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The XIX International Grassland Congress took place in São Pedro, São Paulo, Brazil from February 11 through February 21, 2001.

Proceedings published by Fundacao de Estudos Agrarios Luiz de Queiroz

ID # 14-05

STOLON ATTRIBUTES RELATED TO PERSISTENCE OF WHITE CLOVER IN BUENOS AIRES, ARGENTINA

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Abstract

A trial was carried out at Pergamino Agricultural Experimental Station (33º 56' S, 60º 33' W), Argentina, to study the stolon morphology of white clover cultivars with different leaf size, inflorescence production through reproductive cycle, and vegetative persistence. Treatments were four white clover cultivars: Espanso (Italy), Experimental L.49 (Argentina), Jacui S2 (Brazil) and Nora (Sweden). A completely randomized block design was used (n=6). Throughout two years, measurements of stolon length and dry and organic matter were performed every 60 days. The inflorescence number was also recorded. Results showed significant differences among cultivars in all the studied characters and almost in all the samples dates. Stolon weight showed a close association with stolon size, and the latter with the vegetative persistence (r=0.90). Stolon weight, chiefly related to stolon size, is a major character to be considered to improve white clover vegetative persistence in our region. Poor inflorescence production was not strictly associated with a better vegetative persistence.

Keywords: stolon, vegetative persistence, cultivars, *trifolium repens* L.

Introduction

The objective of white clover breeding, in most countries with temperate climate as Argentina, is perennial improvement. Vegetative persistence, the result of renewal of old stolons by young ones for asexual reproduction, has been associated with stoloniferous habit (Caradus and Williams, 1989. This pattern of growth and senescence reduces the plant size and limits the tolerance to stress and competence. The small leaved and highly stoloniferous clover types are more persistent, and have superior ability to colonize bare ground spaces (Burdon, 1983). Abundant flowering had been negatively associated with vegetative persistence (Williams, 1987). At the Pergamino Agricultural Experiment Station, several experiments of cultivars evaluation indicated differences in persistence, mainly during the summer. However, morphological characteristics associated with persistence have not been studied yet. The objectives of this work was to study the stolon morphology, inflorescence production, and vegetative persistence in white clover cultivars of different leaf size in the north of Buenos Aires Province, Argentina.

Material and method

The experiment was carried out at Pergamino Agricultural Experiment Station, Argentina (33º56' S, 60º33' W) during two years. Treatments were four white clover cultivars of different leaf size: Espanso (very large leaf), Experimental cultivar L.49 (large leaf, and selected in the north of Buenos Aires Province), Jacui S2 (medium-large leaf and profuse flowering) and Nora (small-medium leaf and frost and drought tolerant).

Treatments were arranged in a randomised complete block design with six replicates. The size of plots was 2,9 m^2, separated with tall fescue barriers. Every two-month, during two years, two samples of 0.04 m^2 per plot were taken. In each sample, all stolons were harvested and stored

in a plastic bag. In lab, petioles and leaves were discarded; stolon length was measured and then dried and weighed.

The following variables were computed stolon weight (g OM m^{-2}), stolon density (cm dm^{-2}), and inflorescence number during the reproductive period (n^o m^{-2}). From the first two variables stolon size (stolons weight cm^{-1}) was calculated. At the end of this trial a visual score of persistence was performed (from 0=null to 9=highest)

Data were analysed by ANOVA and GLM procedures using the SAS System. Means were compared using LSD ($p<0.05$).

Results and Discussion

Differences were found among cultivars in stolon weight in all dates ($p<0.001$). Espanso had higher stolon weight than the other cultivars. This cultivar also showed best persistence at the end of the trial. Stolon weight was associated with stolon size (r=96).

The stolon density showed significant differences in date 9 (Table 1). During the first three dates, Nora had a higher stolon density than the other cultivars. After that, stolon density in Nora decreased compared to the other cultivars and finally disappeared before the end of the experimental period. Nevertheless, at the beginning of the experimental period, Nora was highly stoloniferous, and did not show persistence in this environment.

The stolon size exhibited significant differences among cultivars in all dates (Table 2) and Espanso was superior ($P< 0.05$) to the other cultivars. L49 and Jacui S2 had similar values. SS was significantly correlated with persistence score (r=0.90).

High stolon densities are important to improve persistence in dryland environments (Caradus and Williams, 1989). However, close association between stolon size and persistence found in the

present experiment may indicate that improvement of vegetative persistence in this region could be obtained mainly by selection for stolon density within population of very large stolons size.

The total number of inflorescence per cultivar was: Jacui S2: 1003>L49: 718>Espanso: 214>Nora: 111. These results suggest that, despite the lower number of inflorescence produced by Nora, there was no apparent positive effect on stand persistence as indicated by the decline in stolon density (Table 1) In this work, inflorescence number was not negatively correlated with persistence as was frequently observed in some ecotypes of white clover (Williams, 1987), probably because the north European cultivar was not adapted to local conditions.

References

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Table 1 - Stolon density(cm dm^{-2}) over 11 sample dates of four white clover cultivars.

	samples-date										
	nº 1	nº 2	nº 3	nº 4	nº 5	nº 6	nº 7	nº 8	nº 9	nº 10	nº 11
cultivars	Dec	Feb	Apr.	Jun	Aug	Oct	Dec	Feb	Apr	Jun	Aug
Espanso	61	64	64	44	44	69	60	61	48	43	43
Exp.L49	81	78	43	50	69	76	65	30	34	38	33
Jacui S2	56	43	24	26	41	51	42	32	17	38	27
Nora	138	93	43	24	45	54	29	9	--	--	--
LSD *(r)*	***	***	**	***	*	*	***	**	*	ns	ns

*(r) * P<0.05, **P<0.01, ***P<0.001.*

Table 2 - Stolon size (g cm^{-1}*100) over 11 sample dates of four white clover cultivars.

	samples-date										
	nº 1	nº 2	nº 3	nº 4	nº 5	nº 6	nº 7	nº 8	nº 9	nº 10	nº 11
Cultivars	Dic	Feb	Apr	Jun	Aug.	Oct	Dec	Feb	Apr	Jun	Aug
Espanso	1,9	2,44	2,40	2,50	2,70	2,75	2,57	2,31	1,66	2,55	2,81
Exp.L49	0,75	0,91	1,00	1,05	1,25	1,36	1,27	1,45	1,02	1,14	1,50
Jacui S2	0,97	1,20	1,36	1,15	1,61	1,76	1,35	1,50	1,19	1,48	1,74
Nora	0,54	0,68	0,70	0,90	1,21	0,87	0,85	1,03	-	-	-
LSD *(r)*	***	***	***	***	***	***	***	***	*	***	***

*(r) * P<0.05, ***P<0.001.*