

Test of Allelism for the anthracnose resistance *Co-1* gene.

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A total of six dominant genes conferring resistance to *Colletotrichum lindemuthianum* (Sacc. & Magnus) Lams.- Scrib., have been genetically characterized and reported (Young and Kelly, 1996). These anthracnose resistance genes were known by different names until Kelly and Young (1996) proposed a new gene nomenclature using the 'Co' symbol (for *Colletotrichum*) followed by a number (indicating the order of appearance of genes in the literature): *Co-1* (*A*); *Co-2* (*Are*); *Co-3* (*Mexique 1*); *Co-4* (*Mexique 2*); *Co-5* (*Mexique 3*) and *Co-6*. The originally identified *Mexique* genes were shown to be independent from each other and from the *Co-2* gene (Fouilloux, 1979). However, genetic evidence showing independence of these *Mexique* genes from *Co-1* gene was lacking. Since *Co-1* gene belongs to the Andean gene pool, as opposed to *Co-3* *Co-4*, and *Co-5* of Middle American origin, it was assumed that all these genes were located at different loci.

The objective of the present study was to test independent assortment of *Co-1* gene from *Co-3* *Co-4*, and *Co-5* genes.

The Michigan cultivar Raven was used as the source of the *Co-1* gene (Kelly et al., 1994). Raven was crossed to the differential cultivars Mexico 222, TO and TU carrying the *Co-3* *Co-4*, and *Co-5* genes respectively. For the allelism test, F₂ populations from each cross were challenged with a race of the pathogen known to be avirulent to their respective parental material. A chi-square test for a 15:1 (R-:rr) segregation ratio was performed on each F₂ population under study. This allelism test confirmed that *Co-1* is an independent dominant gene, located at a different locus from the *Co-3* *Co-4*, and *Co-5* genes (Table 1). The genetic evidence presented in this study should complete the characterization of the *Co-1* gene and support its new assigned gene symbol replacing the original identification (*A*).

Table 1. Allelism test for genetic characterization of the anthracnose resistance *Co-1* gene.

F ₂ Population	Loci tested	Race used	No "R" Plants	No "S" Plants	χ ² a	P ^b
Raven/Mex 222	<i>Co-1/Co-3</i>	521	94	6	0.00	1.0
Raven/TO	<i>Co-1/Co-4</i>	73	67	5	0.00	1.0
Raven/TU	<i>Co-1/Co-5</i>	73	63	4	0.00	1.0

^a 15:1 (resistant, R-: susceptible, rr) expected ratio for two independently assorting genes.

^b P= estimated probability value.

- Fouilloux, G. 1979 New races of bean anthracnose and consequences on our breeding programs. Pages 221-235 in: Int. Symp. Dis. Trop. Food Crops. H. Maraite and J.A. Meyer, eds.
- Kelly, J.D. and Young, R.A. 1996. Proposed symbols for anthracnose resistance genes. Annu. Rep. Bean Improv. Coop. 39:20-24.
- Kelly, J.D., G.L. Hosfield, G.V. Varner, M.A. Uebersax, S.D. Haley, and J. Taylor. 1994. Registration of 'Raven' black bean. Crop Sci. 34:1406-1407.
- Young, R.A. and J.D. Kelly. 1996. Characterization of the genetic resistance to *Colletotrichum lindemuthianum* in common bean differential cultivars. Plant Dis. 80:650-654.