u>									
Max Temp.	Rank of 16	2002	6	11	14	6	10	10	10
	°F	2002	67	69	76	77	87	94	78
	°F	1987-2002	68	69	73	79	86	94	78
Min Temp.	Rank of 16	2002	1	3	2	2	10	1	2
	°F	2002	38	40	43	46	54	57	46
	°F	1987-2002	41	42	45	49	54	60	49
Ppt.	Rank of 16	2002	7	1	1	1	1	1	2
	inches	2002	0.01	0.00	0.00	0.00	0.00	0.00	0.01
	inches	1987-2002	0.42	0.34	0.30	0.38	0.14	0.04	1.60

Table 3. Small grain variety yield results from **Arizona City (APB)**, 2002.

Entry	Source	Grain Yield <sup>a</sup> lbs/acre	Test Weight lbs/bu	1000	Plant Height inches	Headed on 3/28 %	Grain Protein %	HVAC %	Frost damage %
				Kernel Weight grams					
<u>Barley</u>									
Max	WWW	2214	51.3	40.2	31	1	---	---	---
Nebula	WPB	2323	53.0	42.1	34	40	---	---	---
PH595-096	WPB	2432	54.6	37.3	34	60	---	---	---
Patti	WWW	2214	51.8	40.9	32	10	---	---	---
Baretta	APB	2541	53.5	39.8	35	20	---	---	---
Mucho	APB	2142	50.9	41.4	32	30	---	---	---
Commander	WWW	2468	51.0	36.6	34	1	---	---	---
Barcott	WPB	2432	49.5	34.3	30	80	---	---	---
BA8017	WWW	2142	51.7	38.4	31	0	---	---	---
<u>Durum</u>									
Kofa	WPB	3158	62.4	47.1	---	---	16.3	100	---
D98-213	APB	2977	62.5	42.2	---	---	16.1	100	---
Ria	WWW	2904	61.5	34.7	---	---	15.3	100	---
YU-895-130	WPB	3049	63.2	43.3	---	---	17.0	100	---
Topper	WWW	3521	62.4	33.7	---	---	14.6	100	---
Platinum	WWW	3340	63.0	41.7	---	---	15.5	100	---
YU897-44	WPB	3049	63.4	47.5	---	---	16.2	100	---
Mohawk	WPB	3376	62.3	47.3	---	---	15.8	99	---
Deluxe	WWW	3666	61.1	37.3	---	---	15.9	100	---
D99-OD-210	APB	3158	62.9	46.0	---	---	16.0	100	---
Crown	WWW	3194	60.0	39.4	---	---	15.8	100	---
Tacna	WPB	2831	62.8	51.0	---	---	17.2	99	---
D6575	WWW	3340	63.0	38.5	---	---	15.2	99	---
Bravadur	WWW	3158	61.0	38.6	---	---	15.6	99	---
Matt	APB	3158	61.6	40.9	---	---	16.0	100	---
Sky	APB	2904	61.8	42.6	---	---	15.6	100	---
Duraking	WWW	3122	62.2	34.2	---	---	14.9	100	---
Kronos	APB	3267	61.7	44.3	---	---	15.6	100	---
Ocotillo	APB	3122	61.8	40.0	---	---	16.0	99	---
D1138	WWW	3303	62.7	39.4	---	---	15.7	100	---
WPB 881	WPB	3049	61.0	41.1	---	---	15.3	100	---
Orita	WPB	3194	62.2	48.1	---	---	16.0	98	---
D5384-2	WWW	2940	58.9	30.6	---	---	15.6	100	---
D3121	WWW	3086	59.3	30.5	---	---	15.2	99	---
D99-OD-82	APB	2940	61.8	46.6	---	---	15.2	100	---
D8267	WWW	2650	62.0	35.7	---	---	16.4	98	---
<u>Wheat</u>									
Brooks	WPB	7369	65.0	42.1	35	5	14.6	---	5
COI957-3	WWW	6752	64.3	37.0	36	5	13.3	---	5
Cavalier	WWW	7151	64.4	43.5	35	5	14.4	---	5
Yecora rojo	UC	7079	64.9	40.9	34	5	14.5	---	5

<sup>a</sup> Grain yield: LSD (5%) = 764, 649, and 682 lbs/acre and cv = 23, 15, and 6% for barley, durum, and wheat, respectively.

