Morphogenetic characteristics of Mulato II Brachiariagrass under contrasting growth rates and canopy height maintained by continuous stocking

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Introduction

Understanding plant growth is essential to the formulation of sound management in grazed pastures. Forage plant morphogenetic responses help explain plant growth under different conditions and management practices such as frequency and intensity of defoliation. The aim of this study was to evaluate morphogenetic responses of hybrid brachiariagrass (*Brachiaria* spp) cv. Convert HD 364 (also known as "Mulato II") to two growth rates and three canopy heights kept constant by continuous stocking.

Materials and Methods

-The trial was carried out in Piracicaba - SP, Brazil, from January to April 2013, with treatments corresponding to the combination of two growth rates generated by 50 and 250 kg N ha^{-1} yr^{-} and three heights (10, 25 and 40 cm) kept constant by continuous stocking in an RCB design with a factorial arrangement, and three replications.
-Paddocks had 200 m^2.
-30 tillers per paddock were monitored
-measurements were take twice a week in marked tillers.
-Replacement of tillers after 28 days.
-Morphologic characteristics were used to calculate the following morphogenetic responses: phyllochron (d $leaf^{-1}$) – PHY; leaf appearance rate (leaf d^{-1}) – LAR; stem elongation rate (cm $tiller^{-1}$ d^{-1}) – SER; and senescence rate (cm $tiller^{-1}$ d^{-1}) – SR.
- Analysis of variance with Mixed Models procedure in SAS was used to examine treatment effects.

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Figure 1. General view of experiment. A. Marked transect in a paddock. B. Marked tillers in a transect. C. Leaf length measurement.

Results and discussion

LAR and PHY were affected by growth rate (P<0.001 and P<0.001, respectively) and canopy height (P=0.0002 and P=0.0009, respectively). Under low growth rate LAR decreased from 0.114 to 0.083 leaf d^{-1} (Figure 2) and PHY increased from 8.95 to 12.3 d $leaf^{-1}$ (Figure 3). Reduction in growth rate increased PHY, indicating that to maintain defoliation intensity and sward height, stocking rate needs to be adjusted according to growth rate. LAR and PHY were similar in 25- and 40-cm canopies (0.095 leaf d^{-1} and 11.42 d $leaf^{-1}$, respectively).

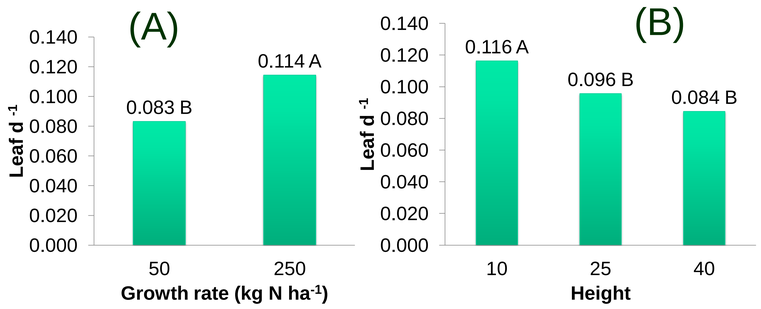

Figure 2. LAR of Mulato II Brachiariagrass in response to (A) growth rate and (B) sward height.
Capital letters atop bars compare growth rates or heights.

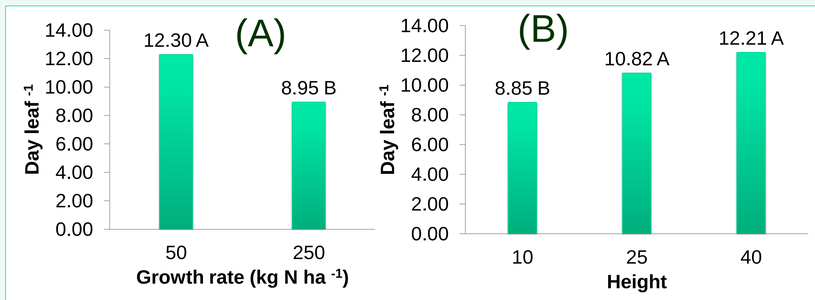

Figure 3. PHY of Mulato II Brachiariagrass as a result of (A) growth rate and (B) height kept by continuous stocking.
Capital letters on top of bars compare growth rates or heights.

Greater growth rate likely increased meristematic activity and resulted in greater SER (Figure 4). SR was greater under higher growth rates (0.144 cm $tiller^{-1}$ d^{-1}) and in taller swards (0.184 cm $tiller^{-1}$ d^{-1}) indicating changes morphological traits and that management be adjusted to meet satisfactory level of forage utilization.

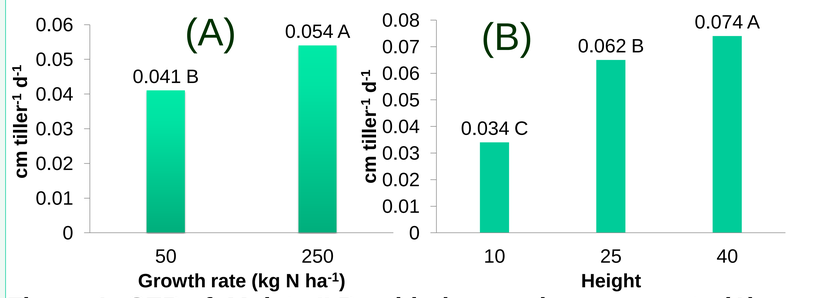

Figure 4. SER of Mulato II Brachiariagrass in response to (A) growth rate and (B) sward height.
Capital letters atop bars compare growth rates or heights.

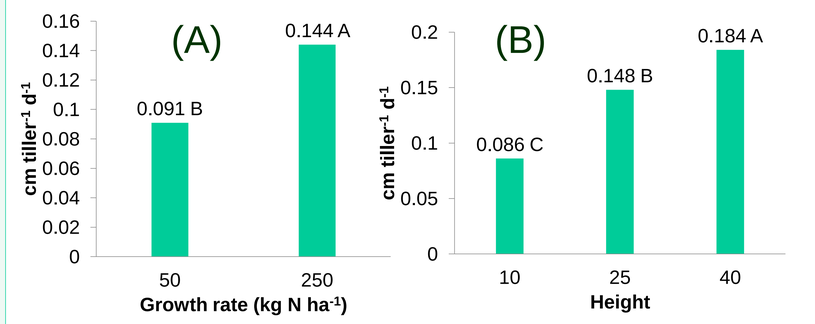

Figure 5. SR of Mulato II Brachiariagrass in response to (A) growth rate and (B) sward height.
Capital letters atop bars compare growth rates or heights.

Conclusion

Growth rate and canopy height can modify sward morphogenetic characteristics and this requires that management be adjusted accordingly, so that forage production and utilization are optimized, reducing senescence and stem elongation.

Acknowledgment: