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EFFECT OF YELLOW VEIN MOSAIC VIRUS INFECTION ON THE PHYLLOSPHERE MICROFLORA OF BHENDI (*Abelmoschus esculentus* W. and A.) PLANTS*

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Activity of microorganisms on leaf surfaces has in recent years been described by many workers (Last, 1955; Sinhs, 1965; Dickson, 1967). Considerable interest, therefore, lies in investigating the abundance of microorganisms which occur on leaf surfaces at various stages of plant growth. Virus diseases are known to bring about metabolic derangements in the host plants which in turn affect the population and type of microorganisms residing in the phyllosphere region. With this aim the population pattern of microorganisms on leaves was studied in relation to the effect of virus infection and maturity of the leaves during plant growth.

Materials and Methods

YVMV culture was maintained on susceptible bhendi plants. Local *Kilichunden* variety of bhendi, highly susceptible to yellow vein mosaic virus was used as the host plant throughout the study. Leaf samples (top, middle and bottom) from five healthy and five inoculated plants were collected at random for each sampling. Populations of fungi, bacteria and actinomycetes in the phyllosphere was estimated as per the method described by Leben (1961). Soil extract agar medium was used for bacteria, peptone-dextrose-agar with rose bengal and streptomycin for fungi and Ken Knight's agar for actinomycetes.

Results and Discussion

The inoculated plants showed symptoms of vein clearing after 13-16 days. The highest fungal population was observed on the bottom leaves of healthy plants the maximum being 0.771 lakh per 100 sq. cm. The top leaves of healthy plants generally had the minimum fungal population. There was significant difference between the fungal population on healthy bottom and inoculated bottom leaves and also healthy middle and inoculated middle leaves. The difference between the healthy top and inoculated top leaves was not significant (Table 1).

Bacterial population was found to be highest on the bottom leaves of inoculated plants, the maximum being 3.321 lakhs on the 60th day after inoculation. The top leaves always had the minimum bacterial count. The bacterial

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Table 1

Population of fungel propagules on the leaves of healthy and Y. V. M. V. inoculated bhendi plants (in lakhs/100 sq. cm)

Age of plants	Days after inoculation	Healthy			Inoculated		
		Top.	Middle.	Bottom.	Top.	Middle.	Bottom.
30	20	0.197	0.537	0.413	0.237	0.215	0.192
40	30	0.199	0.497	0.578	0.213	0.310	0,298
50	40	0.247	0.410	0.698	0.247	0.289	0.214
60	50	0.257	0.451	0.771	0.212	0.291	0.335
70	60	0.263	0.353	0.661	0.221	0.297	0,297

c. D. at 5 % level -- 0.090 F test — Significant

HB HM IM IB HT IT

Table 2

Population of bacterial propagules on the leaves of healthy and Y. V. M. V. inoculated bhendi plants (in lakhs/100 sq. cm.)

Age of plants	Days after inoculation	Healthy			Inoculated		
		Top.	Middle.	Bottom.	Top	Middle.	Bottom.
30	20	0.896	1.213	1.873	1.127	2.313	2.832
40	30	1.341	1.543	1.991	1.739	2.182	2.413
50	40	1.011	1.131	2.543	1.713	2.567	3.001
60	50	1.121	1.134	2.329	1.713	2.328	2.981
70	60	0.917	1.431	2.431	1.835	2.832	3.321

C. D. at 5% level — 1.103 F test — Significant

IB IM HB IT HM HT

population in the middle leaves of inoculated plants was found to be significantly higher than that on the corresponding leaves of healthy plants. The difference between the inoculated bottom and healthy bottom leaves as well as the inoculated top and healthy top were not significant (Tabe 2).

In both inoculated and healthy plants, the highest population of actinomycetes was obtained on the bottom leaves; the top leaves of inoculated plants

had the minimum population. The difference between the actinomycetes population on the top, middle and bottom leaves of healthy and inoculated plants were not found to be significant (Table 3)

Table 3

Population of actinomycetes propagules in the leaves of healthy and Y. V. M. V. inoculated bhendi plants. (In lakhs/100 sq. cm.)

