

Performance of Commercial Grain Sorghum Hybrids in Indiana, 2001

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Sorghum has received serious consideration as a grain crop in some Indiana locations. With adapted hybrids and proper management, sorghum will usually produce higher returns than either corn or soybeans on certain soil types and low rainfall areas, especially if the grain is fed to livestock (see Purdue Extension Publication AY-198). This publication provides producers, seedsmen, extension educators and others with information on sorghum hybrid performance.

A total of 53 hybrids from the 12 companies listed in Table 4 were evaluated at three locations in Indiana. One of the earliest sorghum hybrids to be developed, RS610, and a Purdue cultivar of good agronomic quality and wide adaptation, P954063, were used in each year's trials as standards against which newer commercial hybrids can be compared.

LOCATION OF TRIALS

The three trial locations in 2001 are shown in Figure 1.

Location 1 (Tippecanoe County). The trial was at the Purdue University Agronomy Research Center (ARC) near West Lafayette, on a Chambers silty clay loam soil.

Location 2 (Jennings County). The trial was at the Southeast Purdue Agricultural Center (SEPAC) near North Vernon, on a Avonburg silt loam soil.

Location 3 (Knox County). The trial was at the Southwest Purdue Agricultural Center (SWPAC) near Vincennes, on a Ross loam soil.

TRIAL PROCEDURES

Plots. The plots were arranged in a randomized complete block design with three replications at each location. Each plot consisted of two rows 16 feet long with 30 inch row spacing.

Planting. The seedbeds were prepared by conventional tillage. Location 1 was planted with a John Deere Max-emerge planter. Locations 2 and 3 were planted with a two-row cone planter. The seeding rate was approximately 10 seeds per foot. Plant population was thinned to six plants per foot shortly after emergence resulting in approximately 100,000 plants per acre.

Cultural Practices. Ramrod-atrazine pre-plant or pre-emerge herbicide combination was used for weed control in all locations. Each location was cultivated at least once and hand weeded as necessary. An optimum soil fertility level was maintained in order to allow maximum hybrid performance.

Harvest. At the two southern-most locations, heads from all plants in a 10-foot section of each row of the two-row plot were hand harvested. The Tippecanoe County trial was harvested with a plot combine. After threshing, grain moisture was recorded and yields adjusted to 13.5 percent moisture.

Information recorded. Half-bloom, plant height and percent bird damage were recorded during the growing season. Half-bloom is the number of days from planting until 50 percent of the plants have shed pollen halfway down the head. Physiological maturity (cessation of dry matter accumulation in the grain) is reached 35-40 days after half-bloom. Plant height is the average height, in inches, from the soil surface to the tip of the head at maturity. Bird damage was measured by visual estimation of the percentage of grain yield lost to bird feeding.

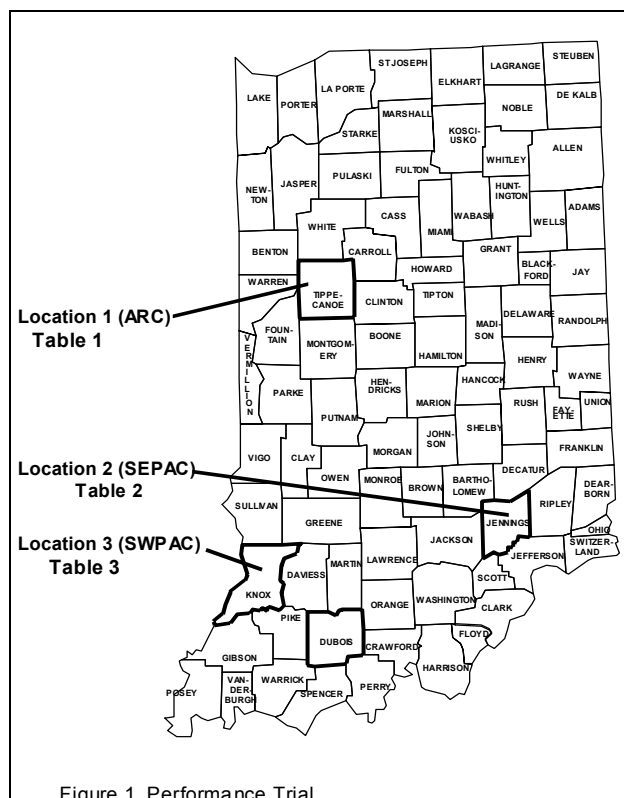


Figure 1. Performance Trial

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RESULTS

Results of the 2001 performance tests are presented by location in Tables 1 through 3. General conditions present at each location are given below.

