

Small Grains Variety Evaluation at Arizona City, Eloy, Maricopa, and Yuma, 2000

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Summary

Small grain varieties are evaluated each year by University of Arizona personnel and industry cooperators. 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. The results contained in this report will be combined with results from previous years in a summary available from Arizona Cooperative Extension.

Introduction

Small grain varieties are continually tested as part of the on-going effort to assess variety productivity and characteristics. The purpose of these tests were to characterize new barley, durum, and wheat 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, Eloy by World Wide Wheat, Maricopa Agricultural Center by the University of Arizona, and Yuma Valley by Western Plant Breeders. The seed was planted with a cone planter in seven rows spaced 7 inches apart and about 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 design with 4 replications and a variable number of entries depending on the crop. Growing conditions at each site are listed below. The following data was collected, but not all data was collected at every location: grain yield, grain protein, test weight, kernel weight, HVAC, plant height, lodging, heading, anthesis, and physiological maturity. Grain was harvested with a small plot combine 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. Heading, anthesis, and physiological maturity dates are noted when 50% of the plants reach these stages. Physiological maturity is defined 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, WWW = World Wide Wheat.

Eloy (World Wide Wheat)

Varieties were planted on November 19, 1999. The plots were irrigated six times throughout the growing season (including emergence irrigation). A total of 211 lbs N/A as UAN32 was applied via irrigation water. The plots were harvested July 10, 2000.

Maricopa Ag. Center (University of Arizona)

Seed was planted into dry soil classified as a sandy loam on December 6, 1999. A total of 42 inches of water was applied in nine irrigations: December 6, December 20, January 25, February 18, March 3, March 20, March 29, April 7 and April 24. UAN32 was applied in the irrigation water at a rate of 50 lbs N/acre on January 25 and February 18, and at a rate of 35 lbs N/acre on March 3, 20 and 29 for a total of 205 lbs N/acre.

Yuma Valley (Western Plant Breeders) – Barley

A trial was planted on a clay loam soil that was previously in cantaloupes and irrigated up on December 6, 1999. A total of six irrigations were applied including the irrigation to germinate the seed. Nitrogen application included 70 lbs N/acre preplant and 180 lbs N/acre in the first three irrigations as ammonia for a total of 250 lbs N/acre. The plots were harvested on May 18, 2000.

Yuma Valley (Western Plant Breeders) – Durum and Wheat

Seed was planted on a sandy loam soil following lettuce on January 15, 2000 and an irrigation to germinate the seed was applied the same day. No preplant fertilizer was applied. A total of 262 lbs N/acre as UAN-32 was applied over the growing season. Seven irrigations were required. Plots were harvested June 1, 2000.

Discussion

The 1999-00 wheat growing season can be characterized as warm and dry compared to normal (Table 1). March was the only month where appreciable rainfall was recorded and most of this occurred in one storm in the early part of the month. The growing season had above average temperature except for December. Yield and plant characteristics of the varieties are presented for the various locations in Tables 2-5 and a summary of the grain yields at all locations is presented in Table 6. Several locations and years are needed to accurately assess variety performance. Contact your local Cooperative Extension for a summary of small grains trials in Arizona. The results of this trial are most useful when combined with data from other years.

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Table 1. Climatic data for Eloy, Maricopa and Yuma Valley for the 1999-00 growing season compared to the long-term average. The weather for the Arizona City location in this trial is similar to Eloy.

Climate variable	Year(s)	Dec	Jan	Feb	Mar	Apr	May
<u>Eloy</u>							
Max Temp. (F)	1999-00	68	71	74	75	88	98
	Avg. ‡	68	68	72	77	85	94
Min Temp. (F)	1999-00	30	34	38	44	52	60
	Avg. ‡	37	36	40	44	50	58
Ppt. (in)	1999-00	0.00	0.16	0.16	1.39	0.00	0.00
	Avg. ‡	1.16	0.92	0.86	1.03	0.27	0.19
<u>Maricopa</u>							
Max Temp. (F)	1999-00	67	71	73	75	89	99
	Avg. ‡	67	68	71	76	84	95
Min Temp. (F)	1999-00	32	36	39	44	52	61
	Avg. ‡	36	35	37	42	47	56
Ppt. (in)	1999-00	0.00	0.00	0.00	1.97	0.00	0.00
	Avg. ‡	1.53	0.59	0.83	0.67	0.39	0.12
<u>Yuma Valley</u>							
Max Temp. (F)	1999-00	70	73	74	77	89	98
	Avg. ‡	69	68	73	78	86	93
Min Temp. (F)	1999-00	41	43	46	48	54	61
	Avg. ‡	39	38	40	45	51	57
Ppt. (in)	1999-00	0.00	0.00	0.05	0.22	0.00	0.00
	Avg. ‡	0.42	0.35	0.27	0.26	0.12	0.01

Table 2. Small grain variety yield results from **Arizona City (APB)**, 2000.

