Grain Sorghum Variety Trial, Gila Bend, AZ, 1994

L. E. Jech and S. H. Husman

Abstract

Eight grain sorghum varieties were grown on two farms in the Gila Bend area of Arizona. Three additional varieties were only grown as entries on one farm or the other. No comparison of farm management techniques is attempted. Dekalb 51 was the highest yielding variety (5582 lb./Ac). Short, mid and full season varieties were included in the trial. The Short season varieties offer some advantages for farm management and rotation programs in the area.

Introduction

Grain sorghum is grown in the Gila Bend area in rotation with cotton and small grains. Sorghum is planted in mid July and harvested in late November and early December. Sorghum hybrids have improved in both quality and yield. This test was conducted to determine if the short season varieties compared favorably with the full and medium season varieties.

Methods and Materials

Nine grain sorghum hybrids were tested in a randomized complete block design on two farms. Three additional hybrids were included on one farm and not the other due to lack of sufficient seed. Fields were under the control of the individual grower and were managed the same as their other grain fields. Plots were full field length. Experiment 1 was drilled on prepared seed beds with the seed line on the shoulder on the water furrow and the other on the dry side of the furrow. Row spacing was 38" and the plots were 12 rows wide. Each treatment was replicated 3 times. Planting was done with the cooperator's equipment and harvesting was done with the University of Arizona small plot combine. Full field strips were harvested in the middle of the plot and weighed. Samples were taken and percent moisture and bushel weights were determined. Bird feeding rates were estimated in Experiment 1 plots and reported in Table 3. Plant populations were taken after stand establishment and percent field germination determined based on the number of seed per pound planted and the population after establishment. Water samples from the wells used to irrigate the fields were collected and analyzed.

Exp. 2 contained 7 of the same hybrids as in Experiment 1. In addition, two hybrids that were unreplicated were also included. Unit planters were used to plant the sorghum on the top of the ridge. Each furrow was irrigated on this farm. As before, each treatment was replicated 3 times in a randomized complete block layout. Two hybrids were included in the experiment and yields are reported but the plots were planted as solid blocks and only one sample was taken. The data was not used in the analysis and is only reported here for comparison. Three rows were harvested with a Massey-Ferguson (MF8) combine.

Crop History (Experiment 1)

Cooperator: Gin Ranch
Soil Type: Glenbar silty clay loam
Elevation: 690 ft.
Planting Method: Drilled on the shoulder of furrows
Planting Date: 13 July 1994 Rate: 13 lb. per acre
Fertilizer: Preplant: none
40 lb. NH_3 in water applied in two (2) 20 lb. applications in irrigation water
Irrigation: By furrow as needed
Harvest: 15-16 December

Crop History (Experiment 2)

Cooperator: Enterprise Ranch
Soil Type: Glenbar silty clay loam
Elevation: 710 ft.
Planting Method: Unit Planter
Planting Date: 20 July 1994 Rate: 11 lb. per acre
Fertilizer: Preplant: 150 lb. and 2 applications (20 lb. each) water run UN 32
Herbicide: 2 pts Atrix
Irrigation: By furrow as needed
Harvest: 15-16 December

Results and Discussion

Water quality results are given in Table 1. Soil type on the farms were similar, but the water used for irrigation on Experment 2 was of lower quality, note especially the SAR and total salts. Yield and agronomic data are presented in Table 2. The difference in plant populations in Exp. 1 are significant and may affect the remainder of the parameters evaluated. It is noted that both Northrup King varieties were among the lowest yielding varieties. Much more consistent plant populations in Experiment 2. The highest yields were Cargill 727 (Exp. 1, 5167 lb./ac; Exp. 2, Dekalb 51, 5582 lb./ac). Both hybrids were medium season length varieties. Short season hybrids, in general had reduced yields compared with other varieties. Table 3 presents bird feeding damage ratings of the hybrids from data collected while harvesting the sorghum on Experiment 1. The early maturing varieties came under heavy feeding pressure while waiting for the longer season hybrids to mature in both experiments and may help explain the lower yields for these hybrids.

