

Bean Yellow Mosaic Virus in Bulbous Irises in Israel

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ABSTRACT

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Bean yellow mosaic virus was found in bulbous irises, as determined by inoculation to test plants, serology, and specific inclusions. No distinct symptoms were observed on infected irises.

Bean yellow mosaic virus (BYMV), a member of the potyvirus group, causes diseases in many legumes and also infects members of the iridaceae such as gladiolus (6), freesia (7), tritonia, and crocosmia (5). BYMV is widespread in gladiolus, and practically all plants in many varieties are infected.

In numerous inoculations from irises in Israel since 1960, no indications of the virus were obtained. During the last 3 yr, however, BYMV has been isolated from irises in Israel, and this is reported herein. Similar findings were obtained recently in the Netherlands (5). Brunt and Phillips (1) also found BYMV in irises imported from Israel.

MATERIALS AND METHODS

All test plants were grown in a screened greenhouse and transferred to a 22 C chamber before inoculation. Mechanical inoculations were done with crude extracts of iris leaves ground in 1% K₂HPO₄. For inoculations from *Chenopodium amaranticolor* Coste et Reyn. and *Tetragonia expansa* Murr. to *C. amaranticolor* and *T. expansa*, 1% polyvinyl pyrrolidone was added.

Serologic tests were by enzyme-linked immunosorbent assay (ELISA) following the procedures of Clark and Adams (3). The γ -globulin for coating the plates was diluted 1:1,000. Leaf tissue was homogenized with a mortar and pestle in phosphate-buffered saline at 1:10 w/v. Enzyme-labelled γ -globulin was used at a dilution of 1:1,000. BYMV antiserum was obtained from R. Koenig, Braunschweig, W. Germany.

Samples for electron microscopy were fixed, embedded in Epon, sectioned, and

examined with a JEM 7A electron microscope as described previously (4).

RESULTS AND DISCUSSION

During 1978 through 1980, BYMV was



Fig. 1. Chlorotic spreading lesions on *Chenopodium amaranticolor*.

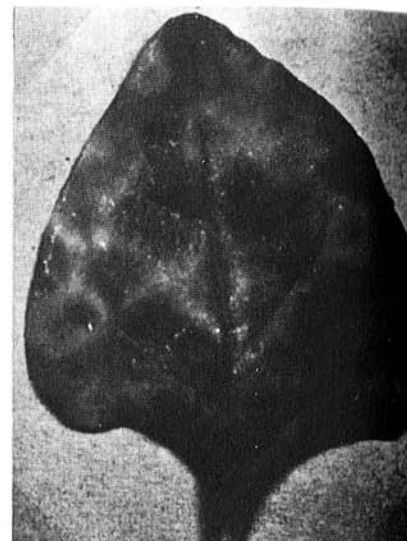


Fig. 2. Chlorotic ringlike lesions on *Tetragonia expansa*.

