

# Wheat Variety Trials on the Safford Agricultural Center, 1994

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## **Abstract**

*Thirteen varieties of wheat were tested at the Safford Agricultural Center in 1994. An experimental variety, BR6053 was the highest yielding variety in the trial with a yield of 4453 pounds per acre.*

## **Introduction**

Wheat is a potential alternative crop in the Graham county area. Low prices over the past several years, however, have limited the production. Some interest was generated this year due to higher than normal prices, because of this interest, this trial was initiated.

## **Methods and Materials**

Thirteen varieties of wheat were obtained from the breeders and seed companies that have an interest in wheat being grown in Arizona. Most of these same varieties were grown by Mike Ottman on the Maricopa Agricultural Center. A small plot, replicated field trial was developed for the comparison of these varieties. Plots were planted using a John Deere Van Brunt grain drill, seeding in 6 inch rows. The following crop history indicates the important features of the study.

### ***Crop History:***

Previous crop: Cotton

Soil type: Pima clay loam variant

Planting date: 16 December 1993

Seeding rate: Approximately 150 lbs/ac

Fertilizer: 200 lbs/ac of 16-20-0 broadcast pre-plant, 110 lbs/ac urea on 11 February and again on 18 March

Herbicide: None

Insecticide: None

Irrigation: Furrow, watered up and 7 irrigations (approximately 40 acre inches) Rainfall: 1.57 inches

Plot size: 2 rows (6 feet) wide by 35 feet long

Harvest date: 12 July

The plots were harvested using a Gleaner Model L combine, catching the grain from each plot in a 5 gallon bucket in the grain bin. These buckets were weighed using an electronic hanging scale and samples were taken to determine moisture and bushel weight and for further quality analysis. Plant height and stand counts were taken just prior to harvest. Grain samples were sent for analysis to the USDA/ARS Wheat Quality Lab in Fargo, ND.

AZSCHED irrigation scheduling software was used to schedule irrigations on these plots using the following values:

Rooting zone: 3.5 feet

Water holding capacity of the rooting zone: 5.75 inches of water

Management allowed deficiency: 50%

Irrigation efficiency: 75%

## **Results and Discussion**

The yields and other agronomic characteristics of the wheat varieties tested are found in Table 1. Four experimental wheat varieties yielded higher than any of the registered varieties, which is encouraging. BR6053, from FMC, had the highest yield of the varieties tested with a yield of 4453 pounds per acre. Yields were better than normal at this site, but still lower than desired. Unfortunately, a standard wheat variety was not included in the trial for comparison purposes.

Plant heights were generally lower than normal, so crop management method were evaluated to see if these were less than optimal. AZSCHED was used to predict irrigations so calculated percent soil water depletion levels were abstracted from the historical summary and plotted in Figure 1. It is noted that around 90 days after planting the depletion level was allowed to rise above 60%, this was during the rapid growth time for wheat and could well be responsible for the shorter plant heights. Over the next 40 day period, more water was applied than called for by AZSCHED resulting in negative depletion values or leaching to occur. This provided more than enough water for the plants but may have removed some nutrients due to leaching. AZSCHED calculated a leaching loss of 8.39 inches. After 135 days the percent depletion was allowed to rise to 55% twice, this was during grain fill and may have lowered the final yields below their optimal values.

Variations are seen in the seeding rates. The planter was set to deliver approximately 150 pounds of seed per acre for Delano variety and all of the varieties were planted at that same setting. Differences in rates are then related to seed size and weight. There was not a close correlation between the number of seeds planted and the number of heads counted per square foot at harvest time which determined the plant population. This indicates that all of the varieties tillered to fill in the available space.

Tables 2a, 2b and 2c contain quality information on kernels, milling and baking, respectively. These results will not be discussed in this paper but the reader is directed to the last column of table 2a for the overall scoring from the tests. With the best quality varieties only scoring 2's it appears that none of the varieties could challenge baking varieties from other parts of the country.