Age of plants	Days after inoculation	Healthy			Inoculated		
		Top.	Middle	Bottom.	Top.	Middle	Bottom
30	20	0.731	0.621	0.896	0.891	0.971	1.310
40	30	0.621	0.650	0.834	0.314	1.330	1.411
50	40	0.532	0.671	0 845	0.713	1.417	1.423
60	50	0.541	0.621	0.707	0.761	1.317	1.781
70	60	0.594	0.599	0.791	0.834	1.513	1.731

C. D. at 5 % level - 0.040 F test — Significant

IB IM HB HM HT IT

Table 4

Total microbial population on the leaves of healthy and Y. V. M, V. inoculated bhendi plants (In lakhs/ICO sq. cm.)

Age of plants.	Days after inoculation	Healthv			Inoculated		
		Top.	Middle	Bottom	Top.	Middle.	Bottom
30	*20*	1.824	1.665	3.182	2.455	3.504	4.334
40	30	1.161	2.690	3.403	2.266	3.822	4.122
50	40	1 790	2.212	4.086	2.673	4.273	4,638
60	£0	1.919	2.016	3.897	2.686	4.036	4.997
70	60	1.774	2.293	3.573	2.888	4.642	5.349

C. D. at 5 % level -1.12 F test — Significant

IB IM HB IT HM HT

The total microbial population on the top, middle and bottom leaves of inoculated plants was always higher than the corresponding leaves of the healthy plants, but the difference was significant only in the case of middle leaves. The bottom leaves of both diseased and healthy plants supported the maximum total microbial population, while the top leaves had the minimum. Differences in the

microbial population could not be correlated with the age of plants (Table 4). A similar observation was made by Balakrishnan (1969) in bunchy top virus infected banana plants.

It has been noticed that the leaves of yellow vein mosaic virus inoculated bhendi plants had higher total carbohydrate and nitrogen contents and the infected plants exhibited narrow C/N ratio as compared to the healthy ones (Potty and Wilson, 1973). The differences in microbial population between the leaves of healthy and diseased bhendi plants can be attributed to the changes in host physiology as a result of infection by the yellow vein mosaic virus.

Summary

Phyllosphere microflora of yellow vein mosaic virus inoculated and healthy bhendi plants have been studied at different stages of growth. The middle and bottom leaves of infected plants showed significantly lower population of fungi than the corresponding leaves of healthy plants. The bacterial population on the middle leaves of infected plants was significantly higher than that of the healthy. The differences between the actinomycete population on the leaves of healthy and infected plants were not significant. The middle leaves of infected plants showed significantly higher total microbial population than those of the healthy ones. The differences in microbial population between leaves of healthy and diseased plants is attributed to the changes in host physiology caused by virus infection.

സംഗ്രഹം

മൊസെയ്ക് രോഗം ബാധിച്ച വെണ്ടച്ചെടികളുടെ പത്രതലത്തിലുള്ള 'മൈക്രോ ഫ്ലോറയെ കുറിച്ച് ഒരു പഠനം നടത്തി. രോഗം ബാധിച്ച ചെടികളുടെ മദ്ധ്യഭാഗത്തും അടിഭാഗത്തും ഉള്ള ഇലകളിൽ രോഗം ഇല്ലാത്ത ചെടികളെ raiasojaail^0 ഗണ്യമായ തോതിൽ ഫംഗസുകൾ അധികം ഉള്ളതായി കണ്ടു. tttoocno ബാധിച്ച ചെടികളുടെ മദ്ധ്യഭാഗത്തുള്ള ഇലകളിൽ ആകെയുള്ള 'മൈക്രോബിയൽ പോപ്പുലേഷനും' രോഗമില്ലാത്ത ചെടികളിലേതിനെക്കാൾ ഗണ്യമായ തോതിൽ വർദ്ധിച്ചിrosary

REFERENCES

Balakrishnan Nair, P. K. 1969. Effect of bunchy-top virus infection on the chemical constituents, phyllosphere microflora and the incidence of *Cordana* leaf spot in banana> M. Sc. Ag. thesis submitted to the University of Kerala.

Dickson, C. M. 1967. Fungal colonization of *Pisum* leaves. *Canad. J. Bot.* **45**, 95-97.

Last, F. T. 1955. Seasonal incidence of *Sporobolomyces* cereal leaves. *Trans. Brit. mycol. Soc.* 38, 221-239

Leben, C. 1961. Microorganisms on cucumber seedlings. *Phytopathology* 51, 553-557

Potty, V. P, and K. I. Wilson 1973. Studies on the physiology of virus disease of bhendi plant. *Agric. Res. J. Kerala* I **1**, 65-68

Sinha, S. 1965. Microbial complex of the phyllosphere and disease control. *Indian Phytopath.* **18**, 123-125.

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