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INHERITANCE OF RESISTANCE TO MUNGBEAN YELLOW MOSAIC VIRUS

K.R. REDDY and D.P. SINGH

ABSTRACT

The crosses involving susceptible cultivated lines of blackgram, Vigna mungo ('UL2' and 'RU2') and of greengram, V. radiata ('T44' and 'K851') as female and one resistant line of V. mungo var. silvestris (IW 3390) and of V. radiata var. sublobata (PLN15) were made in glasshouse. The parents, F_1 and F_2 generations of the wide crosses were grown in kharif (wet) season. Both natural and artificial inoculation techniques were used to test the material against MYMV. The susceptibility was dominant and resistance was due to one dominant and one recessive genes.

Blackgram or urdbean, Vigna mungo (L.) Hepper and greengram or mungbean, V. radiata (L.) Wilczek are important grain legumes which are widely cultivated in different seasons in India. The main constraints encountered in the breeding high yielding varieties of these crops have low yielding potential and susceptibility to diseases and pests. Among the diseases mungbean yellow mosaic virus (MYMV) is very devastatng in the kharif season.

The resistance to MYMV can be transferred from cultivated types. The genes from wild species/progenitors may provide alternative sources of resistance. In addition the interspecific crosses made with the view to transfer resistance could also produce tremendous diversity for yield and ints components.

MATERIALS AND METHODS

The susceptible lines of blackgram ('UL2' and ' RU2') to MYMV were crossed with a resistant line of the wild progenitor, V. mungo Var. silvestris (IW 3390). Similarly the susceptible lines of greengram ('T44' and 'K851') were also crossed with a resistant line of wild progenitor, V. radiata var. sublobata (PLN 15). The crosses were made in the glasshouse using cultivated lines as female and the wild types as male. The seeds of V. radiata var. sublobata (PLN 15) and the F_1 and F_2 seeds involving this line were scratched with blade opposite to hilum to bream hard seed coat. The parents, F_1 and F_2 generations were planted in khariff at 50 and 10 cm row to row and plant to plant distances, respectively. 'UL2' the highly susceptible green seeded blackgram line was replicated after every 5 rows of the test material to intensify inoculum from natural sources. No chemical was sprayed during the crop season. It was to maintain high population of the vector, whitefly (Bemisia tabaci Genn.). Artificial inoculations (Nene, 1972) using plastic pickle pots for single plants of parents and F_1's and muslin cloth covered iron cages for 18-20 plants of F_2 generation were also

Table 1. Reaction of parents and F hybrids to MYMV in blackgram during Kharif, 1985.

Parents/Hybrids	Number of plants tested	Mean disease score	Disease reaction
UL 2	140	8.29	Susceptible
RU 2	25	6.84	Moderately susceptible
IW 3390	7	3.00	Resistant
UL2xIW 3390	6	6.33	Moderately susceptible
RU2xIW 3390	3	5.66	Moderately susceptible

Table 2. Segregation for resistance to MYMV in the F_2 generation of blackgram during Kharif.

Cross	Segregation		Expected genetic ratio	Chisquare value	P-Value between
	Susceptible	Resistant			
UL2xIW 3390	250	65	13:3	0.736	0.50-0.30
RU2xIW 3390	194	55	13:3	1.824	0.20-0.10

followed. In both the methods 8-10 viruliferous whiteflies per plant were used for inoculation. The disease scores were recorded after 15 days of inoculation on individual plants using 1 to 9 scale suggested by Singh (1980) for blackgram and Shukla (1977) for greengram. The mean disease score was calculated as (infection rate x frequency) total number of plants. The F_2 data were classified into resistant (1 to 3 scores) and rest as susceptible. This was done based on the mean disease score of parents. The F_2 segregation was tested for goodness of fit by using Chi-square.

RESULTS AND DISCUSSION

Vigna mungo x *V. mungo var. silvestris* crosses :

The disease reaction of parents and F_1 hybrids of blackgram is presented in Table 1. 'UL2' showed a mean disease score of 8.29, indicating a highly susceptible reaction to MYMV. The resistant line of V. mungo var. silvestris, 'IW3390' had the mean disease score of 3.00, indicating a resistant reaction. 'RU2' showed the mean disease score of 6.48 exhibiting a moderately susceptible reaction. The hybrids of both the wide crosses, 'UL2' x 'IW3390' and 'RU2' x 'IW3390' exhibited moderately susceptible reaction (Table 1). This suggested the dominance of susceptibility over resistance. Similar results have been reported by Dwivedi and Singh (1985) in a wide cross of blackgram.

The segration for resistance in the F_2 generation of interspecific crosses, 'UL2' x 'IW3390' and 'RU2' x IW3390' was in 13 (susceptible) : 3(resistant) ratio (Table 2). The Chi-square values computed in these two corsses showed a good fit for this ratio. This suggested that resistance to MYMV in these crosses is governed by one dominant and one recessive games. Dwivedi and Singh (1985) reported two recessive genes for resistance to MYMV in the wide cross ('Pant U-84' x V. mungo var. silvestris type B) of blackgram. The resistant line 'Pant U84' in this cross was a cultivated type and the wild progenitor was susceptible to MYMV.

Table 3. Reaction of parents and F hybrids to MYMV in greengram during Kharif.

Parents/Hybrids	Number of plants tested	Mean disease score	Disease reaction
T 44	18	7.89	Susceptible
K 851	25	7.64	Susceptible
PLN 15	20	3.00	Resistant
T44xPLN 15	11	6.09	Moderately susceptible
K851xPLN 15	8	6.50	Moderately susceptible

Table 4. Segregation for resistance to MYMV in the F_2 generation of greengram during Kharif.

Cross	Segregation		Expected genetic ratio	Chisquare value	P-Value between
	Susceptible	Resistant			
T44xPLN 15	94	23	13:3	0.064	0.80-0.70
K851xPLN 15	144	37	13:3	0.341	0.70-0.50

Vigna radiata x *V. radiata var. sublobata* crosses :

The disease reaction of parents and F_1 hybrids is presented in Table 3. The resistant line of V. radiata var. sublobata ('PLN15') had the mean disease score of 3.00, indicaing a resistant reaction. 'T44' and 'K851' had the mean disease score of 7.89 and 7.64, respectively showing the susceptible reaction. The F_1 plants of 'T44' x 'PLN 15' and 'K851' x 'PLN 15' showed the mean disease score of 6.09 and 6.50, respectively. The F_1's therefore were classified as susceptible indicating the dominance of susceptibility over resistance. Similar observations were made by Shukla *et al.* (1978) and Singh and Sharma (1983).

The segregation for resistance in the F_2 generation of these two wide crosses of greengram was in 13 (susceptible): 3(resistant) ratio. This suggested that one dominant and one recessive genes were responsible for resistance to MYMV in the 'PLN 15' line of V. radiata var. sublobata. Singh and Sharma (1983) also reported similar results in the wide crosses of greengram. However, two recessive genes for resistance were responsible in the varietal crosses of greengram (Shukla *et al.*, 1978).

The results of the present investigation are based on the data of Parents, F_1 and F_2 generation and, therefore, ;are ought to be onfirmed by the F_3 results. It seems that the gene(s) for resistance to MYMV in the cultivated lines of backgram and greengram are different from the gene(s) of their respective wild progenitors. The studies on allelic relationship will confirm it.

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