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2006 Grain Sorghum Update

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ARKANSAS GRAIN SORGHUM PERFORMANCE TESTING AND HYBRID SELECTION - 2006

Grain sorghum performance trials were conducted at four locations (Figure 1) in Arkansas in 2006. The information provided includes yield potential and agronomic considerations for successful grain sorghum production. This publication is intended to help producers' select high-yielding hybrids for planting under Arkansas conditions.

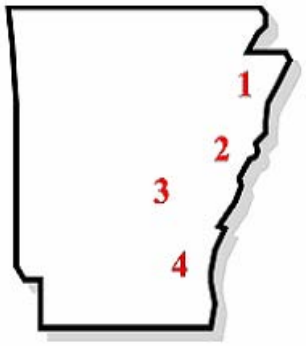

FIGURE 1. LOCATIONS OF ARKANSAS GRAIN SORGHUM PERFORMANCE TESTS, 2006

1 – Northeast Research and Extension Center, Keiser – Irrigated & Non-irrigated - Sharkey Clay Soil

2 – Lon Mann Cotton Branch Station, Marianna – Irrigated - Calloway Silt Loam Soil

3 – Rice Research and Extension Center, Stuttgart – Irrigated – Crowley Silt Loam Soil

4 – Southeast Research and Extension Center, Rohwer – Irrigated & Non-irrigated – Herbert Silt Loam Soil

Methods

Grain sorghum hybrids were evaluated in the Arkansas Grain Sorghum Performance Trials to provide an unbiased comparison of their performance. In general, recommended cultural practices were used and tailored by location.

Each trial consisted of 26 hybrids replicated four times in a randomized complete block design. Four trials were irrigated as needed according to the Arkansas Irrigation Scheduler program and two trials were non-irrigated. Phosprorus and Potassium were applied according to soil test analysis and nitrogen rates ranged from 150 to 175 lbs/acre, depending on trial location. Row spacing was 38 inches at Keiser and Rowher, 32 inches at Stuttgart, and 30 inches at Marianna. For additional information on agronomic practices conducted in each trial , consult the *Arkansas Corn and Grain Sorghum Performance Test – 2006*, Arkansas Agricultural Experiment Station. (www.arkansasvarietytesting.org)

Hybrid Selection

Numerous grain sorghum hybrids are commercially available in Arkansas. Breeding programs exist for the development of high-yielding hybrids that provide desired agronomic characteristics and disease resistance. These hybrids are released yearly, and many are included in the Arkansas Grain Sorghum Performance Testing program.

Hybrid selection is an important management decision for successful grain sorghum production. Yield potential is important, but should not be the primary concern when selecting a hybrid. Other characteristics such as lodging potential, disease reaction, and head exertion should also be considered. Grain sorghum yields are influenced by the hybrid adaptation and by the level of management to maximize the genetic yield potential. No hybrid is superior to all other hybrids under all circumstances. Thus, selecting two or more hybrids is recommended, which not only spreads the risks associated with adverse environmental factors but also benefits management operations such as harvesting.

The performance of any given hybrid will likely differ from site to site each year. While the yield data from all locations may be helpful, the data from the locations closest to your farm may be the most meaningful. Choosing hybrids that perform well at the location representing a soil type similar to yours is also suggested. Hybrid performance differs by location due to disease and environmental factors. By selecting a hybrid with a two- and three-year yield average, a more realistic performance of that hybrid can be evaluated. Therefore, selecting adapted grain sorghum hybrids with a two or three-year yield history is important. (See Table 2.)

Bacterial Diseases

Bacterial Leaf Spot -Bacterial leaf spot is caused by *Pseudomonas syringae pv. syringae.* It is common throughout the state, but especially in south Arkansas. Symptoms include small water-soaked spots on the lower leaves, which gradually enlarge into round lesions, usually with reddish borders. On certain hybrids, margins die and turn dark brown. As lesions dry out, the centers become tan to off-white. At this stage, leaf spot can resemble other leaf-spotting problems caused by herbicide drift, fungi, etc. Bacterial leaf spot is common in the spring when wet and windy conditions persist, but the disease usually decreases during hot and dry summer weather. The bacterium survives in crop debris and certain weedy grasses. Control measures include crop rotation, destruction of crop residue, good weed control, and planting resistant hybrids.

