INTRODUCTION OF FORAGE LEGUMES INTO PASTURES OF THREE DIFFERENT GRASSES

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Abstract

It was evaluated the introduction of a mixture of calopo, galaxia, perennial soybean, guata and stylo broadcsted into marandu, setaria and tanzania half-plots already established in three cafeterias, each one located inside a paddock of each grass. The legumes were seeded in the end of the Spring (12/07/98), after the plots had been cut down and fertilized. The cafeterias were grazed intermittently by buffaloes maintained in the three paddocks. The occurrence of the five legume plants was avaluated by countings (#/m^2) effected in the middle of Autumn, Winter and Spring of 1999 and Summer of 2000. Along with this last counting it was evaluated the forage remained after grazing and its N%. Marandu-grass presented the higher amount of forage remained after grazing but the lower presence of legumes along all countings. The contrary happened with Tanzania-grass. Significantly higher N% was found in the mixed grass half-plots compared with them without legumes.

Keywords: mixed pastures, legume introduction, management, grass nitrogen percentage.

Introduction

Mixed pasture is still little used in tropical Brasil due to limited information upon its management, species adapted to each environment and compatibility between species in the mixture. In spite of that, forage legumes have already proved experimentally to be able of furnishing expressive amounts of nitrogen, according to Carvalho´s (1986) review.

Several methods of introducing and maintaining forage legumes have already been tested (Consentino & Pedreira, 1991) in São Paulo. The Instituto de Zootecnia of Nova Odessa, in previous researches, has several promising forage legume accessions, some of them detached in the work of Veasey et al. (1999), whose values have to be confirmed in mixture with grasses, under grazing. The objective of this work was to evaluate the introduction and persistence of five of those accessions into pastures already established with *Brachiaria brizantha* cv. Marandu, *Setaria sphacelata* cv. Kazungula and *Panicum maximum* cv. Tanzania.

Material and Methods

The study was held in Nova Odessa, SP, where the climate can be included in the Cwa type from the Köppen´s classification. On February, 1997 it was seeded one paddock of each grass and inside of each one it was located a cafeteria with plots (6.25x8.0m) of the three grasses, in a completely randomized design, with four replications in each cafeteria, in order to study the acceptance of them by young female buffaloes. On 12-04-98 the plots were splitted and in the halves of each one it was broadcast seeded a mixture of calopo (*Calopogonium mucunoides* NO 1824), galaxia (*Galactia striata* NO 1871), guata (*Macrotyloma axillare* cv. Guatá), perennial soybean (*Neonotonia wightii* NO 253) and stylo (*Stylosanthes guianensis* NO 2313). It was used, respectively, 2.5, 3.0, 2.0, 2.0 and 4.0 kg of sulfuric acid scarified seeds per ha. The entire plots were cut down to 15cm of height and fertilized with P, Ca, S, K, Zn, B, Cu and Mo before seeding. One week after seeding and until 03-01-99 each cafeteria was intermittently grazed by the young buffaloes that stayed in the corresponding paddocks each time tanzania´s plots reached 20-25cm until they were lowered to 10cm. From 03-01-99 to 09-15-99 the animals have no access to the cafeterias, in order to permit natural re-seeding of the legumes. On 09-16-99, it was applied a 200 kg/ha of KCl fertilization, and the cafeterias began, again, to be intermittently grazed.

The occurrence of each one of the five legumes in the half plots of the three grasses was, measured by countings (#/m^2) in two one square meter points chosen at random, effected during Autumn (04-15-99), Winter (08-05-99), Spring (12-10-99) and Summer (02-03-2000). During this last counting it was also taken forage samples from the grasses in the two half-plots (with and without legumes) to determine their N percentages. On 03-13-2000, it was evaluated the amount of remained forage after grazing in two areas of 0,25 m^2 chosen at random in each legumeless sub-plots of the three grasses.

Results and Discussion

The countings of each legume number /m^2 and the sum of them mixed with each grass, in the four seasons, are shown in Table 1. Stylo had, in general, the least presence, having always its higher number in tanzania grass plots. Considering the sum of the five legumes, its lower number ($P<0.05$) occurred in marandu grass plots, with about half of that found in tanzania grass plots. The least presence of legumes in the marandu-grass plots (3.5 plants/m^2) was found in the cafeteria located inside the paddock of this grass, just where it occurred the higher amount of forage left after grazing (4.6 t/ha). In general, the more forage grass mass left after grazing the least the total number of legumes/m^2 in the mixed sub-plots, as shown in Table 2. this can be related to the preference of the animals in grazing one or another grass plot, depending on the grass species of the paddock where they were maintained.

