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BURNING AND MANAGEMENT ALTERNATIVES ON FORAGE ACCUMULATION AND FLORISTIC COMPOSITION OF A NATIVE PASTURE

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Abstract

The forage accumulation and floristic composition of native pasture, submitted to burning and alternative management practices, was evaluated during one year. The experimental design was a completely randomized, with five treatments and three replications. The forage accumulation was evaluated in a grazing exclusion cage, and the floristic composition was estimated with Botanal method. The systems without burning were more productive and, among these, the forage accumulation was similar between the one without burning and without mowing and the improve treatments, and the annual accumulation was greater than 9,000 Kg/ha of green forage dry matter. The species *Paspalum notatum*, *P. paniculatum* and *Desmodium incanum* had greater contribution in the improved and mowed treatments. The biennial burning stimulated species of *Andropogon* and *Schizachyrium* genus and also opportunistic species. The alternative management showed to be more sustainable, promoted greater floristic diversity, and allowed increase of species with good nutritive value.

Keywords: native pasture, forage accumulation, floristic composition, improvement, burning

Introduction

Burning has affected vegetation since remote times. Fire can stress individual plants by depleting food reserves as much as plant communities for reducing soil moisture and soil fertility with increase of evapo-transpiration and surface drainage (Steuter and Mc Pherson, 1995). While in small scale the individuals have morphophysiological responses to the fire effect, in greater scales occurs a vegetation dynamic mosaic, as a result of accelerated extinction rates, introduction and fragmentation of plants (Steuter and Mc Pherson, 1995; Bond and Wilgen, 1996). Fire effects on pasture productivity are variables (Daubenmire,1968). The forage production can increase after fire, as a direct effect of ash incorporation (Coutinho, 1994), shade reduction, increase of nitrogen availability through reduction of carbon material, and soil heating (Daubenmire,1968). On the other hand, it can be observed that temporary water deficit condition (Steuter and Mc Pherson, 1995), less plant vigor (Castilhos and Jacques, 1984) and loss of soil fertility in areas affected by erosion can determine reduction in forage yields in burned areas.

A series of alternative can be used to suppress the fire practice, among them the deferement, mowing, and the improvement of native pasture. This work had the objective of evaluating the forage accumulation and floristic composition of a native pasture maintained for long period under different managements.

Material and Methods

This work was carried out in the Campos de Cima da Serra region, André da Rocha, RS, county, in southern Brazil, from september 1997 to september 1998, in a representative native pasture of this region. The native pasture areas studied represented five distinct management practices as follows: without burning and without mowing for 32 years (SQ); without burning for 32 years and mowing annually; improved for 7 years (CNM 7) and

for 24 years (CNM 24) with lime each 3-4 years, annual fertilization and sod-seeding of cool season species; burning for more than 100 years, with biennial frequency. All studied areas were grazed. The experimental design was a completely randomized with five treatments and three replications. The forage evaluation was conducted every 45 and 90 days, with samples cut at 5 cm stubble height, within grazing exclusion cages. Later the pasture samples were separated manually into green forage species, excluding senescent material and undesirable species. The samples were dried in air forced oven until constant weight.

The floristic composition, in terms of incident frequency and species contribution was estimated in november 1998, utilizing the modified Botanal method (Kohmann et al., 1985), with four transects per area, distributing regularly nine 0.25 m^2 "quadrats" per transect.

The statistical procedures utilized were the PROC GLM method (SAS Institute, 1988) from the statistical package SAS, Version 6.12 for Windows. The floristic evaluation data, a matrix of 105 species x five communities, were submitted to an ordination multi-varied analysis by the method of main coordinates, with euclidian distances as a measure of similarity (Podani, 1994), utilizing the software MULTIV (Pillar, 1998).

Results and Discussion

Beside the interaction effect between treatment and year season ($P<0.05$), management systems affected markedly the forage accumulation (Table 1). Forage accumulation of improved treatments has a similar response to the SQ during spring and summer, while it is inferior for the burned and intermediate for the mowing. The forage accumulation is greater in the spring and summer as related to fall and winter. The area submitted to burning for more than 100 years was less productive, and presented less contrast on the forage accumulation among seasons. The high annual forage accumulation of the improved treatments is due, mainly, to the development of native species, which gave a great

response to better soil fertility conditions. It is also expressive the forage accumulation obtained with mowing treatment as compared to forage production usually registered with other systems that do not employ burning practices.

The number of species varied from 52 to 57 in the areas without burning and it was observed only 38 species in areas submitted to burning. The improvement did not affect the number of forage species, but changed the expression of the main contributors for pasture production. The more productive environment of improved treatments is associated to the fast growing species such as *Paspalum notatum***,** *P. urvillei, P. dilatatum* and *P. paniculatum***,** and also the other native species more nutrient demanding. The area without burning and without mowing (SQ) is distinct from the others due to a presence of great amount of *Sorghastrum* spp., which is a genus almost exclusive in this treatment. The expression in number of individuals of *Carex sp., P. paniculatum, P. dilatatum, Trifolium repens* and *Desmodium triarticulatum* is high and common to the two improved treatments. Species with more frequency in the burned area are: *Andropogon selloanus, A. ternatus, Aristida filifolia, A. flaccida, Schizachyrium tenerum, S. microstachyum, Piptochaetium montevidense*, besides other opportunistic species. As far as contribution of components is concerned, in the case of treatment without burning and without mowing (SQ), the highest one was dead material, with almost 40% of the available dry matter, followed by *Sorghastrum* spp. (18.59%), *P. notatum*(11.92%), and *E. horridum* (10.03%). In the area submitted to mowing, *P. notatum* stood out with 57.56%, dead material with 13.44% and *P. montevidense* with 6.19% of the available dry matter. The greatest contribution related to the “other species” component in the CNM 24 treatment (24.24%) was verified by expressive contribution of a great number of pasture components, followed by *P. paniculatum* with 17.16%, dead material with 14.26%, *P. notatum* with 14.25%. The last specie was the greatest forage production component of the CNM 7 treatment, contributing with 49.14%, followed by “other species” with 20.22% and

dead material with 15.07%. In the burned area, the greatest component was *P. montevidense* with 24.53%, dead material with 19.30%, "other species" with 12.61%, *A. selloanus* with 10.57% and *S. tenerum* with 7.70%. Still in this treatment, warm season native grasses contributed with 32.63% of the available dry matter, demonstrating the sensitiveness of this species group to burning.

Burning practice results in less forage accumulation and less diversity of species. Species with higher nutritive value are more frequent and show great contribution in areas not submitted to burning practice.

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Table 1 - Average seasonal accumulation and annual total accumulation of green forage dry matter in native pasture under distinct management practices, André da Rocha, RS, 1997/98.

Treatments	Season				
	Spring	Summer	Autumn	Winter	Total
	---------- kg/ha ----------				
Without burning (SQ)	3702,3 aA	3681,7 aAB	1324,3 bA	847,0 bAB	9555,3 A
Mowing	2615,7 aB	3117,3 aB	665,0 b AB	651,0 bAB	7049,0 B
Improved 24 years	3481,3 aAB	4387,0 aA	94,0 bB	1174,7 bA	9537,0 A
Improved 7 years	3183,7 bAB	4568,5 aA	660,8 cAB	734,7 cAB	9147,7 A
Burning 100 years	1499,0 aC	1463,3 aC	10,0 bB	292,7 bB	3665,0 C
Means	2896,4 b	3443,6 a	710,8 c	740,0 c	

Average interactions followed by distinct letters, small in lines and capital in columns, differ by the Waller-Duncan test, at 10% of probability.