

Small Grains Variety Evaluation at Maricopa, Coolidge and Yuma, 2010

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, durum, and wheat 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, durum, and wheat varieties were evaluated at the following locations: Maricopa by the University of Arizona, Coolidge by World Wide Wheat, and Yuma (durum and wheat) and Maricopa (barley) by Western Plant Breeders. The trial at Yuma consisted of a normal planting on Dec 26 and a late planting on Feb 4. At all locations, the seed was planted with a cone planter in seven rows spaced 7 inches apart and 20 ft long. The seeding rate was approximately 100 lbs/acre for durum and wheat varieties and 85 lbs/acre for barley varieties. The experimental design was a randomized complete block with 3-4 replications, 14-16 barley entries, and 23-36 durum or 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, physiological maturity, 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 NIRS analyzer and expressed on a 12% moisture basis. 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, RSI = Resource Seeds Inc.

Discussion

This growing season was characterized by below average temperature and above average rainfall (Table 2). Temperatures were especially cool during the months of March, April, and May. The month of January was especially wet as well as March in the Yuma location. Due to the cool weather, the growing season was extended by 1-2 weeks compared to normal.

Yield and plant characteristics of the varieties are presented for the various locations in Tables 3-9 and a summary of the grain yields at all locations is presented in Table 10. The trial at Maricopa sustained some minor bird damage in the barley, and the barley line ARGBA2042 was excluded from the yield analysis due to extensive 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

Financial support for this project was received from the Arizona Grain Research and Promotion Council and the Arizona Crop Improvement Association. I wish to thank Kim Shantz of Westbred for conducting the trials in Yuma and Maricopa (WPB Barley) and Charles Nitamoah and Eric Norton of WWW for conducting the trials in Coolidge. The technical assistance of Mary Comeau, Mike Sheedy, Richard Simer, and Glenda Simer is greatly appreciated.

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

Cultural information	Maricopa (U of A)	Durum Yuma (WPB)	Durum Yuma Late Planting (WPB)	Barley Maricopa (WPB)	Coolidge (WWW)
Previous crop	Fallow	Canola	Canola	Sorghum	Cotton
Soil texture	Sandy clay loam	Clay loam	Clay loam	Sandy loam	Sandy clay loam
Planting date	12/10/09	12/26/09	2/4/10 (into rain moisture)	12/14/09	12/18/09
Irrigations	6 12/10, 12/21, 2/17, 3/17, 4/1, 4/15, 5/1	5 12/26, 2/21, 3/23, 4/13,5/3	5 2/21, 3/23, 4/13, 5/3, 5/17	Pivot	4 12/18, 2/20, 4/2, 4/17
Nitrogen (lbs N/a)	220 12/12: 51 (46-0-0) 1/28: 24 (32-0-0) 2/25: 76 (32-0-0) 3/13: 74 (32-0-0)	284 Preplant: 44 (11-52-0) 2/21: 120 (32-0-0) 3/23: 120 (32-0-0)	284 Preplant: 44 (11-52-0) 2/21: 120 (32-0-0) 3/23: 120 (32-0-0)	Chicken manure	284 Preplant: 22 (11-48-0) 12/18:106 (32-0-0) 2/20:106 (32-0-0) 4/2: 50 (32-0-0)
Phosphorus (lbs P ₂ O ₅ /acre)	100	208	208		96
Pesticides	None	Harmony SG	Harmony SG		Broad Leaf Herbicide
Harvest date	6/1 (Durum) 6/3 (Barley)	6/4	6/15	6/17	6/9

Table 2. Climatic data from AZMET for Maricopa, Coolidge, and Yuma Valley during the 2010 growing season compared to the long-term average.

Climate variable	Unit	Year(s)	Dec	Jan	Feb	Mar	Apr	May	Dec-May
<u>Maricopa</u>									
Max Temp.	°F	2010	64	66	68	73	82	90	74
	°F	Avg	65	66	70	77	85	95	76
Min Temp.	°F	2010	33	38	41	43	49	55	43
	°F	Avg	35	36	39	44	51	60	44
Ppt.	inches	2010	0.39	2.64	0.56	0.62	0.00	0.00	4.21
	inches	Avg	0.62	0.72	0.85	0.79	0.26	0.20	3.43
<u>Coolidge</u>									
Max Temp.	°F	2010	64	67	67	73	81	91	74
	°F	Avg	66	67	70	76	84	94	76
Min Temp.	°F	2010	32	38	39	39	44	49	40
	°F	Avg	34	35	38	43	48	56	42
Ppt.	inches	2010	0.30	3.10	1.14	0.71	0.00	0.00	5.25
	inches	Avg	0.64	0.65	0.76	0.71	0.27	0.15	3.18
<u>Yuma</u>									
Max Temp.	°F	2010	66	70	71	77	80	88	75
	°F	Avg	68	69	73	79	86	94	78
Min Temp.	°F	2010	40	44	46	48	51	56	48
	°F	Avg	41	42	45	49	53	60	48
Ppt.	inches	2010	0.02	3.12	0.51	1.00	0.00	0.00	4.65
	inches	Avg	0.35	0.31	0.35	0.34	0.15	0.04	1.54

Table 3. Barley variety yield results from **Maricopa (UA)**, 2010.

Entry	Source	Grain Yield ^a	Test Weight	Plant Height	Lodging	Heading	Maturity
		lbs/acre	lbs/bu	inches	%		
Chico	WPB	6728	50.4	33	0	3/26	5/14
Cochise	WPB	5203	50.5	36	0	3/16	5/06
Gustoe	WPB	5768	50.7	35	19	3/30	5/14
Nebula	WPB	6376	51.0	37	6	3/24	5/12
Commander	WWW	6613	48.6	36	6	3/28	5/10
Max	WWW	6432	49.2	34	63	3/27	5/17
Baretta	APB	7163	50.7	36	0	3/26	5/14
YU505-056	WPB	4879	45.8	35	63	3/24	5/09
YU505-060	WPB	4679	47.5	35	63	3/22	5/12
YU508-603	WPB	5708	52.3	33	44	3/18	5/10
ARGBA2042	WWW	--- ^b	50.7	37	75	3/16	4/27
BA4513	WWW	5321	48.5	36	44	3/27	5/18
BA8017	WWW	5011	48.4	35	50	4/02	5/21
B00-219	APB	7486	51.4	36	0	3/16	4/29
Avg	---	6728	50.4	33	0	3/26	5/14

^a Grain yield: LSD (5%) = 1602 lbs/acre and cv = 16.1%.

^b Yield not reported due to bird damage.

Table 4. Barley variety yield results from **Coolidge (WWW)**, 2010.

Entry	Source	Grain Yield ^a	Test Weight	Plant Height	Lodging	Maturity
		lbs/acre	lbs/bu	inches	%	
Chico	WPB	6213	50.1	30	20	5/18
Cochise	WPB	6986	51.6	35	---	5/10
Gustoe	WPB	6205	51.2	28	---	5/16
Nebula	WPB	7326	52.9	36	---	5/15
Commander	WWW	5844	49.6	26	---	5/19
Max	WWW	6601	49.6	34	60	5/19
Baretta	APB	6464	51.1	34	95	5/17
YU505-056	WPB	6456	44.7	37	75	5/18
YU505-060	WPB	6012	45.1	32	90	5/16
YU508-603	WPB	6414	---	30	---	5/16
ARGBA2042	WWW	5309	---	40	85	5/10
BA4513	WWW	5727	---	36	80	5/20
BA8017	WWW	6369	---	31	---	5/21
B00-219	APB	5658	---	25	---	5/16
Avg	---	6256	49.5	32	72	5/17

^a Grain yield: LSD (5%) = 1210 lbs/acre and cv = 11.5%.

Table 5. Barley variety yield results from **Maricopa (WPB)**, 2010.

Entry	Source	Grain Yield ^a	Test Weight
		lbs/acre	lbs/bu
Chico	WPB	5416	43.0
Cochise	WPB	3509	46.7
Gustoe	WPB	5917	48.5
Nebula	WPB	6379	48.7
Commander	WWW	5731	48.2
Max	WWW	6430	47.9
Baretta	APB	6641	48.3
YU505-056	WPB	6534	46.1
YU505-060	WPB	5670	45.6
YU508-603	WPB	5549	47.1
ARGBA2042	WWW	4777	49.2
BA4513	WWW	5745	47.5
BA8017	WWW	5622	47.1
B00-219	APB	5278	50.3
YU508-601	WPB	6566	49.0
YU508-559	WPB	4801	45.2
Avg	---	5660	47.4

^a Grain yield: LSD (5%) = 1038 lbs/acre and cv = 11.0%.

