

Final Report

Arizona Grain Research and Promotion Council

October 11, 2013

Small Grains Variety Testing, 2013

Mike Ottman
University of Arizona

Small Grains Variety Evaluation at Arizona City, Maricopa and Yuma, 2013

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, Arizona City by Arizona Plant Breeders, and Yuma by WestBred. Data from a location at Tonopah by World Wide Wheat was not collected due to a combination of herbicide damage and apparent sodium damage. The seed was planted in 20 ft rows with a cone planter in seven rows spaced 7 inches apart except at Maricopa where 10 rows were planted 7.56 inches apart. 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, and 13 barley, 20 durum, and 10 wheat entries. Growing conditions at each site are listed in Table 1. The following data was collected, but not all data was collected for all crops at all locations: grain yield, test weight, seed 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. Test weight was calculated from the weight of 1 pint of grain. Seed weight was determined from 200 seed. HVAC was determined from 10 g of seed. Grain protein was determined from total N multiplied by 5.7 for durum and wheat, 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, WB = Western Plant Breeders, WWW = World Wide Wheat, UC = University of California.

Discussion

Yield and plant characteristics of the varieties are presented for the various locations in Tables 2-7 and a summary of the grain yields at all locations is presented in Table 8. This year was characterized by very cold weather in January. 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 Zewdie Abate and Donny Gray of Westbred for conducting the trials in Yuma and Oly Cantu and Al Carleton for conducting the trials in Arizona City (APB). The technical assistance of Mary Comeau, Richard Simer, and Glenda Simer is greatly appreciated.

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

Cultural information	Arizona City (APB)	Maricopa (UA)	Yuma (WPB)
Previous crop	Cotton	Fallow	Black Eyed Peas
Soil texture	Sandy loam	Sandy loam	Clay loam
Planting date	12/30/12	12/4/12	12/26/2012
Irrigation dates (amount)	12/30 (7.14 in.)		
	1/24 (4.66 in.)	12/4 (5.48 in.)	
	2/28 (5.01 in.)	2/22 (5.16 in.)	
	3/22 (5.05 in.)	3/15 (5.16 in.)	12/26
	4/5 (5.17 in.)	3/28 (5.16 in.)	2/9
	4/20 (5.91 in.)	4/10 (6.45 in.)	3/8
	5/7 (6.81 in.)	4/19 (6.72 in.)	3/28
	5/21 (3.30 in.) Wheat/durum	4/29 (7.74 in.)	4/14
	Total = 39.76 (Barley)	Total = 41.87 in.	
	Total = 43.06 (Wheat/durum)		
Nitrogen dates (lbs N/acre, fertilizer)	Nov, 2012: 10 T/A manure	Feb, 2011: 15 T/A manure	
	12/1: 133 as 35-17-0		
	12/29: 0.9 as 8-24-0		
	1/23: 0.8 as 8-24-0	2/22: 51 as 32-0-0	12/26: 70 as 32-0-0
	2/27: 63 as 32-0-0	3/14: 31 as 32-0-0	2/9: 50 as 32-0-0
	3/21: 61 as 32-0-0	3/29: 21 as 32-0-0	3/8: 70 as 32-0-0
	4/5: 59 as 32-0-0	4/09: 61 as 32-0-0	3/28 70 as 32-0-0
	4/20: 51 as 32-0-0 (Wheat/durum)		Total=260lbs N/a
	Total = 317 lbs N/a (Barley)	Total = 164 lbs N/a	
	Total = 368 lbs N/a (Wheat/durum)		
Phosphorus (date, lbs P ₂ O ₅ /a, fertilizer)	Nov, 2012: 10 T/A manure		
	12/1: 65 as 35-17-0		
	12/29: 2.8 as 8-24-0	N/A	N/A
	1/23: 2.3 as 8-24-0		
	Total = 70 lbs P ₂ O ₅ /a		
Pesticides (date)	None	None	Affinity/Aim (2/6)
Harvest date	7/2/13	5/25	6/1

Table 2. Barley variety yield results from **Maricopa (UA)**, 2013.

