

FORAGE SORGHUM AND SILAGE CORN: YIELD, QUALITY AND WATER

Brent Bean¹

ABSTRACT

BMR cultivars on average produce less tons/acre than nonBMR cultivars but tend to have better digestibility as measured by ADF, NDF, and IVTD. When harvested at the grain soft dough stage little difference has been observed in standability between BMR and nonBMR cultivars. Some cultivars of both BMR and nonBMR sorghum are equal in nutritional quality to corn. Approximately 0.7 ton/acre (65% moisture) of forage sorghum can be grown for every inch of water used while using about 30% less water than fully irrigated corn. The PS cultivars produced the highest yields in our trials, but also were the poorest in quality.

Key Words: forage sorghum, brown midrib, BMR, photoperiod sensitive, water use

INTRODUCTION

Trials have been conducted annually since 1999 at the Texas AgriLife Research Field Lab near Bushland, TX, to compare forage sorghum types and cultivars for their yield, water use efficiency, standability, and nutritional composition. These trials have compared brown midrib (BMR), photoperiod sensitive (PS), and conventional forage sorghum and sorghum/sudangrass cultivars. Indirect comparisons were made to corn planted in an adjacent trial.

PROCEDURES

Cultivar comparisons were made by arranging plots in a randomized block design. Each plot was planted on four 30-inch raised beds and were 25 ft long. 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 100,000 to 120,000 seed/acre (depending on year), and fertilizer rate of N and P varied each year depending on soil test analysis. Soil at this location is a silty clay loam. Each cultivar was harvested when grain reached the soft dough stage (approximately 65% whole plant moisture). PS cultivars were harvested on the last harvest date of the season. Corn hybrids were planted adjacent to the sorghum silage trial for comparison. Corn was watered in similar manner as the sorghum based on gypsum block readings. The corn was harvested when the milkline of each hybrid had advanced to 1/2 to 2/3 of the way down the kernel. Details of cultural practices and other study information can be found at

¹ Brent Bean (b-bean@tamu.edu), Professor and Extension Agronomist, Texas AgriLife Research and Extension Center, 6500 Amarillo Blvd. West, Amarillo, TX 79106. **In:** Proceedings, 2008 California & Forage Symposium and Western Seed Conference, San Diego, CA, 2 – 4 December, 2008. UC Cooperative Extension, Plant Sciences Department, University of California, Davis, CA 95616. (See <http://alfalfa.ucdavis.edu> for this and other alfalfa symposium Proceedings.)

RESULTS AND DISCUSSION

When grown under full irrigation many forage sorghum cultivars produced yields similar to that achieved with corn and in most years required significantly less irrigation water. PS cultivars have been the highest yielding, but produced the lowest quality. Adding the BMR trait to a PS cultivar improved quality of the forage but not to the level of non-PS BMR cultivars. On average, the BMR cultivars yielded 10 to 11 percent less than non-BMR cultivars. However, since 1999, we have had two years that were hotter and drier than normal. In these two years the BMR cultivars yielded more than 20% less than the non-BMR cultivars.

Many of the BMR cultivars as well as some of the non-BMR cultivars have consistently had an in-vitro true digestibility (IVTD) value equal or greater than that of corn. An important point is the variation among cultivars 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 cultivars. For instance, the average IVTD values for BMR and non-BMR were 81.3% and 75.9%, but there were some BMR cultivars that were less digestible than the high end of the non-BMR cultivars and some non-BMR cultivars that were as digestible as the high end of the BMR cultivars. Because of the variability of digestibility of both BMR and non-BMR cultivars it is important to examine the forage nutrient composition of specific cultivars and not simply choose one cultivar over another because of the BMR trait.

BMR and non-BMR ADF and NDF values relate differently to % IVTD. For any given value of ADF or NDF, a BMR cultivar will have a higher % IVTD compared to a non-BMR cultivar. This is a very important consideration when comparing ADF and NDF values of BMR and non-BMR cultivars.

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

Poor standability is a reason often cited 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 cultivar for standability, the choice of the individual cultivar is more important than if the cultivar carries the BMR trait.