

Technical Note

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Booneville Plant Materials Center

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Quality Parameters of Five Indiangrass Cultivars

SUMMARY

A three-year study was conducted at the USDA-Natural Resources Conservation Service, Booneville Plant Materials Center in Booneville, Arkansas, for the purpose of evaluating the crude protein, acid detergent fiber, and neutral detergent fiber of five Indiangrass cultivars.

CONCLUSIONS

- ~ Crude protein, acid detergent fiber, and neutral detergent fiber quality results ranged from 6.11 to 9.95, 35.2 to 39.1, and 58.9 to 70.4 %, respectively.
- ~ Crude protein for Rumsey was higher in 1997, 1998, and 1999 than for other cultivars.
- ~ Acid detergent fiber values for Rumsey were lower in 1997, 1998, and 1999 than for other observations. Acid detergent fiber is negatively correlated with digestibility.
- ~ Neutral detergent fiber mean values for Rumsey were lower in the 3 years of the study than other observed values. As neutral detergent fiber percentages decrease, dry-matter intake will generally increase.

INTRODUCTION

Studies have been conducted evaluating the quality parameters (crude protein, acid detergent fiber, and neutral detergent fiber) of Indiangrass (*Sorghastrum nutans* L. Nash) cultivars at various locations throughout the south central United States. However, limited information exists on the quality potential of Indiangrass in the Booneville PMC service area.

Angima and Kallenbach (2008) reported crude protein values for Indiangrass of 3.68, 3.91, 4.39, and 4.74 and fertilized with 0, 50, 100, and 150 lb/acre nitrogen, respectively. They stated that while forage yields generally increase with increasing rates of nitrogen, results of this study found that crude protein did not change significantly with increasing rates of nitrogen. Other researchers have found that forage crude protein was negatively correlated with yield and have emphasized that the negative associations found between forage yields and quality factors have to be considered in developing hay quality factors especially for warm season grasses, (Angima and Kallenbach, 2008 and Moyer, et al., 2003). Bartholomew, et al. (1995) found that

Indiangrass fertilized with 0, 67, and 268 lb/acre nitrogen resulted in 8.9, 15.0, and 8.8 % crude protein, respectively. Henning (1993) stated that it is important to use seed whose place of origin is within 250 to 400 miles south, or within 100 to 150 miles north of the intended location of use. Extreme southern-grown seed may produce stands that die during the winter or at least not produce viable seed. Stands planted to northern-grown seed will tend to mature early and be less productive. The important characteristic of named varieties is that they have proven adaptation in the area to be seeded. Henning indicated that productivity is difficult to predict in native grasses because individual sites are variable and maturity dates vary with latitude. Early maturity usually means less forage production. Moving northern-adapted varieties south shortens time to maturity and vice versa.

This three-year study was conducted to examine the quality parameters of five native warm-season Indiangrass cultivars with commercial fertilizer.

METHODS and MATERIALS

The study was located at the NRCS Plant Materials Center, Booneville, AR. The study was conducted on a Taft silt loam (fine-silty, siliceous, Thermic Glossaquic Fradiuouults) soil. Five Indiangrass cultivars were harvested at the end of the growing season. The five entries included 'Cheyenne', 'Lometa', 'Osage', PI514673 (released as 'Americus' from the Jimmy Carter Plant Materials Center), and 'Rumsey'. Establishment seeding rates for subplots were based on NRCS and University of Arkansas Extension Service recommendations. Quality parameters for crude protein, acid detergent fiber, and neutral detergent fiber were obtained two years after establishment year. Commercial fertilizer (400 lb/acre of 13-13-13) was applied at the beginning of each growing season. The plots were burned in the spring of each season.

The harvest regime for end of season forage quality was based on best management practices for maximizing production and/or hay production for individual grass species. Clipping height for each variety was 4 inches.

