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Dedicated to Prof. dr. MERCEDES WRISCHER on the occasion of her 70th birthday.

Short communication

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FIRST REPORT OF BEET MOSAIC POTYVIRUS ON SUGAR BEET IN CROATIA

NIKOLA JURETIĆ*

University of Zagreb, Faculty of Science, Department of Botany, Marulićev trg 20, 10000 Zagreb, Croatia

Beet mosaic potyvirus was found for the first time in sugar beet (*Beta vulgaris* var. *saccharifera*) in Croatia in the summer of 1998. Virus identification was based on reactions of diagnostic test plants, microscopic and submicroscopic virus cell inclusions and aphid transmission.

Key words: beet mosaic virus, sugar beet, Croatia

Introduction

Species of the genus *Beta* are recognized as sources of various viruses. A considerable number of viruses have been isolated from the species *Beta vulgaris* var. *saccharifera* (sugar beet) (ŠUTIĆ et al. 1999). One of the viruses occurring in this plant all over the world is beet mosaic potyvirus (BtMV). This virus belongs to *Potyviridae*, a taxonomic family of easily aphid-transmitted, filament-shaped and single-stranded RNA viruses (RUSSELL 1971). BtMV produces x-bodies in the cytoplasm and crystalline inclusions in the chloroplasts. Also, this virus produces submicroscopic cylindrical inclusions containing laminated aggregates (EDWARDSON and CHRISTIE 1991). BtMV causes a mosaic disease in sugar beet, red beet, spinach beet and spinach. Usually, this potyvirus occurs in the form of mild strains that do not cause significant economic damage in sugar beet or spinach. However, severe strains of BtMV that cause significant yield losses of sugar beet have been found as well (SHUKLA et al. 1994).

* Corresponding author: E-mail: nikola.juretic@public.srce.hr

In 1998, a virus causing mild mosaic on sugar beet in several fields in eastern Croatia was isolated. This preliminary report deals with its identification and some of its properties.

Material and Methods

In the summer of 1998 infected examples of sugar beet (*Beta vulgaris* var. *saccharifera*) with mild mosaic virus symptoms were found in fields near Županja (the eastern part of Croatia). The virus isolate, denoted MB, was transmitted mechanically to several test plants in the standard way. For further investigations the MB isolate was cleaned by the one lesion method using chlorotic local lesions of *Chenopodium quinoa*.

The light microscope investigations of cell inclusions were performed on living sugar beet plant material. For the study of the virus submicroscopic inclusions, small tissue pieces taken from the lower leaf lamina side of the infected sugar beet were fixed in 3 % phosphate-buffered glutar aldehyde (0.06 M phosphate buffer, pH 7.2) for 90 min at room temperature and post-fixed in 1 % OsO_4 in veronal acetate for 2 hours. After that the tissue was dehydrated through a graded ethanol series. Ultrathin sections were stained with uranyl acetate and lead citrate.

Aphid transmission tests were performed with the green peach aphid *Myzus persicae*. Before acquisition feeding (30 min) the aphids were starved for 4 hours. The inoculation feeding period lasted 20 min. In these tests sugar beet plants served as the source of the virus and also as plants for aphid inoculation. For aphid inoculation 5 individuals of wingless *M. persicae* were used per plant.

Results and Discussion

Symptoms on test plants

The isolate MB was readily mechanically transmitted to the following diagnostic plants: *Beta vulgaris* var. *saccharifera* (vein-clearing and mottling), *Spinacia oleracea* (systemic chlorosis and stunting), *Chenopodium amaranticolor* (chlorotic local lesions), *Chenopodium quinoa* (chlorotic local lesions), *Gomphrena globosa* (chlorotic local lesions). However, isolate MB could not be transmitted to *Nicotiana tabacum* cv. Samsun.

Aphid transmission

The virus isolate MB was easily transmissible by *Myzus persicae*. From 15 sugar beet plants included in the experiment 14 plants were infected by the aphid in the non-persistent way.

Inclusion bodies

The virus inclusions were studied by means of light and electron microscopes. Two months after inoculation amorphous bodies in the form of x-bodies were found in the epidermal cells of sugar beet. However, crystalline inclusions in the chloroplasts, which were described as a characteristic of BtMV, could not be observed.

