Canopy Height and N Rate Affect the Composition of Leaf Area Index and Herbage Accumulation of Continuously Stocked Mulato II Brachiariagrass

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Introduction

In grazed pastures leaf is the main component harvested by the animals and this may affect leaf category contribution to canopy LAI. Canopy height and N may also affect LAI composition and herbage accumulation (HA). The objective of this study was to quantify the effects of three canopy heights (10, 25, and 40-cm) kept constant by mimicked continuous stocking and two N rates (50 and 250 kg ha^{-1} yr^{-1}) on the HA and leaf category composition of LAI of Mulato II brachiariagrass hybrid (Convert HD364) (*B. ruziziensis* × *B. decumbens* × *B. brizantha*).

Figure 1. View of the experimental area.

Material and Methods

-The trial was carried out in Piracicaba - SP, Brazil, during two summer rainy seasons (2012/2013 and 2013/2014).
-A RCB design was used, with a 3 × 2 factorial arrangement, corresponding to three steady-state canopy heights (10, 25, and 40 cm) maintained by continuous stocking and two N rates (50 and 250 kg ha^{-1} yr^{-1}), with three replications (Figure 1).
-Paddocks had 200 m^2.
-Exclosure cages sampled every 21 days were used to estimate HA.
-Herbage samples were collected every 21 d and hand separated into expanding (EL), youngest fully expanded (YL), and mature leaves (ML).
- Contribution of leaf categories to LAI estimated
- Treatment means were compared using PDIFF by Student test ($P < 0.05$).
- Single degree of freedom polynomial contrasts were used (linear and quadratic) to determine the nature of responses to canopy height.

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Results and Discussion

There was a linear increase in HA and LAI with increased canopy height (Figure 2A and 3A).

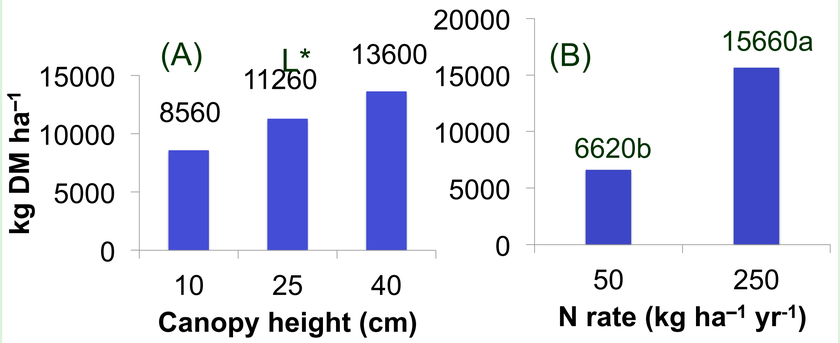

Figure 2. Herbage accumulation of Mulato II brachiariagrass in response to canopy height (A) and N rate (B) under continuous stocking.
L= linear orthogonal polynomial contrast. Means followed by different letters are different by Student test.

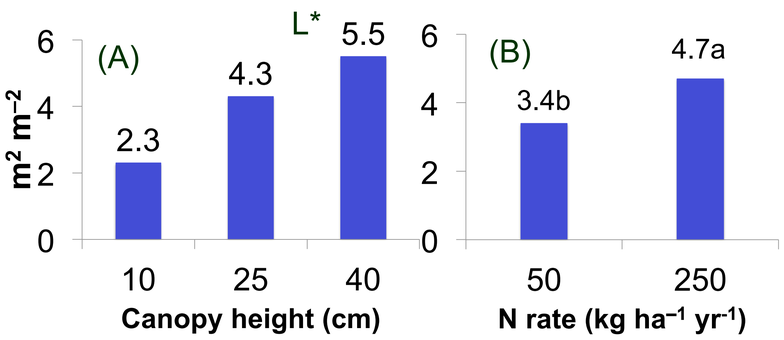

Figure 3. Leaf area index of Mulato II brachiariagrass in response to canopy height (A) and N rate (B) under continuous stocking.
L= linear orthogonal polynomial contrast. Means followed by different letters are different by Student test.

The relative contribution of EL and YL to the LAI increased with the reduction in canopy height. (Table 1). Greater N rate increased HA by 137% (Figure 2B), and LAI by 28% (Figure 3B). The contribution of leaf categories was not affected by N rate ($P > 0.05$). Although canopies kept at 10 cm showed greater proportion of younger leaves (EL and YL) in the LAI - which are those with greater photosynthetic rates - the HA was greater in taller

Table 1. Proportion of expanding leaves, young expanded leaves, and mature leaves into LAI of Mulato II brachiariagrass in response to canopy height under continuous stocking.

Canopy height	Expanding leaves	Youngest fully exp. leaves	Mature leaves
cm	----------%----------		
10	32	30	38
25	30	30	40
40	27	40	45
OPC	L*	L*Q*	L*
SE	1.0	0.8	0.9

OPC= orthogonal polynomial contrast. SE = standard error.

Conclusions

Taller canopies (25 or 40-cm) favor HA of Mulato II brachiariagrass. The proportion of YL decreases as patures are maintained at a taller canopy height.

Fertilization with 250 kg N ha^{-1} yr^{-1} increases LAI and HA, but has little effect on the participation of leaf categories on LAI.

Acknowledgments

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