Bacterial Leaf Streak - Bacterial leaf streak is caused by *Xanthomonas campestris var holcicola.* The disease is common throughout Arkansas. Symptoms include water-soaked streaks between the leaf veins that grow to several inches long, and become purple on most hybrids. The streaks often give the leaves a striped appearance when heavily infected. In very susceptible hybrids, the stripes join into large blotches, killing the leaf. The disease is most common in the spring under warm wet conditions. It usually becomes less serious during the hot dry summer months. Control measures include crop rotation, destruction of crop residue, and planting resistant hybrids.

Fungal Diseases

Anthracnose - Anthracnose is caused by *Colletotrichum sublineolum* (formerly *C. graminicola*). This disease is very common throughout Arkansas and can be found in most fields near harvest. It is favored by warm temperatures, heavy dews, and frequent rains. Anthracnose can cause death of seedlings, leaves, stems, peduncles, and heads and can cause stalk rot and lodging. Anthracnose symptoms include small purple or tan round spots, first noticed on foot-tall plants but often becoming much more severe at flowering and later. Serious yield loss may result if heavily diseased fields are not harvested quickly. On resistant hybrids, spots stay 1/8" or less in size. On susceptible hybrids, spots grow quickly to ½" or more in size and may develop wide yellow borders. Plant resistant hybrids to minimize damage from anthracnose. Anthracnose may be reduced by plowing down infected crop remains, crop rotation for at least 1 year, and good grassy weed control. Sorghum anthracnose does not affect corn although corn has a similar disease.

TIP! ***When the grain reaches the proper moisture, harvest the field. DO NOT WAIT.***

Leaf Blight. Leaf blight is caused by *Exserohilum turcicum* and is widespread in Arkansas. The disease is favored by mild temperatures between 64 - 81 F with heavy dews or rain. It may occur early in the season and continue until grain fill unless slowed by dry weather. On susceptible hybrids under favorable weather, yield losses can approach 50%. The fungus survives on weedy grasses, infected residue, and infested seed. Symptoms include small reddish or tan spots that grow into large elliptical reddish purple or tan lesions, up to ½" wide x 1-6" long. The surface of the lesions may become covered with spores of the fungus, turning the surface dark gray. Control options include resistant hybrids, crop rotation, and control of weedy grasses.

Charcoal Rot - Charcoal rot is caused by a soil-borne fungus, *Macrophomina phaseolina*. It is a major disease of soybean, grain sorghum, and corn in Arkansas, especially in non-irrigated fields. High-yielding hybrids appear to be especially susceptible, particularly when drought-stressed. Charcoal rot is noticed late in the season when headed plants lodge, usually in spots or

areas of a field. Other symptoms include a dried, stringy appearance of the stem near the soil line (at the fold on lodged plants) and the presence of very tiny black sclerotia in the stem tissue. The fungus is soil-borne and survives as sclerotia. High temperatures and drought greatly increase the disease. Charcoal rot can be reduced by timely and adequate irrigation, proper application of potash fertilizer according to a recent soil test, and use of the recommended amount of nitrogen fertilizer. Resistant hybrids are not available.

Head Blight and Molds- Head blight and molds are caused by several fungi. *Fusarium moniliforme, Fusarium semitectum, Curvularia lunata, Phoma sorghina, Helminthosporium spp.* and *Alternaria spp*. are generally considered to be head molds. Also, *Colletotrichum* (anthracnose) can infect heads under certain conditions. Symptoms of head molds include pink, orange or white grains (Fusarium*)* ;black grains (*Curvularia, Alternaria or Helminthosporium);* or grains with small black dots (*Phoma* or *Colletotrichum)*. Head blight usually refers to the infection of the neck or parts of the head, resulting in the death of the head or various parts. Head blights can be caused by *Fusarium* or *Colletotrichum*. Head blights and molds can be minimized by spreading out planting dates so that not all fields flower and head at the same time. Certain hybrids are less susceptible than others but complete resistance is not available. If head molds are heavy within a field, the grain should be tested before being fed to animals since certain *Fusarium* fungi can produce mycotoxins.