The examined ultrathin sections of infected tissue revealed the presence of pin-wheel structures and laminated aggregates. Since the MB isolate produces pin-wheel structures with laminated aggregates (Figs. 1, 2), it belongs, because

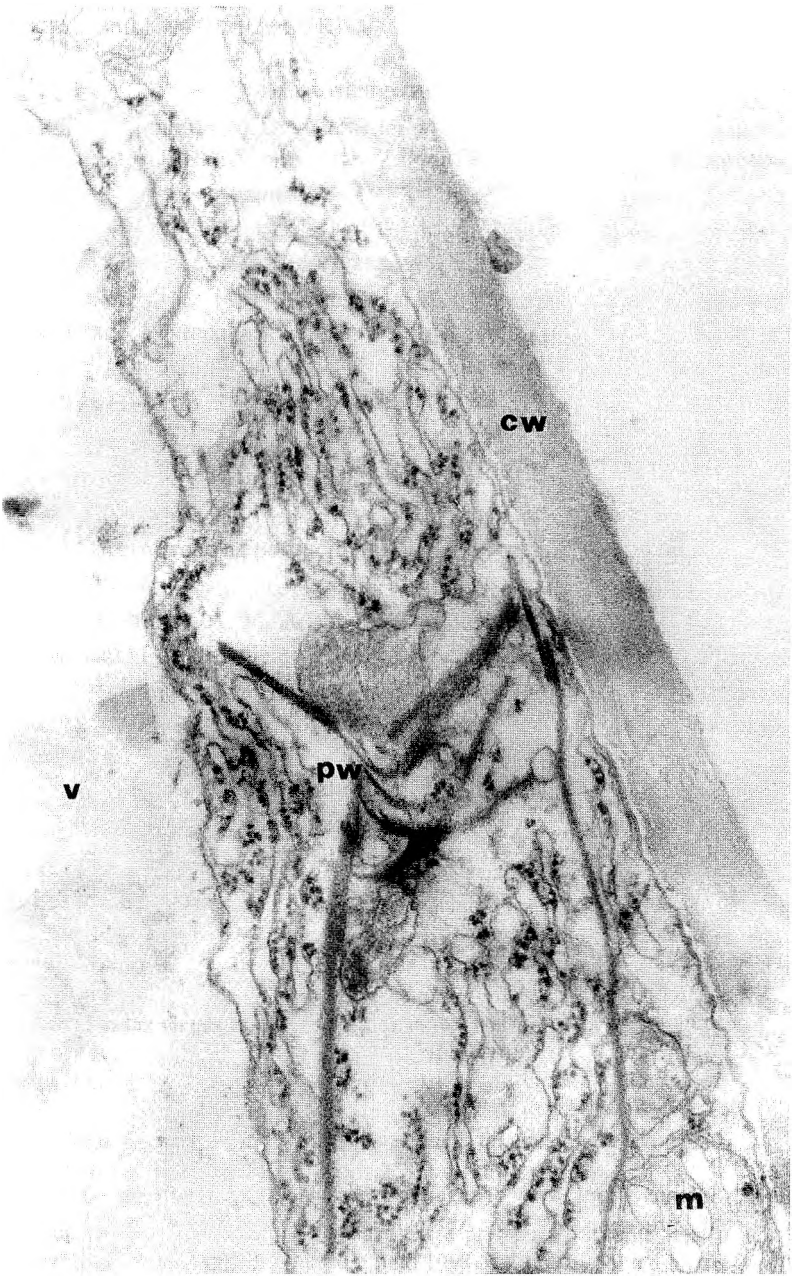

Fig. 1. Submicroscopic view of sugar beet leaf cells infected with the virus MB isolate: **cw** cell wall, **pw** pin-wheel structures, **la** laminated aggregate, **m** mitochondrion, **cl** chloroplast, **v** vacuole. Magnification: 48 000 ×.

