



CULTIVAR RELEASE

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BRS Progresso – Rye cultivar

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Abstract – The rye cultivar BRS Progresso, developed by the Brazilian Agricultural Research Corporation (Embrapa), is the result of a synthetic cross of 18 open-pollinated, self-incompatible lines, resistant to stem rust.

Key words: *Secale cereale*, stem rust, grain yield.

INTRODUCTION

In Brazil, the area used for rye cultivation was continuously 2,300 hectares (IBGE 2012) between 2010 and 2012. However, the total area may be close to 8,000 hectares since the rye fields in the States of São Paulo, Mato Grosso do Sul and Santa Catarina were not included in the official estimates.

Rye cultivation increased from the 1950s, with yields of 710 kg ha⁻¹, to 966 kg ha⁻¹, in the 1990s, reaching 1,164 kg ha⁻¹ in the first decade of 2000. The estimated production of 1,774 kg ha⁻¹ in the 2012 growing season is a record yield. The mean annual gain from 1990 to 2012 was 18.8 kg ha⁻¹ year⁻¹ (De Mori et al. 2013).

The advance in grain yield may result from efforts initiated in the 1970s, rescuing and preserving cultivated populations; new combinations, selections and genotype tests were performed, culminating in the release of BR 1 in 1986, by Embrapa, which was the first rye cultivar in Brazil. Three other rye cultivars were registered by the Ministry of Agriculture, Livestock and Food Supply: IPR 89, BRS Serrano and Temprano, of which the latter two, because of the large production of forage dry matter, are destined for animal feed (De Mori et al. 2013).

Due to the nutritional value of rye, De Mori et al. (2013) encouraged that this cereal be promoted as a contribution to the Brazilian diet, suggesting changes in the Brazilian legislation that foresees the adoption of a standard concentration of rye flour in rye bread. This initiative could result in a stimulus for a resumption of the crop. Aside from baking, the feasibility of rye flour for noodle production was

demonstrated by Kaminski et al. (2011), both in terms of technological and sensory characteristics, as well as in the functionality of nutrient aggregates.

To meet the demand for more productive and stable materials, the new rye cultivar BRS Progresso with moderate stem rust resistance was developed in several studies.

PEDIGREE AND BREEDING METHOD

A synthetic cross with 18 rye lines resistant to stem rust (open-pollinated lines and with obligatory, self-incompatibility system) was conducted in 2003. The lines were sown in double rows, each 3 m long, and harvested in bulk at the end of the cycle. All harvested seeds were sown in 2004, without liming, at extremely high levels of toxic aluminum (on average 35 mmolc dm⁻³) and high acidity in the surface soil layer (mean pH 4.7 in water, pH 4.8 SMP and base saturation "V%" 12%), and no fungicide treatment was performed during plant development. Frequent selections after tillering were performed in the population, by marking plants with higher tolerance to soil acidity and lower susceptibility to stem rust, with frequent elimination of plants sensitive to acidity and susceptible to stem rust.

Of the selected plants, one ear per plant was harvested and threshed separately. In the summer of 2005, five seeds per ear were phenotypically evaluated in a hydroponic solution with an aluminum (Al³⁺) concentration of 10 mg L⁻¹. This characterization was used to discriminate the plants, with subsequent elimination of the seeds of aluminum-susceptible plants. The remaining seeds of the selected plants, with higher tolerance to aluminum in solution, were

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evaluated again and selected for grain quality. The seeds of the selected plants (non-eliminated ears) were mixed and sown in winter 2005, allowing free pollination and then harvested in bulk, in the same area without acidity correction. In 2006, the population was designated PFS 0605, stabilized through new reproductive cycles between 2006 and 2008, assessed in tests of Value for Cultivation and Use (VCU) between 2006 and 2011, and evaluated for several agronomic traits, as of 2006.

PERFORMANCE

The rye cultivar BRS Progresso is tolerant to harmful soil acidity, easily adaptable to acid soils, resistant to the yellow dwarf virus (BYDV), the soilborne wheat mosaic virus (SBWMV), powdery mildew (*Blumeria graminis*) and bacteriosis (*Xanthomonas translucens* pv. *secalis* and *Pseudomonas syringae*); it is moderately resistant to stem rust (*Puccinia graminis* sp. *secalis*), moderately susceptible to leaf spot (*Bipolaris sorokiniana*, *Drechslera* spp. and *Stagonospora nodorum*), and is susceptible to blast (*Magnaporthe oryzae*) and head blight or scab (*Fusarium graminearum*).

BRS Progresso is diploid, has a median cycle length (60 to 75 days from emergence to heading and 125-145 days until maturity), and high plant height (152 cm in Passo Fundo, Rio Grande do Sul). The waxiness of the flag leaf is very weak and that of the ears low to medium.

The moderate stem rust resistance, grain quality and test weight meeting market requirements make BRS Progresso

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outstanding among the other cultivars, allowing cultivation in different production systems in southern Brazil.

In the trials of Value for Cultivation and Use (VCU) for grain yield (kg ha⁻¹), with fungicide treatment, BRS Progresso exceeded the mean of the two best controls, BR 1 and IPR 89, by 9.9 %, with a mean grain yield of 2,898 kg ha⁻¹, at 14 locations in the states of Rio Grande do Sul, Paraná and São Paulo.

In view of the performance of BRS Progresso, the similar climate and rye cultivation in Santa Catarina and Rio Grande do Sul (Southern Brazil) and Paraná, Mato Grosso do Sul and São Paulo (South Central Region) and growing technologies currently available to farmers, this cultivar was registered on 08/30/2013 by the Brazilian Registry of Cultivars - RNC, labelled number 31120, for marketing aimed at grain production in all southern and central - southern wheat growing regions of Brazil (RS, SC, PR, MS and SP) under rainfed cultivation in the cold season.

The grains of BRS Progresso can be used in food and feed and flour extracted from the grains can be used for bread, cookies and pasta.

SEED MAINTENANCE AND DISTRIBUTION

Embrapa is in charge of providing foundation seed of BRS Progresso by the Business Service for Technology Transfer of Embrapa and certified seed in partnership with associate producers.

Available at <<http://www.sidra.ibge.gov.br/bda/tabela/listabl.asp?z=t&o=10&i=P&c=1612>> Accessed on 20 June, 2013.

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