The nitrogen concentrations (Table 2) in the forage considering the mean of the three cafeterias and the three grasses, were higher in the presence than in the absence of legumes in their sub-plots ($P<0.05$). This shows the effectiveness of legumes in fixing and transfering nitrogen to the associated grass. Considering the nitrogen transfer from the legumes to each grass, it was more efficient on the tanzania-grass plots ($P<0.05$), just where it was found the higher number of legumes/m^2, as well as the least amount of forage left after grazing,

demonstrating the importance of the grass-legume mixture choice and the adequate management for the persistence of legumes in a mixed pasture.

Based on the results, it can be concluded that the introduction method and the management used was efficient for introducing legumes into grass pastures already established. Among the three grasses studied, marandu one presented always the least number of legumes/m^2 simultaneously with the higher forage mass left after grazing. The contrary happened with tanzania-grass. The legumes were effective in transfering nitrogen to the grasses, being this transference more effective on the tanzania-grass plots.

References

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Table 1 - Number of plants of each legume and their sum in the three grass plots, on the four year seasons.

Season	Grass	Calopo	Galaxia	Guata	Perennila soybean	Stylo	Sum
		.....n^{o} plants/m^{2}					
Autumn	Marandu	2.1a	1.8ab	0.7ab	0.9ab	0.4b	5.9B
	Setaria	3.0b	4.9a	0.8c	2.1bc	1.2c	12.0A
	Tanzania	4.3a	2.9ab	1.3c	3.0ab	1.6bc	13.1A
	means	3.1a	3.2a	0.9c	2.0b	1.0c	
Winter	Marandu	13.a	0.5b	2.7a	1.0b	1.1b	6.6B
	Setaria	5.0a	2.3bc	3.5ab	2.0bc	1.2c	14.0A
	Tanzania	4.4a	1.9b	2.0b	1.7b	2.5b	12.5A
	means	3.6a	1.6b	2.7a	1.6b	1.6b	
Spring	Marandu	0.4a	2.2a	1.3ab	0.8ab	0.2b	5.0B
	Setaria	1.6a	4.0a	1.8bc	2.9ab	0.5c	10.8AB
	Tanzania	2.9a	2.8a	1.7ab	3.1a	1.2b	11.9A
	means	1.6a	3.0a	1.6b	2.3ab	0.6c	
Summer	Marandu	1.0a	2.5a	2.3b	1.3bc	0.7c	7.8B
	Setaria	2.5a	2.9a	2.5a	2.0a	0.7b	10.6AB
	Tanzania	3.5a	2.7a	2.4ab	1.3c	1.4bc	11.3A
	means	2.3a	2.7a	2.4a	1.5b	0.9b	

Means followed by distinct small letters within a row and distinsct capital letters within a column, for each season, are different by Tukey test ($P<0.05$).

Table 2 - Nitrogen concentrations in the forage of the three grasses, mixed or not with legumes, n^o of legumes/m^2 and amount of grass forage left after grazing in the Summer season evaluation, in each cafeteria.

Cafeteria	Grass	N concentartions		Number of legumes/m^2	Forage left after grazing
		with legumes	without legumes		
		.....%		.....n^o/m^2.....	.....t/ha.....
Marandu	Marandu	0.91	0.91	3.5	4.6
	Setaria	1.12	1.11	7.9	3.2
	Tanzania	1.45	1.03	10.6	1.4
Tanzania	Marandu	1.03	0.85	10.0	2.2
	Setaria	1.29	1.25	11.1	1.8
	Tanzania	1.02	1.02	9.0	1.9
Setaria	Marandu	0.90	0.76	9.6	2.6
	Setaria	1.37	1.17	12.8	2.2
	Tanzania	1.38	0.98	14.2	1.7
Means of the cafeterias	Marandu	0.95bA	0.84bA	7.8b	3.1a
	Setaria	1.26aA	1.18aA	10.6ab	2.4ab
	Tanzania	1.28aA	1.01abB	11.3a	1.6b
Means of the grasses		1.16A	1.01B		

Means followed by distinct small letters within a column, for cafeteria means, and by distinct capital letters within a row, for N concentrations, are different by Tukey test ($P<0.05$).