

CULTIVAR RELEASE

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BRS Centauro – oat cultivar for ground cover and grazing

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Abstract – Plants and seeds of oat cultivar BRS Centauro, of the species *Avena brevis* Roth., are highly uniform. The crop cycle is long, the suitability as fodder excellent, and leaf production particularly high, resulting in better quality forage than that of the black oat forage controls.

Key words: *Avena brevis*, breeding, animal feeding.

INTRODUCTION

The food base of the Brazilian meat and milk production is forage, supplied in the form of silage or hay, or directly on planted or natural pastures, which are highly dependent on seasonality and weather. In certain periods, i.e., the dry season, the food supply by pastures is insufficient to meet the animals' needs, which could be circumvented by supplementing grains in high-cost diets, hay or silage (Meinerz et al. 2012).

Oat is one of the main winter crops in southern Brazil. There are no official statistics in relation to the area used for black oat (*Avena strigosa* Schreb.), the species most commonly planted for soil cover as well as incrop-livestock systems. However, most genotypes available are still common oat populations with high genetic variability, without proven genetic origin, used on large-scale farms, because the amount of seed of registered cultivars is insufficient to meet market demands.

In the states of Rio Grande do Sul, in Santa Catarina and Paraná, in the 2012/13 growing season, grain was harvested on 18.33 million hectares. Of this total, 4.46 million hectares were used for maize and 9.83 million for soybean, totaling 14.29 million hectares of cultivation in the summer or second growing season. However, of this area occupied in the summer, only 2.26 million hectares were used in the winter for grain crops IBGE (2013). Large areas are available for pasture for meat and milk production, where winter

forages could be planted, combining the opportunity with the requirements of the farm enterprise.

According to Valentini et al. (2014), oat is one of the most important cereal crops in the world and the genus *Avena* L. includes wild and domesticated species with different levels of ploidy, with extensive genetic diversity among and within species.

Species of the genus *Avena* occur naturally in several parts of the world. These diploid species are part of a particular group with 14 (2n) chromosomes, including the species *Avena strigosa* Schreb. and *Avena brevis* Roth. (Tavares et al. 1993). According to these authors, citing Ladizinsky and Zohary (1971) and Ladizinsky (1989), the species *A. strigosa*, *A. brevis*, *A. hirtula* and *A. wiestii* belong to the biological species *Avena strigosa*. In the group with genome A, diploid, there are two sub-groups (Yabuno and Nishiyama 1975) with the genomes AsAs and tAtA (Tavares et al. 1993, Ladizinsky 2012). Both *Avena strigosa* and *Avena brevis* are in the AsAs subgroup. According to Leggett (1992), the species *Avena strigosa*, *Avena brevis*, *Avena hispanica* and *Avena nuda*, are part of the same section called *Agraria*; the first three are similar and the botanical identification resulted in the same taxonomic classification, differing from *Avena hispanica* only in the lodicules. Hybrids of crosses between *Avena strigosa* and *Avena brevis* were fertile, indicating close proximity between these species, including morphologically.

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Owing to the importance of planting oats for the maintenance of a mulch cover in the no-tillage system and the sustainability of dairy and beef cattle ranching, Embrapa Wheat resumed research on oats after the introduction of several genotypes in 1996 and oat cultivar BRS Centauro was developed as a result of this endeavor, as an alternative to the common oat populations, still sold in Brazil.

BREEDING METHOD

The main breeding method was modified mass selection. A line named accession IPFA 99012 was derived from a population originally from Portugal, maintained in a collection of the Agricultural Research Service (ARS), of the US Department of Agriculture, with the synonyms "TURGIDA" and "CLAV 4749".

In 1996, 84 oat populations from various sources were introduced from ARS, and sown in the field in 1997, of which the 39 populations with best growth and development were harvested in bulk. In the following year, the 39 populations were resown, and modified mass selection cycles were performed during plant growth, with negative selection, in each population. In 1999, the populations were given experimental designations from IPFA 99001 to IPFA 99039 and adaptation tests were performed to evaluate plant traits, testing mainly forage suitability. Roguing was applied in 2000, 2003 and 2004, to improve the uniformity of the population, maintaining the denominations. In view of the agronomic traits and plant uniformity, the populations IPFA 99001, IPFA 99004, IPFA 99009, IPFA 99012, and IPFA 99013, were evaluated in tests of Value of Cultivation

and Use (VCU) for forage yield between 2007 and 2010. Distinctness, uniformity and stability (DUS) were tested in 2009 and 2010. Due to the superior results obtained in the VCU tests and purity in seed multiplication, line IPFA 99012 was registered in the National Register of Cultivars (RNC) and protected by the National Plant Variety Protection Service (SNPC).