Acknowledgments

This work was supported by the Economic Development Board of Electric District No. Eight in its continuing program. Thank go out to the seed companies; Asgrow, Cargill, Dekalb, ICI Seeds, Northrup King and Pioneer for donating seed used in the experiment. The growers who cooperated with us in this endeavor were Delmar John and Ron Rayner without whose effort this would not have been possible.

Table 1. Water test results for irrigation source for the grain sorghum varieties.

	Pounds per Acre-Ft	
Ion Tested[a]	Experiment 1	Experiment 2
Calcium	350.9	457
Magnesium	114.20	217.60
Sodium	462.40	1792.50
Potassium	20.40	29.90
Carbonate	0.00	9.80
Chloride	457.90	776.50
Sulfate	1360.00	2366.40
Sulfate	76.20	500.50
Nitrate	19.60	28.60
Phosphate	0.33	2.18
Boron	0.44	4.62
Electrical Conductivity (mmhos/cm)	1.50	3.00
pH	7.50	8.40
SAR	7.21	10.48
Total Salts, PPM	1052.34	2274.04

[a]Analysis by IAS Laboratories, Phoenix, AZ

Table 2. Agronomic and yield data for grain sorghum hybrid grown in Gila Bend, Maricopa Co., 1994

Variety	Maturity Class	Plant Population (Thousand)	Yield lb./Ac	Bushel Weight	Percent Moisture
Experiment 1 (Drilled)					
Asgrow 504	medium	34.7 c	4809.7 a b c	57.33 a b	17.57 a
Asgrow 570	medium	37.5 b c	4309.7 b c d	58 a b	15.57 b c d
Cargill 577	early	36.6 b c	3690.3 e	57.67 a b	15.98 b
Cargill 727	medium	31.9 c	5166.7 a	57 b	15.27 b c d
Dekalb 28	early	38.2 b c	4071.3 b c d	57 b	15.37 b c d
Dekalb 51	medium	39.6 b c	4906.3 a b	59 a	15.83 b c
Northrup King 1210	early	53 a	2714.3 e	50.33 c	13.6 d
Northrup King 1580	medium	46.3 a b	3727 d e	58.33 a b	15.17 b c d
Pioneer 8505	medium	37.4 b c	4547.3 a b c d	58.67 a b	15.73 b c d
Pioneer 8872	early-medium	40.3 b c	3833.3 c d	58 a b	14.93 d
		LSD=10.3	LSD= 1477.6 lb.	LSD= 1.79 lb.	LSD= 0.89 Percent
Experiment 2 (Unit Planter)					
Asgrow 504	medium	31.1	4916 a b	58.30 d e f	17.40 a
Asgrow 570	medium	32.3	5388 a b	59.00 b c	16.47 a b
Cargill 577	early	34.6	4675 a b c	58.67 c d	16.73 a
Cargill 727	medium	33.4	5362 a b	57.00 h	15.90 b c
Dekalb 28	early	30.9	4847 a b	58.00 e f g	15.70 b c
Dekalb 51	medium	34.2	5582 a	57.67 f g	15.70 b c
ICI 5319*	medium-full	35.8	5182 *	59.00	15.20
ICI 5503*	medium	32.6	4534 *	57.00	15.20
Northrup King 737	full	36.6	3617 c	58.33 d e	16.33 a b
Pioneer 8505	medium	32.1	4863 a b	59.33 a b	15.67 b c
Pioneer 8877	early-medium	33.2	4494 b c	59.67 a	15.60 b c
		F Test not Significant	LSD= 1078 lb.	LSD= 0.88 lb.	LSD= 1.18 Percent

* Unreplicated Entries were not include in analysis and are presented for comparison only.

**Means followed by the same letter are not significantly different (Fisher's LSD, t=0.05)

Table 3. Bird damage rating in Experiment 1.

Hybrid	Percent Damage (Mean)
Asgrow 504	16.7
Asgrow 570	13.3
Cargill 577	24.0
Cargill 727	21.7
Dekalb 28	30.0
Dekalb 51	22.3
Northrup King 1580	31.7
Northrup King 1210	43.3
Pioneer 8505	23.3
Pioneer 8877	40.0