Entry	Source	Grain yield ^a	Test weight	Seed weight	Plant height	Lodging	Heading	Maturity
		lbs/acre	lbs/bu	mg	inches	%		
Baretta	APB	---	47.1	39.3	27	75	3/23	4/30
Kopious	APB	---	49.5	38.1	28	31	3/18	4/29
Chico	WB	---	48.6	32.3	26	19	3/22	4/29
Cochise	WB	---	46.7	34.3	27	75	3/16	4/29
Gustoe	WB	---	48.0	39.9	27	69	3/28	4/30
Nebula	WB	---	49.6	46.2	32	75	3/20	4/30
Commander	WWW	---	45.8	39.0	28	31	3/25	4/30
Max	WWW	---	49.5	66.9	30	44	3/29	5/06
L-1	APB	---	57.2	37.4	32	56	3/29	5/01
L-2	APB	---	57.6	32.7	32	75	4/02	5/01
BA4545	WWW	---	46.4	41.2	31	75	3/26	5/04
BA9101	WWW	---	47.0	38.4	30	81	3/30	5/05
MBA1714	WWW	---	49.8	37.0	31	94	3/30	4/26
Avg.	---	---	49.5	40.2	29	62	3/25	5/01

^a Grain yield: Data not presented due to low yields from lodging, shattering, and bird damage.

Table 3. Barley variety yield results from **Arizona City (APB)**, 2013.

Entry	Source	Grain yield ^a	Test weight	Seed weight
		lbs/acre	lbs/bu	mg
Baretta	APB	5738	46.8	41.8
Kopious	APB	6230	50.1	42.2
Chico	WB	5491	46.3	33.2
Cochise	WB	6477	47.4	34.6
Gustoe	WB	5456	44.2	32.1
Nebula	WB	4453	49.7	46.1
Commander	WWW	5104	42.2	28.9
Max	WWW	5702	44.4	35.1
L-1	APB	3309	52.9	36.0
L-2	APB	3098	53.7	30.9
BA4545	WWW	5174	45.9	42.6
BA9101	WWW	5597	46.5	33.5
MBA1714	WWW	5069	50.5	38.5
Avg.	---	5146	47.7	36.6

^a Grain yield: LSD (5%) = 822 lbs/acre and cv = 9.5%.

Table 4. Barley variety yield results from **Yuma (WB)**, 2013.

Entry	Source	Grain yield ^a	Test weight	Seed weight
		lbs/acre	lbs/bu	mg
Baretta	APB	4329	49.4	34.0
Kopious	APB	5544	51.6	38.9
Chico	WB	6595	52.5	33.7
Cochise	WB	5683	53.1	35.0
Gustoe	WB	4250	50.8	37.3
Nebula	WB	5576	53.6	44.7
Commander	WWW	4169	50.7	36.3
Max	WWW	5418	53.2	40.8
L-1	APB	4163	55.2	35.5
L-2	APB	2482	50.8	30.9
BA4545	WWW	4473	51.4	44.0
BA9101	WWW	5688	52.3	41.6
MBA1714	WWW	4453	54.6	41.3
Avg.	---	4833	52.2	38.0

^a Grain yield: LSD (5%) = 1182 lbs/acre and cv = 14.5%.

Table 5. Durum and wheat variety yield results from **Maricopa (UA)**, 2013.

Entry	Source	Grain yield ^a lbs/acre	Test weight lbs/bu	Seed weight mg	Plant height inches	Lodging %	Heading	Maturity %	HVAC %	Grain protein %
<u>Durum</u>										
Helios	APB	6448	60.6	41.5	36	33	3/22	5/06	97	14.5
Kronos	APB	---	61.8	50.2	34	100	3/22	5/06	99	14.4
Sky	APB	5897	60.3	42.1	30	67	3/24	5/07	99	13.0
Westmore	APB	---	60.2	37.8	35	100	3/24	5/06	99	15.1
Havasu	WB	5232	63.5	45.5	35	88	3/22	5/06	98	14.4
Orita	WB	5534	58.6	44.4	34	63	3/28	5/06	97	15.6
WB-Mead	WB	6546	61.0	43.1	36	25	3/27	5/09	99	15.7
WB-Mohave	WB	6032	61.2	42.7	34	67	3/26	5/05	98	14.8
Crown	WWW	6035	58.4	45.4	38	44	3/26	5/06	100	14.6
Duraking	WWW	6572	61.1	41.9	35	25	3/27	5/08	99	14.3
Platinum	WWW	6317	59.7	46.2	37	6	3/27	5/06	99	13.9
Q-Max	WWW	5805	59.5	45.1	37	8	3/28	5/06	99	14.8
D1-2	APB	7309	59.5	49.8	35	25	3/24	5/06	99	13.9
D6-419	APB	4981	61.7	48.8	39	81	3/25	5/04	98	15.0
D7-12	APB	3859	57.0	36.0	38	38	4/07	5/13	99	14.0
KRLCD	APB	---	60.5	50.1	34	100	3/23	5/06	100	15.2
ARGD7096	WWW	5264	60.6	40.6	34	67	3/29	5/12	99	14.3
AZD102660	WWW	---	61.4	49.0	37	83	3/22	5/06	89	13.0
CHD0710B	WWW	---	60.2	47.8	33	92	3/24	5/08	99	14.0
CHD6332	WWW	---	61.2	37.2	38	100	3/27	5/06	99	13.8
Avg.	---	5845	60.4	44.3	36	60	3/26	5/07	98	14.4
<u>Wheat</u>										
Joaquin	WB	6274	63.2	43.2	36	0	3/21	5/03	99	13.7
WB9229	WB	6075	63.7	41.2	34	31	3/25	5/05	100	14.5
WB-Joaquin Oro	WB	5145	63.5	44.9	36	0	3/18	4/29	100	15.3
Mika	WWW	---	---	---	40	38	3/29	5/07	---	---
770001	APB	---	60.8	40.5	38	67	3/25	5/03	98	13.8
770205	APB	6107	62.2	42.7	39	38	3/25	5/03	97	14.1
AUBR30023W	WWW	7213	62.6	39.9	36	0	3/26	5/03	99	12.5
AZBR8819WX	WWW	5248	61.4	43.1	37	25	3/18	5/03	97	12.2
CABR3477W	WWW	---	61.9	34.1	38	25	3/26	5/03	98	13.6
CABR3509W	WWW	6745	61.3	37.8	35	0	3/26	5/02	98	12.6
Avg.	---	6115	62.3	40.8	37	21	3/23	5/03	98	13.6

