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CULTIVAR RELEASE

BRSMG Madrepérola: common bean cultivar with late-darkening Carioca grain

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Abstract - *The cultivar BRSMG Madrepérola, recommended for cultivation in Minas Gerais, has the feature of maintaining a light grain color for a longer period than other Carioca grain cultivars. The yield potential is high and the resistance level good to the major anthracnose races in the region.*

Key words: *Breeding,* Phaseolus vulgaris *L., grain type, grain quality.*

INTRODUCTION

Common beans with carioca grain are preferred by consumers, representing approximately 79% of the beans consumed in Brazil. A large number of cultivars with this grain type are recommended and readily available, which differ mainly in terms of resistance to pathogens, plant architecture and cream hues of the grain (Incaper 2010).

Farmers will readily adopt a new bean cultivar with advantages over those in use, with regard to a good seed yield, resistance to the major regional pathogens, and of course, grains that meet the consumers demands, to ensure a good market price for the product. Consumers on the other hand are only interested in grain-related characteristics. In the case of carioca bean, this requirement is more pronounced, especially with regard to the beige hues and brown stripes of the grain tegument. These hues should be fair and persist as long as possible before darkening. Moreover, the beans must have good cooking qualities.

To meet the demand of this large proportion of the population that produces and consumes carioca beans, institutions working together to improve common bean in Minas Gerais (Embrapa Rice and Beans, Agricultural Research Company of Minas Gerais - Epamig, Federal University of Lavras - UFLA, and Federal University of Viçosa - UFV), have registered BRSMG Madrepérola, a new common bean cultivar with late-darkening carioca grain, suited for cultivation in the state of Minas Gerais.

BREEDING METHODS

BRSMG Madrepérola was obtained by hybridization, using the lines AN 512666-0 and AN 730031 as parents. The crosses were made in a greenhouse of Embrapa Rice and Beans, in Santo Antônio de Goiás, GO, where the F_1 to F_5 generations were grown on an experimental field.

In 1996, this population was introduced in the UFV common bean breeding program, and the F_6 generation

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was planted at an experimental station of the Plant Science Department in Coimbra, Minas Gerais. In this generation, plants were selected for carioca grain. The progenies of these plants were evaluated over two generations for yield, grain appearance and response to agents of anthracnose, angular leaf spot and rust. The best lines were assessed in intermediate tests and, finally, one of these lines, called VC-3, was included in the test cycle 2002/2004 of Value for Cultivation and Use (VCU), conducted by the partnership institutions UFLA, UFV, Embrapa Rice and Beans and Epamig, in Minas Gerais.

The VCU tests in which line VC-3 participated were conducted from the winter growing season of 2002 until the winter of 2004 in 43 environments of the state (Abreu et al. 2005). This line was evaluated along with 17 others and with the control cultivars BRSMG Talismã and Pérola. The experiment was arranged in a randomized complete block design with three replications and plots consisting of four 4m rows. The following traits were evaluated: grain yield (kg ha^{-1}); severity of angular leaf spot, on a 1-9 scale, where 1 - plant without disease symptoms to 9 - completely infected plant; plant architecture, on a 1-9 scale, where 1 - upright plants to 9 - completely prostrate plants; degree of lodging, on a 1-9 scale, where 1 - absence of lodging to 9 - all plants lodged; number of days to flowering; and number of days to maturity. The reaction to races 55, 65, 73, 81, 89, 95, and 453 of *Colletotrichum lindemuthianum* was also evaluated in the laboratory, according to the methodology described by Rava et al. (1994), the cooking time (in min) in a 25-seed Mattson cooker (Proctor and Watts 1987); protein content based on the total nitrogen grain content determined by the microKjedahl method using the factor 6.25 to convert total N in protein (AOAC 1980); grain coat color using a colorimeter (Minolta CR-310), which evaluates the colors along three axes in a three-dimensional system, as described by Silva et al. (2008).

CULTIVAR CHARACTERISTICS

Agronomic characteristics

The growth habit of BRSMG Madrepérola is indeterminate, type III and prostrate. It is considered semi-early, compared to other cultivars of the group carioca (Abreu et al. 2005). In the winter growing season, the cycle from emergence to physiological maturity is completed in about 88 days and in the rainy and dry seasons within approximately 80 days.

Disease response

Under artificial inoculation, BRSMG Madrepérola showed resistance to common mosaic virus and to the pathotypes 55, 65, 73, 81, 89, 95 and 453 of *Colletotrichum lindemuthianum*, the causative agent of anthracnose and susceptibility to Curtobacterium wilt and to common bacterial blight. Under field conditions, the response to the fungus *Pseudocercospora griseola*, the causal agent of angular leaf spot, was intermediate, and the response to fusarium wilt (*Fusarium oxysporum*) susceptible.

Grain yield

In 43 trials conducted in three growing seasons in the state of Minas Gerais by Abreu et al. (2005), cultivar BRSMG Madrepérola produced an average grain yield of 2308 kg ha^{-1}, which is 6% above the average of the controls Pérola and BRSMG Talismã (Table 1), and almost 11% higher than the control mean in the winter growing season.

Industrial and technical grain quality

The grains of BRSMG Madrepérola are "Carioca" (light beige with light brown stripes), according to the consumer demands, have an average 100-grain weight of 24.5 g and maintain the color longer without darkening (around six months) than other carioca varieties on the market (Silva et al. 2008).

The nutritional and culinary qualities are excellent, with comparable protein content and cooking time to the most frequently indicated bean cultivars (Table 2) (Abreu et al. 2004, Melo et al. 2005, Abreu et al. 2007).

BASIC SEED PRODUCTION

Cultivar BRSMG Madrepérola was registered by Embrapa, EPAMIG, UFLA, and UFV in the National

Table 1. Mean grain yield (kg ha^{-1}) of the cultivar and controls BRSMG Madrepérola and the controls Pérola and BRSMG Talismã in VCU tests conducted in Minas Gerais from 2002 to 2004, in the rainy, dry and winter growing seasons

Growing season	BRSMG Madrepérola	Pérola	BRSMG Talismã	Yield compared to the mean of the control cultivars	Number of environments
Rainy	2218	2070	2192	104.1	7
Dry	1967	1844	2040	101.3	17
Winter	2646	2427	2343	110.9	19
Mean	2308	2138	2199	106.4	43

Table 2. Grain cooking time and protein content of the common bean cultivar BRSMG Madrepérola, compared with grain of the control cultivars Pérola and BRSMG Talismã

Cultivar	**Cooking time** (min)	**Protein** (%)
BRSMG Madrepérola	29.0	24.2
Pérola	30.0	21.8
BRSMG Talismã	29.5	23.7

Register of Cultivars (RNC) of the Brazilian Ministry of Agriculture, Livestock and Supply (MAPA) on Feb 8, 2011, under number 27607, and protected by the National Plant Variety Protection Service (SNPC) on Feb 13, 2012 (certificate Nr 20120045). EPAMIG is in charge of the seed production.

PARTNER INSTITUTIONS IN THE EVALUATION OF THE CULTIVAR

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 and Coopertinga.

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