Evaluation of new Sorghum-sudangrass and Pearl Millet hybrids as feedstock for the Oklahoma beef production system – Year 2.

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Introduction

New varieties of Sorghum-sudangrass (Sorghum vulgare Pers. × Sorghum sudanense Stapf.) and Pearl millet (Pennisetum americanum L.), which are capable of producing high forage quantity and quality, have not been fully investigated as part of Oklahoma forage system production. Forage characteristics such as forage yield, quality and prussic acid accumulation had not been evaluated at different cutting heights and water regimes in Oklahoma. Therefore, the objectives of this study are:

1. To evaluate / compare three sorghum-sudangrass and two pearl millet hybrids forage quantity and quality for hay production.
2. To determine the effect of cutting stubble height and water regimes on hybrids forage production and quality.

Material and Methods

This ongoing study was initiated in 2016 at the Oklahoma State University South Central Research Station at Chickasha, OK. Two distinct experimental fields such as rainfed and irrigated were established on late June in 2016 and on late May in 2017. Both fields were on a fine, mixed, superactive, thermic Pachic Argiustolls previously cropped with switchgrass (Panicum Virgatum L.) for 6 years.

For both Rainfed and Irrigated trials, a split-split plot design with 3 replications was developed with 2 different sets of treatments:

(1) Five hybrids as main plots (RCBD):

- SP4555
- SP4105
- SP6205BD
- SPX56116
- Millex BMR
- Millex 32
- SPX56116

(2) Two cutting regimes as sub-plot/split: 7.5 cm (3 inches) and 15 cm (6 inches) stubble height.

Results and Discussion

Forage production

1.1. Cutting time effect (2016, only)

Each sub-plot was cut according to its assigned stubble height at 7 weeks after planting (WAP) and regrowth totally harvested (less than 5 cm height) at 15 WAP (final cut). After cut, each subplot (2,800 m² / 30,000 ft²) was baled after 5-6 days of drying period (moisture content target = 15%). Balers were weighted. Samples from windowframes were taken after cutting and before bailing, ground and dried at 55ºC until constant weight in order to estimate dry moisture content and biomass production. These subsamples were processed and Near-Infrared Spectrometry procedures were used for determining Forage quality estimators such as: TDN, NDF, ADF and CP.

Forage quality was available only for the 2016 rainfed trial at first cut (7 WAP) at this time. Significant differences were found only among hybrids. Total digestible nutrients (TDN) ranged from 64 to 66%. Neutral detergent fibers (NDF) ranged from 50 to 55%. Acid detergent fiber (NDF) ranged from 33 to 37%. Crude Protein (CP) ranged from 13 to 17%. Millex BMR showed the highest quality: TDN = 66% (highest), NDF = 50% (average), ADF = 33% (lowest), CP = 17% (highest).

1.2. Stubble Height

Different stubble height cuts did not affect the total forage yield in both trials in 2016. In both cases, the lower forage yield harvested during first cut due to a higher stubble height (15 cm) was compensated for by slight higher yield during second harvest. The forages were established on June 20, 2016 which was considered late but within the planting window for Oklahoma conditions. Therefore, the regrowth after cutting was late in the season resulting in less GDD accumulation than expected. We speculate that earlier planting may increase the potential regrowth of the evaluated crops which might favor forage production at higher stubble height cuts.

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Conclusions

1. Second cut (15 WAP) had lower forage production than first cut (7 WAP). Much lower soil radiation during regrowth due to late planting and less water availability aggravated their differences even though low yields at late cuts are normally expected.
2. Millex BMR (2016, only), SP4555, SP4105 were the top 3 yielding forages in rainfed conditions. SP4555 and SP4105 were the top 2 yielding forages at irrigation conditions.
3. Lower forage yield at first cut due to higher stubble height (15 cm) was compensated for slight high yield during second harvest. However, total yields was not significant between stubble heights.
4. Millex BMR showed the highest forage quality among all tested hybrids (2016, only).

Our findings indicated Millex BMR is the best alternative for rainfed conditions due to high forage yield and quality. In addition, it is tolerant to sugarcane aphids which is an ongoing issue in Oklahoma.