

Small Grains Variety Evaluation at Maricopa and Yuma, 2006

M. J. Ottman

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: 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 durum varieties and 85 lbs/acre for barley varieties. The experimental design was a randomized complete block with 4 replications, 18-19 barley entries, and 23-29 durum entries. Growing conditions at each site are listed in Table 1. The following data was collected: grain yield, test weight, plant height, lodging, heading, flowering (Maricopa, UA only), physiological maturity (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 the Kjeldahl method or NIRS (Maricopa, UA) and expressed on a 12% moisture basis. Flowering is defined as when about half of the heads are shedding pollen and physiological maturity is defined as when the glumes turn brown. 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.

Discussion

This growing season was characterized by warm days, cool nights, and low rainfall (Table 2). The early part of the growing season (December, January, and February) had some of the warmest maximum temperatures on record, and the minimum temperatures were below average during that time period. The maximum temperatures in March were near the lowest on record. April had average temperature, but May had much above average temperature especially at Maricopa. This growing season was especially dry with no rainfall most of the season except in March.

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. Barley data is not presented from WPB because of poor stand establishment or from APB and WWW because of low yields. Durum data from APB is not presented due to low yields. Yields from APB barley and durum and WWW barley were low possibly due to missed irrigation. Durum yields from UA, Maricopa were also low, as were test weights, but not low enough to discard the data.

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

Financial support for this project was received from the Arizona Grain Research and Promotion Council, the Arizona Crop Improvement Association, Allstar Seed, and Ag Services. We wish to thank the following individuals for testing the varieties at their respective sites: Albert Carleton of Arizona Plant Breeders, Kim Shantz and Dale Clark of Western Plant Breeders, and Rex Thompson of World Wide Wheat. The technical assistance of Mary Comeau, Mike Sheedy and Tony Gomez is greatly appreciated.

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

Cultural information	Maricopa (U of A)	Maricopa (WWW)	Yuma (WPB)
Previous crop	Bermudagrass	Alfalfa	Lettuce
Soil texture	Sandy loam	Sandy clay loam	Clay loam
Planting date	12/2	11/28	12/26
Irrigations	7 12/2, 1/26, 2/17, 3/10, 3/24, 4/7, 4/21	6 11/28, 1/31, 2/27, 4/7,4/27, 5/10	6 12/26, 2/17, 3/19, 4/9, 4/21, 5/7
Nitrogen (lbs N/a)	232 12/2: 48 as 16-20-0 1/26: 46 as 46-0-0 2/17: 46 as 46-0-0 3/10: 46 as 46-0-0 3/24: 46 as 46-0-0	299 11/7: 100 as 46-0-0 1/31: 53 as 46-0-0 2/27: 53 as 46-0-0 4/7: 53 as 46-0-0 4/27: 40 as 46-0-0	170 2/17: 70 as 32-0-0 3/19: 70 as 32-0-0 4/09: 30 as 32-0-0
Phosphorus (lbs P ₂ O ₅ /acre)	60 12/2: 60 as 16-20-0	---	---
Pesticides	None	Buctril on 1/20 Govern on 5/6	None
Harvest date	6/2	---	6/1

Table 2. Climatic data from AZMET for Maricopa and Yuma Valley during the 2006 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 20	2006	20	19	20	2	10	18	18
	°F	2006	70	70	75	72	84	98	78
	°F	1987-2006	66	66	70	76	85	95	76
Min Temp.	Rank of 20	2006	6	5	5	12	10	18	8
	°F	2006	33	33	37	44	51	62	43
	°F	1987-2006	35	36	40	44	51	60	44
Ppt.	Rank of 20	2006	1	1	1	19	1	1	8
	inches	2006	0	0	0	2.44	0	0	2.44
	inches	1987-2006	0.58	0.73	0.90	0.81	0.29	0.13	3.43
<u>Yuma</u>									
Max Temp.	Rank of 20	2006	18	18	19	2	7	17	16
	°F	2006	71	72	77	74	84	97	79
	°F	1987-2006	68	69	73	79	86	94	78
Min Temp.	Rank of 20	2006	5	3	12	3	8	13	5
	°F	2006	40	40	45	46	53	60	47
	°F	1987-2006	41	42	45	49	53	60	48
Ppt.	Rank of 20	2006	1	1	1	11	1	16	4
	inches	2006	0	0	0	0.18	0	0.02	0.20
	inches	1987-2006	0.35	0.31	0.35	0.34	0.15	0.04	1.54

Table 3. Barley variety yield results from **Maricopa (UA)**, 2006.