## **Acknowledgments**

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**Table 1. Yields and other agronomic characteristics of wheat varieties grown on the Safford Agricultural Center, 1994.**

Variety	Yield (lbs/ac)	Bushel Weight	Plant Height (in)	Seeding Rate (lb/ac)	Plant Population
BR6053	4452.8 a	60.0 a	25.5 cd	174	838530 a
PH988-131	4242.0 ab	60.0 a	27.0 bc	158	805860 abc
PH991-71	4019.4 abc	59.3 a	27.0 bc	151	805860 abc
BR8631	3960.7 abc	59.5 a	26.3 cd	149	816750 ab
Cavalier	3937.1 abc	58.5 a	25.8 cd	163	784080 abcd
Poco Rojo	3727.2 abc	57.5 a	21.8 e	167	740520 cde
BR1235	3639.6 abc	52.3 a	24.5 d	194	827640 a
BR7073	3593.0 bcd	56.5 a	26.3 cd	206	751410 de
PH989-80W	3527.7 bcd	58.5 a	25.0 d	153	827640 a
Delano	3441.1 bcd	57.0 a	26.3 cd	149	686070 e
PH990-335	3357.4 cd	58.5 a	24.5 d	162	718740 de
DA990-15	3293.6 cd	60.0 a	29.8 a	154	794970 abc
Express	2796.8 d	59.0 a	28.5 ab	140	784080 abcd
Mean	3691.4	58.2	26	163.1	783242
LSD(05)	734.9	6.51	1.73		64504
CV(%)	17.3	7.66	8.51		7.67

**Table 2a. Kernel characteristics of wheat varieties grown on the Safford Agricultural Center, 1994.**

Variety	Test Weight (lb/bu)	Seed Weight (mg)	% Lrg Kernels	% Sm Kernels	% Kernel Ash	% Kernel Protein <sup>1</sup>	Kernel Hardness	Kernel Score <sup>2</sup>	General Score <sup>3</sup>
BR6053	61.8	35.7	36	1	1.47	12.0	86	2	1.3
PH988-131	62.6	38.5	47	1	1.49	12.3	88	2	2.0
PH991-71	61.9	34.8	44	1	1.54	12.4	84	2	1.3
BR8631	60.7	38.0	53	1	1.47	12.4	76	2	1.7
Cavalier	61.2	39.5	56	1	1.49	12.3	84	2	2.0
Poco Rojo	60.1	44.1	46	1	1.54	12.3	72	2	1.7
BR1235	62.0	34.8	54	1	1.51	12.8	95	2	2.0
BR7073	61.1	42.4	67	0	1.53	12.1	70	2	1.7
PH989-80W	60.5	34.7	41	2	1.51	12.6	86	2	2.0
Delano	58.6	42.0	69	1	1.58	11.1	49	2	2.7
PH990-335	61.4	36.4	58	0	1.51	12.5	74	2	1.7
DA990-15	60.8	33.6	38	2	1.55	12.3	88	2	1.7
Express	62.0	29.2	43	1	1.70	13.4	96	3	1.7
Average	61.13	37.21	50.15	1	1.53	12.35	80.7	2.1	1.81
Min Flt Value	57.9	27.1	-	8	-	13.9	-	-	-
Maj Flt Value	56.9	24.1	-	18	-	12.9	-	-	-

1. Kernel protein is based on 14% moisture.
2. 4 is a perfect score, deductions are made for deviations from faulting values.
3. The general score is an average of kernel, milling and baking scores.  
1 = no promise, 2 = little promise, 3 = some promise, 4 = good promise

