ID # 09-45

DRY MATTER YIELD, *in vitro* DIGESTIBILITY, PROTEIN AND FIBER COMPOSITION OF 'TIFTON 9' BAHIAGRASS (*Paspalum notatum*) AT SIX MATURITIES

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Abstract

The objective of this research was to evaluate dry matter yield, *in vitro* digestibility, and the concentrations of protein and cell wall components in 'Tifton 9'clipped at six maturities. Herbage was cut at the age of 20, 27, 34, 41, 48 and 55 days. The experimental design was a randomized complete block with six trataments (ages) and four replications. Dry matter yield and acid detergent fiber ranged from 188 g m^{-2} to 593 g m^{-2} and 386.9 g kg^{-1} to 375.1 g kg^{-1} respectively, with the cubic regression model having the best fit ($P<0.05$). Concentrations of crude protein decreased linearly ($P<0.05$) from 121 to 69 g kg^{-1}. Neutral detergent fiber concentration and "in vitro" digestibility, were not affected ($P>0.05$) by maturity, in the range studied. Dry matter yield, digestibility and concentration of fiber components presented values similar to other tropical forages, whereas the crude protein remained above 100.5 g kg^{-1}, only until the 27 th day, according to the regression model.

Keywords: Tifton 9, *Paspalum notatum*, dry matter yield, chemical composition, digestibility

Introduction

Paspalum forages have long been used for forage in many parts of the world, including tropical and sub-tropical regions in South America and the southeastern North America. They are spread over large areas of the humid, southeastern United States, and are important for the livestock industry, covering about a million hectares and used for feeding beef cattle and equine. In Brazil, Pensacola bahiagrass is broadly studied, although it is not widely used. It is found in southern Brazil, where it is grazed by sheep and cattle.

Using Restricted Recurrent Phenotypic Selection (RRPS, a variation of mass selection) researchers at Tifton, Georgia, USA, developed and released Tifton 9 bahiagrass. This new cultivar is 47% more productive than the variety *Saurae* (common Pensacola bahiagrass) which is the best known and most used (Burton, 1989).

The objective of this work was to generate data on dry matter yield, crude protein, 'in vitro' digestibility and fibers concentrations of Tifton 9 at different maturities in summer growth, in a tropical environment of South America. Potential benefits of this study are to establish management guidelines that allow for optimal utilization of the grass under cutting or grazing in animal production systems.

Material and Methods

The research was carried on an established Tifton 9 pasture in Araçatuba, State of São Paulo, Brazil (21^{o}11'51" S; 50^{o}25'52" W; 379 m alt.). The experimental period was from Jan 13 to March 9, 1997. Before the experiment started, 1500m^{2} of the pasture were clipped and the clipped material was removed. Nitrogen fertilizer was applied at a rate of 60 kg N ha^{-1} as ammonium nitrate.

The experimental design was a randomized complete block. Trataments were six plant maturities, 20, 27, 34, 41, 48, and 55 days after the staging cut. Each maturity harvest was repeated four times (four blocks) resulting in 24 plots with 15 m^2 each. At the time of each harvest, the sampling site was chosen at random within the block and a square metalic frame placed so as to include an area of 1 m^2. The forage inside the frame was then cut manually at soil level, dried at 65 ^oC to constant weight and weighed.

Samples were ground and taken to laboratory for analysis. Dry matter (105 ^oC) and nitrogen (% crude protein = %N x 6.25) were determined following the AOAC (1970). Concentration of ‘in vitro’ digestible dry matter was measured using the method of Tilley & Terry (1963) modified by Timnit (1974). Acid and neutral detergent fiber concentrations were determined by the method of Goering & Van Soest (1970).

Data were subjected to regression analysis. Attempts were made to fit linear and non-linear models (SAS, 1988) of response variables regressed on plant maturities.

Results and Discussions

Dry matter yield was best described by a cubic regression model ($P<0.05$). The model showed maximum yield at 49 days of regrowth, when measured herbage mass was 579.4 g m^{-2} (Figure 1) Considerable variability was noticed in herbage mass on last three sampling dates. Burton et al. (1997) measured yields of about 600 g m^{-2} in Pensacola bahiagrass, with 56 kg N ha^{-1} , similar to the yield obtained in our work.

