

Small Grains Variety Evaluation at Arizona City, Maricopa, and Yuma, 2004

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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: 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, 16 barley entries, and 24 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 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 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 was a poor growing season for small grains and yields were lower than usual in these tests compared to past years. Total precipitation was near the average for the growing season (Table 2). Growing season temperature was near or above average. However, the defining characteristic of this growing season was the hottest March on record at all locations. This, combined with one of the coldest February on record, resulted in hot temperatures occurring earlier than usual and may have been responsible for the lower yields measured this year.

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 conducted by the University of Arizona 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	None	Sudangrass	Alfalfa	Cotton
Soil texture	Clay loam	Sandy clay loam	Sandy clay loam	Clay loam
Planting date	12/5	12/3	11/30	12/14
Irrigations	5	7 12/3, 1/29, 3/1, 3/18, 4/2, 4/16, 4/30	6	6 12/14, 1/17, 2/22, 3/14, 3/30, 4/19
Nitrogen (lbs N/a)	250	218 12/3: 48 as 16-20-0 1/29: 23 as 46-0-0 3/1: 55 as 46-0-0 3/18: 46 as 46-0-0 4/1: 46 as 46-0-0	225	200 1/17: 50 as 32-0-0 2/22: 50 as 32-0-0 3/14: 50 as 32-0-0 3/30: 50 as 32-0-0
Pesticides	None	None	Buctril	None
Harvest date	6/1	5/26	6/21	5/26

Table 2. Climatic data from AZMET for Eloy (near Arizona City), Maricopa, and Yuma Valley during the 2004 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>Eloy</u>									
Max Temp.	Rank of 15	2004	10	9	2	14	7	11	11
	°F	2004	68	67	65	84	83	96	77
	°F	1990-2004	66	68	70	76	84	95	77
Min Temp.	Rank of 15	2004	3	11	2	15	11	10	12
	°F	2004	32	37	35	50	52	59	44
	°F	1990-2004	34	36	39	44	49	57	43
Ppt.	Rank of 15	2004	6	12	6	10	12	1	8
	inches	2004	0.28	1.22	0.59	0.80	0.46	0.00	3.35
	inches	1990-2004	0.80	0.65	0.88	0.65	0.27	0.09	3.29
<u>Maricopa</u>									
Max Temp.	Rank of 18	2004	14	13	3	18	9	14	14
	°F	2004	67	67	66	84	84	97	78
	°F	1987-2004	65	66	70	77	85	94	76
Min Temp.	Rank of 18	2004	10	15	3	18	13	11	14
	°F	2004	34	39	36	51	52	60	45
	°F	1987-2004	35	36	39	44	51	59	44
Ppt.	Rank of 18	2004	7	12	10	8	15	1	12
	inches	2004	0.16	0.71	0.91	0.28	0.98	0.00	3.03
	inches	1987-2004	0.64	0.66	0.81	0.75	0.31	0.14	3.27
<u>Yuma</u>									
Max Temp.	Rank of 18	2004	10	9	3	18	9	11	11
	°F	2004	68	68	69	86	85	94	78
	°F	1987-2004	67	69	73	79	86	94	78
Min Temp.	Rank of 18	2004	5	12	2	18	11	9	9
	°F	2004	40	42	42	53	54	60	49
	°F	1987-2004	41	42	45	49	54	60	48
Ppt.	Rank of 18	2004	1	8	10	8	17	1	8
	inches	2004	0.00	0.06	0.20	0.10	0.69	0.00	1.05
	inches	1987-2004	0.37	0.31	0.34	0.35	0.16	0.04	1.55

Table 3. Small grain variety yield results from **Arizona City (APB)**, 2004.

