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Field Reaction of Landrace Components of Red Mottled Beans to Common Bacterial Blight

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Abstract. Field reaction of 25 red mottled bean (Phaseolus vulgaris L.) genotypes to common bacterial blight (Xanthomonas campestris pv. phaseoli (Smith) Dye) was evaluated in Puerto Rico over 2 years. The average disease severity (percent leaf area with symptoms) was similar over years. The determinate red mottled genotypes had almost twice as much disease as indeterminate genotypes. Eight of the indeterminate genotypes had significantly less disease than the mean of the field experiments. These genotypes may serve as useful sources of resistance to common bacterial blight. The size of the chlorotic zone around necrotic lesions varied between growing regions (Beaver et al., 1985; Coyne and Schuster, 1974; Schieber, 1970). Most red mottled beans grown in the Dominican Republic are susceptible to common bacterial blight, but the characteristic chlorotic border around the necrotic leaf lesions often has not been observed on certain ‘Pompadour’-type red mottled genotypes. The red mottled landrace cultivars, mostly grown by small-scale farmers, have been found to vary for several important traits, including growth habit, leaf pubescence, and biological N fixation capacity (Catano, 1990; Oviedo et al., 1990). The possibility that disease reaction could also vary led to the objective of this research: to evaluate a group of selections from the Dominican red mottled bean landrace for necrotic and chlorotic field reaction to common bacterial blight.

Twenty-five determinate and indeterminate red mottled bean genotypes were evaluated in Puerto Rico for field reaction to common bacterial blight in 1988 and 1989. Two red kidney genotypes, 27R and 3M-152, were also planted as susceptible controls. The experiments were planted at the Isabela Substation on 31 Oct. 1988 and 11 Oct. 1989. A randomized complete block design with five replications was used. Experimental units consisted of one 1.5-m row planted with 15 seed. Plots were evaluated for disease severity 46 days after planting in 1988 and 58 days after planting in 1989. All genotypes were at the early to mid-pod-fill stage of development when visually evaluated for percentage of leaf area showing necrosis and water-soaking due to Cbb. In addition, the size of the chlorotic zones surrounding the Cbb lesions was rated using a scale where 1 = no chlorotic zone and 5 = a chlorotic zone surrounding and nearly as large as the necrotic lesion. Rainfall and temperatures were normal and, therefore, favorable for disease development. Natural infection on the susceptible genotypes became prominent shortly after flowering. The average disease severity was similar between years. The disease severity on the susceptible genotypes became prominent shortly after flowering. The average disease severity was similar between years. The disease severity on the susceptible controls ranged from 24% to 34% (Table 1). The small plots with five replications provided an adequate level of precision to detect significant disease severity differences among genotypes. Moreover, the disease se-
verity of the individual red mottled landrace components was similar between years (Table 1).

As a group, the determinate genotypes had almost twice the disease severity as the indeterminate genotypes (Table 1). Eight of the indeterminate genotypes had significantly less disease than the mean of the test, whereas the disease severity of the determine lines was equal to or greater than the mean of the test. The difference in disease severity between growth habits could not be attributed to differences in maturity, as most of the determinate and indeterminate lines in the experiment flowered and matured within a few days of each other. The indeterminate lines with low Cbb severity may serve as useful sources of resistance to not only Cbb but also to rust *Uromyces appendiculatus* (Pers.) Unger pv. *appendiculatus* since all of these genotypes have also been selected for dense abaxial leaf pubescence, a trait associated with rust resistance (Oviedo et al., 1990). Greater resistance to Cbb and rust would be needed to allow the greater yield potential of indeterminate genotypes to be realized (Beaver et al., 1985).

In 1988, the red kidney control genotypes, 27R and 3M-152, produced typical chlorotic zones around the lesions, and the chlorotic zone around lesions on indeterminate genotypes was larger than that on determinate genotypes (Table 1). In 1989, however, the chlorotic zones were smaller than those in 1988, and there was no significant difference between growth habits or among genotypes. The environment may have affected the degree of expression of the chlorotic zone around the lesions. The halo in the blight of beans caused by *Pseudomonas syringae* pv. *phaseolicola* (Burkholder) is expressed more at 20°C than at higher temperatures (Coyne and Schuster, 1974). Researchers familiar with Cbb symptoms on beans in temperate or higher-altitude tropical environments should know that chlorotic zones around lesions are often not expressed on beans grown in the lowland tropics. The size of the chlorotic zone around necrotic lesions can vary between growing seasons and among bean genotypes in field evaluations.

### Literature Cited


