IDENTIFICATION OF NEW SOURCES OF RESISTANCE TO WEB BLIGHT OF COMMON BEAN

Nancy A. González Martínez[1], Feiko H. Ferwerda[2], Myrna Alameda[1], Juan Carlos Rosas[3] and James S. Beaver[1]

Dept. of Agronomy and Soils[1] and Dept. of Horticulture[2], University of Puerto Rico, Mayagüez, PR 00681-9030 and Escuela Agrícola Panamericana[3], Tegucigalpa, Honduras

Web blight, caused by the fungus *Rhizoctonia solani* Kühn is an important disease of common bean (*Phaseolus vulgaris* L.) in the tropical lowlands of Latin America and Africa where high temperatures and abundant rainfall prevail (Gálvez, et al., 1989). Only moderate levels of resistance to web blight are currently found in common bean. A portion of what appears to be web blight resistance in common bean may be disease escape due to erect architecture and an open leaf canopy. In Honduras, web blight is also found at higher altitudes (> 1000 m) where wild and cultivated scarlet runner bean (*P. coccineus* L.) populations exist. Due to this disease pressure, it was postulated that some *P. coccineus* and *P. polyanthus* accessions may serve as sources of resistance to web blight.

Ninety-nine accessions of *P. coccineus* and *P. polyanthus* from the CIAT bean germplasm collection[i] were screened for web blight reaction using a detached-leaf inoculation technique. This screening technique was used to identify accessions with physiological resistance to web blight rather than traits associated with disease escape. The AG 1-1B isolate, *R. solani* 12, from the fungus collection maintained at the University of Puerto Rico Mayagüez Campus was used to inoculate the detached leaves. The first and third fully-expanded trifoliates of the *P. coccineus* and *P. polyanthus* plants and the susceptible check 'Morales' were cut and the petioles were placed into orchid tubes filled with distilled water. Under aseptic conditions, agar discs (4 mm diameter) were cut from the edges of 4-day-old cultures of *R. solani*. The discs were placed at random on two of the three leaflets of the *P. coccineus* and *P. polyanthus* accessions and on the susceptible check. Immediately after inoculation, the trays were placed inside plastic bags to maintain high humidity and maintained under constant light at temperatures ranging from 26 to 30ºC. The degree of leaf damage was evaluated at 24, 48 and 72 h after inoculation according to the CIAT scale where: 1 = no visible symptoms, 2 = < 5% leaf area affected, 3 = 6-10% leaf area affected, 4 = 11-20% leaf area affected, 5 = 21-30% leaf area affected, 6 = 31-40% leaf area affected, 7 = 41-60% leaf area affected, 8 = 61-85% leaf area affected and 9 = > 85% leaf area affected (Schoonhoven and Pastor-Corrales, 1991).

All of the *P. polyanthus* accessions and most of the *P. coccineus* lines were susceptible to web blight with mean leaf damage scores ≥ 7 at 48 hours after inoculation. G 35163 was the most resistant *P. coccineus* accession, with less leaf damage and smaller lesion size than the susceptible *P. vulgaris* check 'Morales'. Mean leaf damage scores of the first trifoliate of G 35163 were 1 at 24 and 48 hours after inoculation and 3 after 72 hours. The mean leaf damage scores of the third trifoliate of G 35163 was 3 at 48 hours after inoculation and 6 at 72 hours. When G35163 was

evaluated in a second experiment using the same inoculation technique, mean leaf damage scores were 1.8 and 2.3 at 60 and 72 hours after inoculation, respectively. The *P. coccineus* accessions G 35007 and G 35066 expressed moderate levels of resistance to web blight. G35007 had mean leaf damage scores of 5.0 and 6.8 at 72 hours after inoculation for the first and third trifoliates, respectively. G35066 had mean leaf damage scores of 5.0 for the first trifoliate and 6.3 for the third trifoliate at 72 hours after inoculation. Takegami and Beaver (2000) evaluated the web blight reaction of another group of *P. coccineus* accessions from the CIAT bean germplasm collection in the field. Although the accessions had a prostrate growth habit, the web blight scores at 15 days after inoculation were 2.5 for G 35006 and G 35066. When evaluated using the detached-leaf inoculation technique, both lines had mean scores of 2.5 at 60 h after inoculation. In 2000, F.H. Ferwerda at the University of Florida made an interspecific cross between 5-593 and G 35006 and another interspecific cross between 'ICA Pijao' and G 35006. During the summer of 2004, 43 $F_{3:4}$ lines from these crosses were evaluated in the field at Isabela, Puerto Rico for reaction to web blight. The plots were inoculated twice with the AG 1-1B isolate of *R. solani* using techniques described by Takegami and Beaver (2000). Twenty-five of the lines had web blight scores ≤ 2 at 14 days after the second inoculation whereas the susceptible check Morales had a mean score of 5. No further readings were made because tropical storm Jeanne destroyed the nursery. In Honduras in 2001, F_2 plants from the interspecific crosses were crossed with the common bean cultivars 'Tío Canela 75' and 'Amadeus 77'. In 2003, F_3 lines derived from these crosses were screened in the field in Jamastrán, Honduras for web blight reaction. Several lines in the trial had low levels of web blight infection with mean scores < 3.0. These lines have been distributed to cooperators in the Central American region to test their resistance to different isolates of the web blight pathogen.

References

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