Table 4. Small grain variety yield results from **Maricopa (UA)**, 2002.

Entry	Source	Grain Yield <sup>a</sup> lbs/acre	Test Weight lbs/bu	1000	Plant Height inches	Lodging %	Heading	Flower- ing	Maturity %	Grain Protein %	HVAC %
				Kernel Weight grams							
<u>Barley</u>											
Max	WWW	7407	52.9	42.9	28	4	3/27	4/01	5/07	---	---
Nebula	WPB	5757	54.5	46.8	28	0	3/20	3/27	5/03	---	---
PH595-096	WPB	6201	53.5	36.7	27	0	3/08	3/11	4/14	---	---
Patti	WWW	5906	50.3	42.8	29	0	3/20	3/21	5/07	---	---
Baretta	APB	7079	53.3	44.2	29	0	3/20	3/21	5/02	---	---
Mucho	APB	5367	53.1	48.7	26	0	3/14	3/14	4/26	---	---
Commander	WWW	6521	52.5	42.9	28	0	3/21	3/23	5/06	---	---
Barcott	WPB	5389	52.6	42.4	26	0	3/07	3/07	4/12	---	---
BA8017	WWW	7375	50.6	39.1	28	2	3/29	4/01	5/13	---	---
<u>Durum</u>											
Kofa	WPB	6402	63.4	51.6	34	5	3/24	3/29	5/08	14.6	99
D98-213	APB	6938	63.3	46.5	34	0	3/26	3/30	5/09	13.6	98
Ria	WWW	7097	62.7	45.1	35	0	3/29	4/02	5/09	14.1	---
YU-895-130	WPB	6067	64.7	45.4	35	0	3/22	3/25	5/04	14.8	100
Topper	WWW	5707	64.8	41.8	35	0	3/28	3/31	5/08	13.5	100
Platinum	WWW	7335	64.3	44.2	32	0	3/28	4/01	5/09	13.4	100
YU897-44	WPB	6521	63.9	54.4	33	0	3/23	3/27	5/06	14.3	99
Mohawk	WPB	6811	64.4	52.9	34	1	3/21	3/25	5/04	13.7	98
Deluxe	WWW	7124	63.6	46.1	35	0	3/28	3/31	5/08	14.1	99
D99-OD-210	APB	5978	64.9	50.7	30	0	3/21	3/25	5/07	14.0	99
Crown	WWW	6618	61.2	44.7	36	0	3/28	4/01	5/10	14.2	100
Tacna	WPB	5757	63.9	53.2	32	0	3/19	3/24	5/05	15.6	100
D6575	WWW	6662	64.9	52.4	33	0	3/28	4/01	5/11	13.9	98
Bravadur	WWW	6558	63.8	46.0	35	0	3/26	3/30	5/06	14.0	99
Matt	APB	6387	64.1	48.6	35	10	3/25	3/28	5/06	14.1	100
Sky	APB	5948	62.2	44.9	32	0	3/24	3/27	5/09	13.8	99
Duraking	WWW	7504	65.1	45.0	34	0	3/18	3/29	5/07	13.4	---
Kronos	APB	6134	63.7	50.7	35	13	3/25	3/29	5/06	14.0	100
Ocotillo	APB	6432	63.8	45.4	36	0	3/24	3/27	5/06	14.3	100
D1138	WWW	6471	64.7	47.7	38	1	3/25	3/30	5/06	14.5	100
WPB 881	WPB	6737	63.0	50.4	33	0	3/26	3/30	5/06	14.2	99
Orita	WPB	7727	63.1	51.8	33	0	3/27	4/01	5/08	13.9	99
D5384-2	WWW	6059	61.5	38.5	35	1	3/29	4/01	5/07	13.8	99
D3121	WWW	6908	62.6	40.5	34	0	3/30	4/03	5/09	14.0	100
D99-OD-82	APB	6729	63.2	51.9	34	0	3/23	3/27	5/06	14.0	98
D8267	WWW	6275	63.4	45.5	34	1	3/26	3/31	5/04	14.7	100
<u>Wheat</u>											
Brooks	WPB	5456	64.2	40.5	34	0	3/22	3/25	5/02	15.2	---
COI957-3	WWW	5702	63.6	35.5	34	0	3/26	4/01	5/01	14.0	---
Cavalier	WWW	6327	63.4	42.7	32	0	3/24	3/26	5/03	14.9	---
Yecora rojo	UC	5255	64.2	43.6	32	0	3/22	3/26	5/01	15.6	---

