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THE DURATION OF REGROWTH PERIOD AND THE STRUTUCTURAL TRAITS IN A ROTATIONALLY GRAZED Panicum maximum SWARD[3]

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Abstract

Panicum maximum ‘cv’. Mombaça was rotationally grazed by steers. Three regrowth periods based on the number of expanded leaves per tiller: 2.5; 3.5 and 4.5, were compared. Three groups of seven tester steers, one for each treatment, grazed the replications of each experimental paddocks, the animals being removed from a paddock after 4 to 5 day grazing period when its sward leaf area index (LAI) was 1.5, on the average. Sward height and available biomass increased while tiller population density and leaf-stem ratio decreased with regrowth period. Overall averages observed for LAI and photosyntheticly active radiation interception by the end of regrowth periods did not differ among treatments but LAI and light interception evolved faster in the swards submitted to the shortest regrowth period towards the end of the grazing season.

Keywords: leaf number, leaf area index, PAR interception, tiller population, leaf-stem ratio, sward height.

Introduction

The duration of the regrowth period of an intermittent grazing system has been empirically defined. Still, its definition should be based on scientific concepts such as: leaf area index (LAI) and photosyntetically active radiation (PAR) interception (Parsons et al., 1983; 1988), herbage accumulation rate (Bircham and Hodgson, 1983), net accumulation of matter (Parsons et al., 1983), average growth rate (Parsons and Penning, 1988), number of leaves per tiller (Fulkerson and Slack, 1995), besides organic reserve level. From these, the number of leaves per tiller is the criterion more likely to be adopted by the grazier due to its objectiveness. The leaf appearance interval and the number of green leaves per Mombaçagrass tiller were 10 days and 3.5, respectively (Gomide and Gomide, 1997). This paper reports the changes in structural characteristics and biomass production *in Panicum maximum* cv. Mombaçagrass sward rotationally grazed whose regrowth periods were based on the number of expanded leaves in the tiller.

Material e Methods

This experiment was carried out in CEPET/UFV – Capinópolis-MG, Brazil (18^{o}41' S; 49^{o}34' W). Soil experimental area had the following chemical properties: pH 6.2, P and K 8 and 106 mg/dm^3; Al^{+++}, Ca^{++} and Mg^{++} 0.0, 2.8 and 1.0 cmol/dm^3 and organic matter 2.23 dag/kg .

Three regrowth periods were defined based on the number of expanded leaves in the tiller: 2.5, 3.5 and 4.5 leaves per tiller, for treatments A, B and C, respectively. In treatment C, the first expanded leaf being senescent.

A 6 há experimental area, cultivated with mombaçagrass, was divided into 18 experimental paddocks besides a 4 há reserve pasture. The paddocks, whose areas were inversely proportional to the duration of their regrowth period, were randomly allocated in the

2 há area, observing 6 replicates per treatment. Three groups of 7 tester yearling Holstein-Zebu crossbred steers, one group per treatment, rotationally grazed their experimental paddocks. Put and take steers were used so as the grazing period could be completed in 5 days, on the average, leaving a sward residual LAI of about 1.5. The reserve pasture served the purpose of carrying the “put and take” steers as well as any of the 7 tester steer group having to wait for the completion of the regrowth period of the first grazed paddock in the grazing cycle. The variables: sward canopy height, PAR interception, biomass, tiller population, LAI, and leaf-stem ratio, were evaluated. Sampling was accomplished by cuting a 1 X 1 m square placed in representative points of the sward. Cutting was taken 0.15m above ground level. Two samples were taken per paddock at the end of each regrowth period. The experimental period extended from 06 / 12 / 99 to 25 / 04 / 00, comprising 5, 4 and 3 grazing cycles for treatments A, B and C, respectively. A N-P-K fertilizer mixture (50-40-28 Kg/há) was broadcasted on each paddock after every other grazing cycle. PAR interception was estimated from PAR readings taken, around noonday, above and below sward canopy using a line quantum sensor (LI 191SA). LAI was estimated from specific leaf area and total leaf dry matter. Leaf area from an aliquot sample was measured in an image analysis system device (ΔT). The evolution of LAI and PAR interception was estimated from simultaneous readings of these variables in all paddock replicates of treatment C and A swards on march the 17$^{\underline{th}}$ and april the 7$^{\underline{th}}$ respectively, using a sunscan canopy analysis system device (ΔT).

