Bean Golden Yellow Mosaic (BGYM), caused by a whitefly-transmitted geminivirus, can produce a range of symptoms in common bean (*Phaseolus vulgaris* L.) including intense foliar yellowing (chlorosis), pod deformation and severe plant stunting. Plant breeders have identified several sources of resistance to these symptoms (Beebe, 1994; Singh, 2000). The small red bean breeding line DOR 364, released in Central America as ‘Dorado’, has moderate levels of resistance to BGYM. When inoculated in the greenhouse with viruliferous whiteflies, Adames *et al.* (1996) found DOR 364 to have delayed symptom expression. Miklas *et al.* (2000) identified a major QTL and a RAPD for BGYM resistance in DOR 364. This marker has been converted by scientists at CIAT to the SCAR marker SWI2700. The most widely deployed resistance to BGYM is recessive gene *bgm-1* (Vélez *et al.*, 1998) which confers resistance to leaf chlorosis. Urrea *et al.* (1996) identified a codominant RAPD marker linked to *bgm-1* that was converted by CIAT researchers to the SCAR marker SR-2. Molina Castañeda and Beaver (1998) and Acevedo Román (2003) identified the dominant gene *Bgp-1* that permits normal pod development in the presence of severe disease pressure. The expression of *Bgp-1*, however, requires the presence of the the recessive gene *bgm-1*. The small red CIAT bean breeding line DOR 482, released in Central America as ‘Don Silvio’, has the QTL linked to SWI2700, *bgm-1* and *Bgp-1*. The striped, light red kidney bean breeding line DOR 303 has the QTL linked to SWI2700 and a different recessive gene, *bgm-2*, that confers resistance to leaf chlorosis. Vélez *et al.* (1998) reported that DOR 303 also has the dominant gene, *Dwf*, than can cause dwarfing when seedlings are infected with BGYMV. However, light red kidney lines such as PR9443-4, PR0003-384 and PR0003-390 have been developed in Puerto Rico that have the *bgm-2* resistance gene but no dwarfing reaction (Beaver *et al.*, 1999). The reaction of bean lines to BGYM that pyramid the recessive resistance genes *bgm-1* and *bgm-2* has not been documented. The *P. coccineus* accession G 35172 is resistant to both BGYM in Central America and the Caribbean and Bean Golden Mosaic (BGM) in Brazil (Singh *et al.*, 2000). Results from field trials conducted in Puerto Rico suggested that the BGYM resistance of G 35172 is controlled by two genes (Muñoz, 2002). Results from an allelism test suggested that the BGYM resistance genes in G 35172 were not *bgm-1* or *Bgp-1*. However, G 35172 does have the SW12700 marker linked to the QTL for BGYM resistance. Osorno *et al.* (2003), studied an interspecific population with BGYM resistance derived from G35172 and found a recessive gene to confer resistance to leaf chlorosis and a dominant gene to confer resistance to pod deformation. Ferwerda, (2000), evaluating BGYM resistance in the interspecific cross ‘G35172 x ICA Pijao’, reported a recessive gene that conferred resistance to chlorosis and evidence of a second gene involved in the expression of resistance. Bianchini *et al.* (1994), studied the inheritance of resistance to BGM in an interspecific cross between *P. vulgaris* and *P. coccineus* reported a tendency for dominance for resistance to pod deformation and resistance to chlorosis appeared to be recessive. In Puerto Rico, three bean lines with BGYM resistance derived from *P. coccineus* are being considered for release as improved germplasm. The lines are highly resistant to BGYM but do not have the SR-2 marker linked to the recessive gene *bgm-1*. PR0157-4-1 is a small white bean line derived from...
the cross ‘Arroyo Loro // HP8437-95 / G35172 // HP8437-95’. PR0157-4-1 has an indeterminate (type III) growth habit, flowers at 35 days and reaches harvest maturity at 76 days after planting. PR0157-4-1 has the SW12700 marker for the QTL for BGYM resistance and the SW-13 marker linked to the I gene for resistance to bean common mosaic (BCM). PR9771-3-2 is a small red bean line derived from the cross ‘HP8437-95 / G35172 // HP8437-95’. PR9771-3-2 has an indeterminate (type III) growth habit, flowers at 35 days and reaches harvest maturity at 76 days after planting. PR9771-3-2 has the SW12700 marker for the QTL for BGYM resistance and the SW-13 marker linked to the / gene for resistance to bean common mosaic (BCM). PR9771-3-2 has the SWl2700 marker for the QTL for BGYM resistance and the SW-13 marker linked to the / gene for resistance to BCM. PR0247-49 is a shiny black-seeded line derived from the cross ‘Morales // HP8437-95 / G35172 //HP8437-95’. PR0247-49 has an indeterminate (type III) growth habit, flowers at 38 days and reaches harvest maturity at 74 days after planting. PR0247-49 does not have the SWI2700 marker for the QTL for BGYM resistance. When screened in a greenhouse at the University of Nebraska, PR0247-49 was resistant to rust races 41,44 and 53. These lines could be used to broaden the genetic base of BGYM resistance in common bean.

References


