

ASSESSMENT OF LOSSES IN BITTER GOURD DUE TO BITTER GOURD MOSAIC VIRUS

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ABSTRACT

The infection of bitter gourd plant at the early stage by bitter gourd mosaic virus resulted in significant reduction of number of leaves, leaf area, internodal length, thickness of vines, length of vines, number of branches, number of flowers, number of fruits and other fruit characters viz., length of fruits, girth of fruits, weight of fruits and total yield of fruits.

KEY WORDS : Leaves, height of plant, branches, flowers, fruit, bittergourd mosaic virus

Bitter gourd (*Momordica charantia* L.) is one of the most important and commonly cultivated vegetable crops in India. Bitter gourd plants with mosaic symptoms were reported from different parts of India. Experiments were, therefore, conducted to assess the extent of damage caused by bitter gourd mosaic virus in bitter gourd and the results have been presented in this paper.

MATERIALS AND METHODS

Experiments were conducted to estimate the effect of bitter gourd mosaic virus infection on the growth of bitter gourd plant. The culture of the bitter gourd mosaic virus collected from the field was extracted in phosphate buffer (0.01M, P^H 7.0) and inoculated on young bitter gourd plants at two leaf stage after dusting 600 mesh carborundum powder. The experiment was laid out in a completely randomised block design in cement pots.

Varieties and seed materials

One commonly cultivated variety Priya (V1) and another indigenous collection 177 green medium IC 68324 which was found least susceptible to bitter gourd mosaic virus were used for conducting the experiment. The variety Priya was obtained from the Instructional Farm, College of Agriculture, Vellayani and the collection 177 green medium IC 68324 was obtained from NBGPR, Trichur. The following treatments were fixed to estimate the effects of virus infection on the growth of the plant.

Treatment 1 (V1I1) - Inoculation of Priya Variety on tenth day after planting

Treatment 2 (V1T0) - Priya Variety maintained without inoculation (Control)

Treatment 3 (V2I1) - Inoculation of 177 green medium IC 68324 on tenth day after planting.

Treatment 4 (V2I0) - 177 green medium IC 68324 maintained without inoculation (Control)

Pot culture

The cement pots having size 60 x 60 x 30 cm were filled with pot mixture. Four to five seeds were sown in each pot, but only two vigorously growing plants per pot were retained and used for the experiment. Manure and fertilizers were applied according to the package of practices recommended by the Kerala Agricultural University (1993). Separate standards were maintained for each pot for training the plants. The plants were given irrigation on alternate days. All the plants were periodically sprayed with 0.1% dimethoate and 0.2% Dithane M-45 to keep the plants free from pest and fungal diseases.

Observation were recorded on the following aspects at an interval of 1 month.

Number of leaves formed (NL), leaf area (LA), internodal length (IL), thickness of vine (TV), total

Table 1. Effect of infection on bitter gourd by bitter gourd mosaic virus on the number of leaves

Variety	Mean number of leaves					
	Days after planting (P)			I ₀	I ₁	Mean (V)
	40	70	100	Control	Inoculated	CD (V) = 10.39
V ₁	70.75	144.38	175.50	150.42	110.00	130.21
V ₂	58.25	117.75	150.25	118.33	99.17	108.75
CD (VxP) = 6.19						
					Mean (I)	
I ₀ (Control)		75.63	145.63	181.88	134.38	
I ₁ (Inoculated)		53.38	116.50	143.88	104.58	
Mean (P)		64.50	131.06	162.88		
		CD (P) = 4.38	CD (IxP) = 6.20	CD (I) = 10.39		

length of vine (TLV), number of branches developed (NB), number of flowers formed (male and female (NFF), and fruit characters number of fruits formed, length of the fruits, girth of the fruits, mean weight of fruit, and yield of fruits

The data were analysed statistically by applying the technique of analysis of variance for completely randomised block design in split plot fashion and the significance was tested by F test.

Critical differences were calculated for comparing treatment means.

RESULTS AND DISCUSSION

It was found that there was significant reduction in the NL and LA in both the varieties inoculated with virus. The mean NL of the inoculated plants was significantly lesser than that of control plants at 40, 70 and 100 days after planting (Table 1).