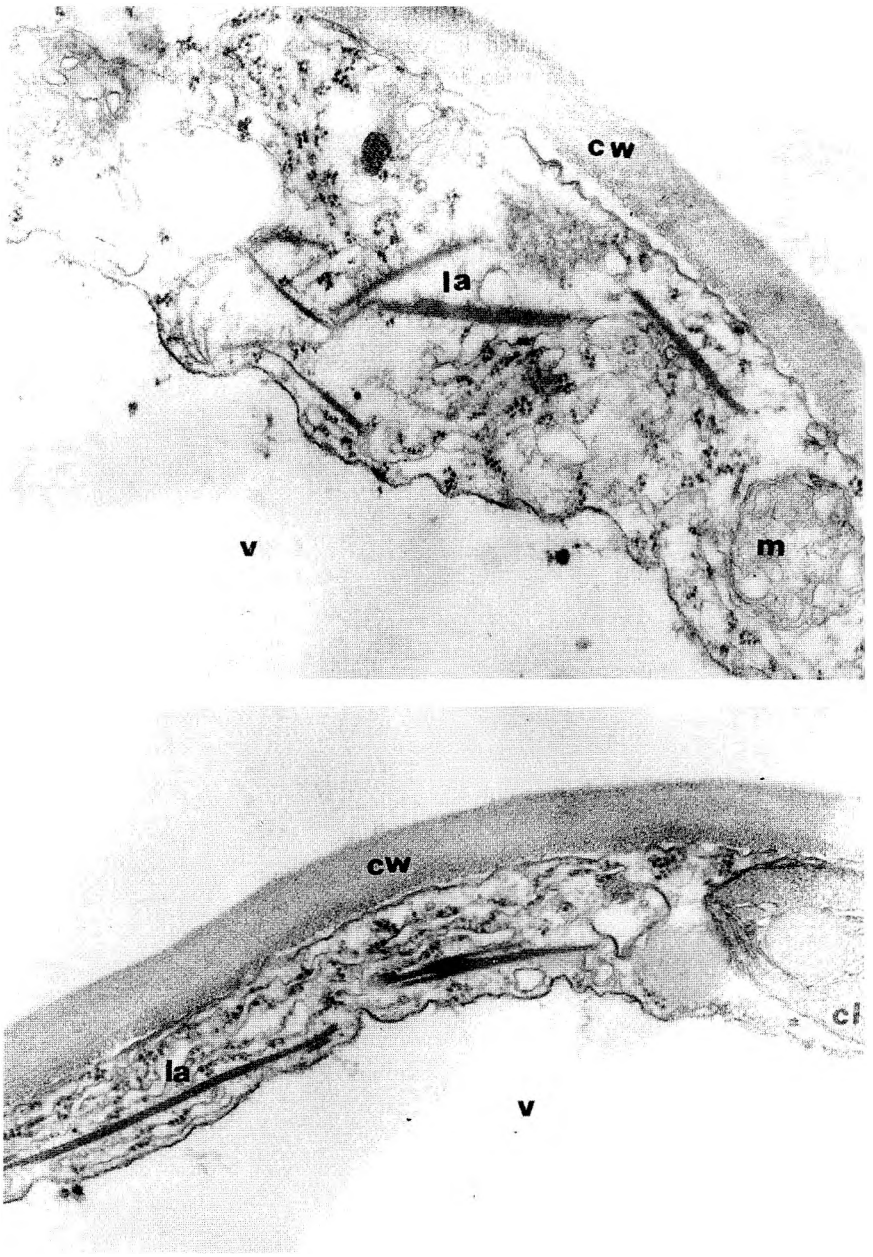

Fig. 2. Submicroscopic view of sugar beet leaf cells infected with the virus MB isolate. Magnification: 37 500 ×. Abbreviations: see Fig. 1.

of this property, to the second subgroup of potyviruses (EDWARDSON and CHRISTIE 1991; PLAVŠIC and ERIC 1984). These aggregates are often very long and similar to bands. Laminated aggregates sometimes form a cluster.

According to the data quoted above, it may be concluded that the MB isolate represents a variant of BtMV. Consequently, this is the first finding of BtMV in sugar beet in Croatia. BtMV has been revealed in sugar beet in many countries. Recently, isolates of that virus found in sugar beet were studied by ROGOV et al. 1991, AVGELIS and KATIS 1992 and KIYMAZ and ERTUNC 1996.

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Sažetak

Prvi nalaz virusa mozaika repe na šećernoj repi u Hrvatskoj

NIKOLA JURETIĆ

Sveučilište u Zagrebu, Prirodoslovno-matematički fakultet, Botanički zavod, Marulićev trg 20/II, 10000 Zagreb

Virus mozaika repe (potyvirus) izdvojen je prvi put iz šećerne repe u Hrvatskoj. Inficirane biljke nađene su u ljeto 1998. u nekoliko polja u blizini Županje. Biljke su pokazivale jedva primjetljivi mozaik. Identificiranje virusa izvedeno je na temelju karakterističnih simptoma na pokusnim biljkama, virusnih mikroskopskih i submikroskopskih staničnih inkluzija te na temelju neperzistentnog prijenosa lisnom uši *Myzus persicae*.