Registration of PR9745–232 and RMC-3 Red-Mottled Dry Bean Germplasm lines with Resistance to Bean golden yellow mosaic virus

Red-mottled common bean (Phaseolus vulgaris L.) germplasm lines PR9745–232 (Reg. no. GP-242, PI 639721) and RMC-3 (Reg. no. GP-243, PI 639868) with resistance to Bean golden yellow mosaic virus (BGYMV), a whitefly [Bemisia tabaci (Gennadius)]-transmitted begomovirus, were developed and released cooperatively by the Agricultural Experiment Station of the University of Puerto Rico (AES-UPR) and the International Center for Tropical Agriculture (CIAT).

PR9745–232 was derived from the double-cross ‘Indeterminate Jamaica Red’ (PI 163122)/PR9180–25C///DOR 482/PR9231–94. Indeterminate Jamaica Red is a pink-striped landrace with a Type III growth habit and heat tolerance. PR9180–25C is a red-mottled breeding line selected for heat tolerance and resistance to common bacterial blight [caused by Xanthomonas axonopodis pv. phaseoli (Smith) Vauterin et al. (syn. = X. campestris pv. phaseoli)]. DOR 482, released in Central America as ‘Don Silvio’, is a small (<25 g 100-seed weight–1) red breeding line with the recessive bgm-1 allele, first identified in pinto bean breeding line A 429 (Blair and Beaver, 1993), for resistance to leaf yellowing and chlorosis caused by BGYMV (Velez et al., 1998). DOR 482 also has the I allele for resistance to BCMV. Furthermore, Molina-Castañeda and Beaver (1998) found DOR 482 to have the dominant Bgp-1 allele for resistance to pod deformation induced by BGYMV. PR9231–94 is a high-yielding line with commercially acceptable red-mottled seed. The double-cross was made at the Isabela, Puerto Rico, Substation in October 1994. The F1 was planted at Isabela in January 1995 and individual plants were selected based on seed and plant type from an F2 nursery planted at the same location in October 1995. Pedigree selection for agronomic traits and disease resistance was used from the F3 to F5, whereupon seed from the F4,5 plant-to-progeny row identified as PR9745–232 was bulked. The breeding line was planted at the Isabela Substation during the summer of 1998 to screen for heat tolerance and resistance to BGYMV.

On a 1-to-9 disease rating scale in which 1 is resistant and 9 is highly susceptible (CIAT, 1987) PR9745–232 had an average BGYMV score of 1.0 in the Dominican Republic in 1998, 1999, and 2000, and in Haiti in 1999 (PROFRIJOL, 2001). However, under severe pressure, a few plants of PR9745–232 developed BGYMV symptoms at Bastidas, Dominican Republic, and at Salagnac, Haiti, in 2003. Nevertheless, the level of BGYMV infection of PR9745–232 was significantly less than in susceptible red-mottled cultivars. PR9745–232 was also resistant to rust [caused by Uromyces appendiculatus (Pers.:Pers.) Unger] at Isabela, Puerto Rico; at San Juan de la Maguana, Dominican Republic; and at Damian, Haiti. The presence of the SCAR marker SW13 suggested that PR9745–232 has the I allele for resistance to Bean common mosaic virus (BCMV), a potvirus. This was confirmed when PR9745–232 expressed whole-plant systemic top necrosis when inoculated with BGYMV and the virus was introduced into the栽培 of the F6 and F7 by bulk. The breeding line was planted at the Isabela Substation during the summer of 1998 to screen for heat tolerance and resistance to BGYMV.

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