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Morphogenic responses of two *Brachiaria* genotypes to clipping frequency

ANA FLÁVIA G. FARIA[1], CARLOS G.S. PEDREIRA[1], DIEGO N.L. PEQUENO[1], LILIANE S. SILVA[1], DAMIÃO W. NGULUVE[2] AND ALIEDSON S. FERREIRA[1]

[1]*Departamento de Zootecnia, Escola Superior de Agricultura Luiz de Queiroz (ESALQ), Universidade de São Paulo, Piracicaba, SP, Brazil.* www.zootecnia.esalq.usp.br
[2]*Faculdade de Zootecnia e Engenharia de Alimentos (FZEA), Universidade de São Paulo, Pirassununga, SP, Brazil.* www.usp.br/fzea

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Introduction

Tropical grasslands represent an important resource for the Brazilian cattle industry, which is heavily dependent on grazed pastures. Total pasture area in the country totals 196 Mha (23% of the country's land area) (FAO 2013). The genus *Brachiaria* represents around 85% of cultivated pastures in Brazil (Moreira et al. 2009), 40% of which are established with *B. brizantha* cv. Marandu (Barbosa 2006). Mulato II is a new hybrid brachiariagrass cultivar, which has been developed to improve agronomic characteristics, broaden the range of adaptation, and ensure high forage production and nutritive value. It has also been viewed as a means of reducing the dependence on the Marandu palisadegrass monoculture (Argel et al. 2007).

The use of new cultivars should be based on adequate understanding of physiological processes and growth potential under a range of management practices. Morphogenic characteristics allow for accessing herbage accumulation potential through the measurement of tissue synthesis and senescence in forage plants. Management practices such as defoliation frequency can modify assimilate partitioning in the forage plant, affecting morphogenic characteristics related to growth rate and forage nutritive value. The objective of this research was to describe and explain morphogenic differences between Marandu palisadegrass and Mulato II brachiariagrass as affected by harvest frequency.

Correspondence: Ana Flávia G. Faria, Departamento de Zootecnia, Escola Superior de Agricultura Luiz de Queiroz (ESALQ), Universidade de São Paulo, Av. Pádua Dias, 11, Piracicaba CEP 13418-900, SP, Brazil.
Email: anfaria@usp.br

Methods

The experiment was conducted in the Department of Animal Science ESALQ/USP, Piracicaba, SP, Brazil (22°42' S, 47°30' W; 580 m asl). Average annual rainfall is about 1,300 mm and temperature ranges between 10 °C and 35 °C. The soil at the experimental area is a Kandiudalfic Eutrudox. Plots were established with *Brachiaria brizantha* cv. Marandu and *Brachiaria* cv. Mulato II in October 2010. The evaluation occurred during the summer season (December 22, 2011−March 20, 2012). Two experiments were conducted simultaneously in adjacent areas, one irrigated and another non-irrigated. The design of each experiment was a randomized complete block in a 2 x 2 factorial arrangement, with the 2 grasses and 2 harvest frequencies (28 and 42 days) and 4 replications, totaling 16 experimental units of 20 m² (4 m x 5 m). Harvests were made 10 cm from the soil surface.

Ten tillers were evaluated for the following characteristics: (a) leaf blade length and (b) leaf type, classified as expanding, expanded, senescing and dead. Leaves were classified as: expanding, when their ligules were not exposed; expanded, when the ligule was visible and/or growth ceased; senescing, when part of the leaf blade showed signs of senescence (yellowing and necrosis); and dead, when more than 50% of the leaf blade was senesced. Degree of leaf senescence was estimated visually. The stem length was measured from the soil level to the ligule of the youngest fully expanded leaf. Means were calculated using "LSMEANS" statement, and comparisons made with "PDIFF" based on a Student t-test ($P<0.05$). Data for the experiment were analyzed using the GLM Procedure of SAS.

Results and Discussion

Marandu palisadegrass had higher leaf appearance rate than Mulato II (Figure 1A). This was due to the higher number of leaves per tiller in Marandu (Figure 1B) and the similar length of leaves in the 2 grasses (8.8 cm, P=0.7789). Leaf elongation rate increased from 0.64 to 1.24 cm/tiller/d with lower harvest frequency (Figure 1C). This characteristic is related to an increase in leaf area resulting in an exponential increase of shoot mass in swards clipped every 42 days relative to those clipped every 28 days. The 42-d clipping frequency resulted in a 3-fold stem elongation rate compared with the 28-d frequency (Figure 1D). The stem component is often related to decreased nutritive value and intake by grazing ruminants.

