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Impact of some cultivation practices on incidence of chilli (*Capsicum annuum* L.) mosaic virus in the plains of West Bengal and performance of some selective insecticides for its control

RANBIR SINGH AND A. K. CHOWDHURY
Department of Plant Pathology, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia 741252, West Bengal.

Chilli (*Capsicum annuum* L.) is attacked by large number of virus diseases of which chilli mosaic (CMV) is of common occurrence in the plains of West Bengal, causing loss in yield. Considering the importance of CMV, studies were undertaken to record the incidence of disease in broadcasted and line sown fields and also to assess the efficacy of some selective insecticides for the management of CMV. In broadcasted fields, the maximum disease incidence recorded was 6.35 and 8.33 per cent while in line shown field in the same locality and same period, it was recorded as 14.11 and 39.0 per cent during 1999-2000 and 2000-2001 respectively. The maximum disease reduction was observed by the application of carbofuran 3G and monocrotophos.

Key words : Chilli mosaic virus, cultivation practice, insecticide

INTRODUCTION

Production of chilli has been hampered due to several factors of which the diseases are major constrains caused by fungi, bacteria, viruses, nematodes etc. Among the various pathogens which severely affect normal growth and production of crop viral diseases are important. The viral diseases cause serious losses and become the most limiting factor affecting both the production and quanlity of fruits. Chilli mosaic is wide spread and causes substantial losses in yield and could infect the crop at all stages of growth. Chilli mosaic is caused by at least five different viruses and are transmitted by mboth echanically and aphid vectors.

This study has been made to observed the effect of cultural practices on chilli mosaic disease as this is one of the important spice crop of West Bengal governing more than 64 thousand hectares of land and performance of some insecticides have also been indcated controlling the virus vector for their management have also been indicated.

MATERIALS AND METHODS

Seedlings of chilli (var. Akashi) for line sowing of were raised in seedbed by adding sufficient amount of organic manure. Every care was taken to protect seedlings by covering with nylon net to keep them free from vector. To study the natural incidence of various diseases, seedlings of 25 days old were transplanted in replicated plots. Adequate quantity of organic manure and inorganic fertilizer in split doses (NPK : 90 : 60 : 40 kg/ha) were applied before and after transplanting of seedling. Plant to plant and row to row spacing were 40 cm and 60 cm respectively.

Insecticidal control

The experimental trial was conducted in the University Farm Kalyani, Nadia, during summer and winter season for chilli mosaic virus disease by using some selective insecticides. The control strategies for CMV was mainly concentrated to find out the effective insecticides to control the virus

transmitting vectors during summer and winter season. The experiment was conducted on the chilli field with Akashi variety in a randomized block design (RBD) with three replications. There were eight treatments (T_1, T_2, T_3, T_4, T_5, T_6, T_7 and T_8,) including an untreated control and the treatments are presented below.

Insecticides used for the control of CMV disease

Treatment	Common name	Trade name	Dose and number of sprays
T_1	Profenofos	Curacron	3 spray at 15 days interval 30 DAT @ 3 ml/l. water
T_2	Monocrotophos	Nuvacron	3 spray at 15 days interval 30 DAT @ 1.5 ml/l. water
T_3	Carbofuran-3G	Furadon	Soil application at the time of transplanting @ 33 kg/hectare
T_4	$T_3 + T_1$ (2 spray)		As T_3 + 2 Spray at 15 days interval 30 DAT
T_5	$T_3 + T_1$ (3 spray)		As T_3 + 3 Spray at 15 days interval 30 DAT
T_6	$T_3 + T_2$ (2 spray)		As T_3 + 2 Spray at 15 days interval 30 DAT
T_7	$T_3 + T_2$ (3 spray)		As T_3 + 3 Spray at 15 days interval 30 DAT
T_8	Control		No spray

Observations were made time to time to record the incidence of mosaic infected plants. The plants which showed typical mosaic pattern symptoms on the younger leaves were taken into consideration to record the disease incidence and compared with the disease incidence with different treatments.

RESULTS AND DISCUSSION

Influence of cultural practices (line sowing and broadcasting) on the incidence of Chilli Mosaic Virus (CMV)

The incidence of CMV in the field were recorded at fortnightly interval for two consecutive years and the results have been presented in Table 1.

From the results it was clearly evident that line sown crop had high incidence of CMV infection in both the years of 1999-2000 and 2000-2001. In general the rate of infection was gradually increased from the month of December to April for both the years of cultivation. In broadcasted method, the maximum disease incidence recorded were 6.35 and 8.33 per cent during 1999-2000 and 2000-2001 respectively, while in line-sown field in the same locality and same period, there were 14.11 and 39.00 per cent incidence during 1999-2000 and 2000-2001 respectively. It was observed that in both the years line sown crop recorded a very high percentage of mosaic incidence as compared to broadcasted field.

Table 1 : Comparison on the incidence of chilli mosaic virus (CMV) under broadcasted and line sown methods of cultivation for two years during rabi season

Pediod of observation (fortnightly)		Disease incidence (in per-cent)			
		1999-2000		2000-2001	
		Broadcasted	Line sown	Broadcasted	Line sown
December	1st	0.00	0.00	0.00	1.33
	2nd	0.00	0.29	0.72	10.00
January	1st	0.87	0.29	1.48	28.66
	2nd	1.60	0.88	3.33	32.00
February	1st	2.63	5.00	3.33	33.33
	2nd	3.58	7.05	3.90	34.66
March	1st	4.45	10.29	5.00	36.66
	2nd	4.97	11.17	5.00	37.33
April	1st	5.92	12.05	7.5	38.00
	2nd	6.35	14.11	8.33	39.00

The variation on the incidence of CMV in two methods of cultivation may be related with the population of aphid vector and their movement within the crop. Spacing of crop in the field may effect the landing of vector as it has been found in case of aphid. Higher plant population as available with broadcasted field usually reduced the disease incidence as found in case with aphid transmitted groundnut rosette virus (A'Brook, 1964 ; 1968).

