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EVALUATION OF FERTILIZING METHODS ON THE ESTABLISMENT OF PASTURE SPECIES ON NATIVE PASTURE BY DIRECT SOWING

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Abstract

The experiment was carried out in the southern of Brazil, by direct sowing ryegrass (*Lolium multiflorum*), white clover (*Trifolium repens*), birds foot trifolium (*Lotus corniculatus*) and red clover (*Trifolium pratensis*) on native pasture. Herbicide Glyfosate was previously applied on this native pasture. The treatments were T1 -seed sowing in row with half fertilizer in row and half broadcasting; T2 – seed sowing in row with all fertilizer in row; T3 – seed sowing in row and all fertilizer broadcasting; T4 – seed and fertilizer broadcasting. The pasture was evaluated by two cuts in 1998 and three cuts in 1999. Considering cut means for two years, treatments T1 and T2 produced the higher dry matter yield and no difference were observed between them, however, both treatments differed ($P<0.05$) from T3 and T4. The best legume-grass mixture in the pasture were obtained in the treatments T1 and T2.

Keywords: fertilizing methods, grass, legumes, native pasture, direct sowing

Introduction

Failure on pasture establishment normally occurs due to a lack of information on this subject, mainly with winter and spring forage species. The main problem consists on the establishment of forage legume species when sowed directly on natural grassland. One of the problems is related to the form of fertilizer application, mainly when legume and grass forage species are sown by "direct drilling machine", droping seeds and fertilizer in row. The restriction is due to the allocation of the fertilizer in the bottom of the row, just below the grass seeds. Legume seeds are broadcasting sown over the row and many legume seeds stay away from the fertilizer. This procedure has an initial benefit effect for the grass growth, establishing a strong competition with the legumes. This experiment was carried out with the objective of evaluating different ways of fertilizer application on the establishment of winter-spring pasture by direct sowing on natural grassland.

Material and Methods

The experiment was established on May 27th of 1998, at the Centro de Pesquísa Pecuária dos Campos Sulbrasileiros (CPPSul), of Embrapa, Bagé, Rio Grande do Sul, on a brunizen shallow soil of hard clay texture of granitic origin (Macedo, 1984). The climate is mesotermic subtropical, inserted in Köppen's classification as Cfa with an annual mean rainfall of 1.300 mm. Soil analysis from the 0-10 cm layer showed: clay - 13%; pH – 4,8; available P – 2,3 ppm; available K – 68 ppm; O. M. – 3,4%; Al – 0,7 me/dl. It was used a complete randomized block design with four replicates, with plots of 3,6 x 5,0 m size. The area of the experiment was dried off with 3,0 l/ha of Glyphosate herbicide in a solution of 120 litres of clean water, 40 days before sowing the pasture species. It was used 400 kg/ha of NPK (05-20-20) fertilizer following soil analysis recommendations. The treatments were as follow: T1 -seed sowing in row with half fertilizer in

row and half broadcasted; T2 – seed sowing in row with all fertilizer in row; T3 – seed sowing in row and all fertilizer broadcasted; T4 – seed and fertilizer broadcasted. The pasture species were ryegrass (*Lolium multiflorum Lam*. – 30 kg/ha), white clover (*Trifolium repens L*. cv. BR – 1 Bagé – 3 kg/ha), and lotus (*Lotus corniculatus L*. cv. São Gabriel – 12 kg/ha) and red clover (*Trifolium pratensis L*. – 6 kg/ha). A direct seed- sower, model "Fundiferro" was used , with 17,5 cm spaced rows, 5,0 cm deep. Evaluations were made by cuttings 2,5 cm high on 06$^{th.}$ 08. 98, 14th.10.98, 07th.06.99, 05th.08.99 and 14th.10.99. Evaluations were made when plants reached 20-cm of height in some treatments. Botanical composition was processed by hand. The treatments were compared using pasture dry matter yields and differences compared by Tukey test.