Entry	Source	Grain Yield ^a lbs/acre	Test Weight lbs/bu	Plant Height inches	Lodging %	Headed on 3/19 %	Grain Protein %	HVAC %
<u>Durum</u>								
Alamo	WPB	5372	65.1	34	0	20	12.4	99
Crown	WWW	5481	60.6	36	0	5	12.8	99
Duraking	WWW	5073	63.3	32	0	10	12.2	98
Kofa	WPB	5191	63.2	32	0	30	12.5	99
Kronos	APB	6026	63.2	32	0	50	11.1	90
Mohawk	WPB	5663	63.5	33	0	50	10.9	97
Ocotillo	APB	5881	64.3	36	0	60	12.6	98
Orita	WPB	6244	62.6	33	0	5	12.5	98
Oro	UC	5554	64.2	34	0	0	11.5	97
Platinum	WWW	6425	64.3	29	10	100	11.4	98
Sky	APB	5481	62.5	30	0	40	11.4	97
WPB 881	WPB	5953	63.4	32	0	80	11.8	98
D990D-82C	APB	4792	63.3	29	0	80	11.3	98
D00-627	APB	5554	64.7	31	0	100	10.6	91
D00-232	APB	5445	62.7	33	0	80	11.5	98
D00AZ-248	APB	5917	63.5	29	0	90	10.3	97
D8270	WWW	5808	65.0	31	0	10	11.4	96
D8227	WWW	5772	64.0	32	0	30	11.5	83
D5384-2	WWW	6570	63.5	32	0	5	10.4	72
D4079	WWW	5814	64.1	35	0	5	10.9	95
PH896-21	WPB	6498	65.6	31	0	100	10.3	95
YU895-130	WPB	5554	64.6	32	0	100	11.1	92
YU897-44	WPB	5663	63.9	30	0	60	10.5	88
YU899170	WPB	5772	63.8	31	0	90	10.6	91
AVERAGE		5729	63.7	32	0	50	11.4	94

^a Grain yield: LSD (5%) = 857 lbs/acre cv =10.6%.

Table 4. Small grain variety yield results from **Maricopa (UA)**, 2004.

Entry	Source	Grain Yield ^a lbs/acre	Test Weight lbs/bu	Plant Height inches	Lodging %	Heading	Flower- ing	Maturity %	Grain Protein %	HVAC %
<u>Barley</u>										
Barcott	WPB	4820	51.9	33	3	3/08	3/09	4/21	---	---
Baretta	APB	5718	52.9	28	0	3/15	3/16	4/25	---	---
Commander	WWW	5826	53.3	30	0	3/17	3/18	4/28	---	---
Gustoe	WPB	5683	54.6	28	0	3/22	3/31	4/29	---	---
Max	WWW	6526	54.2	28	0	3/23	3/25	4/30	---	---
Mucho	APB	4452	51.9	29	0	3/11	3/12	4/23	---	---
Nebula	WPB	6123	53.8	31	0	3/15	3/20	4/24	---	---
B00-219	APB	5464	54	28	0	3/11	3/12	4/24	---	---
B00-109	APB	4631	51.8	27	0	3/13	3/14	4/24	---	---
B9-212	APB	4460	52.9	35	14	3/08	3/09	4/23	---	---
BA4513	WWW	6502	52.4	33	0	3/21	3/24	4/30	---	---
BA4545	WWW	6888	53	33	0	3/21	3/29	4/29	---	---
BA8017	WWW	6776	54.2	27	0	3/21	3/23	4/29	---	---
PH593-078	WPB	5035	53.7	24	0	3/14	3/15	4/28	---	---
PH595-096	WPB	4862	53.8	29	0	3/08	3/10	4/24	---	---
YU502-018	WPB	5677	52.5	28	0	3/16	3/17	4/24	---	---
AVERAGE		5590	53.2	29	1	3/15	3/17	4/25	---	---
<u>Durum</u>										
Alamo	WPB	5847	64.3	34	0	3/15	3/20	4/25	15.1	99
Crown	WWW	5936	61.3	37	0	3/18	3/21	4/30	15.5	99
Duraking	WWW	6667	64.1	31	0	3/17	3/21	4/29	13.8	99
Kofa	WPB	5582	62.7	34	0	3/15	3/20	4/30	14.9	99
Kronos	APB	6055	62.7	32	0	3/15	3/22	4/26	14.5	99
Mohawk	WPB	5852	63.4	32	1	3/15	3/20	4/27	14.0	99
Ocotillo	APB	5659	63.5	36	0	3/15	3/21	4/28	14.9	99
Orita	WPB	6910	62.9	33	0	3/23	3/25	4/29	15.1	99
Oro	UC	6631	63.6	34	0	3/24	3/28	5/01	14.2	99
Platinum	WWW	6140	64.2	31	0	3/16	3/21	4/26	13.5	99
Sky	APB	5797	62	29	0	3/20	3/21	4/30	14.0	99
WPB 881	WPB	6697	62.8	33	0	3/15	3/20	4/26	14.3	99
D990D-82C	APB	6146	62.9	33	0	3/14	3/20	4/26	14.4	99
D00-627	APB	6307	63.9	34	0	3/13	3/19	4/25	14.3	99
D00-232	APB	5616	62.6	36	3	3/13	3/21	4/25	14.3	99
D00AZ-248	APB	5584	63	32	0	3/14	3/20	4/26	14.0	99
D8270	WWW	5882	63.6	34	0	3/22	3/25	4/30	14.9	99
D8227	WWW	5867	63.1	35	0	3/15	3/20	4/30	14.3	99
D5384-2	WWW	6008	62.4	34	0	3/21	3/23	4/29	14.4	99
D4079	WWW	6222	63.3	35	0	3/21	3/24	4/29	14.3	99
PH896-21	WPB	5944	65	33	1	3/14	3/21	4/26	14.2	99
YU895-130	WPB	6657	64.5	34	0	3/14	3/19	4/25	14.4	99
YU897-44	WPB	6163	63.5	32	0	3/15	3/23	4/26	14.6	99
YU899170	WPB	6575	62.2	32	0	3/14	3/20	5/01	14.9	99
AVERAGE		6114	64.3	34	0	3/16	3/21	4/27	15.1	99

