Small Grains Variety Evaluation at Marana, Maricopa, Paloma, and Yuma, 1997

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Interpretive Summary

Small grain varieties are evaluated each year by University of Arizona personnel at one or more locations. The purpose of these tests is to characterize varieties in terms in terms of yield and other attributes. Variety performance varies greatly from year to year and several site-years are necessary to adequate 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 were tested as part of the on-going effort to assess variety productivity and characteristics. Barley, durum, wheat, and oat experimental and commercial cultivars were tested. The purpose of these tests were to characterize new 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 and oat varieties were evaluated at the following locations: Marana Agricultural Center, Maricopa Agricultural Center, Paloma, and the Yuma Valley Agricultural Center. The seed was planted with a cone planter in seven rows spaced 8 inches apart. The seeding rate was approximately 120 pounds of seed per acre. The plots were 6 ft. x 25 ft (20 ft at Yuma) . The plots were trimmed to 21 ft. (16 ft. at Yuma) with Roundup or using a rototiller and the entire plots were harvested (middle 3.75 ft. at Yuma). The experimental design was a randomized complete block design with 4 replications and a variable number of entries depending on the crop and location. Growing conditions at each site are listed below. The following data was collected for at least one location: grain yield, grain protein, test weight, and kernel weight, HVAC, plant height, lodging, heading, anthesis, and physiological maturity. Kernel weight and HVAC were determined from 10 g of hand picked seed. Grain protein was determined with a NIR whole grain analyzer and expressed on a 12% moisture basis.

Marana

The soil type was a Pima clay loam. The field was in cotton the previous summer. Seed was planted into dry soil on field A-1 on December 23, 1996, and a germination irrigation was applied the same day. The plots were irrigated on December 23 (6.0 inches), Feb 26 (4.0 inches), March 10 (3.9 inches), March 28 (4.0 inches), April 11 (3.7 inches), and April 25 (3.8 inches). Preplant fertilizer was applied at a rate of 54 lbs N/acre and 67 lbs P_2O_5/acre as 16-20-0. UAN 32 was applied in the irrigation water at a rate of 50 lbs N/acre on March 10 and March 28. The plots were harvested with a small plot combine on June 3.

Maricopa

The soil type was a Casa Grande sandy loam. The field was in sudangrass the previous summer. Preplant soil phosphate was 8.1 ppm. Seed was planted into dry soil on Field 117 on December 4, 1996, and a germination irrigation was applied on December 6. The plots were irrigated on December 6, January 31, February 26, March 19, April 1, and April 18. Preplant fertilizer was applied at a rate of 80 lbs N/acre and 50 lbs P_2O_5/acre as urea and 16-20-0. Urea was topdressed on January 30 at a rate of 50 lbs N/acre. UAN32 was applied in the irrigation water at a

rate of 25 lbs N/acre on Feb 26 and Apr 1. The plots were harvested with a small plot combine on May 16 (barley), May 23 (durum), and May 21 (wheat).

Paloma

The soil type was a sandy loam. The field was in cotton the previous summer. Seed was planted into dry soil on field 13D1 December 10, 1996, and a germination irrigation was applied on Dec 15. The plots were irrigated on Dec 15, Dec 27, Jan 28, Feb 11, Feb 25, Mar 9, Mar 24, Apr 6, Apr 11, Apr 20, and Apr 29. Preplant fertilizer was applied at a rate of 22 lbs N/acre and 104 lbs P_2O_5/acre as 11-52-0. UAN32 was applied in the irrigation water Feb 28, Feb 11, Feb 25, and Mar 9 at a rate of 53 lbs N/acre except for Mar 25 where 71 lbs N/A was applied. Thus, a total of 252 lbs N/acre was applied. The plots were harvested with a small plot combine on May 30.

Yuma

The soil type was a Gadsden clay loam. The field was in lettuce the previous winter. Seed was planted into moist soil on field Q, borders 15-17 on December 10, 1996. The plots were irrigated on Dec 20, Jan 23, Feb 13, Mar 6, Mar 26, and Apr 10. Urea was applied preplant at a rate of 50 lbs N/acre and UN32 was applied in the irrigation water on Jan 23 and Mar 6 at a rate of 75 lbs N/acre each application. Nitrogen fertilizer application totaled 200 lbs N/acre. The plots were harvested with a small plot combine on May 30.

