SQUASH MOSAIC VIRUS IN MUSKMELON SEED DISTRIBUTED COMMERCIALLY IN ONTARIO

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Abstract

The occurrence of a virus similar to the ringspot strain of squash mosaic virus is reported in muskmelon (*Cucumis melo* L.). The virus was found in seedlings grown in the greenhouse from seed of the cultivar Iroquois obtained commercially in Canada. Evidence of transmission of the virus through the roots of neighboring plants was obtained in a greenhouse test.

Introduction

In May **1971** a pronounced mosaic symptom was observed in muskmelon (*Cucumis melo* L. cv. Iroquois) seedlings that had reached the first true-leaf stage of development. The plants originated from California seed obtained from a commercial seed company in Ontario and planted **28** April **1971** in 3-inch peat pots containing sterilized sandy loam at the Horticultural Research Institute of Ontario, Vineland Station, Ontario. Three weeks after seeding, mosaic symptoms and distortion similar to hormonal injury were noticed on the first true leaves of some seedlings but not on the cotyledons. Many of the affected plants were stunted (Figure **1**). A count: of the plants from this seed lot indicated that 38 of 480 **(7.9%)** were affected. The absence of insects on any of these plants and the relatively high percentage of diseased seedlings suggested that the condition was due to a seed-borne virus. Since there has been no report of the seed transmission of viruses cucurbits in Canada **(1**, 6), an investigation was initiated to identify the causal agent and to verify its seed transmission.

Figure 1. Heolthy seedling of 'Iroquois' muskmelon (right) and one infected with squash mosaic virus (left). Note the pronounced chlorotic mottle on the upper leaf and the extreme distortion and narrowing of the lower ones.

Experimental and discussion

The! reactions of *Vigna sinensis* Savi (cowpea cv. Black-eye), *Nicotiana glutinosa* L., *Citrullis vulgaris* Schrad. (watermelon cv. Market Midget), and *Cucurbita pepo* L. (pumpkin cv. Small Sugar) after inoculation with sap from infected muskmelon indicated that the virus was similar to the ringspot strain of squash mosaic virus (4). No reaction occurred on cowpea or *N. glutinosa*, but local lesions appeared on the cotyledons of watermelon and a systemic ringspot and mottle on pumpkin. In our tests, sap extracted from infected muskmelon retained infectivity after **10** min at 60° C but not at 65" C. These results also agree with those reported for squash mosaic virus (3), which has been reported to be seed-transmitted in California (5).

To assure that the seed, and not accidental contamination of the seedlings, was responsible for the infection, seed of the same cultivar was again obtained from the same supplier. Two lots of **200** seeds were

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selected at random from the source material, one was treated with 10% trisodium phosphate for 15 min while the other was untreated. Both lots were sown in sterilized sandy loam (10 seeds per 5 inch clay pot) and placed in a small, screened greenhouse compartment. To further guard against insect infestation, each pot was covered with a clean polyethylene bag which was removed only after the cotyledons and first true leaves had expanded. Of 192 seedlings that emerged after 3 weeks from untreated seed, 11.9% were virus-infected; whereas 6.7% of 177 seedlings from treated seed shown virus symptoms. These results suggest that: the virus was within the seed since it was not eliminated by the treatment with trisodium phosphate, a chemical reported to eliminate tobacco mosaic virus from tomato seed coats but not from its endosperm (8).

circumstantial evidence for what might be assumed to be mechanical inoculation by root contact or natural root grafting was also obtained. Thirty peat pots, each containing one infected and one apparently healthy seedling at the first leaf stage, were divided into three groups. In one group, the infected seedlings were decapitated with scissors at the soil surface. Prior to decapitation no contact occurred between infected and symptomless seedlings because of adequate spacing. In the second group, the infected seedlings were completely enclosed in a polyethylene nag to prevent contact with the stem and leaves of the neighboring healthy plant. In the remaining group, the infected plants were untouched. A control group of 10 pots in which both seedlings were apparently healthy was maintained under the same greenhouse environment. Six weeks after seeding all the plants in this latter group remained healthy. However, 6 of the 10 originally symptomless seedlings in pots with decapitated infected plants became infected. Of the 10 plants grown adjacent to bagged, infected plants 7 showed virus symptoms. In the pots where healthy plants were not prevented from contacting infected plants, 9 of the 10 seedlings became infected. These results could be attributed mainly to transmission by root contact.

The significance of seed-borne infection and transmission by root contact in outbreaks of squash mosaic virus in commercial muskmelon plantings in Ontario is not known. However, seed transmission could facilitate the initial introduction of the virus. The subsequent spread of the virus would depend mainly on the presence of Diabrotica beetles and the grasshopper Melanoplus differentalis, the reported vectors (2,7). But, as indicated above, transmission by root contact may also be important. In areas of California where cucumber beetles occur (2), squash mosaic virus is prevalent. in commercial muskmelons and other cucurbits and persists in a relatively high percentage of the seed. Therefore, seed imported from these areas could serve as a primary source of inoculum for subsequent infection of muskmelon and other cucurbits in Canada.

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