PROGENY TESTS FOR COMMON BEAN ISOLINES RESISTANT TO DISEASES WITH THE AID MOLECULAR MARKERS

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INTRODUCTION - Bean (*Phaseolus vulgaris* L.) is one of the most important vegetables in the human diet, mainly due to their nutritional qualities (Maldonado, 2002). One of the major factors limiting their productivity are the fungi that cause rust (*Uromyces appendiculatus*), anthracnose (*Colletotrichum lindemuthianum*) and angular leaf spot (*Pseudocercospora griseola*) in common bean. The aim of this study was progeny tests in segregating populations for resistance genes to these three diseases.

MATERIAL AND METHODS - From the F_2 population [(MAR-138A-1-11-4 x BAT-67-15-8) x Rudá R] carrier resistance genes to angular leaf spot, anthracnose and rust (Sanglard et al., 2007); were advanced two generations in the greenhouse using the pedigree method (*bulk* within families). During this process, tests were conducted for the presence of resistance gene using molecular markers. Evaluations of disease (angular leaf spot, anthracnose and rust) followed the methodology proposed by Pastor-Corrales & Jara (1995), Pastor-Corrales (1992) and Stavely et al. (1983).

RESULTS AND DISCUSSION - Of the 292 individuals F_2 [(MAR-138A-1-11-4 x BAT-67-15-8) x Ruda R], were selected 63 in the presence of SCAR (Sequence Characterized Amplified Regions) molecular markers: $SF10_{1050c}$, $SBA08_{560c}$, $SY20_{830c}$, $SAZ20_{845c}$, $SH13_{520c}$, $SAO12_{950c}$, $SAA07_{950c}$ and $SE04_{640c}$ (Sanglard et al., 2007). For planting the next generation, grains were selected within the standard "carioca"genetic *background* 'Ruda'. According to Santos et al. (2001), the early selection of the characteristic type of grain is very efficient due to its high heritability. In F_3 generation [(MAR-138A-1-11-4 x BAT-67-15-8) x Ruda R] were obtained 50 genotypes carrying all molecular markers amplified in the previous generation. Also in the greenhouse, the F_4 generation [(MAR-138A-1-11-4 x BAT-67-15-8) x Ruda R] was sown in family structure for conducting progeny tests. Fifty families were inoculated $F_{3:4}$ [(MAR-138A-1-11-4 x BAT-67-15-8) x Ruda R] sequentially with 21-3 races of *U. appendiculatus*, 65 of *C. lindemuthianum* and 63.23 of *P. griseola* (Table 1). Nine segregating families were discarded, seven to rust and two for anthracnose. Segregating families to rust have not been evaluated for the other diseases (families underlined in Table 1). In addition the evaluations through inoculations, five plants were chosen randomly from each of 41 families segregating for molecular analysis. Were used the same molecular markers described above. We selected 39 common bean families "carioca" containing resistance genes to angular leaf spot, anthracnose and rust. The combined use of phenotypic and molecular evaluations increases reliability in the selection processes.

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Table 1. Progeny tests performed for families $F_{3:4}$ [(MAR-138A-1-11-4 x BAT-67-15-8) x Ruda R] inoculated with the races 63.23 of *P. griseola*, 65 of *C. lindemuthianum* of 21-3 de *U. appendiculatus*

Families	Rust		Anthracnose		Angular leaf spot		Families	Rust		Anthracnose		Angular leaf spot	
	21-3		65		63.23			21-3		65		63.23	
	R	S	R	S	R	S		R	S	R	S	R	S
R3-4-20-4	15	0	15	0	15	0	R3-14-26-15	13	0	13	0	13	0
R3-4-20-11	13	0	13	0	13	0	R3-15-25-7	12	2				
R3-4-20-16	15	0	15	0	15	0	R3-15-25-10	13	0	13	0	13	0
R3-4-20-27	15	0	15	0	15	0	R3-15-25-13	15	0	15	0	15	0
R3-7-23-10	14	0	14	0	14	0	R3-16-17-4	14	0	13	1		
R3-8-2-5	15	0	15	0	15	0	R3-16-17-9	15	0	15	0	15	0
R3-8-2-18	15	0	15	0	15	0	R3-16-17-12	12	0	12	0	12	0
R3-8-2-22	12	2					R3-16-17-13	13	0	13	0	13	0
R3-8-2-23	10	5					R3-21-18-3	14	0	14	0	14	0
R3-10-11-5	15	0	15	0	15	0	R3-21-18-5	15	0	15	0	15	0
R3-10-11-9	15	0	15	0	15	0	R3-21-18-9	14	0	14	0	14	0
R3-10-11-15	15	0	15	0	15	0	R3-21-18-11	15	0	15	0	15	0
R3-10-11-24	15	0	15	0	15	0	R3-21-18-17	15	0	15	0	15	0
R3-12-42-6	8	5					R3-21-18-19	15	0	15	0	15	0
R3-12-42-14	8	7					R3-21-18-22	15	0	15	0	15	0
R3-12-42-15	14	0	14	0	14	0	R3-21-18-25	11	0	11	0	11	0
R3-12-43-1	0	11					R3-27-11-18	12	0	12	0	12	0
R3-12-43-6	12	0	12	0	12	0	R3-27-11-26	15	0	15	0	15	0
R3-12-43-8	10	3					R3-35-6-2	15	0	15	0	15	0
R3-14-26-2	15	0	15	0	15	0	R3-35-6-8	14	0	14	0	14	0
R3-14-26-8	15	0	15	0	15	0	R3-35-6-10	15	0	15	0	15	0
R3-14-26-9	15	0	14	1			R3-35-6-13	14	0	14	0	14	0
R3-14-26-12	15	0	15	0	15	0	R3-35-6-17	15	0	15	0	15	0
R3-14-26-13	12	0	12	0	12	0	R3-35-6-20	13	0	13	0	13	0
R3-14-26-14	15	0	15	0	15	0	R3-35-6-21	14	0	14	0	14	0

R: resistant; S: susceptible; Underlined lines refer to families segregating.