Discussion

Yield and plant characteristics of the varieties are presented for the various locations in Tables 1-4. 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 1997 crop year was generally favorable for small grain production. Some cold temperatures were recorded during the winter, rainfall was below average, and hot weather did not occur till the crop was past maturity. Considerable lodging occurred at the Yuma location but not at the other locations. The results of this trial are most useful when combined with data from other years.

Acknowledgments

Financial support for this project was received from the Arizona Crop Improvement Association and the Arizona Grain Research and Promotion Council.

Table 1. Small grain variety yield results from **Marana**, 1997.

Entry	Source[a]	Grain Yield[b]	Grain Protein[c]	Test Weight	1000 Kernel Wt
		lbs/acre		lb/bu	g
			Barley		
Max	WWW	6371	—	52.9	43.1
BA8055	WWW	6141	—	54.9	46.4
BA7032	WWW	7143	—	53.9	44.0
Barcott	WPB	5415	—	53.0	38.2
Gustoe	WPB	8023	—	55.6	43.2
Nebula	WPB	6686	—	55.4	44.8
PH-593-106	WPB	6628	—	54.1	35.7
Mucho	APB	5678	—	55.5	48.3
B91-3	APB	7597	—	56.0	46.0
UC337	UC	6344	—	53.2	39.2
B2601	Busch	4877	—	55.4	39.6
AVERAGE		6446	—	54.5	42.6
			Durum		
D1856	WWW	6465	13.9	63.3	50.5
Bravadur	WWW	6782	14.5	63.0	48.0
Durex	WWW	6168	14.1	62.3	50.9
Reva	WWW	6237	14.0	63.6	47.4
Ria	WWW	6665	13.9	63.5	46.0
Duraking	WWW	6841	14.0	62.7	44.9
Westbred 881	WPB	6227	14.7	62.4	48.8
YU894-6	WPB	6544	14.1	62.5	50.3
Kofa	WPB	6544	14.5	63.4	54.9
Turbo	WPB	7009	13.3	64.0	53.4
Cortez	WPB	6356	14.6	63.6	48.2
Kronos	APB	6148	14.4	62.9	52.7
Ocotillo	APB	6445	14.8	62.5	47.7
D94-1	APB	6574	14.6	61.4	47.3
AVERAGE		6500	14.2	62.9	49.4
			Wheat		
Rich	WWW	5792	13.3	63.1	41.8
BR7073	WWW	5435	13.0	62.8	44.3
Cavalier	WWW	5465	11.9	63.2	44.0
YU994-199	WPB	5554	12.8	63.7	38.6
Brooks	WPB	5920	12.6	64.1	41.4
Cuyama	WPB	5732	13.4	62.0	36.9
89-1-15B	APB	5356	12.8	64.5	43.1
Yecora rojo	UC	5514	13.5	64.1	41.8
AVERAGE		5596	12.9	63.4	41.5

[a] Source: APB = Arizona Plant Breeders, UC = University of California, and WPB = Western Plant Breeders, WWW = World Wide Wheat.

[b] Grain yield: LSD (5%) = 720, 474, and 865 lb/acre and cv = 7.7, 5.1, and 9.7% for barley, durum, and wheat, respectively. Grain yield reported on an "as is" moisture basis which was about 8%.

[c] Grain protein expressed on a 12% moisture basis.

Table 2. Small grain variety yield results from **Maricopa**, 1997.