Grab samples were obtained from individual plots after the harvest for dry-matter and quality determination. Samples were dried, ground, and analyzed for crude protein, acid detergent fiber, and neutral detergent fiber. Results are presented on a percentage basis for each quality component.

RESULTS and DISCUSSION

Crude protein, acid detergent fiber, and neutral detergent fiber results for three years (Tables 1, 2, and 3) for the observed varieties ranged from 6.11 to 9.95, 35.2 to 39.1, and 58.9 to 70.4 %, respectively.

Crude protein mean values (averaged over three years) ranged from 6.84 (Osage) to 8.85 (Rumsey). Crude protein (CP) is calculated using the nitrogen content of the forage and using the formula: $CP = \% N \times 6.25$. Crude protein will include both true protein and non-protein nitrogen. Crude protein values give no indication if heat damage has occurred, which may alter protein availability. Crude protein for Rumsey Indiangrass was higher for years 1997, 1998, and 1999, at 9.95, 7.69, and 8.11, respectively, than for other varieties. Crude protein for Osage was lower in Years 1998 and 1999 at 6.56 and 6.11, respectively. Crude protein for Rumsey was

approximately 1 percentage point higher than for Cheyenne and approximately 2 percentage points higher than for Lometa (6.98) and Osage (6.84).

Acid detergent fiber means ranged from 35.7 to 38.3 for Rumsey and Lometa, respectively. The value for acid detergent fiber (ADF) refers to the cell wall portions of the forage that are made up of cellulose and lignin and are the least digestible of the plant carbohydrates. These values are important because they relate to the ability of an animal to digest the forage. Acid detergent fiber is negatively correlated with digestibility, as ADF increases, digestibility of a forage usually decreases. Rumsey acid detergent fiber values were lower in 1997, 1998, and 1999 at 36.2, 35.2, and 35.8, respectively, than other varieties tested. Lometa values for acid detergent fiber were higher than other varieties in 1997 (39.1), 1998 (37.6), and 1999 (38.3).

Neutral detergent fiber means ranged from 63.6 for Rumsey to 67.5 for Osage. The neutral detergent fiber value is the structural carbohydrate in the total cell wall, which is comprised of the ADF fraction plus hemicellulose. As such, the NDF fraction is partially digestible and values are important in ration formulation because they are an indicator of forage bulkiness and reflect the amount of forage the animal can consume. As NDF percentages increase, dry-matter intake will generally decrease. Mean values for Rumsey were 58.9, 65.5, and 66.5 for s 1997, 1998, and 1999, respectively, and were lower than other observed values. The mean neutral detergent fiber value for Osage (67.5) was higher than for other means for tested.

LITERATURE CITED

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Table 1. Crude Protein of Five Indiangrass Cultivars

Variety	Year			Mean
	1997	1998	1999	
	-----%-----			
Cheyenne	8.41	7.21	7.98	7.86
Lometa	6.99	6.98	6.96	6.98
Osage	7.85	6.56	6.11	6.84
PI514673	7.75	7.29	7.45	7.49
Rumsey	9.95	7.69	8.11	8.85

Table 2. Acid Detergent Fiber of Five Indiangrass Cultivars

Variety	Year			Mean
	1997	1998	1999	
	-----%-----			
Cheyenne	38.6	37.2	37.8	37.9
Lometa	39.1	37.6	38.3	38.3
Osage	38.3	37.6	38.3	38.1
PI514673	38.7	35.7	37.1	37.1
Rumsey	36.2	35.2	35.8	35.7

Table 3. Neutral Detergent Fiber of Five Indiangrass Cultivars

Variety	Year			Mean
	1997	1998	1999	
	-----%-----			
Cheyenne	61.7	65.8	68.4	65.3
Lometa	62.9	68.1	68.9	66.6
Osage	62.9	69.2	70.4	67.5
PI514673	62.9	69.5	67.4	66.6
Rumsey	58.9	65.5	66.5	63.6