Table 2. Effect of infection on bitter gourd by bitter gourd mosaic virus on the leaf area

Variety	Mean number of leaves					
	Days after planting (P)			I ₀	I ₁	Mean (V)
	40	70	100	Control	Inoculated	CD (V) = 10.39
V ₁	56.45	74.60	76.13	91.20	46.98	69.09
V ₂	50.80	70.70	73.30	80.40	49.47	64.93
					Mean (I)	
I ₀ (Control)		62.35	96.05	102.00	86.80	
I ₁ (Inoculated)		44.90	53.25	47.43	48.53	
Mean (P)		53.63	73.65	74.71		
		CD (P) = 2.49	CD (IxP) = 3.52	CD (I) = 2.62		

Table 3. Effect of infection on bitter gourd by bitter gourd mosaic virus on internodal length

Variety	Mean length in cm					
	Days after planting (P)			I ₀	I ₁	Mean (V)
	40	70	100	Control	Inoculated	CD (V) = 10.39
V ₁	7.30	9.95	10.70	11.30	7.33	9.32
V ₂	8.05	9.30	10.85	10.53	8.27	9.40
	CD (VxP) 0.17			CD (VxI) = 0.20		
				Mean (I)		
I ₀ (Control)		8.50	11.40	12.85	10.92	
I ₁ (Inoculated)		6.85	7.85	8.70	7.80	
Mean (P)		7.68	9.63	10.78		
	CD (P) = 0.11		CD (IxP) = 0.17		CD (I) = 0.14	

The mean leaf area of the inoculated plants was 48.53 cm² but the inoculated plants had 86.80 cm² (Table 2). Due to virus infection, the variety V₁ showed a reduction of 3.97 cm in the mean IL but the variety V₂ had only a reduction of 2.26 cm (Table 3).

This variation may be due to varietal differences. Raghunadhan (1989) while studying with snake gourd mosaic virus also found that the

plants infected at the early stage of growth, there was significant reduction in the NL, LA and IL. The results of the present study also agree with findings of Singh (1986) with respect to IL.

It was observed that the bitter gourd plants inoculated with virus at the early stage, there was significant reduction in the vine thickness, NB formed and TLV in both varieties. The variety V₁ showed a maximum reduction of 0.61 m in the

Table 4. Effect of infection on bitter gourd by bitter gourd mosaic virus on the total length of vine

Variety	Mean length in M					
	Days after planting (P)			I ₀	I ₁	Mean (V)
	40	70	100	Control	Inoculated	CD (V) = 10.39
V ₁	2.43	3.63	3.93	3.62	3.02	3.32
V ₂	2.06	2.63	3.34	2.82	2.54	2.68
	CD (VxP) 0.18			CD (VxI) = 0.15		
				Mean (I)		
I ₀ (Control)		2.40	3.31	3.97	3.23	
I ₁ (Inoculated)		2.09	2.95	3.30	2.78	
Mean (P)		2.24	3.13	3.63		
	CD (P) = 0.13		CD (IxP) = 0.18		CD (I) = 0.10	

Table 5. Effect of infection on bitter gourd by bitter gourd mosaic virus on the number of branches

Variety	Mean number of branches					
	Days after planting (P)			I ₀	I ₁	Mean (V)
	40	70	100	Control	Inoculated	CD (V) = 10.39
V ₁	5.98	8.19	10.50	10.44	6.00	8.22
V ₂	5.88	8.25	10.00	9.08	7.00	8.04
CD (VxP) 0.96						
				Mean (I)		
I ₀ (Control)		7.10	9.69	12.50	9.76	
I ₁ (Inoculated)		4.75	6.75	8.00	6.50	
Mean (P)		5.93	8.22	10.25		
	CD (P) = 1.1		CD (I) = 0.68			

mean length of vine, but the V₂ had a reduction of only 0.28 M. This implies that the variety V₁ may be highly susceptible to virus than V₂. Jayasree (1984) found that yellow vein mosaic disease of pumpkin produced significant reduction in the NL, size of the leaves, IL and TLV. The results of the present investigation also agree with above the findings.

