FORAGE SORGHUM SILAGE VS CORN SILAGE

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ABSTRACT

Trials were conducted from 1999 to 2005 at the Texas Agricultural Experiment Station, near Bushland, TX, to compare forage sorghum types and varieties for their agronomic characteristics, water use efficiency, standibility, forage and grain yield, and nutritional value. Comparisons were also made to corn varieties planted in an adjacent trial. Forage sorghum yield was similar to that achieved with corn but required considerably less in-season irrigation water. Averaged across all entries, BMR (brown midrib) varieties yielded 10 to 11 percent less in most years than non-BMR varieties, and in one year where weather conditions were hotter and dryer than normal, yield was 26% less. Average in-vitro digestibility of BMR varieties was higher than non-BMR varieties and was similar to that of corn. Lodging on average has not been worse with the BMR varieties, however, a higher percentage of the BMR varieties were observed to have at least some observable lodging compared to the non-BMRs.

INTRODUCTION

In the Texas High Plains the cattle industry is primarily centered on stocker cattle grazing systems and confined cattle feeding. Both of these segments utilize hay and silage in their feeding operations. Additional demand for quality silage is coming from the areas budding dairy industry. Corn silage has long served the region well, producing consistent high quality silage. However, many areas no longer have the irrigation capacity to successfully produce corn silage. Six years of research has shown the potential for replacing corn with lower water requiring forage sorghum. These studies have examined the yield and quality of recently developed BMR (brown midrib), photoperiod sensitive (PS) and conventional forage sorghum varieties. BMR sorghums have less lignin content in the plant making them on average, higher in digestibility than non-BMR sorghums.

METHODS AND MATERIALS

Since 1999 forage sorghum variety trials have been conducted at the Texas Agricultural Experiment Station located at the James E. Bush Farm near Bushland, TX. In these trials, different types and varieties of forage sorghum were compared for their agronomic characteristics, water use efficiency, standibility, forage and grain yield, and nutritional value. Comparisons were also made to corn varieties planted in an adjacent trial.

The varieties were planted in a randomized block design in four row plots planted on 30-inch raised beds. The trials were considered to be fully irrigated with water applied as needed by furrow. Irrigation scheduling was determined by monitoring gypsum blocks placed in the soil at depths of 1, 2, and 3 feet. Moisture blocks were read every two to three days and plots were

irrigated when the average of the three moisture blocks fell below 60. Seeding rate was 120,000 seed/acre and fertilizer rate of N and P varied each year depending on soil test analysis. Each variety was harvested when grain reached the soft dough stage. PS varieties were harvested on the last harvest date of the season.

Corn varieties were planted adjacent to the sorghum silage trial for comparison. Maturity of corn varieties ranged from 114 to 119 CRM. Each variety was planted in a 200-ft strip on four 30-inch rows at 34,000 seed/acre. Plots were irrigated based on gypsum block readings at soil depths of 1, 2, and 3 feet. Four samples were collected from each variety plot (strip) for yield and nutrient composition determination when each variety's milkline had advanced 1/2 to 2/3 of the way down the kernel. Details of cultural practices and other study information for each year can be found at http://amarillo.tamu.edu/.

RESULTS AND DISCUSSION

Forage sorghum yields have been similar to that achieved with corn and in most years required at least 40% less irrigation water than fully irrigated corn. PS varieties have been the highest yielding, but produced the lowest quality. On average, the BMR varieties yielded 10 to 11 percent less than non-BMR varieties, with the exception of 2003 when conditions were drier and hotter than normal, BMR varieties yielded 26% less than non-BMR varieties.

Many of the BMR varieties as well as some of the non-BMR varieties have consistently had an in-vitro true digestibility (IVTD) value equal or greater than that of corn. An important point is the variation among the varieties within each type. Despite the average differences for protein, fiber, lignin, and digestibility, there was a great deal of overlap among the BMR and non-BMR varieties. For instance, the average in-vitro digestibility values for BMR and non-BMR were 81.3% and 75.9%, but there were some BMR varieties that were less digestible than the high end of the non-BMR varieties and some non-BMR varieties that were as digestible as the high end of the BMR varieties. So the designation of "BMR" or non-BMR does not necessarily mean an individual variety was better or worse than other alternatives. Although percent ADF and NDF was somewhat higher in the BMR varieties compared to corn, the in-vitro digestibility was similar. It is also important to note that the range in digestibility of the BMR varieties was similar to what was observed in corn

A six year summary of the varieties that were in our trials for at least three years revealed the following: 1) non-BMR forage sorghum varieties averaged 24.1 ton/Ac (65% moisture) of silage with an average % IVTD of 75.9% and 2) BMR forage sorghum varieties averaged 20.7 ton/Ac of silage with an average % IVTD of 81.3%. Each year yield and % IVTD were compared to corn. The average yield of the non-BMR varieties was 100% of the average corn yield and % IVTD was 94.2% of corn. BMR varieties yielded 85.9% of corn with a % IVTD of 100.4% of corn.

Poor standibility is a reason often sited by growers for not growing BMR forage sorghum. Our results have shown that BMR forage sorghums do not necessarily lodge more than non-BMR forage sorghum. When choosing a variety for standibility, the choice of the individual variety is more important than if the variety is a BMR or not.