

Vegetation Patterns of Different Managements in Natural Grasslands of Pampa Biome

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Introduction

The Pampa vegetation, in Rio Grande do Sul state has approximately 450 grasses and 150 legumes (BOLDRINI, 2002) and is an important habitat for biodiversity. It also provides free forages to livestock. In this context, for sustainable grazing management to be effective, it is necessary to establish an *equilibrium* between preservation of diversity and forage production (OVERBECK, 2007). Thus, further studies are needed concerning the grazing effects on Pampa's plant communities and how plants response to it. These interactions are essential to understand the patterns of vegetation according to grazing regime adopted.

Thus, this research aimed to identify the vegetation patterns of natural grasslands of Pampa biome under different grazing managements.

Material and Methods

The experiment was conducted in a natural grassland of Pampa biome located at Bagé city (31° 18' S, 53° 57' W) in Rio Grande do Sul state. The area is situated in a transition zone between the Southern Campaign and Southeast Hills and the climate is Cfb, temperate humid, according to Köpen classification with the historical average rainfall, of last 30 years, of 1446.2 mm and average temperatures of 18.7 °C (INMET, 2015). The area has no history of agricultural mechanization and, during the last 40 years, it was managed extensively with cattle and sheep herds at low stocking rates (< 0.5 animal unit ha⁻¹).

In June 2012, the experimental area was completely excluded from grazing of large herbivores and it was subdivided in two management regimes: grazed (GRAZ) and ungrazed (UNGRAZ). The Brangus heifers' entrance in GRAZ occurred in February 2013.

The vegetation was preferentially sampled, comprising of variations in sunlight exposure, relief, soil and drainage. Fifty transects with 1.25 m² of area were demarcated (40 in GRAZ and 10 in UNGRAZ). It was used the Londo-scale (LONDO, 1976) modified to estimate the cover class of each vascular plant species. The vegetation survey was carried out from December 2014 to February 2015.

The relative cover data of species *per* transect was submitted to ordination by principal coordinates analysis (PCoA), based on chord distance between transects, in 'vegan' package of R software (Oksanen et al., 2016; R Development Core Team 2015).

Results and Discussion

The first and second axes of PCoA analysis explained 22.90 % and 17.82 % of the total variation respectively. It was possible to observe a defined vegetation pattern only in UNGRAZ management that

was positioned along the positive portion of second axis. In GRAZ management, it was not possible to distinguish a pattern.

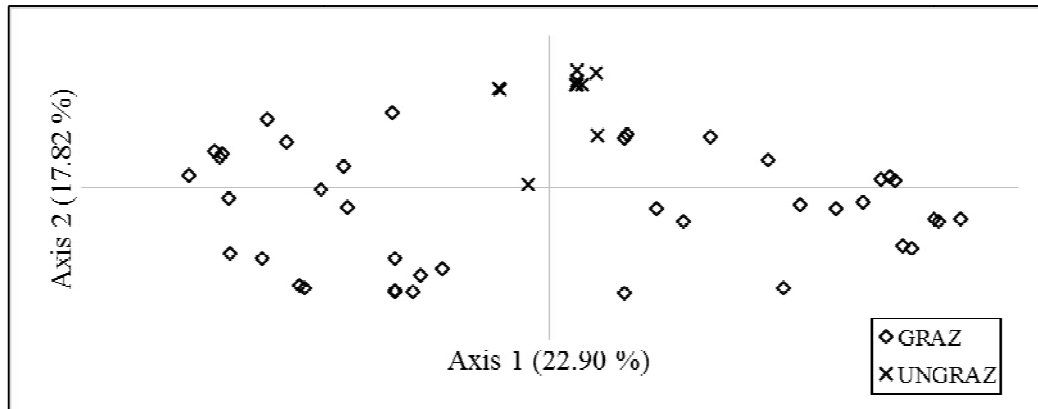


Figure 1. Plant communities' ordination diagram of grazed (GRAZ) and ungrazed (UNGRAZ) managements.

In UNGRAZ management, determinant factor to dominance is light capture followed by plants that have taller vertical size. Great efficacy in light capture became dominant while short-plants size are subdued to shading. The latter disfavors the full maintenance of the vital activities of these, causing disappearance of some plant species. Therefore, in our UNGRAZ management, spatial occupation is done by few species (e.g. *Acanthostyles buniifolius*, *Anthraenantia lanata* and *Saccharum angustifolium*) and it decreases communities' heterogeneity revealing a distribution pattern in them.

Grazing effects (e.g. defoliation, trampling) reduces the mean height of vegetation's canopy allowing capture of light for higher number of plant species than in UNGRAZ management. Concomitantly, there is the effect of grazers' preference for some plant species that influence in spatial distribution of species. Both factors play an important role in vegetation, changing the dominance of species along the GRAZ area and increasing the heterogeneity of it. As consequence, plant communities of GRAZ management do not have a defined pattern of distribution.

Conclusions and Implications

Plant communities of Pampa biome responds rapidly to grazing disturbances. The comprehension of interaction between plant and grazer is the core for development of managements that aim the sustainable use of natural ecosystems.

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