There was no variation in ‘in vitro’ dry matter digestibility within the range of maturities studied. It was not possible to fit any of the proposed polynomial models to the variation in digestibility. Domingues (1993) found a quadratic decrease in digestibility over a 65-day range of maturities in Pensacola bahiagrass with the lowest value of 393 g kg^{-1} at the highest maturity. Stanley et al. (1977), working in Florida, also found a decline in the digestibility of Pensacola bahiagrass, and concluded that this decline was caused by the increase in the proportion of low digestible material as the plant ages.

There was no effect ($P<0.05$) of maturity on neutral detergent fiber concentration but a cubic regression model could be fit to the data, with values ranging from 390.1 g kg^{-1} at 24 days to 366.90 g kg^{-1} at 47 days of regrowth (Figure 2). Domingues (1993) reported a quadratic fit for NDF ($P<0.05$) and a cubic fit for ADF ($P<0.05$). The increase in herbage cell wall concentration during regrowth is associated with higher herbage mass, but also with a greater proportion of stems resulting in a higher concentration of fiber components (Omaliko, 1980), and potentially, lower digestibility.

A linear decrease ($P<0.05$) in crude protein (CP) concentration was found, reaching lowest values of 68.8 g kg^{-1} at 55 days, by the regression model (Figure 2). The CP concentration on the 34th day (91.3 g kg^{-1}) was lower than the one found by Cuomo et al. (1996), who measured an average of 122 g kg^{-1} at 20 days and 92 g kg^{-1} 40 days in three *Paspalum* grasses. According to the NRC (1996) the CP requirement of beef cattle for growth and finishing is 100.5 g kg^{-1}. The decline in CP concentration found in the present work can be partially explained by the accumulation of dry matter, causing the diluition of protein and minerals in the total herbage mass (Gomide, 1976).

Under the conditions of the work reported here, we conclude that the yield and the concentration of dry matter in Tifton 9 herbage increased with increased maturity. Concentrations of ADF, NDF and digestible dry matter were not affected by maturity within the range studied. Concentration of CP declined with age, making Tifton 9 forage not suitable for finishing beef animals after the 27th day of regrowth.

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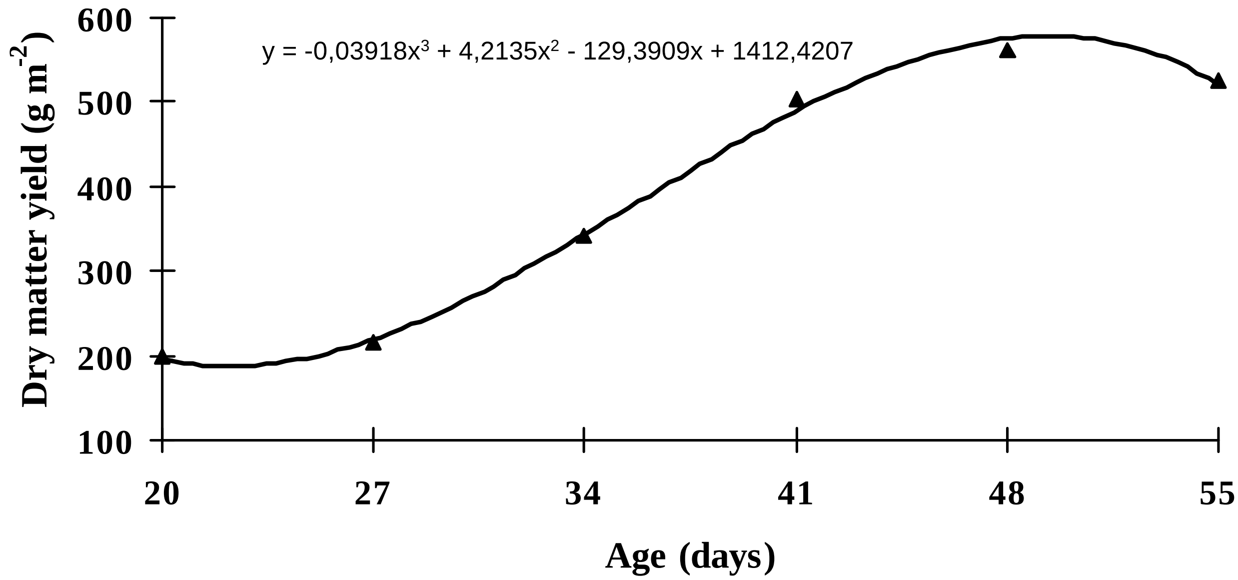