Location 1 (Tippecanoe County). The hybrids were planted on May 31. Rainfall from April through September totaled 24.58 inches. No lodging or bird damage was observed. A wet spring led to the later than average planting date. The growing season was good. The abundance of rainfall during June and July contributed to higher yields. Growing degree day (GDD) accumulation totaled 3129. Yields averaged 152 bu/acre (8508 lb.), with the highest yielding hybrid averaging 182 bu/acre (10207 lb.). This was one of the highest yielding tests in the last 20 years.

Location 2 (Jennings County). The hybrids were planted on June 15. Rainfall from April through September totaled 29.28 inches. With the wet early conditions, stand establishment for poor for some hybrids. No bird damage or lodging was observed at this location. This was a very good growing season. Yields averaged 7109 bu/acre (6091 lb.), with the highest yielding hybrid averaging 138 bu/ac.(7738 lb.) This was an above average test.

Location 3 (Knox County). The hybrids were planted on June 14. Rainfall from April through September totaled 15.11 inches. The trial was slightly damaged by birds, with the average amount of bird feeding surpassing 20 percent of the potential yield on some hybrids, resulting in the higher than acceptable variability (CV). Yields averaged 98 bu/acre (5472 lb.), with the highest yielding hybrid averaging 134bu/ acre (7525.). This was an above average test at this location.

DISCUSSION

An analysis of variance was conducted and the Least Significant Difference (LSD) computed at the 5 percent level of significance. The LSD indicates how much one entry must differ from another entry within a location to be reasonably certain that it is a true difference. If the yield difference between the two hybrids is less than the LSD, then other factors must be considered in deciding which hybrids to grow, such as days to flowering. The LSD is given in the same units as the average (i.e. pounds per acre, etc.). An asterisk (*) beside a yield average on a performance table indicates that the yield is not significantly different from the highest yield in the table.

The coefficient of variation (CV) was determined for the traits measured. The CV measures the amount of experimental error relative to the average and indicates how much error was present. When yields are high relative to the experimental error, the CV will be small.

Growing degree day (GDD). A modified 50 scale was used. GDD equals daily mean minus 50 (below 50 adjust to 50, above 86 adjust to 86). April 1 thru September was recorded.

Participating companies. The companies participating in the 2001 performance trials are listed in Table 4.

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Table 1. 2001 Grain Sorghum Performance Trial, Location 1, Tippecanoe Co.