Entry	Source	Grain Yield ^a lbs/acre	Test Weight lbs/bu	Plant Height inches	Lodging %	Heading	Flowering	Maturity
Barcott	WPB	5808	49.8	33	0	7-Mar	7-Mar	19-Apr
Baretta	APB	5432	49.2	36	20	23-Mar	23-Mar	26-Apr
Chico	WPB	5687	46.7	31	3	21-Mar	21-Mar	28-Apr
Cochise	WPB	6292	50.2	32	0	7-Mar	7-Mar	22-Apr
Commander	WWW	4948	44.7	37	20	26-Mar	26-Mar	29-Apr
Gustoe	WPB	5687	49.2	35	33	26-Mar	26-Mar	27-Apr
Max	WWW	5633	46.8	35	83	26-Mar	26-Mar	5-May
Mucho	APB	---	---	---	---	---	---	---
Nebula	WPB	6776	52.4	40	0	20-Mar	20-Mar	27-Apr
Patti	WWW	5351	43.3	35	55	19-Mar	17-Mar	30-Apr
BA1129A	WWW	6400	48.4	36	5	21-Mar	21-Mar	27-Apr
BA8017	WWW	5243	43.0	31	33	23-Mar	23-Mar	1-May
B-38-24	APB	6211	52.4	35	0	15-Mar	15-Mar	24-Apr
B00-219	APB	6776	49.4	35	0	11-Mar	11-Mar	22-Apr
B02AZ 6-1	APB	6023	49.2	41	5	17-Mar	17-Mar	24-Apr
YU 599-006	WPB	6131	50.2	38	10	23-Mar	23-Mar	26-Apr
YU 502-051	WPB	5163	47.8	38	20	16-Mar	16-Mar	23-Apr
YU 502-080	WPB	5674	47.8	36	30	21-Mar	21-Mar	28-Apr
Poco	Wilbur Ellis	4759	50.9	23	5	24-Feb	24-Feb	9-Apr
AVERAGE		5657	48.4	35	17	18-Mar	18-Mar	25-Apr

^a Grain yield: LSD (5%) = 832 lbs/acre and cv = 10.4%.

Table 4. Durum variety yield results from **Maricopa (UA)**, 2006.