**Table 2b. Milling performance of wheat varieties grown on the Safford Agricultural Center, 1994.**

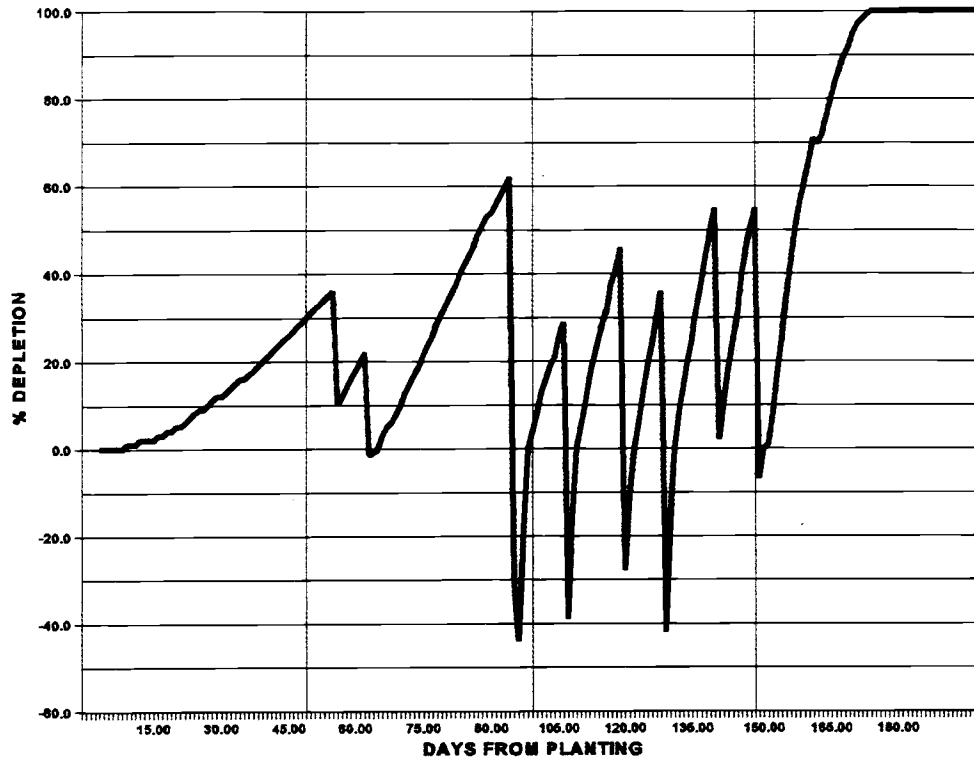
Variety	% Flour Extraction	% Flour Ash	% Flour Protein <sup>1</sup>	Milling Character <sup>2</sup>	Milling Score <sup>3</sup>
BR6053	68.0	0.37	10.8	5	2
PH988-131	69.0	0.36	11.2	5	2
PH991-71	67.2	0.39	11.2	5	2
BR8631	68.0	0.37	11.5	5	2
Cavalier	67.4	0.36	11.2	5	2
Poco Rojo	58.7	0.39	11.5	5	1
BR1235	67.4	0.36	12.0	5	2
BR7073	66.2	0.37	11.0	5	2
PH989-80W	66.6	0.40	11.8	5	2
Delano	44.8	0.42	10.6	4	1
PH990-335	68.6	0.34	11.6	5	2
DA990-15	66.6	0.41	11.3	5	2
Express	68.0	0.38	12.7	5	3
Average	65.12	0.38	11.42	4.9	1.9
Min Flt Value	65.9	0.57	12.9	-	-
Maj Flt Value	63.9	0.61	12.4	-	-

1. Flour protein is based on 14% moisture.
2. 0 = very soft, 5 = normal.
3. 4 is a perfect score, deductions are made for deviations from faulting values.

**Table 2c. Baking results of wheat varieties grown on the Safford Agricultural Center, 1994.**

Variety	Mixogrph Absorption	Mixogrph Pattern <sup>1</sup>	Baking Absorption	Dough Mix time (min)	Dough Handling Score <sup>2</sup>	Crumb Color Score <sup>3</sup>	Crumb Grain Score <sup>4</sup>	Loaf Volume	Baking Score <sup>5</sup>
BR6053	55.0	2	55.0	7.00	5	8.5	7.5	171	1
PH988-131	55.3	2	55.3	4.00	7	8.0	8.0	179	1
PH991-71	57.3	2	57.3	5.00	7	9.0	8.5	168	1
BR8631	57.6	2	57.6	5.00	9	8.5	8.0	190	2
Cavalier	56.5	2	56.5	4.50	9	8.00	8.5	187	2
Poco Rojo	56.5	2	56.5	4.50	7	8.0	8.0	174	1
BR1235	60.0	2	60.0	2.50	5	8.0	8.5	166	1
BR7073	57.9	2	57.9	5.00	7	8.0	8.5	169	1
PH989-80W	57.3	2	57.3	4.00	9	8.5	8.0	194	2
Delano	56.2	2	56.2	5.00	7	8.0	8.0	164	1
PH990-335	57.3	2	57.6	4.00	9	8.5	8.0	194	2
DA990-15	57.6	2	57.6	4.50	9	7.5	8.0	199	2
Express	60.8	2	60.8	2.50	9	8.0	8.0	205	2
Average	57.33	2	57.35	4.42	7.6	8.19	8.12	181.5	1.5
Min Flt Value	-	2,7,8	61.9	2.75	6	7.5	7.5	165	-
Maj Flt Value	-	1,9-11	60.4	1.75	4	5.0	5.0	155	-

1. Large numbers for mixogrph pattern indicate stronger mixing characteristics.
2. 0 = dead, 9 = elastic.
3. 2 = dull grey, 10 = bright white.
4. 2 = irregular, open and large cells; coarse grain and thick walls; rough and soggy texture.  
10 = close, elongated and uniform cells; fine grain and thin walls; soft texture.
5. 4 is a perfect score, deductions are made for deviation from faulting values.



**Figure 1. Percent depletion during the growing season from AZSCHED software calculations.**