^a Grain yield: LSD (5%) = 805 and 772 lbs/acre and cv = 10.1 and 7.7% for barley and durum, respectively.

Table 5. Small grain variety yield results from **Maricopa (WWW)**, 2004.

Entry	Source	Grain Yield ^a lbs/acre	Test Weight lbs/bu	Plant Height inches	Lodging %	Heading	Grain Protein %	HVAC %
<u>Barley</u>								
Barcott	WPB	4250	48.1	22	0	3/06	---	---
Baretta	APB	5178	52.6	21	0	3/17	---	---
Commander	WWW	4933	52.0	21	0	3/17	---	---
Gustoe	WPB	4905	53.6	22	0	3/22	---	---
Max	WWW	5268	52.9	27	0	3/25	---	---
Mucho	APB	4059	50.0	22	45	3/10	---	---
Nebula	WPB	4230	52.4	22	50	3/18	---	---
B00-219	APB	4863	51.9	21	0	3/11	---	---
B00-109	APB	4108	50.8	24	60	3/13	---	---
B9-212	APB	3912	51.4	24	30	3/08	---	---
BA4513	WWW	5052	52.3	28	0	3/19	---	---
BA4545	WWW	5006	51.7	28	0	3/18	---	---
BA8017	WWW	5338	51.0	25	0	3/20	---	---
PH593-078	WPB	4676	53.1	20	0	3/17	---	---
PH595-096	WPB	4966	53.2	20	0	3/10	---	---
YU502-018	WPB	5538	51.7	21	0	3/19	---	---
AVERAGE		4768	51.8	23	12	3/15	---	---
<u>Durum</u>								
Alamo	WPB	5328	64.2	32	45	3/18	14.4	99
Crown	WWW	5284	63.0	30	0	3/17	13.4	99
Duraking	WWW	5914	63.6	33	0	3/25	14.2	99
Kofa	WPB	5492	63.6	35	0	3/23	14.1	99
Kronos	APB	5276	63.3	30	0	3/22	15.3	95
Mohawk	WPB	4946	63.0	28	0	3/18	13.9	98
Ocotillo	APB	4873	62.8	25	0	3/22	14.0	99
Orita	WPB	5475	63.1	30	0	3/21	13.9	99
Oro	UC	5924	63.5	31	0	3/17	14.4	98
Platinum	WWW	5858	64.2	30	0	3/20	13.4	99
Sky	APB	5339	62.7	30	45	3/18	14.8	98
WPB 881	WPB	5559	62.5	33	0	3/20	14.9	99
D990D-82C	APB	5102	63.4	31	0	3/22	13.4	99
D00-627	APB	4961	63.8	30	0	3/16	14.4	95
D00-232	APB	5295	63.4	35	0	3/16	14.9	99
D00AZ-248	APB	4993	63.9	28	85	3/14	13.2	98
D8270	WWW	5327	63.9	31	0	3/13	14.4	98
D8227	WWW	4972	63.0	33	0	3/11	15.4	91
D5384-2	WWW	5039	63.2	34	0	3/18	14.3	86
D4079	WWW	5415	64.3	31	0	3/18	14.8	97
PH896-21	WPB	5309	64.2	31	0	3/21	14.1	97
YU895-130	WPB	5618	64.0	32	0	3/18	14.3	96
YU897-44	WPB	5349	63.8	31	0	3/12	13.9	94
YU899170	WPB	5228	63.5	33	0	3/17	14.7	95
AVERAGE		5328	63.5	31	7	3/18	14.2	97

^a Grain yield: LSD (5%) = 400 and 773 lbs/acre and cv = 5.9 and 10.2% for barley and durum, respectively.

Table 6. Small grain variety yield results from **Yuma (WPB)**, 2004. The barley trial was abandoned due to severe lodging.