Target Spot - Target spot is caused by *Bipolaris sorghicola*. This is a potentially serious disease that was first noticed in Arkansas at serious levels in 2001, but only in an isolated location. Symptoms include reddish or grayish spots which later develop into irregular or barrel-shaped lesions up to 4" long on leaves. Rarely the spots develop a tan center. The fungus attacks all plant parts and can develop all season. The fungus survives in infected debris or on weed hosts such as johnsongrass. A few hybrids appear to be resistant and should be planted if the disease becomes a problem. Crop rotation and good weed control are also helpful.

Zonate Leaf Spot - Zonate leaf spot is caused by *Gloeocercospora sorghi*. This is a very common disease throughout Arkansas but is generally minor. Symptoms include very large (1-3") circular lesions that have alternating straw-colored and purple rings. Young lesions are purple blotches that may have tan irregularly shaped spots in the centers. The fungus survives in soil and infected plant debris. During warm and wet weather, pinkish-orange slime containing spores may be visible on the lesions. The fungus is spread by rain and water and the disease can be severe in wet periods. Moderately resistant hybrids are available for planting. Crop rotation and good weed control (especially of johnsongrass) minimize the disease.

Sorghum Ergot - Sorghum ergot is caused by a fungus called *Claviceps africanae*. The disease was introduced into the United States a few years ago and has caused significant losses in hybrid seed production fields in certain states. The disease has not caused serious losses in commercial hybrids to date, only in hybrid seed production. Sorghum ergot was first reported in northeast Arkansas in 2000 in a late-planted field. The disease was not found or reported in Arkansas in 2001 or since. The fungus usually only infects sterile flowers and produces a fungal ergot that oozes spore-filled honey dew attractive to certain flies and other insects. Spores in the honey dew infect other flowers nearby. Ergots gradually mature and turn darker in color but do not grow larger than individual sorghum grains. Control has thus far not been needed in commercial hybrids but the disease will be monitored the next few years in most grain sorghum states. All commercial hybrid seed is treated to minimize the spread of the disease by seed and crop rotation may become important if the problem increases. Planting grain sorghum at recommended dates should help. Planting late is not recommended since lower night temperatures in August can lead to sterile flowers that are more easily infected by the fungus.

Table 1. Yields of Grain Sorghum Hybrids in Arkansas Performance Trials, 2006 [1]								
	Keiser Irr.	**Keiser Nonirr.**	**Maria. Irr.**	**Stutt. Irr.**	**Rohwer Irr.**	**Rohwer Nonirr.**	**Irrig. Avg.**	**Nonirr Avg**
Hybrid	**----------lbs/acre----------**							
Asgrow A571	**8615**	**6582**	**9562**	7653	**8491**	**7191**	**8580**	**6887**
Dekalb DKS37-07	5610	5119	8871	6892	7590	6369	7241	5744
Dekalb DKS54-00	**7783**	**6465**	8501	**8197**	7661	6215	8036	6340
Dyna Gro 751B	**7909**	**6243**	**10746**	**8295**	6756	6505	**8427**	6374
Dyna Gro 754B	6814	5510	**9457**	7113	6884	**6925**	7567	6218
Dyna Gro 758B	7128	5786	9122	6983	**7846**	**7093**	7770	**6440**
Dyna Gro 780B	**8124**	5917	9108	**7798**	7057	6345	8022	6131
Dyna Gro GX06750	**7815**	**6532**	9072	7342	7706	**6973**	7984	**6753**
Dyna Gro X1743	**7374**	**6429**	9422	6791	**8503**	**7215**	8023	**6822**
FFR 322	**7697**	**5937**	**9691**	**8663**	7565	**7363**	**8404**	**6650**
Garst 5360	7035	5518	9142	6029	7702	6619	7477	6069
Garst 5401	6788	4785	**9489**	**7920**	**8953**	**7184**	**8288**	5985
Garst 5515	6525	5346	8671	7514	7444	5977	7539	5662
Golden Acres 3827	**8004**	**6188**	**9796**	**8517**	**8427**	**6996**	**8686**	**6592**
Golden Harvest H-502	**7495**	**6699**	**9790**	**8206**	7366	6559	**8214**	**6629**
Golden Harvest H-511	**7380**	**6601**	9139	7006	**7831**	6767	7839	**6684**
Monsanto MSC 432	**7572**	**6089**	7820	**7800**	7576	**7106**	7692	**6598**
Monsanto MSD 472	6306	4775	**10546**	7639	**8327**	**7116**	**8205**	5946
Monsanto MSD 477	5747	3874	8572	6672	**8174**	6715	7291	5295
NC+7B51	7303	5117	**9967**	**8933**	**7894**	**6938**	**8524**	6028
Pioneer 84G62	**7874**	**7174**	**10527**	**9376**	**8765**	**7514**	**9136**	**7344**
Terral TV1050	7095	**6013**	8953	**8196**	7396	**6908**	7910	**6461**
Terral TV93S72	6824	5766	9165	7522	7050	**7164**	7640	**6465**
Terral TV9421	7167	5681	**9841**	**7786**	**8253**	**7400**	**8262**	**6541**
Terral TV96H81	**8018**	**6898**	**10414**	**8407**	7157	6820	**8499**	**6859**
Terral TVX96H91	**8381**	**7088**	**10027**	**9122**	**9102**	**7481**	**9158**	**7285**
Grand mean	7322	5928	9439	7784	7826	6902	8093	6415
LSD (5%)	689	1182	840	1003	754	800		
C.V. (%)	6.7	12.0	6.3	9.2	6.9	8.3		