Entry	Source[a]	Grain Yield[b]	Test Weight	1000 Kernel Weight	Plant Height	Lodging	Heading	Anthesis[c]	Physio-logical Maturity[d]
		lbs/acre	lb/bu	g	inches	%			
				Barley[e]					
Max	WWW	4218	54.9	45.4	26	0	3-22	3-22	4-29
BA8055	WWW	5455	53.4	43.7	26	0	3-18	3-18	4-25
BA7032	WWW	4594	54.3	43.3	27	0	3-20	3-20	4-24
Barcott	WPB	4069	52.9	40.4	31	0	3-02	3-05	4-07
Gustoe	WPB	5030	55.5	42.0	26	0	3-20	3-21	4-23
Nebula	WPB	5455	55.0	42.6	31	0	3-18	3-18	4-22
PH-593-106	WPB	5485	54.4	38.5	26	0	3-19	3-19	4-22
Mucho	APB	5336	54.4	47.8	26	0	3-07	3-08	4-13
B91-3	APB	5929	54.0	43.9	25	0	3-17	3-17	4-21
UC337	UC	5405	53.6	37.3	38	0	3-16	3-16	4-19
B2601	Busch	3960	55.9	37.0	34	0	3-18	3-18	4-19
AVERAGE		5035	54.4	42.1	29	0	3-16	3-16	4-20
				Durum					
D1856	WWW	6138	61.4	50.0	33	0	3-19	3-25	4-29
Bravadur	WWW	7356	61.4	48.0	33	0	3-20	3-24	4-28
Durex	WWW	6623	61.4	51.4	33	0	3-16	3-21	4-29
Reva	WWW	6564	61.6	51.6	33	0	3-19	3-24	4-29
Ria	WWW	6405	62.0	51.8	34	0	3-21	3-26	4-30
Duraking	WWW	6980	62.5	49.7	34	0	3-20	3-24	5-01
Westbred 881	WPB	6712	61.2	52.6	34	0	3-17	3-22	4-29
YU894-6	WPB	6722	60.4	45.9	32	0	3-14	3-20	4-28
Kofa	WPB	6069	61.8	57.1	33	0	3-16	3-21	4-28
Turbo	WPB	6168	61.5	55.0	38	0	3-21	3-27	5-02
Cortez	WPB	6326	61.6	51.4	36	0	3-22	3-27	5-03
Kronos	APB	6821	62.4	55.6	35	0	3-14	3-20	4-27
Ocotillo	APB	6349	62.1	51.0	37	0	3-15	3-21	4-28
D94-1	APB	7217	60.5	46.7	30	0	3-18	3-23	4-29
AVERAGE		6604	61.6	51.3	34	0	3-18	3-23	4-29
				Wheat					
Rich	WWW	6758	60.1	39.1	30	0	3-18	3-22	4-27
BR7073	WWW	6683	59.7	42.9	29	0	3-16	3-20	4-27
Cavalier	WWW	7306	61.2	43.1	29	0	3-19	3-23	4-27
YU994-199	WPB	6495	61.3	40.9	31	0	3-12	3-17	4-27
Brooks	WPB	6990	62.0	42.6	30	0	3-17	3-21	4-27
Cuyama	WPB	6594	61.4	40.9	33	0	3-14	3-19	4-28
89-1-15B	APB	7475	62.6	39.6	32	0	3-16	3-21	4-27
Yecora rojo	UC	6851	61.6	39.7	27	0	3-15	3-20	4-24
AVERAGE		6894	61.2	41.1	30	0	3-15	3-20	4-26

Table 2 (con'd). Small grain variety yield results from **Maricopa**, 1997.

Entry	Source[a]	Grain Yield[b]	Test Weight	1000 Kernel Weight	Plant Height	Lodging	Heading	Anthesis[c]	Physio-logical Maturity[d]
		lbs/acre	lb/bu	g	inches	%			
				Oats[f]					
Sierra		—	—	—	58	20	3-23	3-27	4-25
Pert	UC	—	—	—	51	0	4-13	4-14	—
Cayuse		—	—	—	62	13	4-21	4-21	—
Mesa	UA	—	—	—	52	5	3-28	3-30	5-02
AVERAGE		—	—	—	56	10	4-05	4-07	4-28

[a] Source: APB = Arizona Plant Breeders, UA = University of Arizona, UC = University of California, and WPB = Western Plant Breeders, and WWW = World Wide Wheat.

[b] Grain yield: LSD (5%) = 699, 705, and 574 lb/acre and cv = 9.7, 7.4, and 5.6% for barley, durum, and wheat, respectively. Grain yield reported on an "as is" moisture basis which was about 8%.

[c] Anthesis = first day of pollen shed.

[d] Physiological maturity defined as when glumes turn brown.

