IDENTIFICATION OF RESISTANCE GENES OF COMMON BEAN LINE MAIII -16.153 TO *Pseudocercospora griseola*

Paula Furtado de Pádua[1], Nathália Bottrel Maia Pereira[1], Fernanda Aparecida Castro Pereira[1], Ângela de Fátima Barbosa Abreu[2], Elaine Aparecida de Souza[1]

[1]Universidade Federal de Lavras, 37200-000, Lavras, MG – Brazil,
[2]Embrapa Arroz e Feijão, Santo Antônio de Goiás, GO, Brazil
*easouza@dbi.ufla.br

INTRODUCTION

The angular leaf spot, caused by the fungus *Pseudocercospora griseola*, is one of the main diseases of common bean (Nay et al., 2019). The most effective strategy for control is the use of genetic resistance (Nelson et al., 2018). Therefore, it is important to identify resistance genes for use in breeding programs. An alternative to accumulate several resistant alleles to *P. griseola* including those of small effect is by use of recurrent selection. The line MAIII-16.156, obtained from the recurrent selection program for ALS conducted by the Universidade Federal de Lavras in partnership with Embrapa, has shown high resistance to *P.griseola* strains (Amaro et al., 2007; Arantes et al., 2010; Nay et al., 2019). During the Common Bean Disease Workshop on Angular Leaf Spot and Root Rot, held in Skukuza, South Africa, in 2015, this strain was indicated to compose the new international set of differentiating cultivars for ALS (Souza et al., 2016). Despite the high level of resistance presented by this line, there is no information about the resistance genes that it possesses. Therefore, the aim of this work was to identify the number of resistance genes in this line through the evaluation of a F_2 segregating population.

MATERIALS AND METHODS

The BRS Horizonte line (susceptible) was crossed with MAIII-16156 line (resistant) and the F_1 and F_2 generations were obtained. The F_2 plants were assessed in four experiments. Two *P. griseola* strains, race 63-63 and 63-23, were inoculated in plants in V2 and V3 stages. 109 seeds were used for each experiment. The F_2 seeds were sown in trays and 12 days after planting, the seedlings were inoculated with a conidial suspension. The conidial suspension was obtained from colony mycelium discs of *P. griseola* strains, which were replicated into test tubes containing PDA (potato-dextrose-agar) medium and maintained at 24 ° C in an incubator (BOD) for a period of 12 days. Subsequently, the mycelium was scraped with the addition of 5-10 mL of sterile distilled water in each tube. The suspension obtained was filtered through a layer of cheesecloth. The inoculum was composed of a suspension of conidia at a concentration of 2.0×10^4 conidia mL^{-1} and the inoculation was performed with manual spray. 12 days after planting, the seedlings were inoculated with a conidial suspension at the V2 stage. After 25 days, the seedlings were inoculated in the V3 stage. Disease severity was assessed 15 days after inoculation using a diagrammatic scale (1 to 9 scores). For the V2 stage, the diagrammatic scale proposed by Librelon et al., (2015) and for V3 stage the 9 level scale proposed by Pastor-Corrales and Jara (1995) (Vital et al., 2006) was used. The seedlings were classified according to their resistance or susceptibility reaction to *P. griseola*. Seedlings with scores of ALS severity from 1 to 3 were considered resistant and seedlings with scores above 3 were classified as susceptible.

RESULTS AND DISCUSSION

The segregation observed for plants inoculated with isolates of the race 63-63 and 63-23 in the V2 stage were 73:36 and 85:24, approximating the ratio 3R: 1S (Table 1). The segregation observed for plants inoculated with isolates of the race 63-63 and 63-23 in the V3 stage were 78:32 and 85:23, approximating the ratio 3R: 1S (Table2).

Segregation in the F2 revealed a gene of major effect, and that dominant allele is responsible for resistance in the line MAIII -16.153.

Table 1. Segregation observed for plants inoculated with isolates of the race 63-63 and 63-23 in V2 stage

	F_2 Generation					
Race	**V2** Stage					
	Obs. Freq.		Expec.Freq.		X^2	P-value
	R	S	R	S		
63-63	73	36	3:1		3.64	**0.062**
63-23	85	24	3:1		0.51	**0.472**

Table 2. Segregation observed for plants inoculated with isolates of the race 63-63 and 63-23 in V3 stage

	F_2 Generation					
Race	**V3** Stage					
	Obs. Freq.		Expec.Freq.		X^2	P-value
	R	S	R	S		
63-63	78	32	3:1		0.98	**0.321**
63-23	85	23	3:1		0.18	**0.668**

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REFERENCES

Amaro, G. B. et al. (2007) Genetics and Molecular Biology 30: 584–588.

Arantes, L. D. O. et al.(2010) Crop Breeding and Applied Biotechnology 10: 232–237.

Librelon, S. S. et al. (2015) Australasian Plant Pathology 44:385-395.

Nay, M. M. et al. (2019) *Crop Science* 59 (4):1376-1391

Nelson, R. et al. (2018) Nature Reviews Genetics 19(1): 21.

Souza, T. L. P. O et al. (2016) Bean Improvement Cooperative Annual Report. 59: XV.

Van Schoonhoven, A.; Pastor-Corrales, M.A. (1987.) Standard system for the evaluation of bean germplasm. CIAT.54.