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).

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 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.

Results and Discussion

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

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.

<table>
<thead>
<tr>
<th>Canopy height (cm)</th>
<th>Expanding leaves</th>
<th>Youngest fully expanded leaves</th>
<th>Mature leaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>32</td>
<td>30</td>
<td>38</td>
</tr>
<tr>
<td>25</td>
<td>30</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>40</td>
<td>27</td>
<td>40</td>
<td>45</td>
</tr>
<tr>
<td>OPC</td>
<td>L(^*)</td>
<td>L(^<em>)Q(^</em>)</td>
<td>L(^*)</td>
</tr>
<tr>
<td>SE</td>
<td>1.0</td>
<td>0.8</td>
<td>0.9</td>
</tr>
</tbody>
</table>

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 pastures 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.

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