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CONSTRUINDO SABERES, FORMANDO PESSOAS E TRANSFORMANDO A PRODUÇÃO ANIMAL

ACUMULATION OF SECONDARY MACRONUTRIENTS IN THE AERIAL PART OF CAPIM-ELEPHANT CV. ROXO AS A FUNCTION OF CUMULATIVE PLUMBING PRECIPITATION

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Resumo: Objetivou-se estimar os acúmulos de cálcio, magnésio e enxofre na parte aérea do capim-elefante cv. Roxo manejado sob sequeiro em resposta à precipitação pluvial acumulada. Registraram-se precipitações pluviais acumuladas de 0,70; 17,20; 100,60; 102,80; 121,30; 362,10 e 373,30 mm nas idades de crescimento de 9; 18; 27; 36; 45; 54 e 63 dias após o corte, respectivamente. Em cada idade referente à precipitação pluvial acumulada foram registrados os acúmulos de Ca, Mg e S na biomassa de forragem verde do capim-elefante cv. Roxo. Os acúmulos de Ca e S em função da precipitação pluvial aumentaram linearmente. Estimaram-se incrementos de 0,019 e 0,012 kg ha^{-1} mm^{-1}, perfazendo acúmulos de 8,45 e 4,65 kg ha^{-1} para Ca e S, respectivamente, numa precipitação acumulada de 373,30 mm. O acúmulo de Mg apresentou resposta quadrática, sendo maximizado na precipitação estimada em 310,00 mm, perfazendo acúmulo de 19,55 kg ha^{-1}. Recomenda-se que a adubação de manutenção com os macronutrientes Ca, Mg e S seja realizada de forma parcelada ao longo do ciclo de crescimento do capim-elefante, conforme a disponibilidade de precipitação pluvial. O acúmulo de macronutrientes secundários no capim-elefante cv. Roxo apresentou a seguinte ordem: Mg>Ca>S na época chuvosa.

Keywords: maintenance fertilization, nutrient absorption gait, nutritional requirement, *Pennisetum purpureum*

Introduction

Elephant-grass (*Pennisetum purpureum*) is among the most productive forage plants, however, in order to obtain its productive potential, it must be available in secondary macronutrients in aggregation. The nutritional demand of the plant varies according to the age, availability of abiotic factors, species and cultivar (Backs et al., 2018). From animal growth gait studies, it is necessary to establish nutritional requirements for the plant grow.

It is highlighted that in crops under rainfed, the nutritional requirement of the forage is conditioned by the temporal variation of rainfall. It is also important to note that there are few studies in the literature on the progress of accumulation of calcium, magnesium and sulfur for cultivars of elephant-grass under rainfed conditions. The objective of this study was to estimate the accumulations of, Ca, Mg and S in elephant-grass cv. Roxo under rainfed in response to rainfall.

Material and methods

The experiment was carried out at the Animal Science Department of the Universidade Federal do Ceará, NEEF/DZ/CCA/UFC, in Fortaleza-CE. The climate of the region is classified as Aw' tropical rainy. The elephant-grass (*Pennisetum purpureum*) cv. Roxo cultivated in Yellow Argisol with sandy texture, managed under cutting at ground level. Accumulated precipitation of 373.30 mm and average temperature of 28.00 °C was recorded. Maintenance fertilization was carried out with doses equivalent to 600 kg ha^{-1} $year^{-1}$ of nitrogen (urea), 200 kg ha^{-1} potassium (potassium chloride) and 50 kg ha^{-1} of FTE-BR12. A completely randomized design with three replicates (experimental units of 10.5 m^2) was used.

Cumulated rain precipitates of 0.70 were quantified as precipitates; 17.20; 100.60; 102.80; 121.30; 362.10 and 373.30 mm in the growth analyzes of 9; 18; 27; 36; 45; 54 and 63 days after cutting, respectively. In a larger scale of years of

rainfall, accumulation levels of calcium (Ca), magnesium (Mg) and sulfur (S) were found in the green grass biomass of elephant-grass cv. Roxo.

At each age a biomass sample was collected using a 1.0 m^2 frame. Subsequently the biomass was weighed and forced into the forced ventilation oven at 55 °C. After reaching constant weight the biomass was ground and submitted to nitroperchloric digestion to determine the Ca, Mg and S contents (Silva, 2009). The accumulation of the nutrients was obtained from the product of the dry biomass of green fodder by the content of the respective nutrient.

The nutrient accumulation data as a function of accumulated precipitation were tested for fit for linear and quadratic models. The choice of models was based on the significance of the linear and quadratic coefficients (up to the 5% probability level) and the coefficient of determination. As a tool to aid statistical analysis, the SISVAR 5.6 computer program was adopted.