Table 6. Durum and wheat variety yield results from **Maricopa (UA)**, 2010.

Entry	Source	Grain Yield ^a lbs/acre	Test Weight lbs/bu	Plant Height inches	Lodging %	Heading	Maturity %	HVAC %	Grain Protein %
<u>Durum</u>									
Alamo	WPB	6661	64.1	37	25	3/23	5/17	100	14.7
Havasu	WPB	8030	64.5	37	6	3/22	5/12	99	14.1
Orita	WPB	8115	61.8	37	6	3/27	5/14	100	14.8
WPB-881	WPB	7149	62.5	37	6	3/23	5/15	100	14.6
Crown	WWW	7270	61.0	38	6	3/26	5/16	100	14.5
Duraking	WWW	7310	63.4	37	6	3/24	5/16	99	14.7
Q-Max	WWW	6327	59.8	38	0	3/28	5/17	100	14.7
Kronos	APB	7678	62.6	36	25	3/22	5/15	100	14.2
Sky	APB	7967	61.9	35	19	3/23	5/17	100	13.9
Ocotillo	APB	7191	62.9	38	13	3/23	5/15	100	14.4
Westmore	APB	7786	63.0	35	25	3/22	5/15	100	15.1
YU802-4	WPB	7681	62.5	37	6	3/26	5/18	100	15.2
YU805-17	WPB	8660	63.2	36	6	3/23	5/15	100	14.5
YU806-93	WPB	8039	63.8	36	19	3/24	5/16	100	14.4
YU807-115	WPB	7104	63.2	34	0	3/22	5/14	100	15.4
D1636	WWW	7124	62.7	38	19	3/25	5/12	100	13.9
D6575D	WWW	7110	61.6	36	31	3/28	5/17	100	14.6
Dking206white	WWW	8509	63.7	37	31	3/23	5/15	100	13.8
UT12074	WWW	7971	63.0	37	6	3/22	5/17	100	14.6
D1-2	APB	7938	62.7	35	0	3/24	5/17	99	14.9
D2-95	APB	7331	63.3	36	19	3/23	5/16	100	14.4
D2-97	APB	8154	63.7	36	6	3/22	5/13	100	14.3
D3-1-5P	APB	6791	63.1	36	31	3/25	5/15	100	14.1
Fortissimo	RSI	7886	62.7	36	0	3/25	5/14	99	14.5
RSI 59	RSI	8136	63.2	36	0	3/28	5/17	100	14.4
Volante	RSI	7888	63.5	35	6	3/25	5/15	100	13.9
Normanno	Allstar	6778	61.4	37	25	4/01	5/21	99	14.5
Saragolla	Allstar	7847	63.9	36	31	3/24	5/16	100	13.3
Avg	---	7587	62.8	36	13	3/24	5/15	100	14.4
<u>Wheat</u>									
Yecora Rojo	UC	6959	63.5	36	0	3/23	5/12	100	14.9
Cavalier	WWW	5931	61.5	40	0	3/26	5/12	100	13.6
Joaquin	WPB	7657	63.9	39	0	3/22	5/14	100	14.5
W11-6	APB	4332	62.5	41	6	3/22	5/14	100	15.5
W2-8	APB	3716	62.1	41	0	3/23	5/15	99	14.1
Blanca Grande	RSI	7260	64.5	39	0	3/22	5/11	100	13.9
Summit 515	RSI	7283	62.3	38	0	3/26	5/14	100	13.8
05W90192	RSI	6673	62.3	37	0	3/26	5/14	100	14.0
Avg	---	6226	62.8	39	1	3/24	5/13	100	14.3

^a Grain yield: LSD (5%) = 1010 lbs/acre and cv = 8.1% for durum and LSD (5%) = 618 lbs/acre and cv = 6.7% for wheat.

