Research Note

VIRULENCE OF RHIZOCTONIA SOLANI ISOLATES ASSOCIATED WITH WEB BLIGHT OF COMMON BEAN[1]

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Web blight (WB), caused by the asexual stage *Rhizoctonia solani* Khün, has been observed in Puerto Rico (PR) in commercial and experimental plantings of common bean (*Phaseolus vulgaris* L.). The disease can become severe in the Caribbean during the rainy season with warm temperature. Thirteen *R. solani* (Rs) isolates collected in PR from soil, infected seeds, hypocotyls, leaves, and pods of common bean plants were characterized as belonging to the anastomosis group (AG) 1 and AG 4 (Echávez-Badel et al., 1997). The objective of this study was to determine the difference in virulence between Rs 011 and Rs 012 isolates obtained from leaves of common bean collected in Isabela and Aguada, respectively.

Greenhouse and field experiments were conducted at the Alzamora Farm and at the Isabela Substation, respectively, of the College of Agricultural Sciences (CAS), University of Puerto Rico, Mayagüez (UPRM). We used the web blight (WB)-susceptible advanced line PR 9418-2 from the bean breeding program of the Agricultural Experiment Station, CAS, UPRM. The PR 9418-2 line was planted in 10-cm-diameter pots containing a mix of peat moss and pasteurized soil (1:1 v/v) and raised under greenhouse conditions. This line was also planted in the field at the Isabela Substation in rows 1 m long and 0.6 m apart.

Isolates Rs 011 and Rs 012 were grown in a liquid medium containing 10 g peptone, 0.5 g $KHPO_4$, 0.25 g $MgSO_4$ and 15 g dextrose per liter of water (Ko and Hora, 1971). After six days of incubation at 28° C in a controlled-environment incubator shaker, the mycelial mats were removed by filtering and washed several times with distilled water, then blended for two to three minutes. The final suspension (1 g mycelium per 300 ml of distilled water) of two isolates was applied with a salt shaker (3 ml) or micropipette (20 µl) on the third trifoliolate leaf of plants grown in the greenhouse. After 72-h incubation in a mist chamber at 28° C, plants were returned to the greenhouse. The same mycelial suspension was sprayed (30 ml/row) from a 3.78-L manual sprayer to the foliage of plants at V4 growth stage (Van Schoonhoven and Pastor-Corrales, 1987) grown in the field.

A randomized complete block design and treatments in a factorial arrangement were used. Uninoculated plants were sprayed with distilled water as a control check, and four replications were used in the greenhouse and field experiments. Means were separated by Tukey's test. The experiments were evaluated for WB severity with the CIAT

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scale reported by Van Schoonhoven and Pastor-Corrales (1987), in which 1 to 10% of the foliar area affected indicates a lower disease severity, 10.1 to 40% = moderate WB severity, and more than 40% = high disease severity or susceptible reaction.

Macrosclerotic Rs 011 and Rs 012 isolates were virulent in line PR 9418-2 but the virulence was variable. Significant differences ($P < 0.05$) in WB severity were found between the isolates: Rs 012 was significantly more virulent than Rs 011 in the greenhouse (Table 1). The interaction of the isolates × inoculation method (salt shaker or micropipette) was not significant for disease severity. No significant difference in severity was found between Rs 011 and Rs 012 under field conditions (Table 1). However, Rs 012 was more aggressive before harvesting, causing necrotic lesions on leaves and severe defoliation. As expected, the control check did not show WB symptoms. Results reported by Echávez-Badel et al. (1997) indicated that Rs 011 and Rs 012 isolates, collected from bean leaves, were pathogenic to 25 advanced bean lines in nonreplicated rows at the Isabela Substation.

Gómez-Galué (1997) and Bautista-Pérez (1998) determined that the Rs 011 and Rs 012 isolates of *R. solani* obtained from bean leaves in Isabela and Aguada, respectively, were capable of infecting stems and leaves under greenhouse and field conditions, and the foliar symptoms showed the same WB characteristics. Polanco et al. (1996) identified two types of *R. solani*, macro- and microsclerotic isolates (AG 1-IB), collected from bean leaves at Isabela. They found that the macrosclerotic type was more virulent. In contrast, the AG 1-IB microsclerotic type obtained from leaves in the southwestern region of the Dominican Republic was more virulent infecting the stems and leaves of common bean (Godoy et al., 1992; Polanco et al., 1996).

Galindo (1982) reported that the isolates of *R. solani* belonging to AG 1 were capable of infecting bean leaves and hypocotyls under laboratory and greenhouse conditions. Two AG 1 isolates collected from bean leaves in PR were found to be pathogenic to common bean when the detached-leaf method was used (Bautista-Pérez, 1998). It is important to note that no morphological characteristics (hymenia, basidia and basidiospores) of *T. cucumeris* were observed throughout this study.

Results suggest that the macrosclerotic Rs 012 isolate can be a good source of inoculum for screening common bean genotypes for resistance to WB disease in Puerto Rico.

TABLE 1.—*Virulence of* Rhizoctonia solani, *isolates Rs 011 and Rs 012, in the common bean line PR 9418-2 planted in greenhouse and field in Puerto Rico.*

		Percentage of web blight severity[1]	
Isolate	Location	Greenhouse[2]	Field[2]
Rs 011	Isabela	75.00 a	82.50 a[3]
Rs 012	Aguada	97.50 b	81.68 a
C.V. (%)		11.43	15.5

[1]Web blight severity was determined by the CIAT scale (1 to 10% of the foliar area affected = low disease severity and more than 40% = high disease severity).

[2]Mean of four replications.

[3]Values followed by the same letter within a column are not significantly different ($P < 0.05$).

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