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Corn: Sorghum Double Cropping Systems for Irrigated Silage Production

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Summary

Irrigated corn-sorghum and sorghum ratoon cropping systems were studied for silage yield. The sorghum ratoon cropping system yielded the most silage per acre (38.6 vs 32.0 tons per acre). However, the second crop of the ratoon sorghum system was harvested very late (16 November) at an immature stage and was high in moisture. These data indicate that corn-sorghum and ratoon sorghum double cropping are feasible systems for producing high yields of silage under irrigation in central Texas and may be suitable for optimally utilizing dairy waste water.

KEYWORDS: Ratoon cropping/forage sorghum/nitrogen fertilization.

Introduction

Forage and dairy producers in the West Cross Timbers region are searching for cropping system alternatives that will result in high forage yields per acre and utilize dairy waste water for irrigation. Dairy operators prefer to use silage in rations because of its quality and because it provides a wet base for total mixed rations. Both corn and sorghum silages are fed to cows in amounts ranging from 15 to 40lbs/cow/day.

We studied two cropping systems for irrigated corn and sorghum silage production: corn as first crop followed by sorghum planted in corn stubble; and sorghum as first crop with sorghum regrowth as the second crop (ratoon cropping).

Procedure

Soil at the experimental site is a Windthorst fine sandy loam (fine, mixed, thermic, Udic Paleustalfs). Fertilizer (250 lbs N, 60 lbs P_2O_5, and 60 lbs K_2O/A) was applied to land moldboard-plowed and disked. For cropping system I, Pioneer 3165 corn (136-day maturity) was planted 6 April 1988 in plots consisting of four 36-inch rows wide by 30-ft long. Corn was harvested for silage on 24 July. Dekalb-Pfizer FS-25e forage sorghum (medium-late maturity) was planted no-till into corn stubble after corn harvest on 28 July. Second-crop sorghum was harvested on 20 October. For cropping system II, Dekalb-Pfizer FS-25e was planted 9 May and harvested 21 August. Sorghum was allowed to regrow and regrowth was harvested 16 November. Corn was harvested when grain was at medium dent stage and sorghum when grain was at soft dough stage. The center 10 ft from the two middle rows of each plot were harvested by hand to determine silage yield. Subsamples were taken and dried at 140°F to determine dry matter percentage. Second crop sorghum was separated into components (leaf, stalk, and ear or head) to determine dry matter distribution.

Nitrogen was applied at 250 lbs/A on all plots in spring. Nitrogen was applied at 0, 50, 100, and 150 lbs/A on subplots of the second crop. There were four plots (replicates) of each system component and nitrogen rate.

Corn in system I received 12.3 inches of rain and 11.5 inches of irrigation water from planting to harvest. Sorghum planted after corn received 3.8 inches of rain and 11.5 inches of irrigation water. Sorghum planted in system II received 13.2 inches of rain and 15.5 inches of irrigation water from planting to harvest. Regrowth sorghum received 4.8 inches of rain and 6.6 inches of irrigation water.

Results

The sorghum ratoon cropping system resulted in the greatest silage yields (Table 1). The yield difference between the two systems was due to a greater yield of first crop sorghum compared with first crop corn. Yield of sorghum in the second phase was similar between systems. Regrowth sorghum was harvested when heads began to appear instead of the soft dough stage because of the late date and thus was very high in moisture, whereas replanted sorghum was harvested at the soft to hard dough stage. This is reflected in the dry matter distribution among stems, leaves, and heads (Table 1). Planting first crop sorghum one to two weeks earlier may help avoid the problem of immaturity and high moisture silage in ratoon cropping. There was no response to nitrogen fertilizer in second crop sorghum.

Corn earworm was a problem in second crop sorghum and seemed to be worse in replanted sorghum than in ratooned sorghum. Sevin was applied twice to control insects in second crop sorghum.

If initial production inputs are assumed to be equal for both systems, the sorghum ratoon cropping system may be more economical because expenses for seed and planting the sorghum crop behind corn are eliminated. Sorghum silage, however, is somewhat lower in quality and price than corn silage. The increased yield of sorghum may overcome price and quality aspects.

These data indicate that corn-sorghum and ratoon sorghum double cropping are feasible systems for producing high yields of silage under irrigation. This study will be repeated in 1989 at the Stephenville Research Center and on producer farms under irrigation with dairy waste water.

TABLE 1. SILAGE YIELDS OF TWO DOUBLE CROPPING SYSTEMS AT STEPHENVILLE, TEXAS IN 1988

System and component	Plant date	Harvest date	Yield[1]	% Stem	% Leaf	% Head
System I						
First crop corn	4-6-88	7-24-88	20.6			
Second crop sorghum	7-28-88	10-20-88	11.4	48.6	13.9	37.6
		Total	32.0			
System II						
First crop sorghum	5-9-88	8-21-88	26.3			
Regrowth sorghum		11-16-88	12.3	67.5	22.9	10.5
		Total	38.6			

[1]Tons of 35% dry matter silage per acre.