Table 7. Durum and wheat variety yield results from **Coolidge (WWW)**, 2010.

Entry	Source	Grain Yield ^a	Test Weight	Plant Height	Maturity	HVAC	Grain Protein
		lbs/acre	lbs/bu	inches	%	%	%
				<u>Durum</u>			
Alamo	WPB	5472	---	40	5/15	---	---
Havasu	WPB	6297	---	40	5/14	---	---
Orita	WPB	6992	---	38	5/19	---	---
WPB-881	WPB	4993	63.0	38	5/15	100	14.5
Crown	WWW	5217	61.3	38	5/21	100	14.7
Duraking	WWW	6517	---	40	5/16	---	---
Q-Max	WWW	5236	61.1	40	5/23	100	14.1
Kronos	APB	6167	63.1	38	5/14	100	13.7
Sky	APB	6300	62.5	38	5/18	100	13.6
Ocotillo	APB	5867	---	40	5/18	---	---
Westmore	APB	6399	---	36	5/15	---	---
YU802-4	WPB	6065	59.8	40	5/19	100	15.0
YU805-17	WPB	6635	61.2	38	5/15	100	14.6
YU806-93	WPB	7243	64.4	40	5/20	100	14.1
YU807-115	WPB	7159	63.4	36	5/17	100	14.2
D1636	WWW	6376	62.7	44	5/16	100	13.6
D6575D	WWW	5419	62.6	40	5/22	100	13.8
Dking206white	WWW	6631	62.2	38	5/16	100	13.9
UT12074	WWW	5936	62.9	40	5/17	100	14.0
D1-2	APB	6338	62.9	38	5/20	100	14.5
D2-95	APB	6703	64.0	42	5/17	100	13.8
D2-97	APB	7448	63.8	38	5/18	100	13.2
D3-1-5P	APB	6251	64.0	40	5/19	100	13.4
Avg	---	6246	62.6	39	5/18	100	14.0

^a Grain yield: LSD (5%) = 1727 lbs/acre and cv = 16.8%.

Table 8. Durum and wheat variety yield results from **Yuma (WPB)**, 2010.

Entry	Source	Grain Yield ^a lbs/acre	Test Weight lbs/bu	Plant Height inches	Lodging %	Heading	HVAC %	Grain Protein %
<u>Durum</u>								
Alamo	WPB	8574	64.5	34	18	4/11	97	12.4
Havasu	WPB	8250	64.4	34	23	4/11	95	11.5
Orita	WPB	8612	62.0	34	0	4/13	91	11.5
WPB-881	WPB	7649	62.1	34	35	4/11	98	12.8
Crown	WWW	7734	60.4	36	0	4/17	92	11.6
Duraking	WWW	8810	62.6	25	3	4/06	95	11.4
Q-Max	WWW	8328	59.5	36	0	4/17	86	11.6
Kronos	APB	8574	63.0	33	30	4/08	87	11.7
Sky	APB	7692	60.6	31	20	4/09	99	12.5
Ocotillo	APB	8008	62.5	38	25	4/12	98	12.7
Westmore	APB	8293	61.7	34	35	4/09	99	12.7
YU802-4	WPB	8354	61.4	34	3	4/16	96	12.2
YU805-17	WPB	8807	62.3	33	0	4/12	98	12.3
YU806-93	WPB	8652	62.9	35	10	4/11	99	12.6
YU807-115	WPB	8608	62.9	32	8	4/09	99	13.0
D1636	WWW	8167	61.5	35	43	4/11	99	13.2
D6575D	WWW	8404	63.0	35	3	4/17	83	11.4
Dking206white	WWW	8989	63.9	34	5	4/12	91	11.1
UT12074	WWW	7888	63.1	34	15	4/09	80	13.2
D1-2	APB	8121	61.5	31	0	4/15	94	11.7
D2-95	APB	7168	61.9	34	43	4/10	99	13.3
D2-97	APB	8435	63.3	34	35	4/09	99	11.9
D3-1-5P	APB	8120	62.6	34	23	4/13	90	11.6
Normano	Allstar	8410	62.8	34	13	4/19	80	11.4
Saragolla	Allstar	9793	64.2	34	38	4/11	86	11.4
Maestrone	Allstar	8028	63.0	38	40	4/11	99	12.1
Atil-2001	CIMMYT	10018	63.3	34	10	4/16	73	10.9
Avg	---	8388	62.5	34	18	4/12	93	12.1
<u>Wheat</u>								
Yecora Rojo	UC	7527	62.9	32	8	4/11	97	12.7
Cavalier	WWW	8086	62.4	34	28	4/18	98	11.7
Joaquin	WPB	8672	64.1	35	18	4/08	95	12.2
W11-6	APB	6569	61.9	38	35	4/08	99	14.1
W2-8	APB	6991	62.7	38	25	4/10	91	12.5
Avg	---	7569	62.8	36	23	4/11	96	12.7