[e] Barley: Yield of some varieties depressed due to severe aphid infestation.

[f] Oats: Oats not harvested due to skips at planting.

Table 3. Small grain variety yield results from **Paloma**, 1997.

Entry	Source[a]	Grain Yield[b]	Grain Protein[c]	TestWeight	1000 Kernel Wt	HVAC
		lbs/acre		lb/bu	g	%
			Barley			
Max	WWW	8603	—	56.3	44.8	—
BA8055	WWW	8336	—	55.6	43.9	—
BA7032	WWW	8524	—	55.9	42.6	—
Barcott	WPB	5346	—	56.0	43.0	—
Gustoe	WPB	8395	—	56.5	42.9	—
Nebula	WPB	7514	—	56.4	46.9	—
PH-593-106	WPB	7455	—	57.1	41.4	—
Mucho	APB	6554	—	55.9	48.5	—
B91-3	APB	8514	—	56.2	45.9	—
UC337	UC	6524	—	54.8	40.2	—
B2601	Busch	6168	—	57.6	39.9	—
AVERAGE		7448	—	56.2	43.6	—
			Durum			
D1856	WWW	6079	12.6	63.4	47.5	100
Bravadur	WWW	6653	11.8	63.1	49.7	100
Durex	WWW	6584	12.3	62.8	51.7	100
Reva	WWW	6178	11.8	63.9	49.3	96
Ria	WWW	6247	11.6	64.5	46.6	94
Duraking	WWW	6742	11.0	64.3	45.2	96
Westbred 881	WPB	6505	12.5	63.4	52.0	100
YU894-6	WPB	6108	11.6	63.9	50.5	100
Kofa	WPB	6376	12.6	63.7	52.4	100
Turbo	WPB	6693	11.4	64.8	56.1	96
Cortez	WPB	6297	11.7	64.6	53.0	99
Kronos	APB	6544	10.9	64.7	54.9	69
Ocotillo	APB	6475	12.4	64.2	47.3	99
D94-1	APB	7366	11.5	62.7	46.6	92
AVERAGE		6489	11.8	63.9	50.2	96
			Wheat			
Rich	WWW	6217	10.8	64.6	43.9	—
BR7073	WWW	6029	11.9	63.6	47.0	—
Cavalier	WWW	6296	11.2	63.7	42.2	—
YU994-199	WPB	6663	11.7	64.8	42.9	—
Brooks	WPB	6405	11.2	65.0	42.5	—
Cuyama	WPB	6594	11.0	64.3	43.1	—
89-1-15B	APB	6801	9.9	65.4	41.8	—
AVERAGE		6429	11.1	64.5	43.3	—

[a] Source: APB = Arizona Plant Breeders, UC = University of California, WPB = Western Plant Breeders, WWW = World Wide Wheat.

[b] Grain yield: LSD (5%) = 566, 388, and 589 lb/acre and cv = 5.2, 4.2, and 6.3% for barley, durum, and wheat, respectively. Grain yield reported on an "as is" moisture basis which was about 8%.

[c] Grain protein expressed on a 12% moisture basis.

Table 4. Small grain variety yield results from **Yuma**, 1997.

Entry	Source[a]	Grain Yield[b]	Grain Protein[c]	TestWeight	1000 Kernel Wt
		lbs/acre		lb/bu	g
			Barley		
Max	WWW	6825	—	—	—
BA8055	WWW	7202	—	—	—
BA7032	WWW	6883	—	—	—
Barcott	WPB	7420	—	—	—
Gustoe	WPB	7719	—	—	—
Nebula	WPB	6708	—	—	—
PH-593-106	WPB	7216	—	—	—
Mucho	APB	7298	—	—	—
B91-3	APB	6302	—	—	—
UC337	UC	5706	—	—	—
B2601	Busch	6592	—	—	—
AVERAGE		6897	—	—	—
			Durum		
D1856	WWW	7739	13.4	—	—
Bravadur	WWW	7812	13.9	—	—
Durex	WWW	7652	14.4	—	—
Reva	WWW	7405	13.2	—	—
Ria	WWW	7754	15.1	—	—
Duraking	WWW	8000	13.1	—	—
Westbred 881	WPB	8044	14.3	—	—
YU894-6	WPB	8204	13.4	—	—
Kofa	WPB	7405	14.4	—	—
Turbo	WPB	8204	13.3	—	—
Cortez	WPB	7972	14.0	—	—
Kronos	APB	6969	13.4	—	—
Ocotillo	APB	7115	14.6	—	—
D94-1	APB	7289	13.5	—	—
AVERAGE		7683	13.9	—	—
			Wheat		
Rich	WWW	7957	13.8	—	—
BR7073	WWW	7841	13.3	—	—
Cavalier	WWW	7515	13.9	—	—
YU994-199	WPB	7855	14.7	—	—
Brooks	WPB	7347	13.8	—	—
Cuyama	WPB	7827	13.6	—	—
89-1-15B	APB	8393	14.3	—	—
Yecora rojo	UC	6970	14.7	—	—
AVERAGE		7713	14.0	—	—