Entry	Source	Grain	Grain	Test	Plant	Lodging	Heading	Flower-	Maturity	Grain	HVAC
		Yield ^a	moisture	Weight	Height			ing		Protein	
		lbs/acre	%	lbs/bu	inches	%			%	%	%
<u>Durum</u>											
Alamo	WPB	5432	7.9	62.5	38	0	25-Mar	29-Mar	5-May	13.9	100
Crown	WWW	5091	6.9	52.7	40	0	30-Mar	3-Apr	7-May	15.6	99
Duraking	WWW	6041	7.8	59.0	36	0	28-Mar	1-Apr	7-May	13.8	99
Havasu	WPB	5351	7.8	61.8	38	0	24-Mar	28-Mar	5-May	13.3	99
Kofa	WPB	5342	7.5	60.2	39	0	24-Mar	29-Mar	5-May	13.6	100
Kronos	APB	5606	7.6	59.8	38	8	23-Mar	28-Mar	4-May	12.9	98
Matt	APB	5019	7.7	59.9	41	5	26-Mar	30-Mar	6-May	14.1	99
Mead	WPB	5109	7.6	58.8	37	20	29-Mar	3-Apr	7-May	12.9	98
Mohawk	WPB	5647	7.5	58.9	37	3	22-Mar	27-Mar	2-May	13.2	97
Ocotillo	APB	---	---	---	---	---	---	---	---	---	---
Orita	WPB	5485	7.5	58.2	36	0	27-Mar	1-Apr	6-May	14.6	100
Platinum	WWW	5790	7.6	58.8	34	0	27-Mar	1-Apr	7-May	14.4	100
Sky	APB	6382	7.7	58.9	34	0	25-Mar	29-Mar	7-May	12.4	98
WPB 881	WPB	5364	7.3	59.3	37	0	25-Mar	29-Mar	6-May	13.6	99
YU-802-175	WPB	5414	7.6	62.8	37	0	27-Mar	1-Apr	6-May	13.0	99
YU-802-4	WPB	4983	7.4	57.3	38	0	1-Apr	5-Apr	8-May	14.6	100
D8270	WWW	5288	7.6	60.8	36	0	30-Mar	4-Apr	6-May	12.8	99
D0061	WWW	5700	7.4	58.6	39	0	3-Apr	6-Apr	9-May	12.3	96
CHD1978B	WWW	4912	7.4	56.2	39	0	2-Apr	6-Apr	8-May	14.7	99
D6575D	WWW	4930	7.4	58.4	37	0	4-Apr	7-Apr	8-May	13.3	100
16-5	APB	4535	7.5	62.2	34	0	17-Mar	22-Mar	3-May	14.0	100
D02AZ-111MT	APB	5288	7.3	58.2	35	0	27-Mar	31-Mar	6-May	13.9	99
D257-11	APB	5969	7.7	60.8	37	3	26-Mar	31-Mar	6-May	12.4	97
GD007	Allstar	3997	7.9	59.8	43	0	29-Mar	2-Apr	5-May	13.3	96
GD008	Allstar	5019	7.8	62.4	38	0	29-Mar	2-Apr	7-May	12.0	83
GD009	Allstar	4880	7.8	60.5	42	0	28-Mar	1-Apr	4-May	14.8	100
Royal I AZ	AgServ	5069	7.3	58.2	38	0	28-Mar	1-Apr	7-May	14.3	100
Royal II AZ	Ag Serv	5539	7.4	60.5	36	0	25-Mar	29-Mar	7-May	13.3	99
Kamut MT	Ag Serv	1721	7.1	56.0	60	55	10-Apr	12-Apr	11-May	17.7	100
AVERAGE		5128	7.5	59.5	38	3	28-Mar	1-Apr	6-May	13.7	98

^a Grain yield: LSD (5%) = 795 lbs/acre and cv = 11.0%.

Table 5. Durum variety yield results from **Maricopa (WWW)**, 2006.

Entry	Source	Grain Yield ^a lbs/acre	Test Weight lbs/bu	Plant Height inches	Lodging %	Heading	Grain Protein %	HVAC %
<u>Durum</u>								
Alamo	WPB	7079	62.1	33	80	25-Mar	13.1	100
Crown	WWW	6806	59.0	38	0	6-Apr	13.7	100
Duraking	WWW	7636	61.8	32	0	6-Apr	13.6	100
Havasu	WPB	7364	62.3	35	10	27-Mar	13.4	100
Kofa	WPB	7143	60.5	35	60	28-Mar	13.9	100
Kronos	APB	6534	61.2	33	50	2-Apr	13.4	100
Matt	APB	7014	60.5	36	90	26-Mar	14.1	99
Mead	WPB	6858	60.5	33	10	4-Apr	14.1	100
Mohawk	WPB	7182	61.8	36	30	30-Mar	12.8	99
Ocotillo	APB	6404	62.0	34	20	25-Mar	13.3	99
Orita	WPB	6910	59.8	35	0	30-Mar	14.4	99
Platinum	WWW	6871	60.6	31	20	2-Apr	13.4	99
Sky	APB	6573	58.5	33	70	28-Mar	13.0	100
WPB 881	WPB	6327	60.4	36	20	1-Apr	13.4	100
YU-802-175	WPB	7014	62.5	33	0	1-Apr	14.3	100
YU-802-4	WPB	6301	60.7	34	0	7-Apr	14.4	100
D8270	WWW	7299	60.7	36	30	3-Apr	13.2	100
D0061	WWW	6249	59.8	35	0	7-Apr	13.5	99
CHD1978B	WWW	6741	60.4	36	20	4-Apr	13.6	100
D6575D	WWW	6430	61.4	33	0	6-Apr	12.9	99
16-5	APB	6456	61.5	34	30	19-Mar	13.1	100
D02AZ-111MT	APB	6417	59.4	31	10	27-Mar	13.1	100
D257-11	APB	7040	62.1	36	80	27-Mar	13.5	100
AVERAGE		6835	60.9	34	27	31-Mar	13.5	100

^a Grain yield: LSD (5%) = 713 lbs/acre and cv = 7.3%.

