Study on Testing the Role of Micronutrients on Chlorotic Mottle (geminivirus) Disease Development in Frenchbean (*Phaseolus vulgaris* L.)

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SUMMARY

Applications of micronutrients was found effective in frenchbean (*Phaseolus vulgaris* L.) cultivar Arkakomal and Contender against chlorotic mottle (geminivirus) disease by soil application and spray application. Observations were recorded in the form of disease appearance at days after sowing and disease index. After the applications of micronutrients, ferrous sulphate, magnesium sulphate, lime and zinc sulphate were found comparatively more effective in *rabi* and *kharif* seasons.

Key words : Chlorotic mottle, Geminivirus, Frenchbean.

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Frenchbean (*Phaseolus vulgaris* L.) is an important short duration vegetable and grain legume crop. The crop is cultivated in *kharif*, autumn, *rabi* and summer seasons. Due to its cultivation all the year round this crop serves as a good host of so many viruses. Chlorotic mottle disease of frenchbean caused by chlorotic mottle virus (geminivirus) has a very short history in Jabalpur region (Keshwal, 2001). The name of chlorotic mottle was coined to decribe the characteristics foliar symptoms in beans (Jayasinghe, 1982). Management of diseases caused by geminivirus through vector control and or use of resistant varieties have been found to be of no promise (Mali, 1986). Protective means of virus disease control like insectcidal and fungicidal sprays thus becomes inpracticable, laborious and costly. The role of micronutrients has been studied to know as what type of effect they do on host vis-a-vis reduction and or increase in disease. Experiment was conducted for screening and testing the effect of micronutrients on disease development.

MATERIALS AND METHODS

Experiments were conducted in the Plant Virology Laboratory and glasshouse of Plant Pathology Department, College of Agriculture, JNKVV, Jabalpur (M.P.). Election microscopy was done in Advance Centre for Plant Virology, IARI, New Delhi. Experiments were conducted in pot culture to see the effectivity of selected micronutrients (in the form of chemical compounds) *viz.*, manganese sulphate, zinc sulphate, copper oxide, ferrous sulphate, calcium carbonate, sulphur, potassium sulphate, magnesium sulphate, copper sulphate, lime, boron, ferric chloride. Arkakomal and Contender cultivars of frenchbean were grown in pots of 30cm diameter. Experiments were conducted separately in *kharif* and *rabi* seasons in year 2002-2003. Application of micronutrients was done by soil as well as spray. Microneutrients were applied at once in soil before sowing of seeds followed by spray application at 15 and 30 days after germination of seeds. Routine seed treatment with fungicides, thiram (3g/kg) and bavistin (1.5g/kg) along with rhizobium culture was done. The diseased plants in pots with severe symptoms of chlorotic mottle (geminivirus) disease were kept in between the replications for natural inoculation. Four replications were maintained. Observations were recorded just after germination in the form of disease appearance at days after sowing and also the disease index. Diseased plants were tagged and scoring of disease development was done in the scale of 0-5. The disease index was calculated from 5 random plants in the formula given below.

Disease index:

Numerical rating description
0 Healthy
1 Initial symptoms on leaf
2 Mild symptoms on leaf
3 Symptoms on leaf and other parts of

plant
4 Severe symptoms over category 3
5 Complex symptoms, distortion, dwarfing etc.

$$\text{Disease index (DI)} = \frac{\sum \text{of numerical ratings} \times 100}{\text{No. of plants observed x highest degree of rating}}$$

RESULTS AND DISCUSSION

The data have been presented in Table 1 which indicated that in *kharif* season in cultivar Arkakomal, ferrous suphate was found to be more effective as the disease appeared at 34 DAS (days after sowing) followed by zinc suphate, 31 DAS lime 30 DAS, magnesium sulphate 28 DAS, calcium carbonate 24 DAS and in cultivar Contender the ferrous sulphate was also more effective and the disease appeared at 44 DAS followed by zinc sulphate 37 DAS, lime 33 DAS, Magnesium sulphate 28 DAS. In *rabi* season in cultivar Arkakomal, the incidence of disease was observed at 25 DAS by ferrous sulphate followed by lime 22 DAS, magnesium sulphate 21 DAS, zinc sulphate 21 DAS and in cultivar Contender at 27 DAS for ferrous sulphate treatment and rest of the treatments followed nearly the same pattern as lime 24 DAS, magnesium sulphate 22 DAS, zinc sulphate 22 DAS.In *kharif* the disease index was found to be least in case of magnesium sulphate treatment (9) followed by zinc sulphate (11), ferrous sulpahte (12), lime (12) ferric chloride (21) sulphur (31) per cent in cultivar Arkakomal and in cultivar Contender the disease index was found lowest in ferrous sulphate (13) followed by lime (16), zinc sulphate (17), magnesium sulphate (22) and sulphur (22) per cent. In *rabi* season, the effect of lime was higher as seen by disease index of 14 per cent followed by zinc sulphate (19), ferrous sulphate (23) per cent in cultivar akrakomal and in cultivar Contender nearly same pattern was followed by ferrous sulphate (17), lime 17), zinc sulphate (18), magnesium sulphate (23) per cent.

Results Indicated that the disease was observed in high severity during *kharif* season in both the varieties inspite of this, application of five micronutrients were found effective on reduction of disease (disease index) and late appearence of disease in both the seasons. The effect was more superior in *kharif* season than the *rabi* seasons.Likely same results were found on okra yellow vein mosaic (geminivirus) disease by (Pun *et al*.,2000)

In this experiment, the applications of micronutrients was effective in reduction of disease incidence (disease severity) in both *rabi* and *kharif* seasons. In *kharif* and *rabi* season the application of five micronutrients was significantly effective in reducing the disease incidence and late appearence of disease.

Table 1 : Disease development in *kharif* and *rabi* Season

Sr. No.	Treatments	Dose (%)	Disease development in							
			Kharif				*Rabi*			
			Arkakomal		Contender		Arkakomal		Contender	
			DAS	DI	DAS	DI	DAS	DI	DAS	DI
1.	Manganese sulphate	0.1	14	35	18	30	12	41	14	37
2.	Zinc sulphate	0.1	31	11	37	17	21	19	22	18
3.	Copper oxide	0.1	21	34	18	23	17	42	17	41
4.	Ferrous sulphate	0.1	34	12	44	13	25	23	27	17
5.	Calcium carbonate	0.1	24	29	19	31	17	39	17	46
6.	Sulphur	0.1	17	31	18	22	14	33	18	35
7.	Potassium sulphate	0.1	20	24	21	29	17	34	19	36
8.	Magnesium sulphate	0.1	28	9	28	22	21	32	22	23
9.	Copper sulphate	0.1	16	25	17	28	16	40	18	45
10.	Lime	0.1	30	12	33	16	22	14	24	17
11.	Boron	0.1	17	34	17	22	18	35	16	42
12.	Ferric chloride	0.1	17	21	24	29	13	29	16	35
13.	Check (control)		10	36.5	11	42	12	71	9	66
	S.E. ±		4.89	4.23	2.85	5.97	2.76	7.12	1.77	8.23
	C.D. (P=0.05)		9.92	8.59	5.78	12.12	5.61	14.45	3.59	16.70

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