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Transmission of Chilli-Mosaic-Virus through Pollen and Root-Contact

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Introduction

The transmission of chilli-mosaic-virus (RAMKRISHNAN 1961; MISRA & JHA 1967, 1969, 1970, 1971, 1972; MISRA 1968, 1970, 1971) has been studied by several methods. Previous records of JHA & RAYCHAUDHURI 1956, MISHRA 1965 and ESKAROUS 1971, that this virus can be successfully transmitted to different hosts by mechanical inoculation, by stem grafting, and by insect vector has been confirmed. Further, this virus is not transmitted by seed, soil and dodder. Transmission through the agency of pollen and root-contact has proved positive.

Materials and Methods

Chilli (*Capsicum annuum* L.) plants variety NP 46 were raised inside insect-proof glass-house, and all experiments done with these plants. The virus culture was maintained on Tobacco (*Nicotiana tabacum* L.) variety 'White Burley'. All inoculations were done with standard extract from infected tobacco leaves by rubbing. Carborundum was used as abrasive.

Experimental Results

Results with pollen and root-contact transmission are presented below.

1. Pollen transmission

Pollen transmission is well known in cherry (WAY & GILMER 1958, GILMER & RAY 1960) and squash (DAS 1961, DAS & MILBRATH 1961).

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Pollen from diseased chilli plants were dusted over the stigmas of healthy plants after emasculating the flower of healthy chilli plants. All flowers of a particular branch were pollinated and then bagged to avoid contamination. Many of the healthy chilli plants treated in such a way developed characteristic symptoms of mosaic. The incubation period varied from 26 to 39 days. The natural spread of chilli-mosaic-virus could, thus, be accounted for up to some extent by infected pollen.

2. Root Transmission

In order to find out the possible role of chilli roots in the transmission of the virus the following experiments were done:

(a) Absorption of virus through root hairs. Chilli seeds were allowed to germinate on a moist filter paper inside a petridish. After the radicles grew long enough and the first leaves appeared (in 7—10 days) the seedlings were dipped in infective sap for different durations. After this treatment the seedlings were planted in earthen pots where they established themselves by developing new roots and leaves. These were maintained for a period of one year. Control plants were treated with distilled water instead of standard extract. None of the plants could either exhibit symptoms or show the presence of virus in them as tested by back inoculation. However, the height of the treated plants was found to be reduced proportionately to the duration of treatment.

(b) Absorption of virus through natural abrasions on roots. Chilli seeds were allowed to germinate as in the previous experiment. They were then transferred to coarse sand in conical funnel with a cotton pad at the base. Seven such sets were maintained with one plant in each funnel. Five of the funnels were watered once every day with 40 ml of nutrient solution and 10 ml of standard virus extract. The other two funnels received 50 ml of nutrient solution only, and acted as controls. This procedure was continued for a period of 20 days (considered sufficient to produce abrasions on the roots in sand culture) and the plants were then taken out and planted in soil within pots. Even after a period of six months none of the plants developed the symptoms of mosaic and were not containing the virus as proved by back inoculation on tobacco. It was again observed that all treated plants were reduced in height in comparison to the controls.

(c) Transmission of virus through root-contact. — Natural root grafts have been reported to carry viruses from diseased to healthy recipient in peach (Hunter & al. 1958). Diseased chilli plants and the healthy ones were taken out of their pots inside the glass house. Their roots were cleared and washed well with water. Two plants, one diseased and the other healthy, were planted together in a larger pot with their secondary roots superimposed. A piece of cardboard was placed between then to avoid aerial

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contact. Ten such replicas were set. One month after this treatment the roots of the two plants developed contact by fusion. The pots were left undisturbed for a period of two months more when all the plants developed symptoms of mosaic. Healthy test plants got infected through root contacts.

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Summary

The positive role of pollens and root-contacts in transmitting chilli-mosaic-virus, in addition to previously reported methods of sap inoculation, grafting and insects, has been discussed. This provides an extra explanation, in addition to insect vectors, to account for the natural spread of viruses in chilli fields. It is also reported that the virus is not transmitted through seed, soil and dodder.

Zusammenfassung

Das Chilli-Mosaik-Virus (ChMV auf *Capsicum annuum* L.) kann ergänzend zu den bisher bekannten Möglichkeiten des Übertragens durch Preßsaft, Pfropfen und Insekten auch durch Pollen und durch Wurzelkontakt verbreitet werden. Dies ist zusätzlich zu den Insekten als Überträgern für die natürliche Ausbreitung der Virosen in *Capsicum*-Feldern verantwortlich. Das Virus wird nicht durch Samen, durch den Boden oder durch *Cuscuta* übertragen.

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