<sup>a</sup> Grain yield: LSD (5%) = 1574, 1157, and 1136 lbs/acre and cv = 17, 12, and 12 % for barley, durum, and wheat, respectively.

Table 5. Small grain variety yield results from **Maricopa (WWW)**, 2002.

Entry	Source	Grain Yield <sup>a</sup> lbs/acre	Test Weight lbs/bu	1000	Plant Height inches	Lodging %	Heading	Flower- ing	Maturity %	Grain Protein %	HVAC %
				Kernel Weight grams							
<u>Barley</u>											
Max	WWW	4778	51.3	46.7	28	0	4/15	---	---	---	---
Nebula	WPB	3989	50.4	46.3	30	0	4/01	---	---	---	---
PH595-096	WPB	5206	50.7	37.2	26	0	---	---	---	---	---
Patti	WWW	4321	47.6	42.1	28	0	4/01	---	---	---	---
Baretta	APB	5214	50.2	43.3	26	0	4/05	---	---	---	---
Mucho	APB	4260	49.7	47.8	27	0	---	---	---	---	---
Commander	WWW	4927	50.0	42.9	24	0	4/08	---	---	---	---
Barcott	WPB	4626	48.5	40.3	25	0	---	---	---	---	---
BA8017	WWW	5434	---	---	26	0	4/08	---	---	---	---
<u>Durum</u>											
Kofa	WPB	5207	63.5	52.6	30	0	4/01	---	---	14.2	99
D98-213	APB	5198	63.0	46.3	28	0	4/08	---	---	14.5	100
Ria	WWW	4649	63.8	50.3	35	0	4/08	---	---	14.5	100
YU-895-130	WPB	5248	63.7	41.0	25	0	3/29	---	---	15.5	100
Topper	WWW	4762	65.1	45.9	28	0	4/08	---	---	14.0	100
Platinum	WWW	5716	62.5	41.5	25	0	3/29	---	---	13.9	100
YU897-44	WPB	5139	63.4	50.8	27	0	4/05	---	---	14.7	100
Mohawk	WPB	5399	63.6	49.5	30	0	3/29	---	---	13.7	100
Deluxe	WWW	5456	63.9	48.8	30	0	4/05	---	---	14.3	100
D99-OD-210	APB	5168	65.3	51.3	27	0	3/29	---	---	13.8	100
Crown	WWW	5105	62.6	55.7	34	0	4/08	---	---	15.2	100
Tacna	WPB	3964	63.2	53.2	29	0	3/29	---	---	16.3	100
D6575	WWW	5035	65.5	54.3	30	0	4/05	---	---	14.4	100
Bravadur	WWW	5283	63.5	49.3	24	0	4/05	---	---	14.4	100
Matt	APB	4709	63.9	50.3	31	0	4/05	---	---	14.6	99
Sky	APB	5011	63.0	45.2	29	0	4/05	---	---	13.3	100
Duraking	WWW	5532	64.2	43.5	27	0	3/29	---	---	13.9	100
Kronos	APB	4446	64.3	52.4	30	0	4/05	---	---	13.9	99
Ocotillo	APB	4842	63.8	47.4	32	0	4/05	---	---	14.6	98
D1138	WWW	4891	64.7	50.3	33	0	4/01	---	---	14.2	100
WPB 881	WPB	4863	63.0	50.6	28	0	4/08	---	---	14.7	100
Orita	WPB	4682	62.9	53.4	30	0	4/01	---	---	15.2	100
D5384-2	WWW	5271	---	---	31	0	4/08	---	---	---	---
D3121	WWW	5121	---	---	29	0	4/08	---	---	---	---
D99-OD-82	APB	5103	63.1	48.3	31	0	3/29	---	---	13.9	99
D8267	WWW	4054	64.1	47.5	26	0	4/05	---	---	15.1	100
<u>Wheat</u>											
Brooks	WPB	5597	64.6	42.4	29	0	4/05	---	---	15.2	---
COI957-3	WWW	5716	64.5	37.0	30	0	4/05	---	---	14.9	---
Cavalier	WWW	5350	63.6	43.2	31	0	4/05	---	---	15.5	---
Yecora rojo	UC	5292	64.6	46.7	30	0	4/05	---	---	15.9	---

