Evaluation of Silage-Type Sorghum Hybrids for Yield and Crude Protein

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Summary

Nineteen silage-type sorghum hybrids were tested 2 years for dry matter production, crude protein content, and days to harvest at the soft dough stage at Stephenville, Texas under dryland conditions. Yields averaged 3.05 to 7.27 tons dry matter per acre with significant differences. Generally, a longer growing period resulted in higher yield and lower crude protein content. Crude protein content was 4.25 to 7.36 percent over 2 years with significant differences among hybrids. Age to soft dough stage varied from 84 to 123 days.

Introduction

Silage use by dairymen has increased in the past few years because of the need for high quality forage. Corn silage is generally considered superior in quality to sorghum, but risk is greater in corn production due to water requirements. This study was undertaken to determine the performance of several silage-type forage sorghum hybrids.

Procedure

Nineteen sorghum hybrids were tested in both 1984 and 1985 on a Windthorst fine sandy loam soil under dryland conditions. Agronomic details of the test are given in Table 1. The range in rainfall was due to different harvest dates for hybrids of differing maturity. Plots were arranged in a randomized complete-block design with four replications. Fertilizer was incorporated by disking prior to bed preparation. Ten feet of the center row were harvested with a machete at the soft dough stage of maturity. Date of harvest was recorded and days from planting to harvest determined. Whole-plant samples were cut into 6-inch lengths and dried at 70°C and used to determine dry matter production and crude protein by the Kjeldahl method. The analysis of variance procedure was used to determine significance of main effects and Duncan's multiple range test was used to make multiple comparisons of hybrid yield and crude protein content.

KEYWORDS: Silage/sorghum/hybrids/dry matter/crude protein.

Results and Discussion

The 2-year mean dry matter production ranged from 3.05 to 7.27 tons/A (Table 2). Dry matter production of the four highest ranked hybrids was significantly greater than that of the nine lowest ranked hybrids. Hybrid ranking each year was similar to the 2-year ranking. Test yields in the 2 years were the same despite greater rainfall and nitrogen application in 1985. Generally, higher yields resulted from a longer growing period which ranged from 84 to 123 days for the 2-year mean (Table 4).

Crude protein content averaged 4.29 to 7.36 percent over 2 years (Table 3). Generally, there was an inverse relationship between yield and crude protein content. Test mean in 1985 was about 1 percent lower despite a higher rate of nitrogen fertilizer and dry matter yield equal to that of 1984.

TABLE 1. AGRONOMIC DATA FOR SILAGE SORGHUM PERFORMANCE TEST AT STEPHENVILLE IN 1984 AND 1985

	1984	1985
Plant Date	April 27th	May 16th
Fertilizer (N-P_2O_5-K_2O)	148-60-0 lbs/acre	206-72-0 lbs/acre
Fertilizer Application Date	03/08/84	03/07/85
Fertilizer Source	130 lbs/acre 18-46-0 270 lbs/acre Urea	157 lbs/acre 18-46-0 387 lbs/acre Urea
Plant Population	3.5-5.5 plants/row-ft	3.5-5.5 plants/row-ft
Rainfall (acre-inches)	5.05 - 6.24[1]	9.10 - 9.22[1]
Harvested Length	10 row-feet	10 row-feet
Plot Size	15 ft x 3 rows	15 ft x 3 rows

[1]Range in rainfall is due to harvesting plants of differing maturity as they reach soft dough stage.

