

## Studies on some Aspects of Yellow Mosaic Disease of Black Gram (*Vigna mungo* (L.) Hepper).

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Out of 281 cultivars of black gram observed for their reaction to yellow mosaic disease under natural conditions of epiphytotics, 15 cvs. remained free from infection, 11 cvs. were tolerant, 20 cvs. were moderately tolerant, 33 cvs. were susceptible and 202 cvs. were highly susceptible. The studies revealed that major set back to pod bearing maturity and yield in black gram [*Vigna mungo* (L.) Hepper] occurred at 25% infection intensity of YMV. Therefore, the use of parent material even with 25% YMV infection should be discouraged in the hybridization programme.

Black gram [*Vigna mungo* (L.) Hepper] is an important pulse crop of India. Besides other factors, yellow mosaic disease is a main cause of reduction and instability for its production. The disease causes severe yield losses, (Grewal, 1966; Williams *et al.*, 1967, 1968). The virus was first observed by Nariani (1960) on green gram and he reported that the virus may be transmitted to black gram. Nair (1971) on the basis of pot experiments concluded that the disease was responsible for fewer pods per plant. Studies were undertaken at the project Directorate (Pulses), Regional Station I.A.R.I. Kanpur, on locating sources for resistance and on the effect of YMV infection on maturity yield and podding in black gram.

### MATERIAL AND METHODS:

In order to locate the sources for resistance, 281 black gram cultivars

were observed for their reaction against the disease under conditions of natural epiphytotics for a period of two years i.e. 1978-79 and 1979-80.

These cultivars were sown on 12-7-78 and 21-7-79 in a simple randomized block design with three replications having a single row plot of 3m. length. The plant to plant distance was 15 cms. with the test cultivars and alternate row of a highly susceptible black gram cultivar Krishna was sown as infector row. In each cultivar the number of total plants and the number of plants infected with YMV were recorded and the percentage of infected plants was worked out. On the basis of percentage of plants infected these cultivars were grouped as given below:

Category	Percentage of plants infected
Resistant	0
Tolerant	0.1 to 10

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Moderately tolerant	10.1 to 25
Susceptible	25.1 to 50
Highly susceptible	50.1 to 100

In order to find out the effect of YMV infection on podding, maturity and yield, the black gram cultivars T-9 and Krishna were sown in 5X3m. plots in three replications. Rows and the plants were 45 cm. and 15 cm. apart respectively. Both the cultivars after seedling emergence were regularly observed for the appearance of YMV infection. After 20 days all the plants which exhibited YMV infection were tagged. They were regularly observed for the intensity of YMV infection. After 60 days of sowing these plants were separated on the basis of percent foliage infected and were grouped as those showing 100, 50 and 25 percent foliage infected,

Randomly 25 healthy plants were selected. In all these plants the total number of pods were counted and the average number of pods per plant for each category of infection was worked out. The mature pods from these plants were picked on 60, 75 and 85 days after sowing so as to find out the effect of YMV infection on the maturity of pods. Later on the average yield per plant was worked out.

## RESULTS AND DISCUSSION

Out of 281 cultivars, 15 showed no infection, 11 showed tolerant reaction, 20 showed moderately tolerant reaction, 33 showed susceptible reaction and 202 cvs. showed highly susceptible reaction. The resistant, tolerant and moderately tolerant cultivars are given below:

Resistant = BR-10, K-68-110, NP-6, NP-7, NP-14, NP-16, NP-19, NP-20, NP-21, PLU-277, PLU-340, PLU-476, U-9, 15/7 and 7368/4-B.

Tolerant = PLU-247, PLU-518, 12/1, 22/3, F-3(414), F-3(399), F-3(430), PLU-733, PLU-1275, PLU-1136 and PLU-1148.

Moderately tolerant = PLU-284, PLU-497(A), PLU-825, PLU-823, PLU-313, PLU-657, PLU-964, PLU-878, PLU-1146, PLU-1137, PLU-1139, PLU-440, 7384/4, 7380/2, 7375/3, 7370/7, F-3(421), F-3(402), F-3(400) and F-3(435).

