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CULTIVAR RELEASE

BRSMG Realce: Common bean cultivar with striped grains for the state of Minas Gerais

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Abstract – *The common bean cultivar "BRSMG Realce", recommended for the state of Minas Gerais, has high yield potential and resistance to powdery mildew, bacterial wilt and to anthracnose pathotypes 65, 73, 77, 81, 91, 475 and 479. The plants and pods are high, resulting in lower loss during mechanical harvest.*

Key words: *Special grains, genetic breeding*, Phaseolus vulgaris *L.*

INTRODUCTION

In most regions of the state of Minas Gerais, consumer preference is for "carioca" type common beans (beige with brown stripes) (Ramalho and Abreu 2006). In some specific regions, such as the Zona da Mata region of Minas Gerais, the preference is for black and also red beans. However, throughout the state, other types of beans, which may be considered as special varieties, like the striped type, even though less consumed, attain higher prices in the market. Therefore, for the producer, production of this type of bean has advantages, which may contribute to increased income.

One of the few bean cultivars with this type of seed now available on the market is BRS Radiante (Faria et al. 2003). Therefore, the institutions that work with genetic breeding of common bean in Minas Gerais, the Federal Universities of Lavras (UFLA) and of Viçosa (UFV), the Crop and Livestock Research Company of Minas Gerais (Empresa de Pesquisa Agropecuária de Minas Gerais - Epamig) and the Brazilian Crop and Livestock Research Company (Empresa Brasileira de Pesquisa Agropecuária - Embrapa), have made a joint effort in evaluation of inbred lines with this type of bean, for the purpose of obtaining and recommending new options of striped bean cultivars superior to BRS Radiante for producers. As fruit of this joint work, "BRSMG Realce" is recommended, a new option of a striped common bean cultivar for the state of Minas Gerais.

BREEDING METHODS

The BRSMG Realce cultivar arose from the PR 95105259/PR 93201472 cross, made in 1996 at Embrapa Arroz e Feijão. In 1997, the F_2 population was grown in a screen house in Santo Antônio de Goiás. In 1998, in the F_3 generation, selection of individual plants was made in regard to angular leaf spot, rust and anthracnose. The $F_{3:4}$ progenies obtained were advanced in bulk without selection. In 1999, a new selection of individual plants within the $F_{3:5}$ families was made for resistance to anthracnose, angular leaf spot and upright plant architecture. Also in 1999, in the $F_{5:6}$ generation, a selection of lines for upright plant architecture and high bean yield was made. In the

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$F_{5:7}$ generation in 2000, a new selection of lines was carried out for upright plant architecture, high yield, resistance to common bacterial blight, powdery mildew and anthracnose and commercial type of striped bean. The $F_{5:8}$ generation was assessed for yield and plant architecture, selecting the LM 200208821 line.

In 2001, this line was assessed in the Preliminary Striped Seed Trial (EPL), together with 30 additional lines and two controls in two locations: Santo Antônio de Goiás, GO, in the winter season, and Ponta Grossa, PR, in the dry season. In 2003, it was assessed in the Intermediate Trial (EI) with ten additional lines and two controls in seven environments: Santo Antônio de Goiás, GO, in the winter season; Ponta Grossa, PR, in the rainy and dry season; Lavras, MG, in the dry season; Sete Lagoas, MG, in the dry season; Simão Dias, SE, in the rainy season; and Seropédica, RJ, in the winter season. The results obtained in joint analysis of grain yield and other agronomic characteristics allowed the LM 200208821 line, with the pre-commercial name of CNFRJ 10556, to be promoted to the Value for Cultivation and Use (VCU) field trial.

As of the 2005 dry crop season up to the 2006/2007 rainy season, this line was assessed in the trials for determination of Value for Cultivation and Use (VCU), together with 21 other lines and the controls BRS Radiante and Jalo EEP 558. The experiments were conducted by UFLA, UFV, Embrapa Arroz e Feijão and Epamig in the state of Minas Gerais in the environments shown in Table 1. A randomized block experimental design was used with three replications, with plots consisting of four four-meter rows.

TRAITS OF THE CULTIVAR

Plant architecture and resistance to lodging

Table 1. Mean seed yield (kg ha^{-1}) of the BRSMG Realce cultivar and of the controls (BRS Radiante and Jalo EEP 558) by location, season and year of assessment in the state of Minas Gerais