Table 6. Durum variety yield results from **Yuma (WPB)**, 2006.

Entry	Source	Grain	Test	Lodging	Heading	Grain	HVAC
		Yield ^a	Weight			Protein	
		lbs/acre	lbs/bu	%		%	%
			<u>Durum</u>				
Alamo	WPB	5850	64.1	80	2-Apr	13.9	100
Crown	WWW	6522	59.3	7	6-Apr	13.3	100
Duraking	WWW	7031	62.6	57	6-Apr	12.9	100
Havasu	WPB	7085	63.5	77	3-Apr	13.7	100
Kofa	WPB	5668	62.8	73	1-Apr	13.7	100
Kronos	APB	7049	62.2	87	27-Mar	14.1	100
Matt	APB	5813	62.5	90	31-Mar	13.7	100
Mead	WPB	6813	60.5	83	3-Apr	14.2	100
Mohawk	WPB	5741	62.1	90	31-Mar	13.1	100
Ocotillo	APB	6395	62.8	0	8-Apr	13.7	100
Orita	WPB	6504	61.1	37	3-Apr	14.0	100
Platinum	WWW	6013	61.3	80	5-Apr	13.1	100
Sky	APB	5904	60.6	87	2-Apr	13.1	100
WPB 881	WPB	6013	62.6	70	2-Apr	13.9	100
YU-802-175	WPB	6831	63.3	63	4-Apr	13.9	100
YU-802-4	WPB	6994	60.6	50	8-Apr	14.0	100
D8270	WWW	7412	62.5	63	6-Apr	12.8	99
D0061	WWW	5196	59.6	27	9-Apr	12.6	98
CHD1978B	WWW	6086	60.7	73	10-Apr	12.8	100
D6575D	WWW	5995	61.6	87	8-Apr	13.3	99
16-5	APB	7339	63.9	33	28-Mar	14.7	100
D02AZ-111MT	APB	6685	61.6	73	2-Apr	13.3	100
D257-11	APB	5777	63.5	90	3-Apr	13.8	100
AVERAGE		6401	62.0	65	4-Apr	13.5	100

^a Grain yield: LSD (5%) = 948 lbs/acre and cv = 9.0%.

Table 7. Summary of small grain variety yield results for 2005 from Arizona City (APB), Maricopa (U of A), Maricopa (WWW), Yuma (WPB durum), and Coolidge (WPB barley).

Entry	Source	Grain yield (% of location average for these entries)			Mean	Standard Deviation
		Maricopa (U of A)	Yuma (WPB)	Maricopa (WWW)		
Alamo	WPB	106	91	104	100	8
Crown	WWW	99	102	100	100	2
Duraking	WWW	118	110	112	113	4
Havasu	WPB	104	111	108	108	4
Kofa	WPB	104	89	105	99	9
Kronos	APB	109	110	96	105	8
Matt	APB	98	91	103	97	6
Mead	WPB	100	106	100	102	3
Mohawk	WPB	110	90	105	102	10
Ocotillo	APB	---	100	94	97	4
Orita	WPB	107	102	101	103	3
Platinum	WWW	113	94	101	103	10
Sky	APB	124	92	96	104	17
WPB 881	WPB	105	94	93	97	7
YU-802-175	WPB	106	107	103	105	2
YU-802-4	WPB	97	109	92	99	9
D8270	WWW	103	116	107	109	7
D0061	WWW	111	81	91	94	15
CHD1978B	WWW	96	95	99	97	2
D6575D	WWW	96	94	94	95	1
16-5	APB	88	115	94	99	14
D02AZ-111MT	APB	103	104	94	100	6
D257-11	APB	116	90	103	103	13