^a Grain yield: LSD (5%) = 937 lbs/acre and cv = 7.9%.

Table 9. Summary of barley variety yield results for 2010 from Maricopa (U of A), Coolidge (WWW), and Maricopa (WPB).

Entry	Source	Grain yield (% of location average)			Mean	Standard Deviation
		Maricopa (U of A)	Coolidge (WWW)	Maricopa (WPB)		
Chico	WPB	113	99	96	103	9
Cochise	WPB	87	112	62	87	25
Gustoe	WPB	97	99	105	100	4
Nebula	WPB	107	117	113	112	5
Commander	WWW	111	93	101	102	9
Max	WWW	108	106	114	109	4
Baretta	APB	120	103	117	114	9
YU505-056	WPB	82	103	115	100	17
YU505-060	WPB	79	96	100	92	11
YU508-603	WPB	96	103	98	99	3
ARGBA2042	WWW	----	85	84	85	0
BA4513	WWW	89	92	102	94	6
BA8017	WWW	84	102	99	95	10
B00-219	APB	126	90	93	103	20
YU508-601	WPB	----	----	116	116	----
YU508-559	WPB	----	----	85	85	----

Table 10. Summary of durum and wheat variety yield results for 2010 from Maricopa (U of A), Coolidge (WWW), and Yuma (WPB).

Entry	Source	Grain yield (% of location average)			Mean	Standard Deviation
		Maricopa (U of A)	Coolidge (WWW)	Yuma (WPB)		
<u>Durum</u>						
Alamo	WPB	88	88	102	93	8
Havasú	WPB	106	101	98	102	4
Orita	WPB	107	112	103	107	5
WPB-881	WPB	94	80	91	88	8
Crown	WWW	96	84	92	91	6
Duraking	WWW	96	104	105	102	5
Q-Max	WWW	83	84	99	89	9
Kronos	APB	101	99	102	101	2
Sky	APB	105	101	92	99	7
Ocotillo	APB	95	94	96	95	1
Westmore	APB	103	102	99	101	2
YU802-4	WPB	101	97	100	99	2
YU805-17	WPB	114	106	105	108	5
YU806-93	WPB	106	116	103	108	7
YU807-115	WPB	94	115	103	104	11
D1636	WWW	94	102	97	98	4
D6575D	WWW	94	87	100	94	7
Dking206white	WWW	112	106	107	109	3
UT12074	WWW	105	95	94	98	6
D1-2	APB	105	102	97	101	4
D2-95	APB	97	107	85	96	11
D2-97	APB	108	119	101	109	9
D3-1-5P	APB	90	100	97	95	5
Fortissimo	RSI	104	---	---	104	---
RSI 59	RSI	107	---	---	107	---
Volante	RSI	104	---	---	104	---
Normano	Allstar	89	---	100	95	8
Saragolla	Allstar	103	---	117	110	9
Maestrале	Allstar	---	---	96	96	---
Atil-2001	CIMMYT	---	---	119	119	---
<u>Wheat</u>						
Yecora Rojo	UC	112	---	99	106	9
Cavalier	WWW	95	---	107	101	8
Joaquin	WPB	123	---	115	119	6
W11-6	APB	70	---	87	78	12
W2-8	APB	60	---	92	76	23
Blanca Grande	RSI	117	---	---	117	---
Summit 515	RSI	117	---	---	117	---
05W90192	RSI	107	---	---	107	---