Entry	Source	Grain Yield ^a lbs/acre	Grain protein %	Test weight lbs/bu	Kernel weight g/1000	HVAC %	Plant height inches	Lodging %
<u>Barley</u>								
Baretta	APB	7187	---	50.5	39.6	---	35	5
Mucho	APB	5590	---	52.6	50.5	---	29	0
Nebula	WPB	6534	---	54.0	47.5	---	30	30
Caliber	WWW	3884	---	51.3	39.5	---	36	80
Commander	WWW	5953	---	50.4	40.6	---	35	0
Horizon	WWW	5518	---	51.7	39.4	---	34	40
Max	WWW	6570	---	52.0	41.3	---	36	40
Patti	WWW	6098	---	48.5	39.8	---	31	0
AVERAGE		5917	---	51.4	42.3	---	33	24
<u>Durum</u>								
D95-412	APB	5844	12.8	62.0	42.8	100	31	---
D95-434	APB	6244	12.1	63.3	43.4	100	33	---
D96-651	APB	5881	11.6	64.6	42.6	100	33	---
Kronos	APB	6752	11.4	62.7	49.0	98	30	---
Ocotillo	APB	5554	12.7	63.6	47.1	100	37	---
Cortez	WPB	6062	13.3	62.0	43.2	100	34	---
Kofa	WPB	6098	12.9	63.5	51.5	100	33	---
Mohawk	WPB	6098	14.8	58.6	40.0	100	33	---
Tacna	WPB	5155	13.6	63.9	53.2	100	31	---
YU895-130	WPB	5518	13.1	63.0	37.9	100	34	---
YU895-89	WPB	6244	14.3	60.3	42.3	100	33	---
Bravadur	WWW	5627	12.7	63.3	42.3	100	33	---
Crown	WWW	6425	13.0	60.7	44.8	100	37	---
D2626	WWW	6207	12.0	63.9	36.1	100	31	---
Deluxe	WWW	6208	13.3	63.0	44.2	100	34	---
Duraking	WWW	6207	12.5	63.4	40.6	100	30	---
Platinum	WWW	5917	13.3	62.1	37.4	100	30	---
Ria	WWW	6534	12.3	62.9	38.6	99	36	---
Topper	WWW	6099	12.5	63.5	37.8	100	36	---
AVERAGE		6035	12.8	62.6	42.9	100	33	---
<u>Wheat</u>								
Yecora Rojo	UC	7587	13.0	63.9	41.1	---	31	---
Brooks	WPB	7405	13.6	63.2	36.9	---	38	---
YU995-241	WPB	7333	13.5	62.9	39.2	---	35	---
BR4835	WWW	7986	13.2	64.0	36.9	---	40	---
Cavalier	WWW	7732	13.6	62.6	39.7	---	31	---
AVERAGE		7609	13.4	63.3	38.8	---	35	---

^aGrain yield: LSD (5%) = 1292, 877, and 544 lbs/acre and cv = 14.9, 10.3, and 4.6% for barley, durum, and wheat, respectively.

Table 3. Small grain variety yield results from **Eloy (WWW)**, 2000.

