Evaluation of *Phaseolus vulgaris* Germplasm For Resistance To Five Anthracnose Races Isolated in Northern Spain

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Bean anthracnose, caused by the fungus *Colletotrichum lindemuthianum* (Sacc.& Magnus) Lambs.-Scrib., is a serious problem in Northern Spain. At the moment, five different races of this fungus have been identified in this area (Ferreira et al. 1998), and some resistance sources as A321, A493, A252 and Sanilac (*Co-2*) have been successfully used in our breeding programs. However, due to the likely emergence of new pathogenic strains, the identification of other sources of resistance would be of major interest. In this report we present the results of an evaluation for resistance to five races of anthracnose of 292 *Phaseolus vulgaris* accessions conserved in the SERIDA collection (Villaviciosa, Asturias, Spain).

C. lindemuthianum races 3, 6, 38, 102, and 787 (binary nomenclature; Pastor Corrales, 1991) were used in this work. These races were collected between 1992 and 1997 from common bean cultivars grown in Northern Spain. The inoculations were carried out on 10-days-old seedlings. The seedlings were sprayed with an aqueous conidial suspension derived from monosporic cultures containing 10^6 spores per ml and maintained at 20-22ºC, and 90-100% humidity. At least ten plants form each accession were evaluated after 7-9 days according to the criterions described by Schoonhoven and Pastor Corrales (1987).

A total of 246 landraces, 35 international lines and 8 breeding lines obtained in SERIDA (Xana, A1183, A1220, A1231, A1239, A1258, X1358 and X1319) were evaluated for resistance against the five races. In each evaluation the set of differential cultivars proposed by Pastor Corrales (1991) was incorporated as control. The results are summarized in Table 1.

According to the severity and homogeneity of anthracnose symptoms, four types of accessions were considered: resistant accessions (R), in which all plants were clearly resistant; susceptible accessions (S), in which all plants showed severe disease symptoms; accessions with intermediate reaction (I), in which all plants were moderately susceptible; and accessions containing both resistant and susceptible plants (R/S), probably proceeding from mixed populations. The accessions belonging to these two last types are included in the collection as local germplasm accessions.

In regard to the virulence of individual races to local materials, it ranged from 84% of race 6 to 57% of race 3. These values differ of those found in international materials, ranging from 55% of race 3 to 28% of race 102.

Table 2 shows the resistance spectra of the materials in which the reactions to all five pathogenic races were analyzed. Twenty-five out of 32 possible resistance spectra (combinations) were found, being the susceptibility to all races the most frequent one.

In addition to the differential cultivars Cornell 49 242, PI 207262, AB136 and G2333, and the breeding lines A1220, A1183, A1258, A1231, A1239, X1319 and X1358 (Table 1), eight international lines (Catrachita, A252, A321, A493, Sanilac, SEL1360, SEL1308 and BAT93) were resistant to all five races. None of the landraces presented a good resistance to all five races. The local germplasm accessions V369, V225 and V309, showed a good resistance to four races and an intermediate or mixed reaction for the fifth one.

The variation found suggests the presence of an important polymorphism in the genetic control for the resistance to *C. lindemuthianum* and offers the opportunity to identify new genes or alleles implicated in this resistance.

Table 1.- A summary of the reaction of 246 landraces, 35 international lines and 8 breeding lines to anthracnose races 3, 6, 38, 102 and 787 (R= resistant, S= susceptible, I = intermediate; R/S= mixed populations).

Race	*Type of accession*	Type of reaction R	S	I	R/S	Total	% Susceptible
3	Landraces	77	131	12	9	238	57.2
	International lines	14	19	1	0	34	55.9
	Differentials	10	2	0	0	12	16.7
	Breeding lines	8	0	0	0	8	0.0
6	Landraces	24	192	8	3	236	84.6
	International lines	16	17	2	0	35	48.6
	Differentials	10	2	0	0	12	16.7
	Breeding lines	7	1	0	0	8	12.5
38	Landraces	40	190	3	4	246	80.2
	International lines	19	13	3	0	35	37.1
	Differentials	9	3	0	0	12	25.0
	Breeding lines	7	1	0	0	8	12.5
102	Landraces	50	150	20	8	237	65.8
	International lines	24	10	1	0	35	28.6
	Differentials	8	4	0	0	12	33.3
	Breeding lines	8	0	0	0	8	0.0
787	Landrace	75	136	7	9	236	59.9
	International lines	16	18	0	1	35	51.4
	Differentials	7	5	0	0	12	41.7
	Breeding lines	8	0	0	0	8	0.0

Table 2.- Frequency of the resistance spectra for races 3, 6, 38, 102 and 787, in the landraces and international lines of the SERIDA collection. Intermediate reactions were considered as susceptible; Mixed populations were considered as resistant.

Resistance spectrum 3	6	38	102	787	Landraces	Int. lines
S	S	S	S	S	87	5
R	S	S	S	S	7	0
S	**R**	S	S	S	4	0
S	S	R	S	S	15	1
S	S	S	R	*S*	18	6
S	S	S	S	R	12	1
R	R	S	S	S	0	0
R	*S*	R	S	S	2	0
R	S	S	R	*S*	2	0
R	S	S	*S*	R	32	0
S	R	R	S	S	0	0

Resistance spectrum 3	6	38	102	787	Landraces	Int. lines
S	R	*S*	R	*S*	6	0
S	R	S	S	R	0	0
S	S	R	R	*S*	0	3
S	S	R	*S*	R	1	0
S	S	S	R	R	0	0
R	R	R	S	S	0	0
R	R	*S*	R	*S*	0	0
R	R	S	S	R	2	0
R	*S*	R	R	*S*	2	0
R	*S*	R	*S*	R	3	0
R	S	S	R	R	13	2

Resistance spectrum 3	6	38	102	787	Landraces	Int. lines
S	R	R	R	*S*	0	2
S	R	R	*S*	R	1	0
S	R	*S*	R	R	0	1
S	S	R	R	R	0	0
R	R	R	R	*S*	2	0
R	R	**R**	*S*	R	5	4
R	R	*S*	R	R	5	0
R	*S*	R	R	R	8	0
S	R	R	R	R	0	1
R	R	R	R	R	3	8

References

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