Figure 1 – Dry matter accumulation during regrowth.

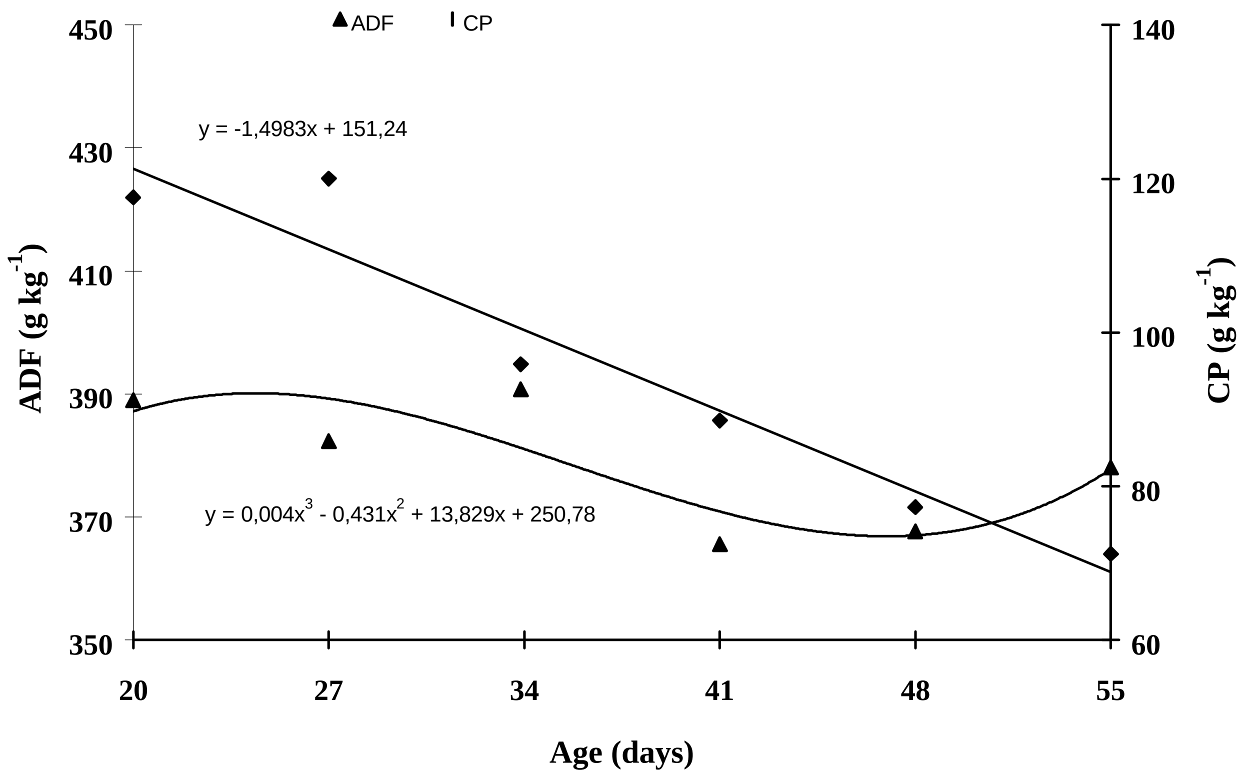

Figure 2 – Acid detergent fiber and crude protein concentration during regrowth.