Results and Discussion

Overall mean figures for the studied variables are shown in table 1. Sward height and available biomass per grazing cycle increased with duration of regrowth period while leaf-stem ratio and tiller population decreased. Sward under the longest regrowth period had higher (P<0,05) LAI, but the difference does not seem substantial; presumably its lower tiller population counterbalanced its longest rest period. PAR interception surpassed the critical value of 95% by the end of the regrowth period regardless of experimental treatment. Overall average for light interception did not differ among treatments, a fact attributed to the more intense stem elongation in treatment C sward as deduced from its lower leaf/stem ratio. The decrease in the leaf-stem ratio signals the lowering in forage nutritive value as well as the hindrance of the efficiency with which the animal grazes the sward. The falling in the leaf-stem ratio progressed with succeeding grazing cycle, mainly in the paddocks submitted to the longest regrowth period. Such an event would partially counterbalance the advantage of greater biomass availability in this treatment

Leaf area index and light interception evolved about two weeks earlier in treatment A swards despite its lower final LAI as compared to the treatment C swards (Fig 1). These facts presumably stem from the higher tiller population and lesser tiller decapitation in the swards submitted to the fastest grazing cycle. The difference in LAI between A and C swards at almost complete light interception points out difference between them regarding the architectural arrangement of their leaves. In fact, swards submitted to the longest regrowth period had most of their leaves vertically positioned as compared to the mostly horizontal leaves in treatment A swards.

It is concluded that mombaçagrass regrowth period should not be extended beyond 3 leaf appearance interval.

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Table 1 – Effect of the regrowth period on the structural characteristics and biomass of Mombaçagrass sward.

Grazing Frequency	Height (cm)	Tiller/m^2	LAI	Interception (%)	DM (Kg/há.cycle)	L/S
A	79.1 C	240.0 A	9.1 B	95.6 A	4571 B	2.8
B	97.9 B	176.5 B	8.9 B	96.5 A	5584 AB	3.7
C	117.2 A	148.4 C	10.9 A	96.4 A	7340 A	1.7

LAI – Leaf Area Index
DM – Dry Matter
L/S – Leaf-stem ratio

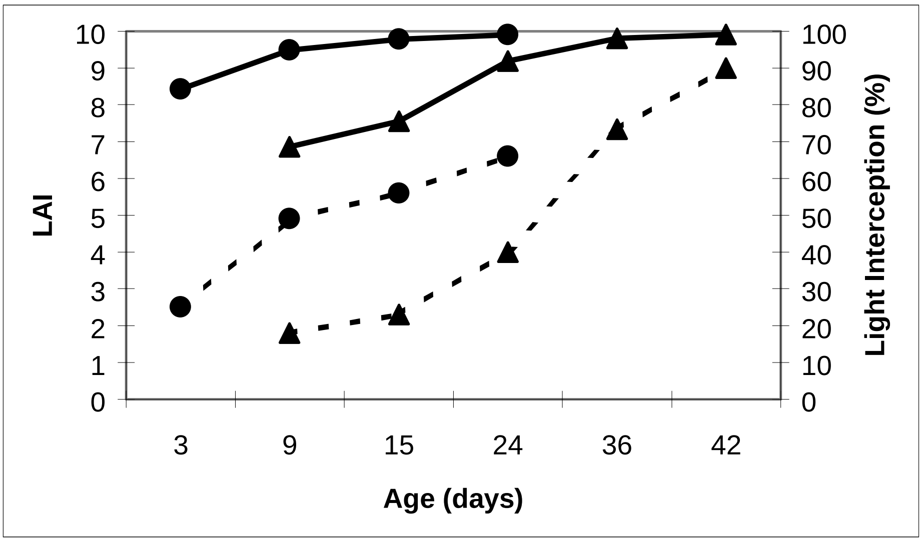

Figure 1 - Evolution of Leaf Area Index (LAI) (- - -- - -) and light Interception **(——)** during the longest (▲) and shortest (●) regrowth period.