Virulence Diversity of *Pseudocercospora griseola* and its Implication for Breeding Common Bean for Resistance to Angular Leaf Spot

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**INTRODUCTION**

Angular leaf spot (ALS), caused by the fungus *Pseudocercospora griseola*, is one of the most widely spread and damaging diseases of common bean (*Phaseolus vulgaris*) in tropical and subtropical countries (Carrizales-Victoria, 1988; Liebmann & Prekrus, 1997; Weimert et al., 1998).

The "First International Angular Leaf Spot (ALS) Workshop" of common bean was held in 1995 at the International Center for Tropical Agriculture (CIAT), Cali, Colombia, with participating researchers from Brazil, Bolivia, Colombia, Mexico, Costa Rica, and various African countries. At this workshop, the use of an international set of 32 common bean differential cultivars—six Andean and six Mesoamerican—and a binary system for identification of ALS races, proposed by CIAT’s Bean Pathology program, was approved. We report the use of this system to characterize a global collection of *P. griseola* isolates and define the race structure of this pathogen.

**MATERIALS AND METHODS**

During the last 20 years, we have determined the virulence phenotype of 589 monosporic isolates of *P. griseola*, using the established international set of common bean differential cultivars. Nine seeds of each differential cultivar—three plants per pot and three pots per differential cultivar—were established in the greenhouse. The first bilatiate leaf of each plant was inoculated 17 days after planting, using 2×10⁵ spores/ml of each isolate. Disease evaluations were conducted 10, 12, 14, and 17 days after inoculation, using a 1-9 disease severity scale (Van Schooten & Pastor-Cevallos, 1987). Scores of 1-3 were considered a resistance response, 4-6 intermediate, and 7-9 susceptible. Disease reaction scores recorded 17 days after infection were used to determine isolate × cultivar compatibility or compatibility. Rating scores of 1-3 were considered incompatible or resistant, while ratings greater than 3 were considered compatible or susceptible. Race designation was estimated by summing the binary values of the differential varieties that had a compatible interaction. Table 1.

**RESULTS**

Of the 589 isolates tested, there were 180 Andean and 426 Mesoamerican. Of these, 184 isolates are from Africa, 56 from Central America, and 247 from South America. The distribution of the number of isolates per country is shown in Table 2.

**CONCLUSIONS**

In total, 134 *P. griseola* races were identified worldwide. Of these races, 31 were unique to Africa, and 80 unique to the Americas. The rest (23) were identified in the two continents.

54 *P. griseola* races were identified from Africa, 60 *P. griseola* races from Central America, and 69 *P. griseola* races from South America.

The inoculation of the international set of differential cultivars with 589 isolates of *P. griseola* revealed great diversity of this pathogen in many countries of Central and South America and in Eastern and Southern Africa. The majority of the Andean differential cultivars are susceptible to the Mesoamerican races of the ALS pathogen from Central America and Brazil. Conversely, the Mesoamerican differential cultivar Mexico 64 is outstanding for its resistance to many races of the *P. griseola* in the world, and most particularly in Africa.

Many races found appear only in a given location, country, or region. This information has been used to better target the deployment of ALS resistance genes and preserve the usefulness of these genes in the regions where ALS is an important disease.