Despite the higher stem elongation rate, which is often associated with light competition among tillers, senescence rate was not affected by clipping frequency (0.0055 cm/tiller/d, P=0.0723). Light competition among tillers was not sufficient to cause accelerated death of mature leaves in the base of the sward.

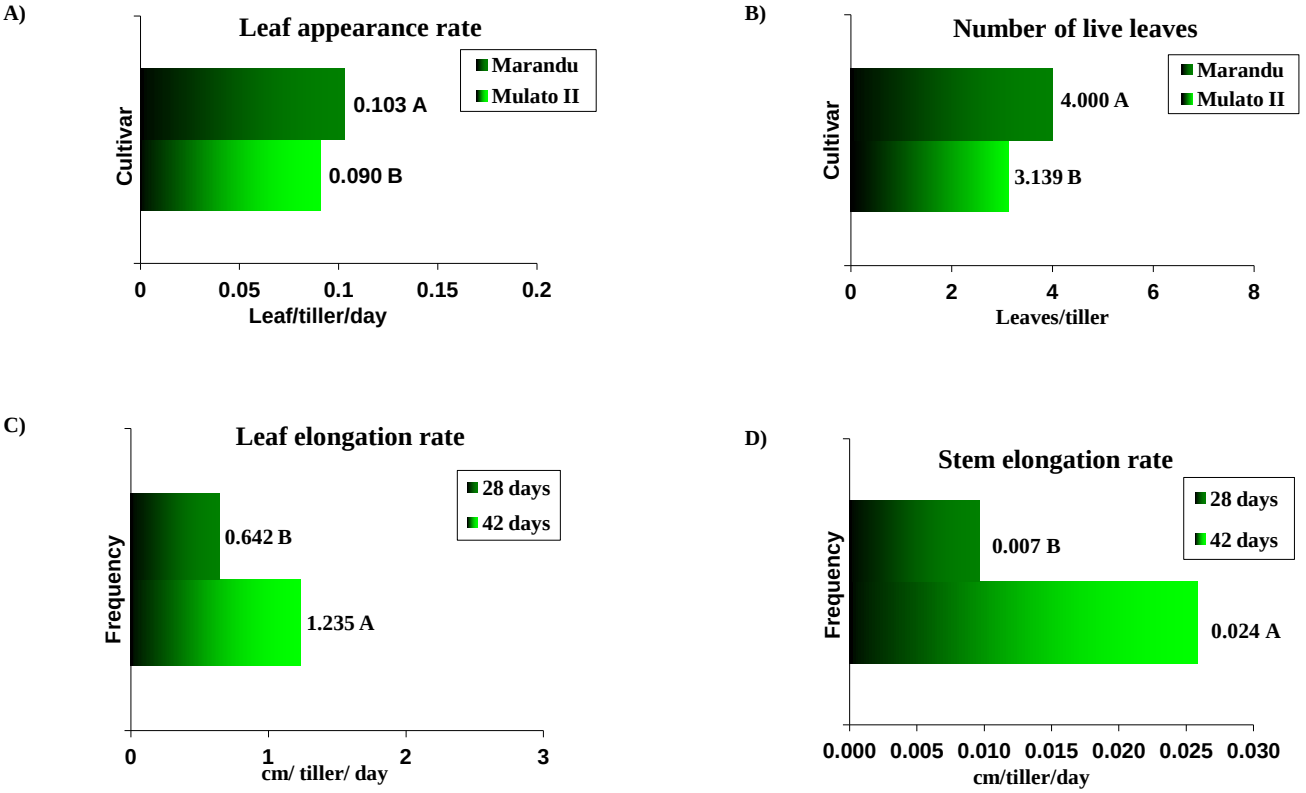

Figure 1. Morphogenic characteristics of 2 *Brachiaria* genotypes in response to clipping frequency. Within parameters, means with different letters are different (P<0.05).

Conclusion

The higher morphogenic rates and growth potential of Marandu palisadegrass than Mulato II may help explain the different growth responses in these genotypes. Harvesting every 28 days would reduce stem proportion in the herbage mass harvested, resulting in better quality forage for animals. However, reduced dry matter production could be expected.

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