Entry	Source	Grain yield ^a lbs/acre	Grain protein %	Test weight lbs/bu	Kernel weight g/1000	HVAC %	Plant height inches	Lodging %	Heading
<u>Barley</u>									
Baretta	APB	5938	---	51.4	43.7	---	33	5	---
Mucho	APB	5208	---	52.5	48.5	---	24	5	---
Nebula	WPB	5499	---	51.7	49.3	---	29	5	---
Caliber	WWW	5234	---	52.0	41.4	---	30	10	---
Commander	WWW	5853	---	51.7	45.4	---	30	5	---
Horizon	WWW	6042	---	49.8	40.9	---	32	5	---
Max	WWW	6398	---	53.3	47.9	---	29	10	---
Patti	WWW	6183	---	49.8	41.5	---	28	5	---
AVERAGE		5794	---	51.5	44.8	---	29	6	---
<u>Durum</u>									
D95-412	APB	6328	11.9	63.5	46.5	100	28	5	31-Mar
D95-434	APB	6585	13.4	64.3	50.5	100	31	10	5-Apr
D96-651	APB	6596	11.9	66.0	48.7	89	33	0	31-Mar
Kronos	APB	5968	12.7	64.1	55.3	97	34	35	30-Mar
Ocotillo	APB	6481	13.7	64.3	46.8	100	35	0	1-Apr
Cortez	WPB	6409	13.2	63.8	47.0	100	32	5	5-Apr
Kofa	WPB	6320	13.3	64.3	54.4	100	31	5	1-Apr
Mohawk	WPB	6398	12.2	64.3	51.0	100	30	10	2-Apr
Tacna	WPB	6290	13.8	65.1	54.1	100	29	5	30-Mar
YU895-130	WPB	6379	13.2	65.8	49.5	100	31	5	30-Mar
YU895-89	WPB	6314	13.7	63.5	51.7	100	31	5	6-Apr
Bravadur	WWW	6237	13.5	64.0	48.6	97	32	10	2-Apr
Crown	WWW	6934	12.9	62.1	50.0	100	37	10	4-Apr
D2626	WWW	7213	12.2	66.0	45.4	97	32	5	31-Mar
Deluxe	WWW	7402	13.6	64.4	50.5	100	33	0	1-Apr
Duraking	WWW	7096	11.9	65.3	46.2	97	30	5	3-Apr
Platinum	WWW	6587	12.7	64.4	41.1	100	27	5	3-Apr
Ria	WWW	6622	12.7	64.3	41.6	98	32	10	2-Apr
Topper	WWW	6818	11.4	65.8	42.6	89	34	0	5-Apr
AVERAGE		6578	12.8	64.5	48.5	98	32	7	1-Apr
<u>Wheat</u>									
Yecora Rojo	UC	6733	14.1	64.4	43.0	---	30	0	30-Mar
Brooks	WPB	7091	13.9	61.6	39.5	---	32	0	1-Apr
YU995-241	WPB	6702	13.6	63.8	38.3	---	34	60	31-Mar
BR4835	WWW	7243	13.1	65.7	40.5	---	34	0	31-Mar
Cavalier	WWW	6961	13.4	64.3	41.8	---	29	0	2-Apr
AVERAGE		6946	13.6	64.0	40.6	---	32	0	31-Mar

^a Grain yield: LSD (5%) = 321, 361, and 558 lbs/acre and cv = 3.8, 3.9, and 5.2% for barley, durum, and wheat, respectively.

Table 4. Small grain variety yield results from **Maricopa (U of A)**, 2000.

