Performance of Commercial Grain Sorghum Hybrids in Indiana, 1997

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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 28 hybrids from the 6 companies listed in Table 4 were evaluated at four 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 four trial locations in 1997 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 an 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.

Location 4 (Dubois County). The trial was at the Southern Indiana Purdue Agricultural Center (SIPAC), near Dubois, on a Tilsit silt 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 Maxemerge planter. Locations 2, 3, and 4 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.

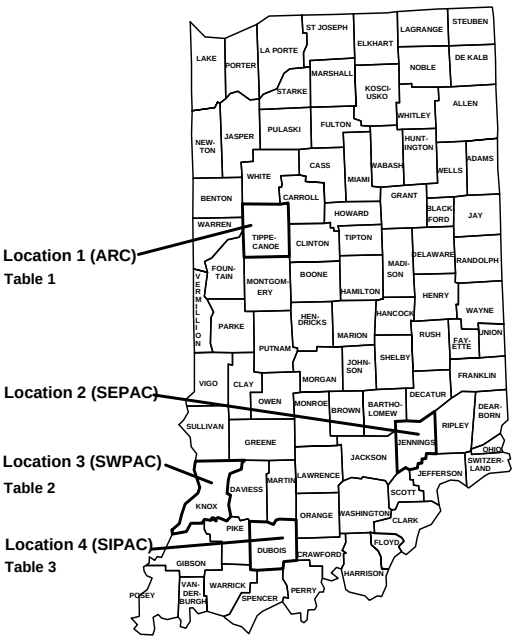

Figure 1. Performance Trial Locations

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RESULTS

Results of the 1997 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 17. Rainfall from April through October totaled 18.88 inches. No lodging or bird damage was observed. A very wet spring contributed to the late planting date. The growing season was good. The lack of rainfall during July and August did not reduce yield. Growing degree day (GDD) accumulation totaled 3137. Yields averaged 159 bu/acre (8920 lb.), with the highest yielding hybrid averaging 187 bu/acre (10448 lb.). This was one of the highest yielding tests in the last 16 years.

Location 2 (Jennings County). The hybrids were planted on May 21. Rainfall from April through October totaled 25.04 inches. With the wet, early conditions, stand establishment was very poor, resulting in the abandonment of this location.

Location 3 (Knox County). The hybrids were planted on June 11. Rainfall from April through October totaled 24.56 inches. Extremely wet conditions in June and July, followed by drought-like conditions in the following months, stressed the crop. The trial was also 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). Growing degree day (GDD) accumulation totaled 3575. Yields averaged 60 bu/acre (3361 lb.), with the highest yielding hybrid averaging 87 bu/acre (4848 lb.).

Location 4 (Dubois County). The hybrids were planted on June 25. Rainfall from April through October totaled 24.61 inches. A small amount of bird damage was observed for some of the hybrids. An early wet season contributed to the very late planting date. Growing degree day (GDD) accumulation totaled 3446. Yields averaged 89 bu/acre (4976 lb.), with the highest yielding hybrid averaging 102 bu/acre (5706 lb.).

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 October 31 was recorded.

Participating companies. The companies participating in the 1997 performance trials are listed in Table 4.

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Table 1. 1997 Grain Sorghum Performance Trial, Location 1, Tippecanoe Co.

Brand	Hybrid	Yield lb/acre	Half-bloom days	Height in.
Triumph	TR82G	10448*	87	52
AgriPro	AP9850	10315*	85	54
Crosbyton	1489	9996*	82	53
Cargill	837	9891*	82	49
Crosbyton	9095	9644*	85	48
Crosbyton	5789	9437*	88	49
Cargill	730	9261	81	45
AgriPro	AP2949	9246	85	49
Agra Tech	GK-802 G	9142	81	49
AgriPro	AP2838	9115	83	49
Triumph	TR65G	9094	82	50
AgriPro	CHEROKEE	9040	84	48
Cargill	770Y	8945	84	46
Cargill	X12027	8832	82	43
Cargill	737	8643	80	42
Crosbyton	7094	8599	84	46
Agra Tech	805 W G	8533	80	48
Triumph	TR462	8341	81	46
Crosbyton	7043	8181	83	42
-check	RS610	7870	77	54
Agra Tech	792G	7472	76	45
-check	P954063	5502	87	46
Grand mean		8920	83	48
LSD (5%)		1033	2	3
C.V. (%)		7	1	4

Yields followed by an asterisk (*) are not significantly different from the highest yield.