[1]Keiser = Northeast Research and Extension Center, Maria. = Lon Mann Cotton Branch Station, Stutt. = Rice Research and Extension Center, Rohwer = Southeast Research and Extension Center - Rohwer Division

***Yields in Bold indicate that the hybrid yielded equal to or greater than the trial average.

Table 2. Two and Three Year Average Yields of Grain Sorghum Hybrids in Arkansas Performance Trials, 2003-2006.														
	Keiser Irr.		Keiser NonIrr		Marianna Irr.		Stuttgart Irr.		Rohwer Irr.		Rohwer NonIrr		All Sites 2-Year Average	
	2-Year	3-Year	2-Year	3-Year	2-Year	3-Year	2-Year	3-Year	2-Year	3-Year	2-Year	3-Year	Irrig.	Non-Irrig.
Brand/Hybrid	----------lbs/acre----------													
Asgrow A571	**8582**	**7973**	6218	6463	**9003**	**7884**	7672	7819	**8673**	**8457**	**7963**	**8077**	**8483**	**7091**
Dekalb DKS54-00	**8193**	**7505**	**6360**	6081	8451	6489	7746	7690	**8592**	**8532**	**7923**	**7816**	**8246**	**7142**
Dyna Gro 751B	**8390**	**7863**	**6512**	**6684**	**9620**	**8101**	**8123**	**8166**	7474	7430	7413	7449	**8402**	6963
Dyna Gro 754B	7451	7063	5948	5929	8829	**7969**	7109	7372	7735	7322	7659	7382	7781	6804
Dyna Gro 758B	7587	•	5996	•	8387	•	7214	•	8211	•	7794	•	7850	6895
Dyna Gro 780B	**8025**	7430	6214	6467	**9300**	**8196**	7644	7963	7654	7759	7328	7553	8156	6771
Dyna Gro X1743	7879	•	**6798**	•	8644	•	7091	•	**8258**	•	7738	•	7968	**7268**
FFR 322	**8235**	**7838**	**6411**	6456	8904	7493	**8073**	**8227**	7816	7730	**7900**	**7745**	**8257**	**7156**
Garst 5360	7532	•	5618	•	8448	•	7020	•	8119	•	7755	•	7780	6687
Garst 5401	7276	•	5421	•	8735	•	7740	•	**9013**	•	**7896**	•	8191	6659
Garst 5515	6750	6241	5714	5929	8354	7297	7543	7420	7856	7618	7179	7049	7626	6447
Golden Acre 3827	**8081**	**7616**	**6429**	**6628**	8826	7463	**8179**	**8304**	8635	**8086**	**8086**	**7784**	**8430**	**7258**
Golden Har. H-502	**8221**	**7828**	**6588**	**6860**	**9316**	**7989**	**7896**	**8012**	7816	7813	7489	7546	**8312**	7039
Pioneer 84G62	**8260**	**7831**	**7006**	**6873**	**9893**	**8126**	**9016**	**9003**	**9308**	**9047**	**8925**	**8730**	**9119**	**7966**
Terral TV1050	7839	**7550**	**6389**	**6524**	8307	6795	**8238**	**8377**	8079	**7969**	**8144**	**7953**	8116	**7267**
Terral TV93S72	7435	7029	6037	5990	8556	**7872**	7397	7487	7580	7501	7695	7421	7742	6866
Terral TV9421	**7942**	7429	6263	6073	8798	7559	**7900**	7845	**8495**	**7983**	**8184**	**7945**	**8284**	**7224**
Terral TV96H81	**8333**	**7982**	**6783**	**6991**	**9386**	**7751**	**7859**	7958	7721	7616	7777	**7807**	**8325**	**7280**
Terral TVX96H91	**8403**	**8030**	**7239**	**7230**	**9435**	7628	**8014**	**8194**	**9032**	**8572**	**7987**	**7828**	**8721**	**7613**
Grand Mean	7917	7547	6313	6479	8905	7641	7762	7989	8214	7962	7833	7739	8199	7073