Entry	Source	Grain yield ^a lbs/acre	Grain protein %	Test weight lbs/bu	Kernel weight g/1000	HVAC %	Plant Height inches	Heading	Anthesis	Maturity
<u>Barley</u>										
Baretta	APB	7724	---	50.6	46.9	---	32	17-Mar	19-Mar	29-Apr
Mucho	APB	6228	---	51.1	52.1	---	29	7-Mar	9-Mar	19-Apr
Nebula	WPB	7664	---	51.1	46.6	---	36	16-Mar	18-Mar	27-Apr
Caliber	WWW	5977	---	51.0	41.7	---	34	27-Mar	27-Mar	1-May
Commander	WWW	7068	---	47.9	45.2	---	34	21-Mar	21-Mar	30-Apr
Horizon	WWW	6326	---	45.5	40.2	---	32	24-Mar	25-Mar	30-Apr
Max	WWW	8260	---	49.9	44.0	---	35	24-Mar	25-Mar	6-May
Patti	WWW	7066	---	47.3	45.3	---	30	18-Mar	20-Mar	2-May
Max/Mucho	---	7527	---	50.5	47.7	---	34	9-Mar	10-Mar	1-May
AVERAGE		7093	---	49.4	45.5	---	33	18-Mar	19-Mar	29-Apr
<u>Durum</u>										
D95-412	APB	6541	12.0	61.4	45.9	100	33	18-Mar	25-Mar	4-May
D95-434	APB	6739	12.0	63.3	52.2	98	38	17-Mar	25-Mar	3-May
D96-651	APB	6490	11.9	64.0	48.4	95	37	20-Mar	26-Mar	4-May
Kronos	APB	6842	12.1	62.3	56.6	94	35	18-Mar	25-Mar	4-May
Ocotillo	APB	6245	12.9	62.6	50.0	100	39	19-Mar	26-Mar	3-May
Cortez	WPB	6301	12.3	60.5	42.8	100	39	29-Mar	4-Apr	7-May
Kofa	WPB	6137	12.9	62.0	56.3	100	37	18-Mar	26-Mar	4-May
Mohawk	WPB	7033	11.9	62.9	54.0	100	37	19-Mar	25-Mar	3-May
Tacna	WPB	6659	13.4	63.4	53.5	100	34	15-Mar	21-Mar	29-Apr
Tacna/Cortez	---	6881	13.0	62.4	50.2	100	36	15-Mar	21-Mar	5-May
YU895-130	WPB	6769	12.0	63.5	44.7	99	35	19-Mar	26-Mar	3-May
YU895-89	WPB	6056	12.5	59.5	47.4	100	37	28-Mar	5-Apr	7-May
Bravadur	WWW	6304	12.5	63.1	52.4	99	37	20-Mar	30-Mar	4-May
Crown	WWW	6031	12.6	58.9	44.6	100	39	23-Mar	31-Mar	7-May
D2626	WWW	6625	11.7	64.0	48.5	100	36	19-Mar	26-Mar	4-May
Deluxe	WWW	6633	12.5	62.4	52.2	100	37	22-Mar	29-Mar	4-May
Duraking	WWW	7339	12.1	62.5	44.2	100	36	21-Mar	28-Mar	5-May
Platinum	WWW	6796	12.4	62.0	44.4	100	33	20-Mar	27-Mar	4-May
Ria	WWW	6569	11.3	63.1	42.6	94	37	25-Mar	1-Apr	5-May
Topper	WWW	6410	11.6	62.9	43.2	97	39	28-Mar	3-Apr	6-May
AVERAGE		6570	12.3	62.3	48.7	99	36	20-Mar	28-Mar	4-May
<u>Wheat</u>										
Yecora Rojo	UC	6332	13.6	47.0	47.3	---	33	18-Mar	23-Mar	28-Apr
Brooks	WPB	6379	13.4	63.3	40.7	---	34	20-Mar	26-Mar	1-May
YU995-241	WPB	6106	13.2	61.6	38.7	---	33	18-Mar	24-Mar	2-May
BR4835	WWW	6058	13.3	63.5	38.9	---	38	16-Mar	23-Mar	4-May
Cavalier	WWW	6536	13.4	62.6	44.6	---	33	20-Mar	25-Mar	1-May
AVERAGE		6282	13.4	59.6	42.0	---	34	18-Mar	24-Mar	1-May

^a Grain yield: LSD (5%) = 895, 556, and 904 lbs/acre and cv = 8.6, 5.9, and 9.3% for barley, durum, and wheat, respectively.

Table 5. Small grain variety yield results from **Yuma (WPB)**, 2000.