Brand	Hybrid	Yield lb/acre	Half bloom days	Height in.
PRODUCTION+	PP777	10207*	69	60
CROSBYTON	X1481	10163*	68	59
Pioneer	84G62	10034*	69	54
PRODUCTION+	PP644	9895*	66	56
WARNER	624Y	9845*	68	60
WARNER	WX99031	9790*	69	48
NC+	7B47	9539*	65	53
WARNER	W-816-E	9456*	67	59
GARST	5522Y	9387*	68	62
U A P SEED	DG780B	9351*	68	64
PRODUCTION+	PP599W	9304*	67	60
Pioneer	8522Y	9274*	67	54
Cargill	837	9209*	68	60
Cargill	737	9200*	64	49
GARST	5503	9197*	67	59
ASGROW	A571	9128*	70	58
Dekalb	DK41Y	9114*	67	60
CROPLAND	454	9107*	66	62
Cargill	775Y	9056*	66	56
MYCOGEN	3700	9051*	65	61
Pioneer	85G85	9037*	61	52
Cargill	697	8935*	66	52
TRIUMPH	TRX94893	8825*	65	54
NC+	6B50	8821*	65	52
GARST	5440	8674	67	60
WARNER	W-818-E	8662	66	64
NC+	7B29	8626	68	52
WARNER	902W	8605	70	66
GARST	5664	8544	65	50
GARST	5631Y	8517	64	50
Pioneer	8500	8483	61	52
NC+	7R83	8441	68	58
PRODUCTION+	PP799E	8338	67	63
Dekalb	DK 40Y	8327	64	57
MYCOGEN	M3838	8185	65	52
NC+	6B67	8165	66	51
TRIUMPH	TR465	8159	67	56
TRIUMPH	TR438	8153	61	51
TRIUMPH	TR82G	8050	69	63
CROPLAN	414	8037	63	48
TRIUMPH	TRX93390	7981	64	54
Pioneer	8699	7973	62	55
Dekalb	DK 45	7955	66	60
Pioneer	87G57	7888	58	49
U A P SEED	DG762B	7836	65	62
MYCOGEN	1482	7691	63	48
PRODUCTION+	PP333	7469	63	48

Table 1. Continued

Brand	Hybrid	Yield lb/acre	Half bloom days	Height in.
U A P SEED	DG 751	7432	67	61
GARST	5515	7383	62	52
WARNER	858E	7316	68	62
TRIUMPH	TR464	7168	66	62
GARST	5516	6868	61	48
Pioneer	86G71	6105	60	50
Check	RS610	6031	63	57
Check	P954063	5951	68	59
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Grand mean		8508	66	56
LSD (5%)		1505	1	3
C.V. (%)		11	1	3

Randomized complete block design.

Yield averages followed by * are not significantly different from the highest average yield in this table.

Table 2. 2001 Grain Sorghum Performance Trial, Location 3, Jennings County.

Brand	Hybrid	Yield lb/acre	Half bloom days	Height in.
Triumph	TR464	7738*	72	63
CROSBYTON	X1481	7088*	73	58
Cargill	837	7053*	74	59
PRODUCTION+	PP599W	6978*	71	58
Pioneer	87G57	6882*	69	51
NC+	7R83	6851*	73	58
PRODUCTION+	PP644	6806*	73	54
MYCOGEN	3700	6666*	74	60
Dekalb	DK 45	6633*	74	60
U A P SEED	DG 751	6629*	72	59
Cargill	697	6625*	72	50
CROPLAND	454	6561*	72	63
PRODUCTION+	PP333	6532*	71	55
U A P SEED	DG762B	6532*	73	60
PRODUCTION+	PP777	6531*	73	59
GARST	5522Y	6515*	72	58
NC+	7B29	6427*	72	54
Pioneer	8699	6413*	71	54
WARNER	624Y	6322	74	60
Pioneer	85G85	6283	72	54
PRODUCTION+	PP799E	6252	75	58
GARST	5515	6238	70	58

Table 2. Continued

Brand	Hybrid	Yield lb/acre	Bird	
			Height in.	damage %
Pioneer	84G62	6209	73	56
NC+	6B50	6183	71	51
TRIUMPH	TR82G	6159	74	59
GARST	5664	6125	71	54
Pioneer	8500	6098	70	53
GARST	5516	6083	69	48
Dekalb	DK 40Y	6063	74	59
CHECK	P954063	6007	75	58
WARNER	WX99031	6003	73	48
U A P SEED	DG780B	5991	73	60
NC+	7B47	5935	74	55
MYCOGEN	1482	5934	72	48
TRIUMPH	TRX94893	5926	73	55
Cargill	775Y	5911	71	55
ASGROW	A571	5872	73	59
WARNER	858E	5858	75	58
GARST	5440	5810	75	58
NC+	6B67	5761	71	50
WARNER	W-818-E	5754	76	62
GARST	5503	5750	74	55
PIONEER	86G71	5744	69	51
CROPLAN	414	5732	69	51
GARST	5631Y	5519	72	52
TRIUMPH	TR438	5470	70	54
CHECK	RS610	5436	72	55
Dekalb	DK 41Y	5419	73	59
Cargill	737	5364	70	51
TRIUMPH	TR465	5319	73	55
MYCOGEN	M3838	5286	72	52
Pioneer	8522Y	5149	72	56
WARNER	W-816-E	5055	71	56
TRIUMPH	TRX93390	4894	74	55
WARNER	902W	4626	75	65
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Grand mean		6091	72	56
LSD (5%)		1363	3	4
C.V. (%)		14	2	5

