INHERITANCE OF NORMAL POD DEVELOPMENT IN BEAN GOLDEN MOSAIC RESISTANT COMMON BEANS

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The objective of this research was to study the inheritance of a normal pod development in bean plants inoculated with bean golden mosaic virus (BGMV). This trait should complement the non-chlorotic leaf reaction in bean lines with the *bgm or bgm-2* gene (Velez, 1996).

Two F_3 sister lines from the cross (DOR364 x WBB20-1) x 'Don Silvio' were selected for non-chlorotic leaf reaction to bean golden mosaic (BGM) in a nursery planted at Isabela, Puerto Rico in June, 1995. At harvest maturity, these lines were found to differ in degree of pod deformation caused by the virus. Most of the pods on line 9556-158 were deformed whereas pod development was normal on 9556-171. Individual plants were harvested from each F_3 plant row. In order to confirm the field reaction, two $F_{3:4}$ seed from each individual plant selection were planted in January, 1996 in a greenhouse at the University of Puerto Rico, Mayaguez Campus and inoculated with viruliferous whiteflies using the technique described by Adames-Mora et al. (1996). At 20 days after inoculation, leaf symptoms on the plants were evaluated. Pod deformation was evaluated at mid-pod fill (R8).

In July, 1996 an experiment was planted in the greenhouse of the University of Puerto Rico, Mayaguez, Campus to evaluate the leaf and pod reaction of the parental lines, F_1, F_2, and backcrosses of F_1 to both parents to BGM. Eight seed of each parent, seven seed of the F_1 and each backcross and 38 F_2 seed were planted. Five seed of 'Top Crop' were planted as a susceptible control. The plants were inoculated with viruliferous flies at eight days after planting and leaf symptoms on the plants were evaluated at 20 days after inoculation. Pod deformation was evaluated at mid-pod fill (R8). In December, 1996, four seed of each parent, 9556-158 and 9556-171, and 59 seed of seven $F_{2:3}$ lines were planted in another greenhouse experiment. The plants were inoculated with viruliferous flies at eight days after planting and leaf symptoms on the plants were evaluated at 20 days after inoculation. Pod deformation was evaluated at mid-pod fill (R8). The Chi- square statistic was used to test for goodness of fit to expected segregation ratios.

Both 9556-158 and 9556-171 have a non-chlorotic leaf reaction similar to their parent Don Silvio. $F_{3:4}$ plants from the line 9556-158 produced deformed pods, whereas $F_{3:4}$ plants from 9556-171 had normal pod development in the greenhouse experiments planted in January and April, 1996 (Table 1). Both lines had normal pod development in the greenhouse where no BGM was present. All of the F_1 plants from the cross 9566-158 x 9556-171 had normal pod development. The F_2 population fit a 3:1 segregation pattern with 27 plants with normal pod development and 11 plants with deformed pods (Table 1). All of the plants from the backcross with 9556-171 were normal, whereas plants from the backcross with 9566-158 fit a 1:1 ratio for normal and deformed pods (Table 1). These results support the hypothesis that normal pod development in the presence of BGMV is controlled by *bgm* and a single dominant gene, for which the symbol *Bgp* is proposed. The $F_{2:3}$ line 1 from a F_2 plant with deformed pods also had deformed pods, whereas the $F_{2:3}$ lines 2, 3, 4 and 5 from plants with normal pods also produced normal pods (Table 2). The $F_{2:3}$ lines 6 and 7 segregated for normal and deformed pods and the patterns of segregation fit a 3:1 ratio with 15 plants with normal pods and 5 plants with deformed

pods (Table 2). These results are in agreement with the hypothesis that normal pod development is controlled by a single dominant gene.

Table 1. Classification of parental, F_1, F_2, and backcross (BC) generations of common bean progeny from the cross 9556-158 x 9556-171 for pod deformation on plants inoculated with bean golden mosaic virus (BGMV)[z]

Generation	Pod type		Expected ratio	X^2	*P*
	Normal	Deformed			
9556-158	0	8			
9556-171	8	0			
F_1	7	0			
F_2	27	11	3:1	0.32	0.57
BC (F_1 x 9556-158)	4	2	1:1	0.66	0.42
BC (F_1 x 9556-171)	5	0	1:0		

[z]The genetic hypothesis is that 9556-158 carries a dominant gene (*Bgp*) for resistance to BGMV induced pod deformation.

Table 2. Classification of parental, and $F_{2:3}$ bean lines from the cross 9556-158 x 9556-171 for pod deformation on plants inoculated with bean golden mosaic virus (BGMV)[z]

Generation	F_2 reaction to BGMV	Pod type		Expected ratio	X^2	*P*
		Normal	Deformed			
9556-158	Deformed	0	4			
9556-171	Normal	4	0			
$F_{2:3}$ line 1	Deformed	0	4			
$F_{2:3}$ line 2	Normal	11	0			
$F_{2:3}$ line 3	Normal	10	0			
$F_{2:3}$ line 4	Normal	8	0			
$F_{2:3}$ line 5	Normal	10	0			
$F_{2:3}$ line 6	Normal	8	3	3:1	0.030	0.86
$F_{2:3}$ line 7	Normal	7	2	3:1	0.037	0.84

[z]The genetic hypothesis is that 9556-158 carries a dominant gene (*Bgp*) for resistance to BGMV induced pod deformation.

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