Results and Discussion

Dry matter production (Table 1) increased from the first to the second year for all treatments. The data show treatment T1 with the highest productivity for all cuts and for the total annual in each year, except for the cut on 14th.10.99, when treatment T2 produced more than T1. Both treatments, for all cuts, never differ significantly ($P< 0.05$). The best pasture yield for both treatments, probably, was due to a better fertilizer distribution in the surface soil layer as mentioned by Cullen (1971), Sheard et al. (1971), Oliveira (1986) and Lobato et al. (1986). In the first year (1998), treatment T3 produced more (3.620 kg DM/ha) than treatment T4 (2.380 kg DM/ha) but in 1999 it was inverse, T4 produced more (5.920 kg DM/ha) than T3 (5.300 kg DM/ha). In both years these differences were not significant ($P < 0.05$). Botanical composition (Table 2) in the first year , (1998), shows better contribution of ryegrass and red clover for all treatments. Higher presence of red clover occured at treatments T1 and T2. White clover had a small contribution among the legumes in this year. In the second year, the contribution of ryegrass decreased for all treatments and weeds for treatments T1 and T2. Red clover increased for treatment T1 and T2 and decreased

for T2 and T3. White clover, lotus and other native forage species increased for all treatments. Lotus, other species and weeds had a higher increased in treatments T2 and T3. These responses are associate to the fertilizing application methods and species capacity of competition for light and nutrients. Ryegrass reduced contribution from the first to the second year for all treatments manly due to lack of natural seeding. Weeds reduced their presence from the first to the second year in treatments T1 and T2, mainly due to legume competition but in treatments T3 and T4, it increased for the inverse reason.

Higher forage yields were always obtained by applying fertilizer in row. White clover presence, were not associated to any method of fertilizer application, lotus was better in brodcasting fertilizer application but red clover presence were always higher by applying fertilizer in row.

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Treat.	17/08/98	14/10/98	Total Annual	07/06/99	05/08/99	14/10/99	Total Annual	Total Means
T1	2100 [a]	3580 [a]	5680 [a]	2990 [a]	1970 [a]	2440 [a]	7400 [a]	2616 [a]
T2	1820 [ab]	3230 [ab]	5050 [a]	2390 [ab]	1720 [ab]	2720 [a]	6830 [ab]	2376 [a]
T3	1160 [bc]	2460 [bc]	3620 [b]	1640 [b]	1230 [c]	2430 [a]	5300 [c]	1784 [b]
T4	650 [c]	1730 [c]	2380 [b]	1790 [b]	1430 [bc]	2700 [a]	5920 [bc]	1660 [b]
Means	1432	2750	---	2202	1587	1432	---	---

Means in the column, with different letters differ significantly (P< 0,05)

Table 1 – Dry matter yield per cut (kg DM/ha), total annual (kg DM/ha) cut means (kg DM/ha). Establishment of winter spring pastures by direct seeding, using different fertilizing methods. (Bagé, EMBRAPA/CPPSul)

Treat.	Ryegrass			Red Clover			White Clover			Lotus			Other spp			Weeds		
	Year 1	Year 2	Mean Cut $^{-1}$	Year 1	Year 2	Mean Cut $^{-1}$	Year 1	Year 2	Mean Cut $^{-1}$	Year 1	Year 2	Mean Cut $^{-1}$	Year 1	Year 2	Mean Cut $^{-1}$	Year 1	Year 2	Mean Cut $^{-1}$
T1	41.3	8.3	21.5	37.6	52.3	46.4	0.1	11.0	6.7	8.7	13.8	11.8	2.9	11.6	8.1	9.3	3.0	5.5
T2	56.6	8.0	27.4	25.0	71.4	37.9	0.5	4.8	3.1	10.0	14.5	12.7	3.8	16.7	11.5	4.1	1.9	7.4
T3	55.4	10.8	28.7	20.1	11.4	14.8	0.1	5.3	3.2	10.3	35.2	25.2	7.3	25.7	18.4	6.7	11.6	9.7
T4	52.4	3.1	22.8	14.1	5.9	9.2	0.1	9.7	5.9	12.4	35.3	26.1	13.7	35.2	26.6	7.4	10.8	9.4

Table 2 – Botanical composition of pasture (%). Means from the first and second year and means from the five cuts in the two years, 1998/99, (Bagé, EMBRAPA/CPPSul).