Evaluation of Red Clover Populations Selected for Persistence and Dry Matter Yield in Rio Grande Do Sul, Brasil

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EVALUATION OF RED CLOVER POPULATIONS SELECTED FOR PERSISTENCE AND DRY MATTER YIELD IN RIO GRANDE DO SUL, BRASIL

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Abstract

Red clover is one of the most important temperate legume species and it is used to alleviate the lack of forage in natural grasslands during the cool season in Rio Gra do Sul, Brasil. However, the lack of persistence presented by this species has not allowed its full utilization. Hence, a breeding program was started to select plants with more persistence and with good dry matter (DM) yield. This work was carried out at the "Estação Experimental Agronômica", Universidade Federal do Rio Grande do Sul. Three selected red clover populations were evaluated in relation to the best available commercial check, cv. Quiñqueli, in a mixture with annual ryegrass. There were significant differences among the populations in relation to persistence and DM yield of its components. Two of the selected populations were more persistent than the check after the first season of growth, pointing to the possibility of making progress in this trait while maintaining the yield potential.

Keywords: forage legumes, plant breeding, selection, *Trifolium pratense*

Introduction

Cattle production based on native pastures is one of the most important activities in the primary sector of Rio Grande do Sul (RS). These native pastures are formed mainly by warm season grasses showing good yield and quality during the spring-summer season. However, yield distribution during the fall and winter is rather low, not only in quantity but also in quality. On the other hand, temperate species, such as red clover and other legume species, play a very important role in increasing the forage supply during periods of shortage, especially during the fall and winter. The cultivars used in RS are usually imported, such as Kenland, Quiñqueli and Estanzuela 116 (Paim, 1988), and although they present a reasonable adaptation to our ecological conditions, they also have poor persistence. Usually, one of the main factors affecting the persistence of red clover is the high temperature during the summer (Kendall, 1958; Matches, 1989).

Therefore, a breeding program was started in our Department, several years ago, with the objective of selecting red clover populations with improved persistence, while keeping good DM yields. This paper presents the evaluation of the first growing season of three selected red clover populations in relation to the best commercially available check.

Material and Methods

The experiment was carried out at the “Estação Experimental Agronômica”, UFRGS in Eldorado do Sul, Brasil, 30^{o} S. The climate is a Cfa, with an average annual precipitation of 1322mm. The experimental design was a randomized complete block, with five replications. The plots measured 12 m^2 (3 X 4 m). Sowing was carried out on 05/05/1999 after application of lime and fertilizer, as recommended by the soil analysis for a mixture of red clover and ryegrass. The amount of seed used was 8 and 20 kg/ha of viable seeds for red clover and ryegrass, respectively.

Three red clover populations (EEA-98-8, EEA-98-1and EEV) previously selected for persistence and DM yield (Montardo, 1998) were evaluated, and the cultivar Quiñqueli was used as check.

The variables evaluated were: red clover and ryegrass DM yield and total mixture DM (red clover + ryegrass) yield and persistence.

The plots were harvested three times during the first growing season on the following dates: 23/09/1999, 30/10/1999 and 05/01/2000.

The mixture was harvested when the plants had about 30-40cm in height and a stubble of 8-10cm was left. Two samples of 25 x 25 cm were collected in each plot and the components were manually separated in order to determine the botanical composition, after drying at 65^{o}C, for 72 hours.

The persistence was evaluated on 17/02/200, through visual estimates, with scores from 1 (worst)-4 (best) being given to each plot inside each particular block.

The statistical analysis was made through the use of analysis of variance (ANOVA) for the statistical model adopted and the averages compared by the Duncan's test, using the SANEST software (Alves *et al.*, 1993).

Results And Discussion

The DM yield of red clover, ryegrass and the mixture of both are presented inTable1. There were significant differences among the populations for the variables evaluated. The cultivar Quiñqueli, the best commercial cultivar available, proved to be a good challenge for the selected populations. Its DM yield production in the first harvest was significantly higher than two of the improved populations, EEA-98-1 and EEV. In the second cut the population EEV-98-8 presented the highest yield, differing significantly from the others. Although there were no significant differences in the last harvest and in the total red clover DM yield, the

EEA-98-8 population presented a trend to outyield the other populations, including the check. The red clover DM yields were within the expected range for this species in the first growing season in this area and higher yields are expected in the second year of evaluation. In general the red clover DM yield distribution was concentrated in the late season, probably due to the high competition made by the ryegrass during the establishment period.

The ryegrass presented a high yield in the first cut and after that its production decreased and it was not present after the second harvest, due to the late date of sowing and also because of the tardiness of the first harvest.

Finally, it is worth noting that after the first year of evaluation it was already possible to detect significant differences among the populations in relation to the persistence of the red clover. The populations EEA-98-1 and EEA-98-8 were significantly more persistent after the first year of growth than the check (Table2). These results point to the possibility of obtaining a red clover population with better DM yield than the best check without losing yield potential.

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Table 1- Dry matter yield of red clover populations, ryegrass and the mixture (kg/ha), after three cuts.

Red Clover[§]				
Population	First Cut	Second Cut	Third Cut	Total
EEA-98-8	701 ab	1473 a	2503 a	4677 a
EEA-98-1	546 b	1170 b	2263 a	3979 a
EEV	632 b	1166 b	2112 a	3910 a
Quiñiqueli	849 a	1215 b	2128 a	4192 a
Ryegrass[§]				
Population	First Cut	Second Cut	Third Cut	Total
EEA-98-8	1633 b	574 a	0 a	2207 b
EEA-98-1	1597 b	566 a	0 a	2163 b
EEV	2401 a	717 a	0 a	3118 a
Quiñiqueli	2123 ab	617 a	0 a	2740 ab
Mixture[§]				
Population	First Cut	Second Cut	Third Cut	Total
EEA-98-8	2334 b	2047 a	2503 a	6884 a
EEA-98-1	2143 b	1736 b	2263 a	6142 a
EEV	3033 a	1882 ab	2112 a	7028 a
Quiñiqueli	2972 a	1832 ab	2128 a	6932 a

[§]Means followed by the same letter in the columns did not differ significantly by the Duncan's test ($P<0.05$).

Table 2 - Persistence of three selected red clover populations in relation to the cultivar Quiñqueli after the first growing season elaluated through visual estimates. The best plot received a score of 4 and the worst, a score of one.

Population	Persistence[§]
EEA-98-1	3,4 a
EEA-98-8	3,0 a
EEV	2,4 ab
Quiñiqueli	1,2 b

[§]Means followed by the same letter did not differ significantly by the Duncan's test ($P<0.05$).