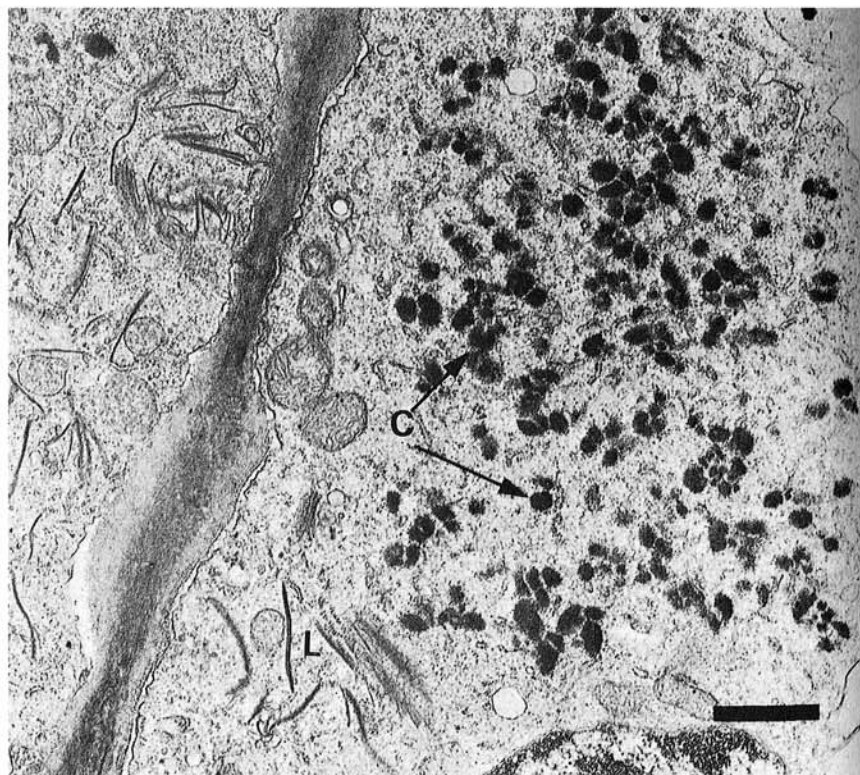


Fig. 3. Cytoplasmic crystalline inclusions (C) and laminate aggregates (L) in mesophyll cells from iris leaf infected by bean yellow mosaic virus. Scale represents 1 μ m.

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found in 13 of 141 iris plants tested including the cultivars Prof. Blaauw, White Perfection, and Wedgewood. The virus was isolated from iris plants with severe and mild mosaic symptoms resembling those of iris severe mosaic virus and iris mild mosaic, respectively. Extracts from four of 37 iris plants induced typical symptoms of BYMV when inoculated onto *C. amaranticolor*, *C. quinoa* L., and *T. expansa*. On *C. amaranticolor*, chlorotic local lesions appeared about 5 days after inoculation and later spread along veins (Fig. 1). Often the virus became systemic. Large chlorotic ringlike lesions were observed on *T. expansa* (Fig. 2). No reaction was observed on *Phaseolus vulgaris* L. var. Scotia.

Presence of BYMV in the four irises and in the test plants was confirmed by ELISA; nine of 104 other iris plants tested also gave positive ELISA reactions. Extract from a BYMV-infected iris was included in every plate. ELISA values (E_{405}) for extracts from BYMV-infected

irises ranged between 0.5 and 0.7 compared with 0.02–0.10 for those from irises infected with severe mosaic or mild mosaic viruses. ELISA values for BYMV-infected *C. amaranticolor* and *C. quinoa* were 0.9 and 1.45, respectively, compared with 0.08 for the controls.

Thin sections were prepared from one BYMV-infected iris plant, and cytoplasmic crystalline inclusions characteristic of the BYMV group (2) were found in leaf mesophyll cells (Fig. 3). Laminated aggregates were also observed. These could be associated with BYMV or with iris severe or mild mosaic viruses, all of which belong to the potyvirus group.

These results, as well as those obtained in the Netherlands (5), indicate that bulbous irises are hosts of BYMV. Conceivably, BYMV is more prevalent in iris since BYMV-infected irises did not show specific symptoms.

The iris isolates of BYMV differ from many other isolates in that no reaction was observed on Scotia beans; in this respect, however, they resemble several

BYMV isolates reported from Florida (8).

LITERATURE CITED

1. Brunt, A. A., and Phillips, S. 1980. The detection, separation from naturally occurring complexes, and partial characterization of four aphid-borne viruses infecting bulbous iris. *Acta Hort.* 109:503-508.
2. Christie, R. G., and Edwardson, J. R. 1977. Light and electron microscopy of plant virus inclusions. *Fla. Agric. Exp. Stn. Monogr. Ser.* 9. 150 pp.
3. Clark, M. F., and Adams, A. N. 1977. Characteristics of the microplate method of enzyme-linked immunosorbent assay for the detection of plant viruses. *J. Gen. Virol.* 34:475-483.
4. Cohen, J., and Loebenstein, G. 1975. An electron microscope study of starch lesions in cucumber cotyledons infected with tobacco mosaic virus. *Phytopathology* 65:32-39.
5. Derks, A. F. L. M., and Vink-Van Den Abeele, J. L. 1980. Bean yellow mosaic virus in some iridaceous plants. *Acta Hort.* 110:31-38.
6. McWhorter, F. P., Boyle, L., and Dana, B. F. 1974. Production of yellow bean mosaic in beans by virus from mottled gladiolus. *Science* 105:177-178.
7. Van Koot, Y., Van Slogteren, D. H. M., Cremer, M. C., and Camfferman, J. 1954. Virusverschijnselen in Freesias. *Tijdschr. Plziekt.* 60:157-192.
8. Zettler, F. W., and Abo El-Nil, M. M. 1977. Bean yellow mosaic virus infections of gladiolus in Florida. *Plant Dis. Rep.* 61:243-247.