***Yields in Bold indicate that the hybrid yielded equal to or greater than the trial average.

Table 3. Agronomic Characteristics of Grain Sorghum Hybrids in 2006 Arkansas Performance Trials.					
Brand/Hybrid	**Irrigated Average Plant Height (in.)[1]**	**Non-Irrigated Average Plant Height (in.)[2]**	**Irrigated Average Head Exertion (in.)[3]**	**Non-Irrigated Average Head Exertion (in.)[4]**	**Head Compactness[5]**
Asgrow A571	58.5	51.5	6.3	7.5	3.3
Dekalb DKS37-07	57.8	50.0	7.8	5.0	4.0
Dekalb DKS54-00	60.0	53.0	7.3	6.0	3.7
Dyna Gro 751B	59.5	52.0	6.0	2.5	2.7
Dyna Gro 754B	58.3	47.5	9.3	7.5	4.0
Dyna Gro 758B	57.8	50.0	6.0	6.5	3.7
Dyna Gro 780B	60.0	53.0	6.0	3.0	2.0
Dyna Gro GX06750	59.3	51.5	4.8	5.5	2.7
Dyna Gro X1743	54.8	45.5	6.0	3.5	2.7
FFR 322	56.5	51.0	5.3	4.0	2.7
Garst 5360	60.0	47.0	9.0	6.0	3.3
Garst 5401	62.8	58.5	6.5	6.0	3.7
Garst 5515	56.3	49.5	7.0	5.5	3.3
Golden Acres 3827	57.8	52.0	8.8	6.0	4.0
Golden Harv. H-502	60.5	46.0	7.8	1.0	3.0
Golden Harv. H-511	57.0	51.0	6.5	3.0	4.7
Monsanto MSC 432	61.8	53.5	9.3	7.5	3.3
Monsanto MSD 472	54.5	46.0	8.0	6.5	4.7
Monsanto MSD 477	60.5	56.0	8.3	7.5	4.3
NC+7B51	57.8	49.0	6.5	2.5	4.3
Pioneer 84G62	56.5	51.5	4.0	2.0	3.7
Terral TV1050	57.0	51.5	7.0	4.0	3.3
Terral TV93S72	57.5	51.0	8.3	8.5	2.7
Terral TV9421	54.0	48.0	6.3	6.0	4.0
Terral TV96H81	58.5	52.0	6.8	4.0	2.7
Terral TVX96H91	59.3	54.0	8.5	5.5	3.7
Grand Mean	58.2	50.8	7.0	5.1	3.5

[1] Average height in inches from the soil surface to the top of the grain head, average of Irrigated trials.

[2] Average height in inches from the soil surface to the top of the grain head, average of Non-Irrigated trials.

[3] Average distance in inches from the flagleaf to the base to the head, average of Irrigated trials.

[4] Average distance in inches from the flagleaf to the base to the head, average of Non-Irrigated trials.

[5] Head Compactness Scale:

1 = Head short and oval, rachis branches intermediate in length, 2 = Head long and slender, rachis branches strong and short.

3 = Head elongated and oval, rachis branches beginning to weaken and intermediate in length, 4 = Head elongated and rectangular in shape, rachis branches intermediate in strength and length, 5= Head open and elongated, rachis branches weak.