^a Grain yield: LSD (5%) = 912 lbs/acre and cv = 14.3% for durum and wheat. Data not presented for some varieties due to bird damage.

Table 6. Durum and wheat variety yield results from **Arizona City (APB)**, 2013.

Entry	Source	Grain yield ^a	Test weight	Seed weight	Plant height	Lodging	HVAC	Grain protein
		lbs/acre	lbs/bu	mg	inches	%	%	%
<u>Durum</u>								
Helios	APB	6638	62.6	52.6	32	25	99	15.2
Kronos	APB	6915	62.1	57.7	31	50	100	15.1
Sky	APB	6571	61.9	44.9	31	25	100	14.4
Westmore	APB	7079	62.4	49.3	31	50	100	14.7
Havasu	WB	6475	63.0	54.9	33	50	99	15.6
Orita	WB	7230	62.2	52.1	33	25	99	15.3
WB-Mead	WB	7416	63.0	52.5	34	25	99	15.7
WB-Mohave	WB	6670	63.3	54.7	33	50	100	15.5
Crown	WWW	6001	60.0	45.0	37	25	100	15.3
Duraking	WWW	7347	62.8	49.3	32	50	98	15.0
Platinum	WWW	6117	59.3	45.2	36	25	100	15.4
Q-Max	WWW	6471	59.2	45.6	36	50	99	15.0
D1-2	APB	6995	62.4	53.6	31	50	100	14.2
D6-419	APB	6348	62.1	52.7	35	50	100	14.6
D7-12	APB	5981	56.3	35.3	36	25	99	13.3
KRLCD	APB	6624	62.0	58.0	33	50	99	16.1
ARGD7096	WWW	7044	62.7	49.9	31	50	100	14.4
AZD102660	WWW	6426	62.5	53.8	38	75	97	13.2
CHD0710B	WWW	7121	61.8	55.7	33	50	100	15.7
CHD6332	WWW	7161	62.5	42.5	31	75	100	14.1
Avg.	---	6731	61.7	50.3	33	44	99	14.9
<u>Wheat</u>								
Joaquin	WB	6624	63.5	48.2	34	25	100	16.0
WB9229	WB	5978	63.6	41.5	34	25	99	17.0
WB-Joaquin Oro	WB	6469	63.6	44.9	32	25	100	15.8
Mika	WWW	4735	58.8	36.0	37	25	100	16.9
770001	APB	6106	62.4	44.3	36	50	99	15.6
770205	APB	4235	62.4	46.3	45	25	100	17.4
AUBR30023W	WWW	6724	63.5	43.8	33	25	99	15.1
AZBR8819WX	WWW	5735	62.2	50.1	34	25	100	15.7
CABR3477W	WWW	5902	63.5	40.6	37	25	100	15.4
CABR3509W	WWW	6283	63.2	42.8	33	25	98	13.8
Avg.	---	5879	62.6	43.8	36	28	99	15.9

^a Grain yield: LSD (5%) = 1072 lbs/acre and cv = 11.2% for durum and LSD (5%) = 606 lbs/acre and cv = 7.1% for wheat.

Table 7. Durum and wheat variety yield results from **Yuma (WB)**, 2013.