Results and discussion

The biomass yield of green forage of elephant-grass cv. Roxo was estimated at 9673.80 kg ha^{-1}, in response to accumulated rainfall of 373.30 mm for the cycle of 63 days. Despite the temporal variation in precipitation during the experimental period, the precipitated quantity made possible a linear increase of green forage biomass of elephant-grass cv. Roxo, favoring the absorption and accumulation of Ca, Mg and S by the same (Figure 1). Thus, it is inferred that the soil water potential remained within the satisfactory range for the absorption, allowing the transport of the nutrients to the rhizosphere region, since this process occurs by mass flow, mainly to the S and Mg.

Ca was the second most accumulated nutrient in the aerial part of elephant-grass cv. Roxo. The accumulation of Ca in the aerial part (CaAP) showed an increasing linear response, with an increase of 0.019 kg ha^{-1} mm^{-1}, accumulating 8.45 kg ha^{-1} for accumulated precipitation of 373.30 mm, at 63 days growth (Figure

1). Such behavior demonstrates the importance of adequate supply of said nutrient for the maintenance of the biomass increment, since Ca is the main constituent of the cell wall (Prado, 2008). Thus, with the increase in rainfall and biomass increase, elephant-grass accumulated Ca until the end of the growth cycle.

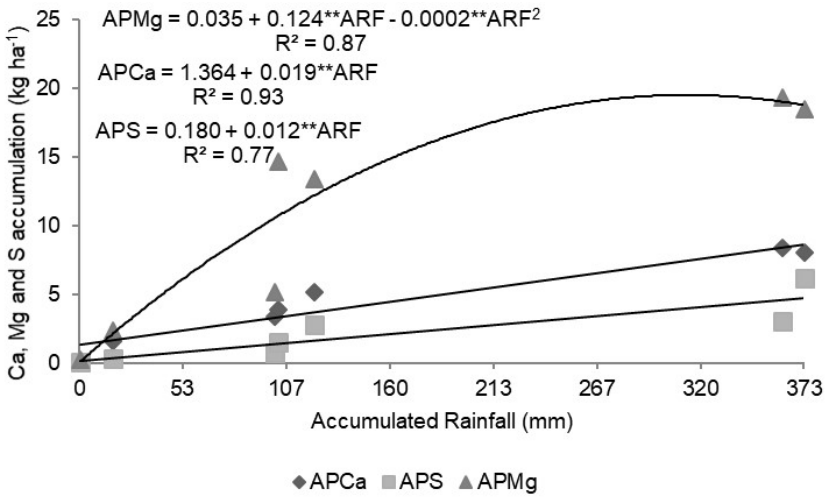

Figure 1 - Accumulation of calcium in the aerial part (APCa), accumulation of magnesium in the aerial part (APMg), and accumulation of sulfur in the aerial part (APS) in the rainy season, accumulated rainfall (ARF), coefficient of determination (R^2), at the level of 1% (**).

Mg was the most accumulated nutrient in the aerial part of elephant-grass cv. Roxo. The accumulation of Mg in the aerial part (MgAP) showed a quadratic behavior, being maximized in the accumulated precipitation of 310.00 mm, accumulating 19.55 kg ha^{-1}, so the accumulation of MgAP did not respond to the accumulated precipitation increase until the end of the cycle, because unlike Ca the Mg has no structural function in the plant. Mg is an enzymatic activator and constituent of the chlorophyll molecule. Thus, elephant-grass cv. Roxo was able to accumulate enough Mg to maintain its productivity at 310 mm.

The S was the nutrient accumulated in less quantity in the aerial part of elephant-grass cv. Roxo. The accumulation of S in the aerial part (SAP) of elephant-

grass cv. Roxo, presented positive linear increase of 0.012 kg ha^{-1} mm^{-1}, accumulating 4.65 kg ha^{-1}, in accumulated rainfall of 373.30 mm at the end of the crop cycle (Figure 1). The positive linear accumulation of SAP is due to the role of this nutrient in plant metabolism, since it participates in several enzymatic reactions, being constituent of organic structures and closely linked to the nitrogen metabolism (Taiz et al., 2017). Thus, the increase in rainfall allowed positive increases in biomass of green forage of elephant grass cv. Roxo and consequently in the growing accumulation of S.

Conclusion

The accumulations of Ca, Mg and S in elephant-grass biomass cv. Roxo, can be estimated from equations, considering the accumulated rainfall, allowing the refinement in the maintenance fertilization scheme for the said macronutrients.

The accumulation of secondary macronutrients in elephant-grass cv. Roxo had the following order: Mg>Ca>S.

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