

INHERITANCE AND ALLELIC RELATIONSHIPS OF ANTHRACNOSE RESISTANCE IN COMMON BEAN PALOMA CULTIVAR

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INTRODUCTION

Anthracnose, caused by *Colletotrichum lindemuthianum* L., is one of the most important fungal diseases of common bean (*Phaseolus vulgaris*, L) (Pastor-Corrales and Tu 1989). Genetic resistance is the most effective method for this disease control. So far, twenty one resistance genes have been already characterized, and among them, only eight are Andean and due to it, the search for Andean resistance sources is really necessary. This way, the work aimed to characterize the genetic resistance of Andean cultivar Paloma.

MATERIAL AND METHODS

Genetic characterization of Paloma cultivar, was carried out through inheritance and allelism tests. Inheritance test was conducted in F₂ population from the cross between Paloma (resistant) and Cornell 49-242 (susceptible) cultivars, by using race 2047 of *C. lindemuthianum*.

Allelism tests were conducted in 16 F₂ populations derived from crosses between Paloma cultivar (R) and the other resistant cultivars that have genes previously characterized. Pathogen races used in these tests were: 65, 73 and 2047. The parental, F₁ and F₂ populations derived from each cross of Paloma with the differential cultivars and other sources of resistance to anthracnose were inoculated with a spore suspension of *C. lindemuthianum* at 1.2×10^6 esporos.mL⁻¹ concentration from each race. Visual evaluation of symptoms was conducted ten days after inoculation. Anthracnose disease reactions were rated visually using a scale from 1 to 9 (Pastor-Corrales et al., 1995). Plants with disease reaction scores between 1 and 3 were considered resistant, whereas plants that rated 4-9 were considered susceptible. The genetics analysis of F₂ populations were performed through Chi-Square Test (χ^2) using Genes Software (Cruz, 2006).

RESULTS AND DISCUSSION

The results of inheritance and allelism tests are disposed in Table 1. The inheritance studies demonstrated a 3R:1S ratio in the F₂ population from the cross between Paloma and Cornell 49-242 ($p = 0.77$), indicating the presence of single dominant gene in Paloma, conferring resistance to race 73. The allelism tests fitted to 15:1 R/S ratio in 16 F₂ populations from the crosses (R × R) involving Paloma and the cultivars Michigan Dark Red Kidney, Cornell 49-242, PI 207262, TO, TU, AB 136, G 2333, Ouro Negro, Jalo Vermelho, Jalo Listras Pretas, Pitanga, Corinthiano, Crioulo 159, Jalo Pintado 2, Perla and Amendoim Cavalo (Table 1). These results indicating the action of two dominant resistance genes, one of them present in the Paloma cultivar and the another in the remaining cultivars. Moreover, allelism tests revealed that the gene present in Paloma is independent from those previously characterized.

Table 1. Disease reaction in F₂ populations from R × S and R × R crosses for the genetic characterization anthracnose resistance in Paloma

Crosses	Race	Resistance Gene	Observed Ratio		Expected Ratio	χ^2	P value
			R ^a	S ^b	R:S		
Paloma (A) × Cornell 49-242 (MA)	2047	<i>Co-2</i>	73	26	3:1	0.084	0.77
Paloma × Cornell 49-242 (MA)	65	<i>Co-2</i>	84	6	15:1	0.027	0.87
Paloma × TO (MA)	65	<i>Co-4</i>	83	6	15:1	0.037	0.85
Paloma × PI 207262 (MA)	65	<i>Co-4</i> ³	70	6	15:1	0.351	0.55
Paloma × TU (MA)	65	<i>Co-5</i>	109	6	15:1	0.209	0.65
Paloma × AB 136 (MA)	65	<i>Co-6</i>	88	6	15:1	0.003	0.96
Paloma × Jalo Vermelho (A)	65	<i>Co-12</i>	47	3	15:1	0.005	0.94
Paloma × JLP ^d (A)	65	<i>Co-13</i>	92	6	15:1	0.003	0.96
Paloma × Perla (A)	65	*	111	19	15:1	0.320	0.57
Paloma × MDRK ^c (A)	73	<i>Co-1</i>	92	8	15:1	0.523	0.47
Paloma × Pitanga (A)	73	<i>Co-14</i>	56	4	15:1	0.018	0.89
Paloma × Ouro Negro (MA)	73	<i>Co-3</i> ⁴	118	9	15:1	0.152	0.70
Paloma × G 2333 (MA)	2047	<i>Co-4</i> ²	155	13	15:1	0.635	0.43
Paloma × Corinthiano (A)	2047	<i>Co-15</i>	94	6	15:1	0.011	0.92
Paloma × Crioulo 159 (A)	2047	<i>Co-16</i>	94	6	15:1	0.011	0.92
Paloma × Amendoim Cavalo (A)	2047	*	109	7	15:1	0.009	0.92
Paloma × Jalo Pintado 2 (A)	2047	*	90	6	15:1	0.001	0.99

* = gene not identified yet; ^aR = resistant; ^bS = susceptible; ^cMDRK= Michigan Dark Red Kidney; ^dJLP= Jalo Listras Pretas; A= Andean gene pool; MA= Mesoamerican gene pool.

CONCLUSION

The inheritance tests indicated the presence of one dominant resistant gene in Paloma. The allelism tests demonstrated that the gene present in Paloma is independent from those genes previously characterized. Paloma has been shown to be an important source of resistance to anthracnose and possesses a new Andean gene that supports its use in common bean breeding programs.

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