Entry	Source	Grain yield ^a lbs/acre	Grain protein %	Test weight lbs/bu	Kernel weight g	HVAC %	Plant height inches	Lodging %	Anthesis
<u>Barley</u>									
Baretta	APB	8383	---	54.8	40.2	---	32	3	---
Mucho	APB	7028	---	54.6	42.9	---	27	5	---
Nebula	WPB	7706	---	55.5	43.3	---	33	0	---
Caliber	WWW	7086	---	55.7	37.9	---	30	0	---
Commander	WWW	8190	---	55.9	37.0	---	30	0	---
Horizon	WWW	7667	---	54.1	40.9	---	29	0	---
Max	WWW	7996	---	53.9	37.7	---	31	0	---
Patti	WWW	7609	---	53.5	37.8	---	29	0	---
Max/Mucho	---	7682	---	54.1	36.8	---	31	0	---
AVERAGE		7705	---	54.6	39.4	---	30	1	---
<u>Durum</u>									
D95-412	APB	5699	14.5	60.9	44.0	100	28	65	14-Mar
D95-434	APB	6171	15.3	62.0	40.7	100	31	65	14-Mar
D96-651	APB	6171	15.1	62.8	41.9	100	32	68	17-Mar
Kronos	APB	7133	14.4	62.7	52.5	100	31	70	13-Mar
Ocotillo	APB	7043	15.3	63.2	45.1	100	34	53	19-Mar
Cortez	WPB	6498	15.9	61.1	45.1	100	34	0	21-Mar
Kofa	WPB	6770	14.9	62.7	48.0	100	32	35	14-Mar
Mohawk	WPB	6843	14.5	60.8	41.9	100	31	55	13-Mar
Tacna	WPB	6734	16.2	62.2	44.7	100	29	35	12-Mar
Tacna/Cortez	---	7133	15.1	62.9	45.2	100	33	5	13-Mar
YU895-130	WPB	7696	15.6	63.7	36.2	100	34	60	16-Mar
YU895-89	WPB	6244	16.7	60.5	48.4	100	33	18	19-Mar
Bravadur	WWW	6026	15.4	61.6	39.9	100	32	38	15-Mar
Crown	WWW	6462	14.9	59.5	37.5	100	35	20	18-Mar
D2626	WWW	6752	14.8	62.6	37.8	100	32	53	15-Mar
Deluxe	WWW	6897	15.5	62.0	41.7	100	34	35	18-Mar
Duraking	WWW	7460	14.0	62.0	36.9	100	33	20	18-Mar
Platinum	WWW	6879	14.1	61.1	35.8	100	30	45	13-Mar
Ria	WWW	6280	15.0	62.0	36.9	100	32	38	16-Mar
Topper	WWW	7097	13.9	64.3	38.8	100	34	0	20-Mar
AVERAGE		6699	15.1	62.0	42.0	100	32	39	16-Mar
<u>Wheat</u>									
Yecora Rojo	UC	5990	15.1	63.7	40.1	---	29	18	15-Mar
Brooks	WPB	6661	15.0	63.2	35.9	---	31	48	14-Mar
YU995-241	WPB	6516	15.1	60.9	33.7	---	31	40	16-Mar
BR4835	WWW	6207	15.1	62.2	34.8	---	36	43	15-Mar
Cavalier	WWW	6625	15.2	61.8	39.3	---	31	33	16-Mar
AVERAGE		6400	15.1	62.4	36.8	---	32	0	15-Mar

^a Grain yield: LSD (5%) = 948, 1279, and 868 lbs/acre and cv = 6.7, 13.5, and 8.8% for barley, durum, and wheat, respectively.

Table 6. Summary of small grain variety yield results from Arizona City (APB), Eloy (WWW), Maricopa Ag. Center (U of A), and Yuma (WPB) for 2000.

Entry	Source	Grain Yield				Mean of locations	Std. dev. of locations
		Arizona City (APB)	Eloy (WWW)	Maricopa (U of A)	Yuma (WPB)		
----- % of location average -----							
<u>Barley</u>							
Baretta	APB	121	102	110	109	111	8
Mucho	APB	94	90	88	91	91	3
Nebula	WPB	110	95	109	100	104	7
Caliber	WWW	66	90	85	92	83	12
Commander	WWW	101	101	100	106	102	3
Horizon	WWW	93	104	90	99	97	6
Max	WWW	111	110	117	104	111	5
Patti	WWW	103	107	100	99	102	4
Max/Mucho	---	---	---	107	100	104	5
<u>Durum</u>							
D95-412	APB	97	96	100	85	95	7
D95-434	APB	103	100	103	92	100	5
D96-651	APB	97	100	99	92	97	4
Kronos	APB	112	91	104	106	103	9
Ocotillo	APB	92	99	95	105	98	6
Cortez	WPB	100	97	96	97	98	2
Kofa	WPB	101	96	93	101	98	4
Mohawk	WPB	101	97	107	102	102	4
Tacna	WPB	85	96	101	101	96	8
Tacna/Cortez	---	---	---	105	106	106	1
YU895-130	WPB	91	97	103	115	102	10
YU895-89	WPB	103	96	92	93	96	5
Bravadur	WWW	93	95	96	90	94	3
Crown	WWW	106	105	92	96	100	7
D2626	WWW	103	110	101	101	104	4
Deluxe	WWW	103	113	101	103	105	5
Duraking	WWW	103	108	112	111	109	4
Platinum	WWW	98	100	103	103	101	2
Ria	WWW	108	101	100	94	101	6
Topper	WWW	101	104	98	106	102	4
<u>Wheat</u>							
Yecora Rojo	UC	100	97	101	94	98	3
Brooks	WPB	97	102	102	104	101	3
YU995-241	WPB	96	96	97	102	98	3
BR4835	WWW	105	104	96	97	101	5
Cavalier	WWW	102	100	104	104	103	2