Entry	Source	Grain yield ^a	Test weight	Seed weight	HVAC	Grain protein
		lbs/acre	lbs/bu	mg	%	%
<u>Durum</u>						
Helios	APB	4932	60.3	37.1	100	16.0
Kronos	APB	5665	61.5	47.4	99	16.1
Sky	APB	4916	59.1	35.6	99	15.9
Westmore	APB	4662	59.1	37.5	100	17.1
Havasus	WB	5411	63.1	47.8	98	17.1
Orita	WB	5796	59.6	45.1	98	18.2
WB-Mead	WB	6417	61.9	40.7	98	16.9
WB-Mohave	WB	6291	63.0	48.1	99	17.1
Crown	WWW	6260	59.9	46.3	99	17.0
Duraking	WWW	6997	63.6	41.1	98	16.1
Platinum	WWW	4775	57.6	42.1	100	16.9
Q-Max	WWW	5710	61.4	47.7	99	15.8
D1-2	APB	6631	60.7	48.1	99	16.4
D6-419	APB	4783	58.5	43.3	99	17.4
D7-12	APB	4984	60.4	34.5	97	15.0
KRLCD	APB	5033	58.7	45.2	100	17.5
ARGD7096	WWW	6172	62.9	45.1	99	16.3
AZD102660	WWW	5116	60.9	42.4	96	14.9
CHD0710B	WWW	5895	60.7	47.1	98	16.6
CHD6332	WWW	3762	59.5	37.6	100	16.7
Avg.	---	5510	60.6	43.0	99	16.5
<u>Wheat</u>						
Joaquin	WB	6413	63.4	39.2	99	16.8
WB9229	WB	6696	64.1	37.1	100	17.7
WB-Joaquin Oro	WB	5801	61.9	38.3	99	17.2
Mika	WWW	4352	60.8	33.4	97	17.5
770001	APB	3665	56.7	30.0	99	17.2
770205	APB	4689	62.8	45.6	100	17.7
AUBR30023W	WWW	5641	62.5	36.7	100	15.5
AZBR8819WX	WWW	5256	60.7	40.0	99	15.5
CABR3477W	WWW	4957	62.8	32.6	99	15.5
CABR3509W	WWW	5872	62.5	38.9	99	14.5
Avg.	---	5334	61.8	37.2	99	16.5

^a Grain yield: LSD (5%) = 1927 lbs/acre and cv = 21.1% for durum and LSD (5%) = 1196 lbs/acre and cv = 13.0% for wheat.

Table 8. Summary of barley, durum, and wheat variety yield results for 2013 from three locations.

Entry	Source	Grain yield (% of location average)			Mean	Standard Deviation
		AZ City (APB)	Maricopa (UA)	Yuma (WPB)		
<u>Barley</u>						
Baretta	APB	112	---	90	101	15
Kopious	APB	121	---	115	118	5
Chico	WB	107	---	137	122	21
Cochise	WB	126	---	118	122	6
Gustoe	WB	106	---	88	97	13
Nebula	WB	87	---	115	101	20
Commander	WWW	99	---	86	93	9
Max	WWW	111	---	112	111	1
L-1	APB	64	---	86	75	15
L-2	APB	60	---	51	56	6
BA4545	WWW	101	---	93	97	6
BA9101	WWW	109	---	118	113	6
MBA1714	WWW	99	---	92	95	5
<u>Durum</u>						
Helios	APB	99	110	90	99	10
Kronos	APB	103	---	103	103	0
Sky	APB	98	101	89	96	6
Westmore	APB	105	---	85	95	15
Havasus	WB	96	90	98	95	5
Orita	WB	107	95	105	102	7
WB-Mead	WB	110	112	117	113	3
WB-Mohave	WB	99	103	114	106	8
Crown	WWW	89	103	114	102	12
Duraking	WWW	109	112	127	116	10
Platinum	WWW	91	108	87	95	11
Q-Max	WWW	96	99	104	100	4
D1-2	APB	104	125	120	116	11
D6-419	APB	94	85	87	89	5
D7-12	APB	89	66	91	82	14
KRLCD	APB	98	---	91	95	5
ARGD7096	WWW	105	90	112	102	11
AZD102660	WWW	96	---	93	94	2
CHD0710B	WWW	106	---	107	106	1
CHD6332	WWW	106	---	68	87	27
<u>Wheat</u>						
Joaquin	WB	113	103	120	112	9
WB9229	WB	102	99	126	109	14
WB-Joaquin Oro	WB	110	84	109	101	15
Mika	WWW	81	---	82	81	1
770001	APB	104	---	69	86	25
770205	APB	72	100	88	87	14
AUBR30023W	WWW	114	118	106	113	6
AZBR8819WX	WWW	98	86	99	94	7
CABR3477W	WWW	100	---	93	97	5
CABR3509W	WWW	107	110	110	109	2