Performance of different insecticides for the management of chilli mosaic virus (CMV) under natural condition

Chilli mosaic virus is spread by aphid vector. Besides host resistance and few cultural practices virus diseases under field condition can only be controlled with suitable insecticides. Considering this, a field experiment was conducted to find out the suitable chemicals for economic control of the disease.

Table 2 : Performance of different insecticides on management of chilli mosaic virus in summer season

Treatment	Dose	Mean Percentage of incidence at DAT		
		60	90	120
T_1=Profenofos	3 spray at 15 days interval at 30 DAT @ 3 ml/l. water	5.71 (2.38)b*	14.07 (3.74)ab	19.05 (25.80)abc
T_2=Monocrotophos	3 spray at 15 days interval 30 DAT @ 1.5 ml/l. water	4.76 (2.17)b	6.90 (2.61)c	11.90 (20.14)c
T_3=Carbofurna-3G	Soil application at the time of transplanting @ 33 kg/ha	2.38 (1.53)cd	18.50 (4.29)a	21.70 (27.73)ab
T_4=T_3 + T_1 (2 spray)	As T_3 + 15 days interval at 30 DAT	3.57 (1.87)bc	10.47 (3.23)bc	16.7 (24.06)bc
T_5=T_3 + T_1 (3 spray)	As T_3 + 15 days interval at 30 DAT	4.76 (2.17)b	9.52 (3.08)c	14.30 (22.17)bc
T_6=T_3 + T_2 (2 spray)	As T_3 + 15 days interval at 30 DAT	2.38 (1.52)cd	2.38 (1.52)d	3.20 (10.18)d
T_7=T_3 + T_2 (3 spray)	As T_3 + 15 days interval at 30 DAT	1.58 (1.25)d	2.40 (1.52)d	2.40 (8.78)d
T_8=Control	No spray	9.52 (3.08)a	18.5 (4.29)a	27.3 (31.42)a
SEm ±		0.124	0.149	1.320
CD (P=0.01)		0.522	0.627	5.557

* In a column means followed by same letter do not differ significantly by Duncan's Multiple Range Test (P=0.01).

DAT = Days After Transplanting.

The studies were conducted in the experimental field with Akashi chilli variety in summer and winter season. Three selective insecticides namely, profenofos (Curacron), monocrotophos (Nuvacron) and carbofuran-3G (Furadon) were tested with different treatments combination and spraying schedules. The incidence of disease was recorded ast 60, 90 and 120 days after transplanting (DAT) in both summer and winter season which are presented in Tables 2 and 3.

The results showed that all the treatments (T_1 to T_7) of different insecticidal combination were found superior in reducing disease incidence at different time interval after spraying than untreated control (T_8). The maximum disease reduction was observed by the application of treatment (T_7) combination of carbofuran –3G + monocrotophos (3 spray) followed by (T_6) carbofuran –3G + monocrotophos (2 sprays). The relation of treatments in winter season was more or less same as in summer season. Similar type of observation was also observed by Sobita Devi and Reddy (1995). They found the monocrotophos was most effective in reducing pepper vein banding virus (PVBV) and CMV. The systemic insecticides and acaricides found effective in reducing mosaic disease of chilli were also observed by Basavarajappa and Patil (1999).

Table 3 : Performance of different insecticides on management of chilli mosaic virus in winter season

Treatment	Dose	Mean Percentage of incidence at DAT		
		60	90	120
T_1=Profenofos	3 spray at 15 days interval at 30 DAT @ 3 ml/l. water	8.33 (2.88)bc*	14.28 (3.77)c	18.60 (32.27)bc
T_2=Monocrotophos	3 spray at 15 days interval 30 DAT @ 1.5 ml/l. water	4.76 (2.18)de	18.50 (4.29)b	23.80 (29.13)cd
T_3=Carbofurna-3G	Soil application at the time of transplanting @ 33 kg/ha	11.90 (3.43)a	23.8 (4.87)a	35.7 (36.68)ab
T_4=T_3 + T_1 (2 spray)	As T_3 + 15 days interval at 30 DAT	5.71 (2.38)cde	11.90 (3.44)c	19.05 (25.81)dc
T_5=T_3 + T_1 (3 spray)	As T_3 + 15 days interval at 30 DAT	6.66 (2.57)cd	12,30 (3.49)c	14.3 (22.18)e
T_6=T_3 + T_2 (2 spray)	As T_3 + 15 days interval at 30 DAT	4.44 (2.10)de	5.71 (2.38)d	7.14 (15.47)f
T_7=T_3 + T_2 (3 spray)	As T_3 + 15 days interval at 30 DAT	3.70 (1.91)e	3.70 (1.91)d	4.80 (12.60)f
T_8=Control	No spray	10.47 (3.23)ab	22.85 (4.77)a	40.50 (39.51)a
SEm ±		0.118	0.144	0.079
CD (P=0.01)		0.497	0.480	4.542

* In a column means followed by same letter do not differ significantly by Duncan's Multiple Range Test (P=0.01).

DAT = Days After Transplanting.

Thus aphids are the most important in regards to crop pest as well as virus vectors. Besides there are involvement of few other pest like mites and thrips causing heavy damage to chilli crop. A proper attention must be given while selecting the insecticidal chemicals considering their involvement both as a control the pest as well as vectors. Further while judging the efficacy of any insecticide to control virus vector or a chilli pest cost benefit ratio and environmental safety to be considered before recommendation.

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