

BRSMG PIONEIRO: NEW CARIOCA COMMON BEAN CULTIVAR RESISTANT TO ANTHRACNOSE AND RUST, FOR THE SOUTHERN OF BRAZIL.

Maurílio Alves Moreira, Everaldo Gonçalves de Barros, José Eustáquio de Souza Carneiro, Fábio Gelape Faleiro, Luís Cláudio de Faria, Geraldo Estevam de Souza Carneiro, Maria José Del Peloso, Trazilbo José de Paula Júnior, Ângela de Fátima Barbosa Abreu, Magno Antônio Pato Ramalho, Leonardo Cunha Melo, João Bosco dos Santos, Carlos Agustín Rava, Joaquim Geraldo Cáprio da Costa, Aloísio Sartorato, Josias Correa de Faria.

Universidade Federal de Viçosa (UFV), 36570-000 Viçosa, MG, Brazil

Embrapa Arroz e Feijão, Caixa Postal 179, 75375-000 Santo Antônio de Goiás, GO, Brazil.

The Southern region of Brazil, that comprises the States of Paraná, Santa Catarina and Rio Grande do Sul, produces about 24,7% of the total national bean production. The prevalent climatic conditions of this region, with moderate temperatures and high humidity, favor disease development such as anthracnose. In this way, one of the main goals of the bean breeding programs in Brazil, is to give emphasis to the development of bean cultivars with resistance to this disease associated to grain type for each region consumers preferences and high average yield. *Colletotrichum lindemuthianum* presents a great pathogen variability making necessary, in the breeding program, the combination of different resistance genes.

BRSMG Pioneiro was obtained in the bean breeding program of the Instituto de Biotecnologia Aplicada à Agropecuária, University of Viçosa, Viçosa, MG, using the backcross method assisted by molecular markers. The original cross involved the genitors Rudá and Ouro Negro. Subsequently, three backcross cycles were performed to the recurrent genitor Rudá. In each backcross cycle the F₁ plants were inoculated with a mixture of pathotypes of the fungus *Uromyces appendiculatus*, the causal agent of bean rust, and with the pathotype 89 of the fungus *C. lindemuthianum*. By using molecular markers, from the resistant plants, it was identified those with the nearest genotype to the recurrent genitor for the next backcross cycle. After the third backcross cycle, 15 selected plants were self pollinated and 50 F_{2:3}RC₃ families were evaluated to their resistance to *U. appendiculatus* and to the pathotype 89 of *C. lindemuthianum*. Only 13 families were resistant and presented no segregation to both pathogens. Vi 4899 was selected as the nearest genetically lines to the recurrent genitor. During 2000 and 2001, it was also evaluated field trials, in 16 different environments in Brazil's Southern region, together with other nine breed lines and cultivars Pérola and Carioca used as control in a complete randomized block design with three replications in the State of Paraná (9), Santa Catarina (2) and Rio Grande do Sul (5).

In the 16 field trials line Vi 4899 showed to be 13% superior in an average yield when compared to the average yield of the controls Carioca and Pérola (Table 1). This data, together with the resistance (Table 2) of this line, allowed its release for planting during the wet and the dry seasons in the States of Rio Grande do Sul, Santa Catarina and Paraná, with the fantasy name of BRSMG Pioneiro.

Cultivar BRSMG Pioneiro was evaluated together with its genitors, cultivars Ruda and Ouro Negro, under artificial inoculation, for disease resistance to ten pathotypes of *U. appendiculatus* and 18 pathotypes of *C. lindemuthianum*. It showed to be resistant to all *U. appendiculatus* races and susceptible only to the pathotype 65 of *C. lindemuthianum* (Table 2). In field trials, it was susceptible to angular leaf spot and to common bacterial blight.

BRSMG Pioneiro presents a type II indeterminate habit growth, with a short-to-medium guide and erect stem and branches in the majority tested environments. During all growing cycle (average of 79 days from emergency to physiological maturity), it also showed to be resistant to lodging. The cultivar BRSMG Pioneiro presents a carioca grain type (cream-beige) with an average of 100 grains weight of 20 g (Table 3). It also presents an excellent cooking quality that fulfill all requirements of the market demand. Genetic seed stocks are maintained by Embrapa Rice and Beans and basic seed is available at Embrapa Technology Transfer.

Table 1. Average grain yield of the cultivar BRSMG Pioneiro compared to the average yield of control cultivars (Carioca and Pérola) in the Valor de Cultivo e Uso - VCU field trials in Southern Brazil, during the years of 2000 and 2001.

State	BRSMG Pioneiro (kg.ha ⁻¹)	Control average yield (kg.ha ⁻¹)	Relative yield (%)	Number of environments
Rio Grande do Sul	1626	1384	117	5
Santa Catarina	3522	3010	117	2
Paraná	2141	1951	110	9
Total average yield	2153	1906	113	-

Table 2. Disease reactions of cultivars BRSMG Pioneiro, Rudá and Ouro Negro inoculated with different pathotypes of *C. lindemuthianum* and *U. appendiculatus*.

<i>Colletotrichum lindemuthianum</i>				<i>Uromyces appendiculatus</i>			
Pathotype	Rudá	Ouro Negro	BRSMG Pioneiro	Pathotype	Rudá	Ouro Negro	BRSMG Pioneiro
7	rr	R/r	RR	54	RR	R/r	RR
23	RR	RR	RR	49	RR	R/r	RR
55	rr	RR	RR	58	RR	R/r	RR
64	RR	R/r	RR	52	RR	R/r	RR
65	rr	rr	rr	59	RR	R/r	RR
67	rr	RR	RR	45	RR	R/r	RR
73	rr	RR	RR	46	RR	R/r	RR
79	rr	RR	RR	50	RR	R/r	RR
81	rr	RR	RR	47	RR	R/r	RR
83	rr	R/r	RR	32	RR	R/r	RR
87	rr	RR	RR				
89	rr	RR	RR				
95	rr	R/r	RR				
102	R/r	RR	RR				
117	rr	R/r	RR				
119	RR	RR	RR				
343	R/r	R/r	RR				
453	rr	R/r	RR				

rr -susceptible ; RR - Resistant; R/r - segregant.

Table 3. Technological grain quality of BRSMG Pioneiro cultivar.

Cultivar	Cooking time (minute)	Soluble solids (%)	Protein content (%)
BRSMG Pioneiro	32.0	10.9	25.2
Pérola	29.0	9.6	21.3
Carioca	24.5	9.2	19.4

Institutions involved in the cultivar evaluation: Embrapa Arroz e Feijão; Embrapa Trigo; Instituto Agronômico do Paraná (Iapar); Centro Federal de Educação Tecnológica (Cefet) - Pato Branco-PR; Empresa de Pesquisa Agropecuária e Extensão Rural de Santa Catarina (Epagri); Fepagro.