PERFORMANCE ASSESSMENT

The yield performance of line IPFA 99012 was evaluated in 2007, 2009 and 2010 in VCU tests in Coxilha, Passo Fundo and Vacaria in Rio Grande do Sul and São José do Cedro in the State of Santa Catarina. The control cultivars UPFA 21 - Moreninha and Agro Zebu, both *Avena strigosa*, were used for comparison. The experiments were conducted in a randomized block design, without fungicide treatment and without supplemental irrigation. The plots consisted of eight 5 m long rows, spaced 0.2 m apart, of which the four center rows, disregarding 0.5 m at either end, were evaluated, in three replications. To evaluate forage, three cuts were performed, either by hand or with a forage harvester, maintaining a plant height of about 7 cm above the soil surface. After each harvest, 30 kg ha⁻¹ of N was applied in the form of urea, proportionately in each plot. An exception was made for the experiment in Vacaria in 2009, in which the plants were cut only once, between the stages of soft and hard grain mass, to evaluate the dry matter production for silage. In the analysis, the effects of cultivars were considered fixed and other effects random.

Line IPFA 99012 exceeded the control mean by 6.7%

Table 1. Production of fresh matter (kg ha⁻¹) and dry matter (kg ha⁻¹) of oat cultivar BRS Centauro and the controls UPFA 21 - Moreninha and Agro Zebu, in tests of Value of Cultivation and Use in 2007, 2009 and 2010

Municipality - UF ¹	Ano	Fresh matter (kg ha ⁻¹)			Dry matter (kg ha ⁻¹)			CV% ²
		BRS Centauro	UPFA 21- Moreninha	Agro Zebu	BRS Centauro	UPFA 21- Moreninha	Agro Zebu	
Passo Fundo - RS ³	2007	34,236	40,506	63,120	5,706	6,751	10,520	19.3
Vacaria - RS ³	2007	39,936	32,802	36,462	6,656	5,467	6,077	16.5
São José do Cedro - SC ³	2007	47,232	46,500	44,556	7,872	7,750	7,426	14.2
Mean		40,468	39,936	48,046	6,745	6,656	8,008	
Passo Fundo - RS ³	2009	23,472	23,358	25,992	3,912	3,893	4,332	12.2
Coxilha - RS ³	2009	10,968	12,570	12,648	1,828	2,095	2,108	18.2
Vacaria - RS ⁴	2009	94,278	72,594	68,214	15,713	12,099	11,369	15.7
Mean		42,906	36,174	35,618	7,151	6,029	5,936	
Passo Fundo - RS ³	2010	26,580	29,250	25,098	4,430	4,875	4,183	9.2
Coxilha - RS ³	2010	40,554	25,638	34,734	6,759	4,273	5,789	16.3
Vacaria - RS ³	2010	35,952	31,968	35,718	5,992	5,328	5,953	14.9
Mean		34,362	28,952	31,850	5,727	4,825	5,308	
Overall mean		39,245	35,021	38,505	6,541	5,837	6,417	19.3

¹ Federal units (UF) or States of Rio Grande do Sul (RS) and Santa Catarina (SC);

² Coefficient of variation;

³ Three cuts during the plant growth stage;

⁴ One cut between the stages of soft and hard grain mass for silage production.

in fresh and dry matter production (kg ha^{-1}), in the overall average (Table 1). In the treatments with three cuts, dry matter production was on average 5,394 kg ha^{-1} , versus a control mean of 5,426 kg ha^{-1} . However, in 2009, in Vacaria, the potential of line IPFA 99012 was evidenced by a dry matter production for silage of 15,713 kg ha^{-1} versus a control mean of 11,734 kg ha^{-1} (Table 1).

Line IPFA 99012 was market-approved as BRS Centauro for forage production, ground cover and for grain/seed production in all wheat-growing regions in the South and central South of Brazil, in the states of Rio Grande do Sul, Santa Catarina, Paraná, Mato Grosso do Sul and São Paulo, in winter cultivation.

OTHER FEATURES

BRS Centauro has excellent mean leaf:stem ratio in relation to the stem (3.4 times higher), while for the control, this ratio was at most 2.5 times higher. The percentage of covered soil area in the first cut was on average 85%, with excellent regrowth capacity after the cuts.

The oat cultivar BRS Centauro is susceptible to stem rust, leaf rust, barley yellow dwarf virus (BYDV) and powdery mildew; it is tolerant to soil acidity.

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- BRS Centauro is released as an additional option for inclusion in cropping systems for ground cover and animal foraging, to replace the common oat populations in the market.
- According to the International Union for the Protection of New Varieties of Plants (UPOV), BRS Centauro is the first protected *Avena brevis* Roth. cultivar in the world. BRS Centauro differs from the original population "TURGIDA" in the following characteristics: growth habit, cycle (from emergence to the first visible spikelet in at least 50% of the panicles) and uniformity of inflorescence (data not shown).
- SEED MAINTENANCE AND DISTRIBUTION**
- The oat cultivar BRS Centauro is registered and protected by the Ministry of Agriculture, Livestock and Supply (MAPA) of Brazil since 10/05/2012 under the number 29179 and protection certificate from 04/01/2013, under number 20130220. Embrapa Wheat produces the genetic seed of the cultivar, Embrapa Products and Markets the basic seed, and the founders of the South Brazilian association for the promotion of forage research (Sulpasto), in partnership with Embrapa, are solely responsible for the production of certified seed.
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