

COMMON BACTERIAL BLIGHT STUDIES IN THE CARIBBEAN AND CENTRAL AMERICA

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In Central America and the Caribbean, common bacterial blight (CBB) of beans (*Phaseolus vulgaris* L.), caused by *Xanthomonas campestris* pv. *phaseoli* (E.F. Smith) Dowson (Xcp) can reduce both seed yield and quality. Studies on common bacterial blight were initiated in Puerto Rico in the 1970's as part of a USAID supported project. Virulent strains were purified and used for inoculation of leaves of potential sources of resistance and breeding lines. The use of multiple needles in the greenhouse and sand blasting in the field were the most common inoculation methods. Eventually, greenhouse inoculation was simplified by a flat clip-prick technique. Field techniques were improved by using bacterial inoculum that was purified and standardized in the laboratory and sprayed in the field with carborundum or sterilized sand (Zapata et al., 1985). Symptoms in the greenhouse and field were successfully graded using a 1-5 scale, where 1 = resistant and 5 = highly susceptible (Zapata et al., 1985).

High levels of resistance to CBB were developed in collaboration with Dr. R. Wilkinson by pyramiding minor genes for resistance from diverse sources. This was accomplished through the selection of resistant plants in the greenhouse at Cornell University and Puerto Rico and in field trials in Puerto Rico (Zapata et al., 1991). In 1990, Drs. G. Freytag, M. Zapata and R. Wilkinson released five CBB resistant germplasm lines (W-BB-1, W-BB-20-1, W-BB-3, W-BB-52, W-BB-II-56). The sources of resistance of these lines were GN-1 sel. 27 and lines with *P. coccineus* background (Zapata et al., 1991). XR-235-1-1 derives its CBB resistance from *P. coccineus* (Freytag et al., 1982). Miklas et al. (1999) released germplasm lines (ICB-3, ICB-6, ICB-8 and ICB-10) with resistance derived from *P. coccineus*. Freytag (1989) reported three linked dominant genes that conferred resistance in the yellow-seeded tepary bean line TL-40. When inoculated with specific strains of Xcp, an F₂ population from a cross between TL-40 and Mex-114 (susceptible) segregated 3 resistant: 1 susceptible as would be expected for single dominant gene resistance. However, there was evidence of linkage when the results from two or three strains were considered. Urrea et al. (1999) studied the inheritance of CBB resistance of three tepary lines. When inoculated with Xcp strain 484a, ratios in the F₂ generation showed that the resistance of Neb-T-6-s and PI321637 was governed by single dominant gene. Results suggested that resistance of Neb T-8a-s was conferred by two dominant genes with complementary effects. Lack of susceptible progeny in test crosses suggests that at least one locus conditioning resistance is shared among Neb-T-6-s, PI321637 and Neb T-8a-s. Dominican red mottled landrace varieties Pompadour 17 and Pompadour K have leaf and pod resistance when field tested in the Caribbean (Beaver et al., 1992). Early generation (F₄) evaluation of breeding lines derived from the cross Dorado/ XAN 176 were effective for screening for field resistance (Varela et al., 1995). The light red kidney germplasm line PR9443-4 had a highly resistant leaf reaction to three Xcp strains when evaluated under greenhouse conditions (Beaver et al., 1999).

Zapata et al. (1985) reported a strain specific reaction to Xcp in *P. vulgaris*. Based on several years of observation of pathogen dynamics, Zapata (1989, 1996a and 1996b) presented an explanation for variability of CBB reaction. Pathogen variability was studied through collaboration with researchers in Central America and the Caribbean where Xcp was prevalent throughout the year. A collection of the pathogen was made from several different countries in the region. Differential lines were identified as well as lines with resistance to multiple races from Puerto Rico, Dominican Republic, Costa Rica and Cuba. The differential lines are: XAN 159, NY 79-3939-1, A774, RAZ 50, L-81-61 and Jutiapa (Zapata, 1996). Other lines, XAN 309, G17341, VAX-2, GN #1 sel. 27, VAX 1 and W-BB-11 were identified to be resistant to isolates from Costa Rica, Dominican Republic, Honduras, and Nicaragua. Isolates from Honduras and Guatemala were the most virulent (Zapata et al., 1998). In 1996, Puerto Rico was the host for the first international workshop on bean common bacterial blight. A proposal was made at the workshop to establish minimum standards to designate Xcp pathogenic races through the use of

differential lines and uniform inoculation methods (Coyne et al., 1996). Strong evidence supporting the existence different Xcp races in Central America and the Caribbean has been found and reconfirmation of pathogenic races has been achieved in subsequent studies by M. Zapata (unpublished).

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