

PASTURE DYNAMICS AFTER SODSEEDING COOL SEASON SPECIES WITH OR WITHOUT GLYPHOSATE IN SUBTROPICAL NATURAL GRASSLANDS

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Abstract

This trial was conducted to evaluate vegetation dynamics of natural grasslands fertilized and sodseeded with the cool season species Italian ryegrass (*Lolium multiflorum*), white clover (*Trifolium repens*) and birdsfoot trefoil (*Lotus corniculatus*) with or without glyphosate. Treatments that included herbicide spraying on natural vegetation caused a substitution of perennial grasses by undesirable species, and did not show a significant contribution of introduced species. *Andropogon lateralis*, *Paspalum notatum*, *Paspalum dilatatum* and *Paspalum plicatulum* almost disappeared, and were replaced by *Chaptalia nutans* and *Apium* spp, among others.

Keywords: vegetation dynamics; *Lolium multiflorum*; *Trifolium repens*; *Lotus corniculatus*; glyphosate; biodiversity

Introduction

Rio Grande do Sul, the southernmost state of Brazil, have almost half its territory (10 millions of hectares) covered by natural grasslands. This is the main feeding resource used by

local beef and dairy cattle farmers. Besides the importance in biodiversity comprised by hundreds of species, herbage production is concentrated in spring and summer due to a dominance of subtropical perennial grasses. Sodseeding cool season species in this natural grassland is an interesting management practice that preserves natural resource and overlays its feeding limitations. The lower cost when compared to a conventional system (plowing and drilling the soil), better soil conservation, longer grazing season and preservation of natural vegetation are some of the advantages of this technique. Seasonal variations in the dormancy of dominant species could hinder a successful establishment of introduced forage species. One of the practices used in no-tillage of grain cultures is glyphosate spraying over the standing biomass. Some researches in natural pastures showed undesirable changes in the species composition after this practice (Perez Gomar et al., 1996; Cavalheiro, 1997). The objective of this research is to understand vegetation dynamics when submitted to these management practices in different regions.

Material and Methods

The trial was held at two private farms, in Alegrete and Bagé. In each farm, two natural grassland paddocks of 5 ha was randomly allocated to each of the following treatments: 1) natural grassland; 2) natural grassland, fertilized and sodseeded with 36 kg/ha of Italian ryegrass (*Lolium multiflorum*), 2 kg/ha of white clover (*Trifolium repens*), 10 kg/ha of birdsfoot trefoil (*Lotus corniculatus*); 3) natural grassland sprayed with 3 kg/ha of glyphosate, fertilized and sodseeded with the same species as in 2; 4) same as in 3, but double the amount of fertilizer. The amounts of fertilizer used was 20 kg of N and 100 kg of P₂O₅/ha, in treatments 2 and 3 and double this in 4. The cool season species was seeded at 1999/4/30. The paddocks was managed with variable stocking rates, adjusted to maintain a similar availability of dry matter (1,000 a 1,500 kg of DM/ha). At least five tester yearling steers (200

kg of liveweight, Hereford breeds) was held at each replication from July to December of 1999. In March of 1999 and 2000, all paddocks had its composition sampled using field sampling procedures adapted from BOTANAL (Tothill et al., 1992). Data obtained in the field was analysed using principal coordinates analysis and randomization tests performed by MULTIV software (Pillar, 1997).

Results and Discussion

Pasture composition was markedly affected by treatments that used glyphosate (T3 and T4). Figure 1 shows that, in both sites, perennial grasses that are the major contributors of forage production like *Andropogon lateralis*, *Paspalum notatum*, *Paspalum dilatatum* and *Paspalum plicatulum* almost disappeared from natural grasslands. These species were replaced by undesirable ones like *Chaptalia nutans* and *Apium* spp, among others. The introduced species had small contributions to the biomass availability: *Lotus corniculatus* not exceeds 50 kg of DM/ha in Alegrete, but represents 470 kg of DM/ha in Bagé; *Trifolium repens* and *Lolium multiflorum* presented less than 70 kg of DM/ha in both sites. Table 1 presents the results of randomization tests showing significant differences in species composition between treatments that not used glyphosate (T1 and T2) and those using the herbicide (T3 and T4).

These findings agrees with results of Cavalheiro (1997) and Perez Gomar et al. (1996), in small plots, indicating a substitution of perennial grasses by annual and perennial grasses and shrubs, that are indesirables as forage plants.

The use of glyphosate in natural grasslands changed markedly the composition of pasture, causing a substitution of perennial grasses by undesirable species in the first year of evaluation.

References

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Table 1 - Comparisons between treatments as G statistics (a ratio of sums of squares between and within treatments) calculated after 10.000 iterations (random assignment of each sampling unit), using euclidian distances as a resemblance measure over biomass contribution of 80 species.

