

Management of watermelon mosaic virus by use of leaf extracts of some medicinal plants

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SUMMARY

The present investigation deals with effect of six medicinal plant extracts on the inhibition of three strains of WMV (watermelon mosaic virus) viz., WMVMM, WMVVB and WMVC on different intervals. Leaf extracts were sprayed at 15 days intervals from the date of inoculation up to 75 days. It was recorded that medicinal plant extracts were inhibitory for all the three strains. Maximum reduction in disease incidence was noted by leaf extract of *Rauwolfia serpentina* for all the three strains up to 75 days. The extracts of this plant against WMV may be recommended for cultivators.

Key words : Management, Watermelon mosaic virus, *Cucurbita pepo*

The complexity of many virus diseases has led to the development of a large number of approaches for their control. The large scale use of chemical insecticides has caused serious environmental problems. However, permanent elimination of any significant amount of broad spectrum synthetic pesticide also cannot be adopted. Thus, new pesticides which can meet different standards, must be specific, non toxic to environment, less expensive and less prompt to the development of resistance by insects, pathogen etc. will have to be found out. This has led to the search of natural pesticides, which are likely to satisfy the above stated consideration. Many workers have investigated reduction in plant virus disease by application of several other methods and found increased yield. Griffing, 1956 and Simons, 1960, have studied the effects of some insecticides and physical barrier method on the yield and spread of pepper vein banding mosaic virus. The use of medicinal plants for the control of virus disease has been attempted by few workers for different plant virus disease on their hosts, but use of medicinal plant extracts for the management of watermelon mosaic virus has not been worked out so far. Watermelon mosaic virus is most prominent causing mosaic disease of pumpkin throughout country. The present investigation has been planned to see the effect of leaf extract of some medicinal plants on pumpkin infected by watermelon mosaic virus (WMV).

The present investigation was undertaken to search sources of chemicals from medicinal plants for possible use of botanical pesticides. Among these, the use of leaf extracts of some higher plants has been reported to induce resistance against infection of few viruses in hypersensitive hosts. (Verma *et al.*, 1982, 1984; Verma and Prasad, 1983) and nonhypersensitive hosts (Verma and Prasad, 1983).

A wide and varied range of naturally occurring inhibitors from plants have been studied (Verma and Raichaudhary, 1970, Awasthi *et al.*, 1984, Noronha *et al.*, 1984; Aminuddin and Singh, 1986).

MATERIALS AND METHODS

All the experiments were conducted on *Cucurbita pepo* L. being a sensitive test plant grown in an insect proof chamber. The leaf extracts of medicinal plants were prepared by taking 100 g. of shade dried leaf and aqueous extracts were prepared by dissolving homogenized leaf powder for 40 hours. The extracts were filtered, centrifuged and were used for further studies.

Three strains of watermelon mosaic virus viz., (WMVMM, WMVVB, WMVC) already maintained in laboratory were used as inoculum. Six days old *Cucurbita pepo* L. seedlings were taken and divided into four groups, each containing fifty seedling. The seedlings of I, II, III groups were inoculated with three strains of WMV while the IV group was inoculated with neutral phosphate buffer, which served as control. Treatments were given at fifteen days interval upto 75 days.

RESULTS AND DISCUSSION

It is evident from Table 1 that out of six plant extracts tested against three strains of watermelon mosaic virus, plant extracts of *Rauwolfia serpentina* recorded

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Treatments (Plant extract)	Per cent disease incidence (days after planting and per cent reduction)																								
	15					30					45					60					75				
	WMV MM	WMV VB	WMV C	WMV MM	WMV VB	WMV C	WMV MM	WMV VB	WMV C	WMV MM	WMV VB	WMV C	WMV MM	WMV VB	WMV C	WMV MM	WMV VB	WMV C	WMV MM	WMV VB	WMV C				
<i>Parthenium hysterophorus</i>	12.0	10.61	8.0	13.62	11.7	12.5	14.1	12.5	14.0	15.2	13.41	11.52	17.8	15.0	17.51	46.91	39.87	51.56							
<i>Rauwolfia serpentina</i>	6.0	4.5	3.5	7.5	5.12	4.0	7.6	6.71	5.2	8.0	7.0	6.7	14.0	5.10	12.0	68.52	69.12	76.04							
<i>Azadirachta indica</i>	7.0	5.0	4.5	7.65	6.5	5.8	9.0	7.6	6.61	11.0	8.1	8.0	16.5	5.81	10.1	62.65	64.74	73.30							
<i>Boerhaavia diffusa</i>	8.5	6.18	5.61	9.85	7.98	6.8	10.62	8.1	7.48	11.7	10.11	9.36	13.5	12.4	11.81	60.71	57.36	68.68							
<i>Clerodendrum aculeatum</i>	9.5	7.81	6.5	9.52	8.5	7.8	10.68	9.8	9.79	12.1	10.5	11.0	14.51	12.1	13.0	59.03	53.59	63.34							
<i>Ocimum sanctum</i>	10.5	8.11	7.0	11.98	10.50	8.5	12.1	11.98	9.21	13.65	12.7	10.84	16.5	14.0	12.4	52.75	45.75	63.42							
Control	21.0	15.1	20.1	22.15	16.2	21.0	26.7	19.5	25.0	30.4	25.0	30.0	36.7	29.18	35.0	---	---	---							
S.E.M.	1.90	1.40	2.11	1.92	1.40	2.16	2.41	1.66	2.56	2.79	2.29	2.95	3.09	2.57	3.29	3.11	4.53	3.76							

incidence of the disease, mosaic mottling strains WMVMM (14%), vein banding strain WMV, VB (9.10%) and chlorotic strain, WMVC (12%) at 75 days after planting, which was superior than other control treatments. Similar trends were also recorded at earlier stages viz., 15, 30, 45 and 60 days after planting.

Extract of *Rauwolfia serpentina* reduced the disease incidence of WMVMM (68.52%), WMVVB (69.12%) and WMVC (76.04%) where as *Azadirachta indica* and *Boerhaavia diffusa* reduced incidence of the mosaic disease 62.65%, 64.74%, 73.30% and 60.71%, 57.36% and 68.68%, respectively. Minimum per cent reduction of disease was recorded by leaf extract of *Parthenium hysterophorus* for all the three strains of watermelon mosaic virus (WMV) upto 75 days after planting. Statistically maximum inhibition occurred after 75 days and afterwards it became static.

It is presumed that glycoproteinaceous inhibitors present in the extract when applied after virus inoculation, induce synthesis of some translocable virus inhibitory substances in the host plant and thus the physiology of the host cell is altered in such a way that virus multiplication is affected. Furthermore, repeated and continuous spray of plant extracts is not associated with environmental pollution. These plant products, however, not yet received commercial attention.

It is clear from that result presented in Table 1 that leaf extract of different medicinal plant if applied before virus infection, reduces disease incidence, symptoms severity and delayed the symptoms appearance. The protective effect was more pronounced if the number of sprays were increased upto 5, which showed to have highest reduction in the disease incidence in case of *Rauwolfia serpentina*.

Similar results were obtained and similar trend has been recorded by Verma and Prasad, 1983; Verma *et al.*, 1984. *Rauwolfia serpentina* as being the medicinal plant has been attempted for the first time and proved inhibitory for watermelon mosaic virus infection. Therefore, the extract may be recommended to cultivators for spray against this disease.

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