Table 4 (con'd). Small grain variety yield results from **Yuma**, 1997.

Entry	Source[a]	Grain Yield[b]	Grain Protein[c]	Test weight	1000 Kernel Wt
		lbs/acre		lb/bu	g
			Oats		
Cayuse		1917	—	—	—
Mesa	UA	3107	—	—	—
Pert	UC	3833	—	—	—
Sierra		2251	—	—	—
AVERAGE		2777	—	—	—

[a] Source: APB = Arizona Plant Breeders, UC = University of California, and WPB = Western Plant Breeders, WWW = World Wide Wheat.

[b] Grain yield: LSD (5%) = 869, 899, 868, and 768 lb/acre and cv = 9.1, 8.3, 7.6, and 17.3% for barley, durum, wheat, and oats, respectively. Grain yield reported on an "as is" moisture basis which was about 8%.

[c] Grain protein expressed on a 12% moisture basis.

Table 5. Summary of small grain variety yield results from **Marana, Maricopa, Paloma, and Yuma.**

Entry	Source[a]	Grain Yield (% of location average)					
		Marana	Maricopa	Paloma	Yuma	Mean	Standard deviation
				Barley			
Max	WWW	99	84	116	99	99	13
BA8055	WWW	95	108	112	104	105	7
BA7032	WWW	111	91	114	100	104	11
Barcott	WPB	84	81	72	108	86	15
Gustoe	WPB	124	100	113	112	112	10
Nebula	WPB	104	108	101	97	103	5
PH-593-106	WPB	103	109	100	105	104	4
Mucho	APB	88	106	88	106	97	10
B91-3	APB	118	118	114	91	110	13
UC337	UC	98	107	88	83	94	11
B2601	Busch	76	79	83	96	83	9
AVERAGE		100	100	100	100	100	0
				Durum			
D1856	WWW	99	93	94	101	97	4
Bravadur	WWW	104	111	103	102	105	4
Durex	WWW	95	100	101	100	99	3
Reva	WWW	96	99	95	96	97	2
Ria	WWW	103	97	96	101	99	3
Duraking	WWW	105	106	104	104	105	1
Westbred 881	WPB	96	102	100	105	101	4
YU894-6	WPB	101	102	94	107	101	5
Kofa	WPB	101	92	98	96	97	4
Turbo	WPB	108	93	103	107	103	7
Cortez	WPB	98	96	97	104	99	4
Kronos	APB	95	103	101	91	97	6
Ocotillo	APB	99	96	100	93	97	3
D94-1	APB	101	109	114	95	105	8
AVERAGE		100	100	100	100	100	0
				Wheat			
Rich	WWW	104	98	97	103	100	3
BR7073	WWW	97	97	94	102	97	3
Cavalier	WWW	98	106	98	97	100	4
YU994-199	WPB	99	94	104	102	100	4
Brooks	WPB	106	101	100	95	101	4
Cuyama	WPB	102	96	103	101	101	3
89-1-15B	APB	96	108	106	109	105	6
Yecora rojo	UC	99	99	—	90	96	5
AVERAGE		100	100	100	100	100	0

[a] Source: APB = Arizona Plant Breeders, UC = University of California, and WPB = Western Plant Breeders, WWW = World Wide Wheat.