Entry	Source	Grain	Test	Lodging	Heading	Grain	HVAC
		Yield ^a	Weight			Protein	
		lbs/acre	lbs/bu	%		%	%
			<u>Durum</u>				
Alamo	WPB	5355	62.2	20	3/24	15.2	99
Crown	WWW	5477	60.4	80	3/26	15.5	99
Duraking	WWW	6145	62.4	0	3/26	13.7	99
Kofa	WPB	4905	60.8	48	3/24	15.6	99
Kronos	APB	5164	61.0	70	3/22	14.8	99
Mohawk	WPB	5832	61.2	63	3/25	14.6	99
Ocotillo	APB	4633	61.7	75	3/24	16.7	99
Orita	WPB	6540	61.0	0	3/28	15.6	99
Oro	UC	5736	61.7	23	3/29	14.3	99
Platinum	WWW	6513	62.7	0	3/27	13.6	99
Sky	APB	5600	59.6	10	3/25	14.1	99
WPB 881	WPB	5178	61.1	70	3/24	15.3	99
D990D-82C	APB	5709	61.5	8	3/22	15.1	99
D00-627	APB	5123	61.8	20	3/20	14.9	99
D00-232	APB	5668	61.2	8	3/20	14.8	99
D00AZ-248	APB	5900	60.6	8	3/22	14.1	99
D8270	WWW	5600	61.9	80	3/25	14.9	99
D8227	WWW	5777	61.4	33	3/28	14.3	99
D5384-2	WWW	6104	61.1	88	3/27	14.8	99
D4079	WWW	5750	62.1	80	3/27	15.3	99
PH896-21	WPB	5083	62.7	58	3/23	14.9	99
YU895-130	WPB	5655	63.1	50	3/25	15.7	99
YU897-44	WPB	6173	61.1	28	3/26	15.0	99
YU899170	WPB	6581	60.3	0	3/26	14.6	99
AVERAGE		5675	61.4	38	3/25	14.9	99

^a Grain yield: LSD (5%) = 564 lbs/acre and cv = 7.0%.

Table 7. Summary of small grain variety yield results for 2004 from Arizona City (APB), Maricopa (U of A), Maricopa (WWW), and Yuma (WPB).

Entry	Source	Grain yield (% of location average for these entries)				Mean	Standard Deviation
		Arizona City (APB)	Maricopa (U of A)	Yuma (WPB)	Maricopa (WWW)		
<u>Barley</u>							
Barcott	WPB	---	86	---	89	88	7
Baretta	APB	---	102	---	109	105	7
Commander	WWW	---	104	---	103	104	7
Gustoe	WPB	---	102	---	103	102	4
Max	WWW	---	117	---	110	114	9
Mucho	APB	---	80	---	85	82	7
Nebula	WPB	---	110	---	89	99	12
B00-219	APB	---	98	---	102	100	15
B00-109	APB	---	83	---	86	85	7
B9-212	APB	---	80	---	82	81	4
BA4513	WWW	---	116	---	106	111	9
BA4545	WWW	---	123	---	105	114	12
BA8017	WWW	---	121	---	112	117	13
PH593-078	WPB	---	90	---	98	94	11
PH595-096	WPB	---	87	---	104	96	10
YU502-018	WPB	---	102	---	116	109	10
<u>Durum</u>							
Alamo	WPB	94	96	94	100	96	8
Crown	WWW	96	97	97	99	97	10
Duraking	WWW	89	109	108	111	104	15
Kofa	WPB	91	91	86	103	93	10
Kronos	APB	105	99	91	99	99	8
Mohawk	WPB	99	96	103	93	98	11
Ocotillo	APB	103	93	82	91	92	10
Orita	WPB	109	113	115	103	110	14
Oro	UC	97	108	101	111	104	15
Platinum	WWW	112	100	115	110	110	10
Sky	APB	96	95	99	100	98	8
WPB 881	WPB	104	110	91	104	102	11
D990D-82C	APB	84	101	101	96	95	8
D00-627	APB	97	103	90	93	95	8
D00-232	APB	95	92	100	99	97	11
D00AZ-248	APB	103	91	104	94	99	10
D8270	WWW	101	96	99	100	99	9
D8227	WWW	101	96	102	93	98	12
D5384-2	WWW	115	98	108	95	104	13
D4079	WWW	101	102	101	102	102	10
PH896-21	WPB	113	97	90	100	100	12
YU895-130	WPB	97	109	100	105	102	10
YU897-44	WPB	99	101	109	100	102	7
YU899170	WPB	101	108	116	98	105	12