## PODS PER PLANT IN HEALTHY AND DISEASED:

The data on average number of pods per plant in black gram cultivars, T-9 and Krishna, presented in table 1, indicate that the differences in pod bearing at the intensities of YMV infection, as of 100, 50 and 25% are significant as compared to healthy plants. However, the number of pods in plants with 50 and

25% infection were at par. Obviously, there was a sharp decline in pod bearing with 25% intensity of infection, though the decline in pod number was not commensurate with further increase in the intensity of YMV infection.

It is clear from the results that major setback to pod formation was at 25% intensity of YMV infection.

### YIELD PER PLANT IN HEALTHY AND DISEASED

The data on per plant yield in gms. presented in table 2, indicate that the differences in yield/plant, of those showing 100, 50 and 25 percent infection of YMV were statistically significant as compared to healthy plants. However, the perplant yields of plants showing different intensities of YMV infection were at par. It is implied that major loss in yield occurred at 25% intensity of YMV infection.

### MATURITY PERIOD OF PODS IN HEALTHY AND DISEASED:

The data presented in table 3 indicate that the differences in number of pods harvested, per plant from healthy and those showing 100, 50 and 25% intensity of YMV infection, were statistically significant at 5% probability level. Maximum number of matured pods (87.2%) were harvested at 60 days after sowing from the healthy plants whereas, from the plants showing 100, 50 and 25 percent intensities of YMV infection, the maximum respective percentage of 77.5, 61.0 and 57.0, pods matured at 75 days after sowing. The results indicated that YMV infection resulted in delayed maturity of pods. The delay in maturity of pods was not proportionate with intensities of infection beyond 25%.

The present findings clearly indicate that YMV infection resulted in less of grain yield, less number of pods/plant and in delayed maturity of pods. The infection did not cause forced maturity of the plant and in turn of pods. It is surmised that due to paucity of chlorophyll in the infected

plants the food synthesis and its translocation to pods is retarded. The plants continued to grow beyond sixty days by which time majority of pods matured in healthy plants. If the harvesting is delayed by 7-10 days, the infected plants may compensate yields to the tune of 16%. It appears that the losses in net yields occur due to normally. One or more factors such as less number of pods/plant, less number of grains/pod and due to shrinkage of grains in the infected plants harvested along with healthy plants. It was observed that main set back to pod bearing, grain yield and maturity was caused at 25% YMV infection. Therefore the use of parent material, bearing even with 25% YMV infection, should be discouraged in the hybridization programmes.

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Table 1 Average number of pods/plant at different intensities of YMV infection

Cultivars	Average pods/plant at YMV infection of			
	100%	50%	25%	0%
T-9	34.57	41.44	39.0	66.0
Krishna	30.22	37.60	45.77	62.0

C.D at 5% = 5.87

C.D at 1% = 7.73

Table 2 Average yield/plant, in gms, for healthy and those showing 100, 50 and 25 percent YMV infection

Cultivars	100	yield/plant in gms. at		
		50	25	0
T-9	7.4	7.1	6.9	12.7
Krishna	5.9	7.9	9.2	13.3

C.D at 5% = 3.10    C.D at 1% = 4.0    C.V % = 3.55

Table 3 Percentage of pods maturing after 60, 75 and 85 days of sowing, from the plants with varying intensities of YMV infection

Percent intensity of YMV infection	Percentage of pods harvested at days after sowing			
	60	75	85	Total
100	9.0	77.5	13.5	100.0
50	38.0	61.0	1.0	100.0
25	35.5	67.0	7.5	100.0
0	87.2	10.5	2.3	100.0
Total	169.7	206.0	24.3	100.0
Average	42.4	51.5	6.0	

C.D at 5% = 25.13

C.D at 1% = 38.11

C.D for days of harvesting after sowing at 5% = 12.55 and at 1% = 19.40