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"BRS URS ENTREVERO" - NEW WHITE CLOVER FORAGE CULTIVAR FOR SOUTH BRAZIL

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Abstract: "BRSURS Entrevero" is a white clover cultivar, indicated for intercropping with winter grasses and for oversowing natural and subtropical pastures in areas with high fertility and humidity. It has high quality and forms a mat of stolons that covers completely the soil, with a prostrate habit with the growth buds close to the surface, resulting in a high grazing aptitude.

Keywords: Legume, plant breeding, Trifolium repens.

Introduction

The *Trifolium* genus means three-leaved and refers to the genus's leaves, which are typically palmate with three leaflets. *Trifolium repens*, commonly called white clover or Dutch Clover, which survive by spreading stolons that form new roots at nodes) rooted nodes. The axillary buds on these rooted stolons can give rise to new plants (Nelson et al., 2020).

Although native to Europe, this plant has naturalized throughout temperate zones in lawns, fields, and roadsides. White clover is an excellent nitrogen fixing plant and can be used as forage plant and for livestock in crop rotation.

Forage legumes are the key to maintaining soil fertility, and providing high protein forage for ruminant livestock. Grass-legume mixes such as ryegrass-clover swards are commonly used in agricultural grassland because the system has the ability to be nitrogen self-sufficient, being economically and ecologically sustainable (Lüscher et al., 2014).

The presence of white clover in swards can increase the total forage yield, corresponding to the addition of more than 240 kg of N applied (Enriquez-Hidalgo et al., 2015).

The diversification of species in pastures allows a momentary and temporal increase in production as well as an improvement in the quality of the ingested forage mass. The productivity benefit of a diversified ecosystem has been attributed to either species complementarity where resources are used more efficiently by a greater number of species (Loreau and Hector, 2001).

Thus, the forage plants breeder's main focuses are the improvement of species that enable the farmers to have a range of species for use in their properties with high gains in most the seasons.

Pedigree and breeding method

"BRS URS Entrevero" is a white clover cultivar improved in southern Brazil and the only one with registration and protection at the Brazilian Ministry of Agriculture, Livestock and Food Supply (MAPA).

The genetic material used in the breeding program was formed by 49 genotypes collected in Eldorado do Sul/RS and Santa Vitória do Palmar/RS, after a severe drought period in 1997. In 1998, the plants were cloned through vegetative propagation (stolons) in a greenhouse, producing between 6 and 10 clones per genotype, at the Agronomy School of UFRGS/Porto Alegre, RS. In the same year, a polycross block was installed, with six replications (clones) and later the seeds were harvested separatelyper plant, at the Experimental Agronomic Station of UFRGS/Eldorado do Sul, RS.

In addition, in 1999, at the experimental station, a progeny test was performed, and the six most productive genotypes were selected to form the new population. In 2000 the mother plants of the six selected genotypes were crossed and the seeds mixed in equal amounts to form the selected population. From 2001 to 2005, seed multiplication of the selected population was carried out with the elimination of atypical plants and from 2006-2009, Value for Cultivation and Use (VCU) and Distinctness, Uniformity and Stability (DUS) tests start to be performed.

Performance

The white clover "BRS URS Entrevero" has an average length of internodes of 2.51 cm and 13.8 inflorescences per plant. The leaves are large, with medium green color, with high density and high intensity of white marks on the leaves.

The Internodes are thick with medium to long size and the plants are semi-erect with high regrowth capacity. The sites where the evaluations were conducted are shown in Table 1. The fresh green forage yield and dry matter yield in three locations and for three years compared to two commercial cultivars are shown in Tables 2 and 3.

Table 1. Characterization of the evaluation sites of the cultivar "BRS URS Entrevero".

City/State	Altitude	Latitude	Sowing	Soil Type
Coronel Barros/RS	311	28º22'59"	May de 2006	Haplortox
Coronel Barros/RS	311	28º22'59"	May de 2007	
Coronel Barros/RS	311	28º22'59"	June de 2008	
Bagé/RS	230	31º20'52"	May de 2006	Alfisol
Bagé/RS	230	31º20'52"	May de 2007	
Bagé/RS	230	31º20'52"	June de 2008	
Eldorado do Sul/RS	40	30º06'22"	May de 2006	Ultisol
Eldorado do Sul/RS	40	30º06'22"	May de 2007	
Eldorado do Sul/RS	40	30º06'22"	June de 2008	

Table 2. Fresh green forage yield (kg ha^{-1}) of cultivar "BRS URS Entrevero" in three locations and for three years compared to two commercial cultivars.

Location	Year	Fresh green forage yield (kg ha^{-1})		
		"BRS URS Entrevero"	Yi	Zapicán
Coronel Barros/RS	2006	22453	29860	20917
Coronel Barros/RS	2007	25450	21100	21287
Coronel Barros/RS	2008	26163	34964	35355
Bagé/RS	2006	37209	36224	40912
Bagé/RS	2007	9559	10926	8275
Bagé/RS	2008	11007	9320	9167
Eldorado do Sul/RS	2006	14796	9525	11987
Eldorado do Sul/RS	2007	14593	15703	12212
Eldorado do Sul/RS	2008	18331	18739	17791
Mean		**19730**	**20707**	**19760**

Table 3. Dry matter yield (kg.ha^{-1}) of cultivar "BRS URS Entrevero" in three locations and for three years compared to two commercial cultivars.

Local	Year	Dry matter yield (kg ha^{-1})		
		"BRS URS Entrevero"	Yi	Zapicán
Coronel Barros/RS	2006	*3817	5136	3263
Coronel Barros/RS	2007	3792	3587	3491
Coronel Barros/RS	2008	4446	5874	5480
Bagé/RS	2006	6214	5651	6096
Bagé/RS	2007	1281	1639	1324
Bagé/RS	2008	1453	1398	1531
Eldorado do Sul/RS	2006	2323	1543	1918
Eldorado do Sul/RS	2007	2434	2434	2125
Eldorado do Sul/RS	2008	3098	3092	2811
Mean		**3206**	**3372**	**3115**

Adaptation

The white clover "BRS URS Entrevero" is recommended for inclusion in mixes with winter active grasses and for oversowing into natural and subtropical pastures to improve the quality of the diet in areas with good fertility and humidity, but does not tolerate soil with moisture in excess. (Sheaffer et al., 2020).

This cultivar is indicated for the three states of the South Brazil, mainly for the places with milder temperatures during the summer, such as of *Cfb* climate.

This is characterized by, temperate oceanic climate, where the coldest month average is above 0 °C (32 °F) (or −3 °C (27 °F), all months present an average temperatures below 22 °C (71.6 °F), at least four months averaging above 10 °C (50 °F) and no significant precipitation differ-rence between seasons (Köeppen, 1948).

Seed production

"BRS URS Entrevero" is registered by the Brazilian Ministry of Agriculture, Livestock and Food Supply (MAPA) with number 31189 (11/10/2013) and the protection number 2160073 (18/04/2016). Genetic seed stock is maintained by EMBRAPA Pecuária Sul, BR 153, Km 633 - Vila Industrial, P. B. 242, 96401-970, Bagé, RS, Brazil. Certified seed are produced by the South-Brazilian Association for the Promotion of For age Research – SULPASTO and is available for sowing on commercial field in the seasons 2021.

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