<sup>a</sup> Grain yield: LSD (5%) = 638, 458, and 682 lbs/acre and cv = 9.2, 5.6, and 7.8% for barley, durum, and wheat, respectively.

Table 6. Small grain variety yield results from Yuma (WPB), 2002.

Entry	Source	Grain Yield <sup>a</sup> lbs/acre	Test Weight lbs/bu	1000		Lodging %	Flower- ing	Grain Protein %	HVAC %
				Kernel Weight grams	Plant Height inches				
<u>Barley</u>									
Max	WWW	6383	50.6	---	35	100	---	---	---
Nebula	WPB	7322	52.1	---	37	20	---	---	---
PH595-096	WPB	8073	49.7	---	34	7	---	---	---
Patti	WWW	6451	45.8	---	33	100	---	---	---
Baretta	APB	6127	46.0	---	35	53	---	---	---
Mucho	APB	6229	48.2	---	31	13	---	---	---
Commander	WWW	5274	42.6	---	34	23	---	---	---
Barcott	WPB	7663	48.1	---	32	0	---	---	---
BA8017	WWW	4881	43.4	---	35	7	---	---	---
<u>Durum</u>									
Kofa	WPB	7503	62.0	53.5	---	---	3/24	14.7	100
D98-213	APB	8811	62.5	45.5	---	---	3/24	14.0	99
Ria	WWW	7085	62.2	45.9	---	---	3/26	14.1	99
YU-895-130	WPB	7866	63.1	40.4	---	---	3/24	15.3	100
Topper	WWW	8684	64.6	44.8	---	---	3/31	12.9	97
Platinum	WWW	8066	63.6	42.4	---	---	3/24	13.6	100
YU897-44	WPB	8393	63.0	51.0	---	---	3/25	14.5	100
Mohawk	WPB	7557	62.0	50.0	---	---	3/24	14.1	100
Deluxe	WWW	8429	63.0	49.0	---	---	3/25	14.5	100
D99-OD-210	APB	7594	64.5	49.8	---	---	3/23	13.9	99
Crown	WWW	8611	61.3	49.0	---	---	3/26	14.4	100
Tacna	WPB	8266	63.7	53.5	---	---	3/23	14.9	100
D6575	WWW	7339	64.0	54.1	---	---	3/25	14.6	100
Bravadur	WWW	7557	62.8	47.6	---	---	3/25	13.9	100
Matt	APB	7485	62.5	46.0	---	---	3/25	14.4	100
Sky	APB	7430	60.4	39.6	---	---	3/25	13.8	100
Duraking	WWW	8157	63.3	44.7	---	---	3/25	13.3	100
Kronos	APB	7775	62.7	52.8	---	---	3/24	14.3	100
Ocotillo	APB	7921	63.3	48.5	---	---	3/24	14.5	100
D1138	WWW	7867	64.4	48.5	---	---	3/25	14.7	99
WPB 881	WPB	7485	62.8	53.8	---	---	3/25	14.3	99
Orita	WPB	8629	62.8	51.0	---	---	3/25	14.6	100
D5384-2	WWW	7121	61.2	38.6	---	---	3/26	14.3	100
D3121	WWW	7703	62.6	42.2	---	---	3/26	14.1	99
D99-OD-82	APB	8030	62.7	52.3	---	---	3/23	14.1	99
D8267	WWW	7594	62.9	46.7	---	---	3/25	14.4	100
<u>Wheat</u>									
Brooks	WPB	8484	62.8	39.4	---	---	3/25	15.2	---
CO1957-3	WWW	8266	64.0	39.0	---	---	3/26	14.3	---
Cavalier	WWW	7885	62.5	39.8	---	---	3/26	15.3	---
Yecora rojo	UC	7648	62.9	40.3	---	---	3/26	15.5	---