Treatments	Contrasts	P ($G_0 > G_{random}$)	
		Alegrete	Bagé
T1 - Natural grassland (N.G.)	T1 x T2	0.17	0.46
T2 - N.G. sodseeded without glyphosate	T1 x T3	0.009	0.02
T3 - N.G. sodseeded with glyphosate	T1 x T4	0.006	0.04
T4 - N.G. sodseeded with glyphosate and double fertilizer	T2 x T3	0.06	0.02
	T2 x T4	0.05	0.03
	T3 x T4	0.81	0.24

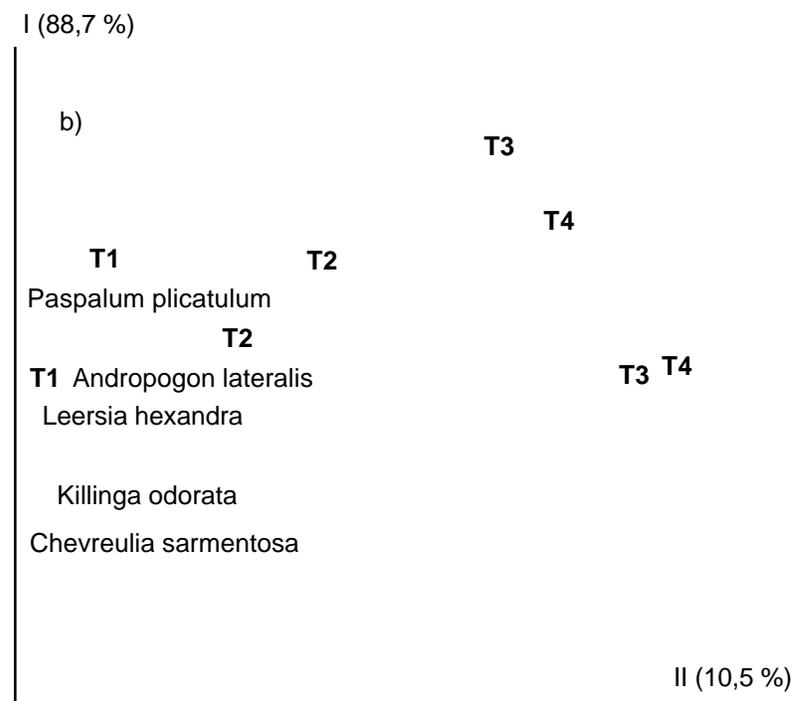
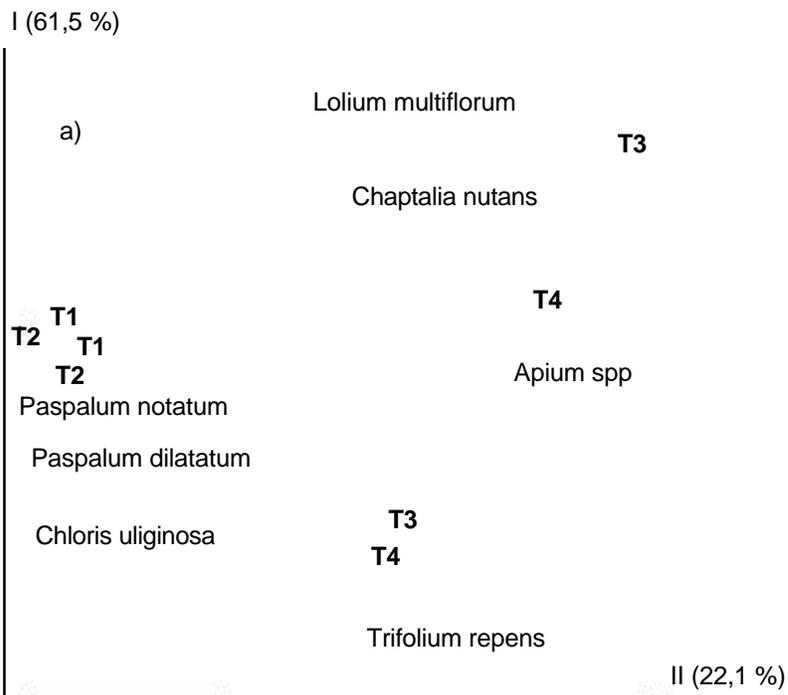


Figure 1 - Ordination diagram (principal coordinates analysis) of species contribution (kg of DM/ha) on total available biomass. Diagram (a) corresponds to Bagé site and (b) to Alegrete one. Species indicated presented a correlation above 0.7 with the ordination axes. Proportion of sum of squares that corresponds to each axe in brackets. The legends for treatments are: **T1** – natural grassland (N.G); **T2** - N.G. sodseeded without glyphosate; **T3** - N.G. sodseeded with glyphosate; **T4** - N.G. sodseeded with glyphosate and double fertilizer.

