Soil Temperature and Planting Date Effects on Corn and Sorghum Silage Production

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Summary

Long- and short-season hybrids of corn and forage sorghum were planted at six dates determined by soil temperature in 1988. Long-season hybrids outyielded short-season hybrids regardless of planting date. Mid-May (soil temperature 65°F) planting of long-season forage sorghum gave the highest yields. Corn hybrids yielded the most when planted at soil temperatures between 60 and 65°F. Short-season forage sorghum yielded less when planted in early June.

Introduction

Sorghum and corn silage production is relatively new to the West Cross Timbers region. Cool soil temperatures and unfavorable seedbed conditions may delay planting or result in very poor stands of corn or sorghum necessitating replanting (Adams, 1967; 1970). Later planting dates favor sorghum; however, many dairy producers prefer corn silage. Thus, our objective was to determine what effect various spring planting dates had on corn and sorghum silage yields.

Procedure

Soil at the experimental site is a Windthorst fine sandy loam (fine, mixed, thermic, Udic Paleustalfs). Fertilizer was applied to land previously moldboard-plowed and disked. All plots received 250 lbs/A of N, 80 lbs/A of P_2O_5 and 80 lbs/A of K_2O.

A long- and short-season hybrid of corn (Pioneer 3165 and 3475, respectively) and forage sorghum (DeKalb-Pfizer FS-25e and FS-5, respectively) were planted at six planting dates determined by soil temperature at four inches below the bedded surface. Corn and sorghum were planted when the soil temperature reached and remained above the target temperature for 5 days. These dates are given in Table 1. Plots consisted of four rows 36 inches wide by 30 feet long. The experimental design was a randomized complete block with a split-plot arrangement of crops and planting dates. Long- and short-season corn or sorghum hybrids were whole plots and planting dates were subplots. There were four replicates per planting date, and plots were irrigated.

Sorghum was harvested when the grain was at soft dough stage and corn was harvested when grain was in medium dent. The center 10 feet from the two middle rows in each plot was harvested by hand for yield determination. Subsamples were taken and dried at 140°F to determine dry matter percentage.

KEYWORDS: Long- and short-season cultivars/forage sorghum.

TABLE 1. SILAGE YIELD (TONS OF 35% DRY MATTER SILAGE PER ACRE) OF LONG- AND SHORT-SEASON HYBRIDS OF CORN AND FORAGE SORGHUM PLANTED AT SIX DATES AT STEPHENVILLE, TEXAS IN 1988

Soil temp.	Plant date	Corn		Sorghum	
		long[1]	short	long	short
50[2]	3/11	17.73	14.3	17.4	18.6
55	3/28	17.1	14.6	15.7	17.7
60	4/8	21.1	14.6	17.7	18.6
65	5/11	18.8	19.1	28.6	18.0
70	5/30	17.7	16.6	23.4	14.6
75	6/9	17.1	13.1	24.3	14.6
Average		18.2	15.4	21.2	17.0

[1]Long-season corn = Pioneer 3165 (136-day maturity); short-season corn = Pioneer 3475 (114-day maturity); long-season sorghum = DeKalb-Pfizer FS 25e (2 weeks later than FS-5); short-season sorghum = DeKalb-Pfizer FS-5.
[2]Average date soil temperature at 4 inches reaches 50°F = March 8; 55°F = March 15; 60°F = April 5 (Dugas 1984).
[3]Standard error ($P < 0.05$) for soil temperature x crop interaction = 4.6. Coefficient of variation = 20%.

Results

Corn hybrids were the most productive when planted at soil temperatures between 60 and 65°F. Late planting and early planting gave similar yields. Planting a shorter season of corn at later planting dates was not advantageous. A dramatic increase in silage yield from the long-season hybrid of forage sorghum occurred between the 8 April and 11 May date. Delaying planting resulted in an 11-ton per acre yield increase. Yield of short-season sorghum decreased when planted later than mid-May. The large increase in long-season sorghum yield between April and May planting dates probably resulted from sorghum developing under longer day lengths thus extending the vegetative growth period.

The long-season hybrids outyielded short-season hybrids in both corn and sorghum. Later planting dates resulted in fewer days from planting to harvest in all treatments except for the long-season hybrid of sorghum (Table 2). Long season sorghum required the same number of days

from planting to harvest at the 28 March, 4 April, 11 May, and 9 June planting dates, whereas the earliest date resulted in the longest period from planting to harvest.

These initial data indicate that there may be and interaction between hybrid and planting date. The study will be repeated in 1989.

TABLE 2. NUMBER OF DAYS FROM PLANTING TO HARVEST FOR LONG- AND SHORT-SEASON HYBRIDS FOR CORN AND SORGHUM PLANTED AT SIX DATES

Plant date	Corn		Sorghum	
	long	short	long	short
3/11	122	110	136	132
3/28	108	98	111	113
4/8	100	94	104	103
5/11	90	78	110	103
5/30	84	71	126	84
6/9	81	73	116	81

Literature Cited

1. Adams, J.E. 1967. Effect of mulches and bed configuration. I. Early-season soil temperature and emergence of grain sorghum and corn. Agron. J. 595-597.
2. Adams, J.E. 1970. Effect of mulches and bed configuration. II. Soil temperature and growth and yield response of grain sorghum and corn. Agron. J. 785-790.
3. Dugas, W.A. 1984. Agroclimatic atlas of Texas. Part 7. Soil temperature. Misc. Pub. 1552 of the Texas Agric. Exp. Stn. College Station.