TABLE 2. DRY MATTER YIELDS OF 19 HYBRIDS OF SILAGE-TYPE SORGHUMS OVER 2 YEARS AT STEPHENVILLE

		Dry Matter (tons/A)		
Hybrid	Seed Source	1984	1985	Mean
FS-25a+	DeKalb-Pfizer	7.76a[1]	6.79ab	7.27a
HW5574	Funk	7.26ab	6.70ab	6.98ab
CowVittles	Conlee	7.04abc	6.85a	6.94ab
Pioneer 911	Pioneer	6.87abc	6.84a	6.86ab
Yieldmaker	Taylor-Evans	6.74abc	6.81ab	6.77abc
G102F	Funk	6.52abcd	6.66ab	6.59abcd
Pioneer 923	Pioneer	6.52abcd	6.39abc	6.45abcd
F5455	Cargill	6.61abc	6.12abcd	6.37abcd
NK405	Northrup King	5.72 cdef	6.91a	6.31 bcd
HiEnergy	SeedTec	7.08abc	5.12 def	6.10 bcd
Titan-R	Asgrow	5.93 bcde	5.90abcde	5.90 cde
Silomaker	Taylor-Evans	5.80 bcdef	5.80abcde	5.80 de
SiloFill 35	RingAround	5.78 bcdef	5.59 bcde	5.68 de
FS351	Paymaster	4.99 ef	5.25 cdef	5.12 ef
NK-300	NorthrupKing	5.14 def	5.09 def	5.11 ef
FS-5	DeKalb-Pfizer	4.46 fg	4.86 ef	4.66 f
FS-1a+	DeKalb-Pfizer	3.28 gh	4.39 fg	3.84 g
811A-GB	RingAround	3.06 h	3.49 gh	3.27 g
H84D	Horizon	2.95 h	3.15 h	3.05 g
Mean		5.76	5.72	5.74
CV%		15.45	12.87	14.23

[1]Means followed by the same letter within a column are not significantly different (p=0.05).

TABLE 3. CRUDE PROTEIN PERCENTAGE AT SOFT DOUGH STAGE OF 19 HYBRIDS OF SILAGE-TYPE SORGHUMS OVER 2 YEARS AT STEPHENVILLE

	Crude Protein Percentage*		
Hybrid	1984	1985	Mean
FS-25a+	4.95 fgh	5.19 cd	5.07 defg
HW5574	4.52 h	4.06 e	4.29 h
CowVittles	4.78 gh	4.09 e	4.43 h
Pioneer 911	6.46 bc	4.78 de	5.02 bcd
Yieldmaker	5.21 efgh	4.39 de	4.80 fgh
G102F	5.76 cdefg	4.54 de	5.15 efgh
Pioneer 923	5.38 defgh	4.42 de	4.90 efgh
F5455	6.25 bcd	4.59 de	5.42 bcdef
NK405	5.08 efgh	4.47 de	4.77 gh
HiEnergy	5.97 cde	4.57 de	5.27 cdefg
Titan-R	5.47 cdefg	4.78 de	5.12 defg
Silomaker	5.03 efgh	4.65 de	4.84 fgh
SiloFill35	5.18 efgh	4.45 de	4.82 fgh
FS351	5.81 cdef	5.17 cd	5.49 bcde
NK-300	5.79 cdedg	5.90 b	5.85 bc
FS-5	6.39 bc	5.62 bc	6.01 b
FS-la+	7.12ab	4.50 de	5.81 bc
811A-GB	6.97ab	6.83a	6.90a
H84D	7.73a	6.99a	7.36a
Mean	5.78	4.95	5.36
CV%	10.48	9.60	10.15

*Means followed by the same letter within a column are not significantly different (p=0.05).

TABLE 4. DAYS FROM PLANTING TO HARVEST AT SOFT DOUGH STAGE OF 19 HYBRIDS OF SILAGE-TYPE SORGHUMS OVER 2 YEARS AT STEPHENVILLE

	Days To Harvest		
Hybrid	1984	1985	Mean
FS-25a+	132	97	115
HW5574	142	102	122
CowVittles	134	97	115
Pioneer 911	142	104	123
Yieldmaker	130	96	113
G102F	136	96	116
Pioneer 923	139	99	119
F5455	133	97	115
NK405	125	98	112
HiEnergy	136	102	119
Titan-R	128	91	109
Silomaker	129	96	113
SiloFill35	134	96	115
FS351	131	91	111
NK-300	120	92	106
FS-5	106	81	93
FS-1a+	87	88	87
811A-GB	87	81	84
H84D	87	81	84