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Silage Sorghum Performance Trial at Stephenville, 1991

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Summary

Sixteen commercial forage sorghum hybrids were evaluated for silage yield, morphological composition, and forage quality at the Texas A&M University Research and Extension Center at Stephenville in 1991. Each hybrid was harvested

twice. At harvest 1, plants were separated into leaves, stalks, and panicles. Whole plants from harvest 1 were analyzed for crude protein (CP) and acid detergent fiber (ADF). Yield average of the experiment was 21.8 tons of 35% dry matter (DM) silage/A and ranged from 18.3 to 26.5 tons/A. Significant differences in morphological composition were noted among hybrids. The tall-growing, late-maturing hybrids generally were composed mostly of stalks (70 to 75%) and few leaves (10 to 27%), with very little panicle (0 to 5%). Hybrids

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differed significantly in CP and ADF; however, these differences did not seem to be related to plant composition.

Introduction

Climatic conditions (frequent drought, high summer temperatures) introduce much risk in corn production for silage in north central Texas. Thus, many producers are turning to silage-type sorghums because of the high biomass yields, drought tolerance, and adaptability to late planting after winter crops. However, sorghum typically is lower in forage quality than corn because of a lower grain and higher fiber concentration.

Our objective was to evaluate 16 silage-type sorghums for yield, morphological composition, and forage quality.

Procedures

The study was done at the Texas A&M University Research and Extension Center at Stephenville. The soil at the Center is a Windthorst fine sandy loam.

Entries were solicited from various seed companies (Table 1), and a \$100 fee was charged for each entry. There were 16 entries from 5 companies. Entries were planted at 8 lb of seed/A on April

30 in two-row plots 30 ft long and 36 in. between rows. Each entry was planted in four replicate plots. Plots received 180 lb nitrogen (N), 70 lb phosphate (P_2O_5), and 10 lb zinc sulfate ($ZnSO_4$)/A before planting. Rainfall was 2.3 in. in April, 4.4 in. May, 3.0 in. June, 0.9 in. July, 6.6 in. August, and 4.8 in. September. No rain fell between June 17 and July 23.

Plots were harvested in mid-July (harvest 1) and regrowth was harvested on October 17 (harvest 2). At each harvest a 10-ft section of each row was hand-cut at a 4-in. height and weighed. A subsample of five plants was chopped in a garden mulcher, and a 1-lb sample of the chopped material was dried at 140 °F for 48 hours to determine DM. A second subsample of eight plants was separated into leaf blade, stalk, and panicle. Individual plant parts were dried at 140 °F for 48 hours. Maturity stage was estimated visually at each harvest according to the scale of Vanderlip and Reeves (1972).

Whole-plant samples from harvest 1 were analyzed for CP and ADF with a calibrated near infrared reflectance spectrometer.

The experimental design was a randomized complete block with four replications. The protected least significant difference (LSD) test was used to compare hybrid means.

Table 1. Seed sources and addresses of seed companies participating in the performance trial.

Hybrid	Company and address
2-Way Sweet Bee	George Warner Seed Company P. O. Box 1877 Hereford, TX 79045
FS-25e	Dekalb Plant Genetics Rt. 2, Box 56 Lubbock, TX 79415
947 843 XSF07 XSF08 XSF09	Pioneer Hibred International, Inc. P. O. Box 788 Plainview, TX 79072
Ranchhand Ponderosa	Western Heritage Seed Co. Box 756 Winters, TX 79567
8480F 8080F 9110F 8010F 9430F 8430F	Crosbyton Seed Co. P. O. Box 429 306 East Main Crosbyton, TX 79322

Results and Discussion

The hybrids '2-Way', 'Ranchhand', '8010F', and '947' each yielded between 24 and 27 tons of 35% DM silage during 1991 (Table 2). These hybrids are all relatively tall and late maturing. The lowest yielding hybrids were 'Ponderosa', '9430F', 'XSF08', and 'XSF09', all earlier in maturity compared with the highest yielding entries. Hybrids differed significantly in morphological composition at harvest 1. The hybrids 2-Way, 'FS-25e', Ranchhand, and 8010F had little panicle and, consequently, more leaf and stalk than did other hybrids. Hot, dry weather in late June and early July severely stressed all entries and caused us to harvest some entries earlier than normal. Thus, the very low panicle proportions of the late-maturing hybrids such as FS-25e, Ranchhand, '9110F', and 8010F at harvest 1 were probably due to the immaturity of the hybrid.

Crude protein concentrations were significantly different among hybrids; however, except for one hybrid ('8080F'), the differences were small. Acid detergent fiber concentrations ranged from 30.3 to

Table 2. Silage yield, morphological composition, and forage quality of 16 forage sorghums at Stephenville in 1991.

Hybrid	Silage yield [†]			Plant composition			Maturity [‡]	Crude protein	Acid detergent fiber
	Harvest 1	Harvest 2	Total	Leaf	Stalk	Panicle			
 tons/A % of whole plant % of dry matter ...		
2-Way	13.6	12.9	26.5	22.3	73.3	4.4	6.3	7.3	31.0
Sweet Bee	11.9	8.4	20.3	10.1	67.6	22.2	6.8	7.0	30.9
FS-25e	13.4	9.2	22.6	27.2	72.8	0.0	4.6	6.7	31.5
947	11.7	12.2	23.9	14.5	64.3	21.2	6.4	7.1	34.2
843F	11.9	10.0	21.9	13.0	65.7	21.3	6.4	7.3	34.1
XSF07	11.4	11.4	22.8	13.2	69.8	16.9	6.4	6.9	32.0
XSF08	9.3	9.4	18.6	11.7	75.0	13.3	6.3	7.4	32.0
XSF09	9.8	9.3	19.1	15.0	66.0	19.0	6.5	6.8	32.0
Ranchhand	12.6	12.2	24.8	21.4	74.1	4.5	6.4	6.8	30.3
Ponderosa	10.1	8.3	18.3	10.5	68.8	20.7	6.4	7.1	33.3
8480F	11.6	10.5	22.1	13.8	71.4	14.8	6.3	7.5	30.6
8080F	10.6	9.3	19.9	12.6	70.8	16.6	6.4	5.8	31.7
9110F	11.8	11.1	22.8	23.1	73.5	3.3	6.2	7.0	31.3
8010F	14.4	10.5	24.9	26.7	71.5	1.8	5.7	6.2	32.0
9430F	11.1	8.5	19.6	11.4	70.0	18.6	6.6	7.2	31.4
8430F	11.3	9.1	20.4	10.2	68.8	21.0	6.5	6.4	33.6
Mean	11.6	10.1	21.8	16.1	70.2	13.7	6.3	6.9	32.0
LSD(0.05)*	2.7	2.4	4.0	4.0	5.8	5.6	0.4	0.9	2.5
C.V.(%) [§]	16.1	16.8	12.9	17.5	5.8	28.8	4.7	9.3	5.4

*LSD = least significant difference at the 5% probability level.

[†]Silage yields adjusted to 35% dry matter.

[‡]Stage 4 = final leaf visible in whorl, 5 = boot stage, 6 = 50% bloom, 7 = soft dough.

[§]C.V. = Coefficient of variation.

34.2%. Neither CP nor ADF seemed to be related to plant composition. Pioneer 947 and 843F had 21% panicle and 34% ADF, whereas 'Sweet Bee' also had 22% panicle but 30.9% ADF.

Literature Cited

Vanderlip, R. L., and H. E. Reeves. 1972. Growth stages of sorghum [*Sorghum bicolor*, (L.) Moench]. *Agron. J.* 64:13-16.