Table 2. 1997 Grain Sorghum Performance Trial, Location 3, Knox County.

Brand	Hybrid	Yield lb/acre	Half-bloom days	Height in.	Bird Damage %
Cargill	737	4848*	70	42	13
Pioneer	8522Y	4600*	68	39	7
Agra Tech	792G	4395*	65	44	15
Cargill	770Y	4021*	66	41	8
AgriPro	HY2660	3957*	70	39	10
AgriPro	AP9850	3880*	69	44	12
Crosbyton	1489	3843*	73	46	10
AgriPro	AP2949	3814*	72	42	10
Cargill	837	3719*	69	46	15
Triumph	TR65G	3718*	72	44	12
Crosbyton	9095	3578*	68	42	13
-check	P954063	3519*	75	44	13
Agra Tech	GK-802 G	3483*	74	40	12
AgriPro	AP2838	3469*	72	42	15
AgriPro	AP2800	3286*	66	40	4
Cargill	730	3280*	72	42	13
AgriPro	Cherokee	3268*	71	45	17
Triumph	TR459	3244*	73	37	13
Pioneer	8310	3236*	72	46	27
Agra Tech	805 W G	3082*	70	43	18
Crosbyton	5789	3066*	74	44	17
Triumph	TR462	3002*	73	41	8
Cargill	X12027	2856*	72	40	12
Pioneer	8305	2512	70	48	17
-check	RS610	2505	66	41	15
Crosbyton	7043	2055	76	38	16
Crosbyton	7094	2015	76	43	20
Pioneer	8446	1866	73	40	13
Grand mean		3361	71	42	13
LSD (5%)		2235	8	4	12
C.V. (%)		40	7	6	52

Yields followed by an asterisk (*) are not significantly different from the highest yield.

Table 3. 1997 Grain Sorghum Performance Trial, Location 4, Dubois County.

Brand	Hybrid	Yield lb/acre	Half-bloom days	Height in.
AgriPro	AP 2838	5706*	63	48
Pioneer	8305	5661*	61	50
Crosbyton	1489	5579*	58	50
Agra Tech	GK-802 G	5471*	62	47
Triumph	TR82G	5468*	63	49
Agra Tech	805 W G	5446*	62	48
Crosbyton	5789	5384*	62	48
Agra Tech	792G	5358*	60	48
AgriPro	AP9850	5297*	61	49
AgriPro	CHEROKEE	5271*	61	50
AgriPro	HY2660	5253*	61	44
AgriPro	AP2949	5218*	65	47
Pioneer	8446	5191*	56	44
Crosbyton	9095	5158*	62	48
Pioneer	8522Y	5134*	48	45
Cargill	X12027	5131*	61	43
Triumph	TR462	5068*	58	48
Crosbyton	7043	5045*	61	45
Triumph	TR481	4788*	64	47
AgriPro	AP2800	4728*	64	47
Cargill	730	4677*	63	43
Triumph	TR65G	4586*	61	48
Cargill	737	4574*	59	43
Cargill	770Y	4536*	58	45
Pioneer	8310	4473*	62	47
Cargill	837	4466*	59	48
Crosbyton	7094	4076	61	49
-check	RS610	4009	54	49
-check	P954063	3875	64	49
Grand mean		4976	60	47
LSD (5%)		1400	5	3
C.V. (%)		17	5	3

Yields followed by an asterisk (*) are not significantly different from the highest yield.

Table 4. Entrants in the 1997 Indiana Grain Sorghum Performance Trials

Company	Address
Agra Tech	Agra Tech Seeds, Inc. 559 N. 550 W. McCordsville, IN 46055
AgriPro	AgriPro Seeds, Inc. 4794W. 350N. Danville, IN 46122
Cargill	Cargill Hybrid Seeds P.O. Box 5645 Minneapolis, MN 55440
Crosbyton	Crosbyton Seed Co. P.O. Box 429 Crosbyton, TX 7932
Pioneer	Pioneer Hi-Bred Int'l P.O. Box 308 Tipton, IN 46072
Triumph Seed	Triumph Seed P.O. Box 1050 Ralls, TX 79357