<sup>a</sup> Grain yield: LSD (5%) = 678, 1283, and 1312 lbs/acre and cv = 6, 10, and 8% for barley, durum, and wheat, respectively.

Table 7. Summary of small grain variety yield results for 2002 from Arizona City (APB), Maricopa (U of A), Maricopa (WWW), and Yuma (WPB).

Entry	Source	Grain yield (% of location average)				Mean	Standard Deviation
		Arizona City (APB)	Maricopa (U of A)	Maricopa (WWW)	Wellton (WPB)		
<u>Barley</u>							
Max	WWW	95	116	98	101	103	13
Nebula	WPB	100	90	113	84	96	23
PH595-096	WPB	105	97	124	110	108	14
Patti	WWW	95	92	99	91	94	10
Baretta	APB	109	111	94	110	107	18
Mucho	APB	92	84	96	90	90	10
Commander	WWW	106	102	81	104	99	24
Barcott	WPB	105	84	118	97	102	19
BA8017	WWW	92	115	75	114	100	21
<u>Durum</u>							
Kofa	WPB	101	97	95	104	100	18
D98-213	APB	95	106	112	104	104	13
Ria	WWW	93	108	90	93	96	11
YU-895-130	WPB	97	92	100	105	98	13
Topper	WWW	112	87	110	95	102	17
Platinum	WWW	107	112	102	114	109	8
YU897-44	WPB	97	99	106	103	101	16
Mohawk	WPB	108	104	96	108	104	20
Deluxe	WWW	117	108	107	109	111	15
D99-OD-210	APB	101	91	96	103	98	11
Crown	WWW	102	101	109	102	103	14
Tacna	WPB	90	88	105	79	91	14
D6575	WWW	107	101	93	101	101	14
Bravadur	WWW	101	100	96	106	101	26
Matt	APB	101	97	95	94	97	9
Sky	APB	93	90	94	100	94	15
Duraking	WWW	100	114	103	111	106	12
Kronos	APB	104	93	99	89	97	13
Ocotillo	APB	100	98	100	97	99	14
D1138	WWW	105	98	100	98	101	14
WPB 881	WPB	97	102	95	97	98	7
Orita	WPB	102	118	109	94	106	11
D5384-2	WWW	94	92	90	106	95	13
D3121	WWW	98	105	98	103	101	16
D99-OD-82	APB	94	102	102	102	100	11
D8267	WWW	85	95	96	81	89	12
<u>Wheat</u>							
Brooks	WPB	104	96	105	102	102	9
COI957-3	WWW	95	100	102	104	100	10
Cavalier	WWW	101	111	98	97	102	9
Yecora rojo	UC	100	92	95	96	96	8