Location	Season	Year	BRSMG	Controls		% in relation to the mean of the controls
			Realce	Radiante	Jalo	
Lavras	Dry	2005	2275	2058	2242	105.8
Lambari	Dry	2005	1404	1142	1087	126.0
Patos de Minas	Dry	2005	1492	2433	2012	67.1
Viçosa	Dry	2005	2855	2695	2613	107.6
Ponte Nova	Dry	2005	1248	1061	1367	102.8
Ijaci	Winter	2005	2442	2531	2354	100.0
Patos de Minas	Winter	2005	1313	1425	1023	107.3
Ibiá	Winter	2005	1901	2215	2099	88.1
Sete Lagoas	Winter	2005	3433	3008	2150	133.1
Ijaci	Rainy	2005	2113	1938	2317	99.3
Lavras	Rainy	2005	1240	1823	1158	83.2
Lambari	Rainy	2005	1700	1533	1346	118.1
Patos de Minas	Rainy	2005	3108	2450	2604	123.0
Lavras	Dry	2006	2733	2323	2144	122.4
Lambari	Dry	2006	3188	3083	3379	98.7
Patos de Minas	Dry	2006	1771	2129	2062	84.5
Viçosa	Dry	2006	2585	3033	2547	92.7
Coimbra	Dry	2006	2188	1692	1638	131.4
Lambari	Winter	2006	2525	1820	2196	125.7
Patos de Minas	Winter	2006	1502	1660	1190	105.4
Uberlândia	Winter	2006	1938	1568	2112	105.3
Coimbra	Winter	2006	2229	2145	2073	105.7
Sete Lagoas	Winter	2006	3050	2967	3075	101.0
Lavras	Rainy	2006	1920	1483	1858	114.9
Patos de Minas	Rainy	2006	1892	2292	2017	87.8
Viçosa	Rainy	2006	1275	1056	1948	84.9
Mean in rainy season			1893	1796	1893	102.6
Mean in dry season			2174	2165	2109	101.7
Mean in fall-winter season			2259	2149	2030	108.1
Overall mean			2128	2060	2024	104.2

Table 2. Some traits of the BRSMG Realce cultivar and of the BRS Radiante control obtained in the trials conducted in the state of Minas Gerais in 2005 and 2006 and in assessments under controlled conditions undertaken at Embrapa Arroz e Feijão in 2009

Trait	BRSMG Realce	BRS Radiante
Architecture[1]	3.6	3.4
Lodging[2]	4.6	5.1
Days to flowering	35	35
Days to maturity	83	81
Powdery mildew[3]	1.9	1.0
Rust[3]	1.0	1.0
Angular leaf spot[3]	4.0	2.7
Anthracnose[3]		
Pathotype 65	1.0	9.0
Pathotype 73	3.0	9.0
Pathotype 77	1.0	8.0
Pathotype 81	2.0	8.0
Pathotype 91	2.0	6.0
Pathotype 475	1.0	4.0
Pathotype 479	1.0	8.0
Fusarium wilt[3]	5.0	5.0
Bacterial wilt[3]	3.0	3.0
Common bacterial blight[3]	4.0	4.0

[1] Scores from 1 to 9 in which 1 indicates upright plants and 9 prostrate plants; [2] Scores from 1 to 9, in which 1 indicates absence of lodging and 9 all the plants lodged; [3] Severity of the disease expressed by scores from 1 to 9, in which 1 indicates resistance and 9 susceptibility.

The BRSMG Realce cultivar has a type I determinate growth habit. In assessments of plant architecture and tolerance to lodging by means of a scoring scale, it exhibited performance similar to that of the "BRS Radiante" control (Table 2). However, since it has higher plants and pods in relation to the soil, it is more adapted to direct mechanical harvest, which leads to lower losses during this process when compared to BRS Radiante.

Reaction to diseases

During the assessments performed in the field, it showed moderate resistance to naturally occurring pathogens (powdery mildew, rust and angular leaf spot), with a degree of severity similar to that of the control BRS Radiante (Table 2). Its resistance to powdery mildew should be noted since this disease generally reduces the yield of cultivars with large seeds, as is the case of BRSMG Realce. It presented resistance to the anthracnose pathotypes 65, 73, 77, 81, 91, 475 and 479, in assessments performed by artificial inoculation in a greenhouse and in the field. It also showed resistance to bacterial wilt, as well as moderate resistance to common bacterial blight and fusarium wilt.

Crop cycle

Flowering of the BRSMG Realce cultivar occurs, on average, at 35 days. In assessments made in the state of Minas Gerais, the crop cycle was similar to that of BRS Radiante, with maturity, on average, at 83 days.

Yield

The BRSMG Realce cultivar had a mean seed yield greater than that of the controls in 16 of the 26 environments in which it was assessed (Table 1). It was also greater than that of the controls when considering the mean value of the locations in each crop season in the state and in the mean value of all the locations and crop seasons. Its yield in the winter crop season especially should be noted, which was 8% greater than the mean value of the controls.

Technological and industrial quality of the seed

The BRSMG Realce cultivar has striped seeds, similar to those of the BRS Radiante cultivar, with mean 100-seed weight of 35 g. It has excellent cooking qualities and cooking time comparable to most of the common bean cultivars which are currently recommended.

BASIC SEED PRODUCTION

The BRSMG Realce cultivar was registered in the name of Embrapa, Epamig, UFLA and UFV in the National Cultivar Registry (Registro Nacional de Cultivares - RNC) of the Food, Livestock and Agriculture Ministry (Ministério da Agricultura, Pecuária e Abastecimento - MAPA) on 10/03/2011 under number 28129 and protected in the National Cultivar Protection Service (Serviço Nacional de Proteção de Cultivares - SNPC) on 03/26/2012 (certificate no. 20120069). Seed production of this cultivar is under the responsibility of Epamig.

PARTNER INSTITUTIONS IN CULTIVAR ASSESSMENT

Embrapa Arroz e Feijão

Universidade Federal de Lavras

Universidade Federal de Viçosa

Empresa de Pesquisa Agropecuária de Minas Gerais

Embrapa Milho e Sorgo

Universidade Federal de Uberlândia

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