Randomized complete block design

Yield averages followed by * are not significantly different from the highest average yield in this table.

Table 3. 2001 Grain Sorghum Performance Trial, Location 3, Knox County.

Brand	Hybrid	Yield lb/acre	Bird	
			Height in.	damage %
NC+	6B50	7525*	54	3
WARNER	WX99031	7479*	48	0
PRODUCTION +	PP644	7077*	56	2
Cargill	737	6752*	50	0
Cargill	775Y	6731*	51	0
CROSBYTON	X1481	6610*	59	2
NC+	6B67	6532*	50	0
TRIUMPH	TR82G	6510*	61	5
GARST	5503	6507*	59	0
Pioneer	84G62	6505*	55	2
GARST	5631Y	6275*	48	3
WARNER	858E	6270*	58	0
PRODUCTION+	PP333	6124*	50	0
PRODUCTION+	PP599W	5988*	58	5
Pioneer	85G85	5973*	52	7
NC+	7B29	5840*	51	0
TRIUMPH	TRX93390	5718*	55	2
WARNER	W-816-E	5715*	62	0
TRIUMPH	TR464	5657*	60	15
GARST	5516	5632*	48	23
GARST	5664	5614*	52	0
Dekalb	DK 45	5612*	62	2
Pioneer	8522Y	5596*	52	0
GARST	5522Y	5593*	60	5
CHECK	P954063	5551*	58	0
WARNER	624Y	5530*	58	2
MYCOGEN	M3838	5521*	50	0
GARST	5440	5482*	60	12
MYCOGEN	1482	5481*	50	8
TRIUMPH	TR465	5410*	55	0
NC+	7B47	5315*	56	5
PIONEER	86G71	5258*	52	5
GARST	5515	5235*	53	5
Dekalb	DK 40Y	5126	56	3
CHECK	RS610	5088	57	3
WARNER	W-818-E	5044	64	5
CROPLAND	454	5006	58	5
MYCOGEN	3700	4990	60	0
Pioneer	8699	4949	53	23
Dekalb	DK 41Y	4933	58	5
U A P SEED	DG780B	4928	60	2
ASGROW	A571	4927	58	5
CROPLAN	414	4918	50	15
Cargill	837	4901	63	12
Pioneer	87G57	4722	50	35
TRIUMPH	TRX94893	4671	55	2
U A P SEED	DG 751	4526	62	7
Cargill	697	4478	54	8
PRODUCTION+	PP799E	4427	60	15
NC+	7R83	4412	60	8
PRODUCTION+	PP777	4382	59	17

Table 3. Continued

Brand	Hybrid	Yield lb/acre	Height in.	Bird damage %
Pioneer	8500	4365	55	8
TRIUMPH	TR438	4333	51	10
U A P SEED	DG762B	4049	63	18
WARNER	902W	3145	66	27
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Grand mean		5472	56	6
LSD (5%)		2315	5	12
C.V. (%)		26	5	123

Randomized complete block design

Yield averages followed by * are not significantly different from the highest average yield in this table.

Table 4. Entrants in the 2001 Indiana Grain Sorghum Performance Trials

BRAND-HYBRID
Warner Seeds, Inc.
UAP Seed
Crosbyton Seed Company
Pioneer Hi-Bred International
Triumph Seed Co., Inc.
Production-Plus +
NC+ Hybrids
Dekalb
Cropland
Mycogen
Garst
Asgrow