The NFF (male and female) in the inoculated plants was significantly lesser than the control plants (Table 6). Pillai (1971) while investigating mosaic disease of snake gourd observed that disease affected plants produced fewer flowers and

fruits. Dubey *et al.* (1974) also noticed similar findings. In general, there was considerable reduction in all the fruit characters *viz.*, number of fruits, length of fruits, girth of fruits, weight of fruits and yield of fruits in both the varieties inoculated with virus when compared to the uninoculated plants. The varieties V₁ and V₂ showed a reduction of 2.25 and 1.17 kg of yield respectively due to virus infection than the control plants (Table 7). Karachi *et al.* (1978) found that susceptible cantaloupe (*Cucumis melo*) CVS: Noy Yizre'el infected with CMV in an early stage, reduced the yield by 73 per cent and tolerant Xv -

Table 6. Effect of infection on bitter gourd by bitter gourd mosaic virus on the production of flowers

Variety	Mean number of flowers					
	Male flowers			Female flowers		
	I ₀ (Control)	I ₁ (Inoculated)	Mean	I ₀ (Control)	I ₁ (Inoculated)	Mean
V ₁	585	478	531.50	78.50	59.50	67.50
V ₂	540	435	487.50	48.50	41.45	44.98
Mean	562.50	456.50		62.00	50.48	
	CD (V) = 13.79 CD (I) = 13.79 CD (VxI) = 19.78			CD (V) = 1.7 CD (V) = 1.7 CD (VxI) = 2.40		

Table 7. Effect of bitter gourd mosaic virus infection on fruit characters

Variety	Mean number of fruits		Mean		Mean length of fruit (cm)		Mean		Mean girth of fruit (cm)		Mean		Mean weight of fruit (kg)		Mean		Total yield of fruit (kg)		Mean		
	I ₀	I ₁	I ₀	I ₁	I ₀	I ₁	I ₀	I ₁	I ₀	I ₁	I ₀	I ₁	I ₀	I ₁	I ₀	I ₁	I ₀	I ₁	I ₀	I ₁	
	(Con- trol)	(Inocu- lated)	(Con- trol)	(Inocu- lated)	(Con- trol)	(Inocu- lated)	(Con- trol)	(Inocu- lated)	(Con- trol)	(Inocu- lated)	(Con- trol)	(Inocu- lated)	(Con- trol)	(Inocu- lated)	(Con- trol)	(Inocu- lated)	(Con- trol)	(Inocu- lated)	(Con- trol)	(Inocu- lated)	
V ₁	14.00	10.50	12.25	17.50	13.90	15.70	17.52	12.20	14.86	0.26	0.14	0.20	3.57	1.32	2.44						
V ₂	12.50	9.00	12.50	13.45	12.10	12.78	10.58	9.24	9.91	0.18	0.12	0.15	2.25	1.08	1.67						
Mean	13.25	9.75		15.48	13.00		14.10	10.72		0.22	0.13		2.91	1.20							
	Cd (V) = 1.94		CD (V) = 1.05		Cd (V) = 0.72		Cd (V) = 0.02		CD (V) = 0.14												
	CD (I) = 1.94		CD (I) = 1.05		Cd (I) = 0.72		CD (I) = 0.02		CD (I) = 0.14												
	Cd (VxI) = 2.74		CD (VxI) = 1.49		CD (VxI) = 1.02		CD (VxI) = 0.03		CD (VxI) = 0.19												

140 by 31 per cent. The results of the present study also showed similar trend.

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COIRPITH COMPOST A SUITABLE MEDIUM FOR MASS MULTIPLICATION OF *Glomus Fasciculatum*

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SUMMARY

An experiment was conducted to find out the best substrate for quick VAM fungi inoculum production. Different substrates viz., compost, composted pressmud, composted coirpith, vermiculite, perlite and vermiculite-perlite (1:1) were screened in this study. The result revealed that composted coirpith was found to be superior in terms of infection percentage, extra-matrical hyphae and spore count. The finding indicated that composted coirpith could be employed as a substrate material for VAM fungi inoculum production.

KEY WORDS : VAM inoculum, substrate, inoculum

VAM fungi are difficult to culture on a commercial scale because they are obligate symbionts. They can be grown with host plants in pot cultures by employing various substrates. They have also been grown by using hydroponics, aeroponic culture and root organ culture. The

common growth medium is soil and is being replaced by inert substances such as vermiculite, perlite sand or a mixture of these for crude inoculum production. The soil based inocula are potentially the best, since, after 6-12 months highly infective inocula can be produced. But this