

A strain of cucumber mosaic virus on tobacco*

by

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Synopsis: The paper deals with the description of a virus disease of tobacco, identified to be a strain of cucumber mosaic.

Introduction: During October 1962, tobacco crop at the Agricultural Research Station, Bhavanisagar was found to be infected with a virus disease. The diseased plant was characterised by mosaic mottling of the leaves with broad green bands along the veins and narrowing of the leaves. The disease was found to be transmissible to *Nicotiana glutinosa* causing systemic mosaic mottling symptoms.

Materials and methods: The virus culture was maintained on either *Nicotiana glutinosa* or on cucumber plants and the inoculum from these plants were used in all experiments. Sap inoculation was made with the standard extract prepared with one gram of the infected leaf material crushed in 1 ml. of 0.1 M phosphate buffer at pH 7.0.

Aphid transmission studies were made with apterous aphids collected from the pure culture raised in cages. Three hours of acquisition feeding, three hours preacquisition starvation period and 24 hours test feeding was the schedule followed in all aphid transmission tests.

Experimental results: Transmission: The disease was found to be easily transmitted by sap inoculation. The disease was also found to be transmitted through the vectors *Aphis gossypii* G and *Myzus persicae* Sulz.

PHYSICAL PROPERTIES OF THE VIRUS: The virus was found infective after exposure to 60°C. for 10 minutes but the infectivity was lost when exposed to 70°C. The dilution end point of the virus was between 1 in 100 and 1 in 200. The virus has a longevity *in vitro* of 24 hours at room temperature.

HOST RANGE: The disease was successfully transmitted by sap and aphids to different hosts. The incubation period of the virus in the plants exhibiting systemic symptoms on sap transmission (i. e.) *Nicotiana tabacum* var white burley and Samsun, *N. glutinosa*, *Datura fastuosa*, *Solanum melongena*, *Petunia hybrida*, *Physalis ixocarpa*, *Trichosanthes anguina*, *Zinnia elegans*, *Capsicum annum*, *Nicandra physaloides*, *Orthosiphon diffusus*, *O. glabratus* and *Cucumis sativus* ranged from 7—11 days. On aphid transmission the incubation period was 7 days

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in cucumber, 11 days in *Petunia* and chilli and 29 days in tobacco. The isolate produced local lesions on cowpea var. blackeye in 4 days and on *Chenopodium amaranticolor* and *C. quinoa* in 5 days.

On white burley tobacco, yellow chlorotic spots with ill-defined margin were produced on the inoculated leaf in 8 days and no other symptoms could be seen on other leaves that expand later.

On Samsun tobacco, mild mosaic mottling symptoms and on *vazaikappal* variety mosaic mottling with narrow vein banding were observed followed by narrowing of the leaves with wavy margins and pointed tip.

Nicotiana glutinosa reacted with systemic mosaic mottling, elongation of the leaf tip and leaf distortion. *Datura fastuosa* reacted with chlorotic vein banding, general chlorosis and downward curling of the leaf. Mosaic mottling of dark and light green areas was the symptom produced on cucumber plants. The leaves were generally smaller than those of the healthy plants.

On *Capsicum annum*, mosaic mottling of the leaves, reduction in leaf size and shortening of the internodes were observed. *Petunia hybrida* reacted with mottled leaves, distortion and stunting.

Systemic mosaic mottling symptoms were produced on *Solanum nigrum*, *S. melongena*, *Orthosiphon diffusus*, *O. glabratus* and *Zinnia elegans*. On *Nicandra physaloides* and *Trichosanthes anguina* vein banding was also observed along with mosaic mottling.

Circular yellow spots of 2. mm. with green centre was observed on *Physalis ixocarpa*. Later the leaves became completely yellow.

Chlorotic local lesions of 1 to 2 mm. were produced on *Chenopodium amaranticolor* and *C. quinoa* which later turned necrotic.

On cowpea variety black eye, reddish local lesions were produced by the virus. The following plant species *Lycopersicon esculentum*, *Gomphrena globosa*, *Physalis peruviana*, *Mirabilis jalapa*, *Datura ferox*, *Euphorbia geniculata*, *Digera arvensis*, *Carthamus tinctorius*, *Citrullus vulgaris*, *Cucurbita pepo*, *Momordica charantia*, *Amaranthus caudatus*, *Cyamopsis tetragonoloba*, *Vinca rosea*, *Soja max* and *Lagenaria vulgaris* were not infected by this virus nor did they carry the virus symptomlessly.

Discussion: A mosaic disease of tobacco caused by *cucumis* virus 1 was reported by Nariani and Nyako (1963). The tobacco virus reported in this paper has similar properties and host range but differs from the present isolate in having a lower thermal inactivation point (55°C.) and longevity *in vitro* (8 hours at room temperature) and in infecting *Cucumis melo* L variety *utilisima*, *Cucurbita pepo* and *Luffa acutangula*. The virus is transmitted by *Aphis gossypii* G and *Myzus persicae* Sulz reported by Doolittle (1920) as vectors of cucumber mosaic virus.

A mosaic disease of *Zinnia elegans* caused by a strain of *cucumis* virus 1 has been reported by Prasad and Raychaudhuri (1961) which also resembles the tobacco virus studied here but differs in that the present virus does not infect *Momordica charantia* but infects *Solanum melongena*, *S. nigrum* and *Vigna sinensis*. The tobacco virus reported here is identified as a strain of cucumber mosaic virus (*Cucumis* virus 1).

Summary: A virus disease of tobacco is described. The virus has a thermal inactivation between 60° and 70° C, a dilution end point of 1:100 to 1:200 and longevity *in vitro* of 24 hours. The host range and symptomatology on different hosts are described. The disease is transmitted by sap and also by the aphid vectors *Aphis gossypii* G and *Myzus persicae* Sulz. The causal virus is identified as a strain of *Cucumis* virus 1.

REFERENCES

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| Doolittle, S. P. | 1920 | The mosaic disease of cucurbits. <i>U. S. Dept. Agric. Bull.</i> 879. |
| Prasad, R. N. and S. P. Raychaudhuri | 1961 | Mosaic disease of <i>Zinnia elegans</i> . <i>Indian phytopath.</i> , 14: 123—126. |
| Nariani, T. K. and K. O. Nyako | 1963 | A mosaic disease of tobacco caused by <i>cucumis</i> virus 1. <i>Indian phytopath.</i> , 16: 313—316. |

ERRATA

Foot Note: 1. In *Madras agric. J.*, 51 (9) : 405

Read as "The investigations presented in the Dissertations were guided by Dr. A. Mariakulandai, Professor of Soil Science from 1—8—1958 to 15—9—1959, Sri R. Soundararajan, Reader in Soil Science from 15—5—1959 to 6—4—1960 and Dr. D. John Durairaj, Reader in Soil Science from 4—10—1958 to 28—2—1959 and from 7—4—1960 to date.