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COMMUNICATION I

Occurrence of a Mosaic Virus in Guava

ABSTRAK

Daun dari satu cabang pokok jambu jenis Burma Red telah didapati menunjukkan simptom mosaik yang selalu dikaitkan dengan serangan virus. Kajian mikroskop elektron terhadap sap dari daun yang diserang menunjukkan virus berbentuk isometrik mempunyai garis pusat berukuran 58-64 nm. Virus ini boleh disebarkan secara mekanik dari pokok jenis Burma Red kepada anak pokok jenis Kampuchea. Berdasarkan kepada simptom, virus ini boleh diberi nama virus mosaik jambu batu.

ABSTRACT

Leaves from a shoot of guava cv. Burma Red were found to exhibit mosaic symptoms typical of a virus disease. Transmission electron microscopic studies of the sap from infected leaves revealed an isometric virus particle with a diameter of 58-64 nm. The virus can be transmitted mechanically from cv. Burma Red to cv. Kampuchea seedlings. Based on the symptom, the virus can be tentatively designated as guava mosaic virus.

INTRODUCTION

Except for citrus trees, no virus disease has been reported on other woody perennial fruit trees in Malaysia (Ong and Doon 1988; Lim 1988). However, recently in March 1989, leaves of a shoot of the guava, *Psidium guajava* cv. Burma Red in the guava germ-plasm collection of MARDI, Serdang, was found to exhibit mosaic symptoms typical of a virus disease. A thorough scrutiny revealed that only one shoot from one tree displayed such symptoms. Old and young leaves of the infected shoot appeared deformed, puckered and rugose with dark and light green mosaic *(Fig. 1)*. The leaf margins were wavy and irregular, and some leaves were much reduced in size when compared to normal, healthy leaves. Five months later, a new infection with milder symptoms was detected on the young shoots of the same trees (cv. Burma Red) and on a few trees in adjacent rows of cvs. Kampuchea and Malaysia Seedless. Symptoms of rugose and puckered leaves were observed, but the mosaic symptoms were not as pronounced as those observed earlier on cv. Burma Red.

This paper reports the result of a study to confirm its viral identity.

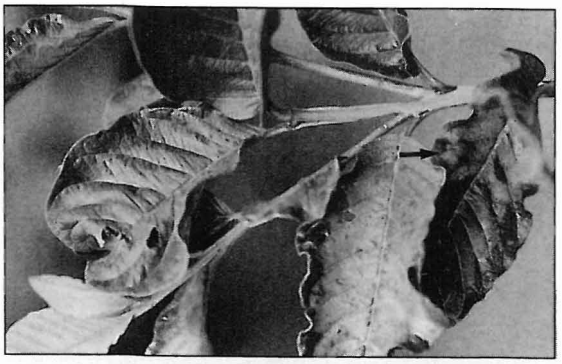

Fig. 1: Light green with rugosity and leaf deformation symptom on guava cv. Burma Red (arrow).

MATERIALS AND METHODS

Leaf sap extracted from leaves of cv. Burma Red, Kampuchea and Malaysian Seedless showing mosaic symptoms were used for electron microscopy. The sap was extracted by grinding in a mortar and pestle with 0.01 M Sorensen's phosphate buffer (pH 7). Formvar-carbon coated grids (300 mesh) were dipped in the sap and negatively stained in 2% aqueous uranyl acetate. The grids were viewed in a Phillips EM 400 transmission electron microscope. The diameters

of the virus particles were compared to a diffraction grating (2,160 lines/mm) and photographed at the same magnification. The procedures were repeated for the infected sap of the other cultivars.

For transmission studies, leaves, of each of the three cultivars showing mosaic symptoms, were separately ground in mortar and pestle with 0.01 M Sorensen's phosphate buffers (pH 7) and Carborundum 600. The leaf extract from each cultivar was rubbed separately onto young leaves of different healthy guava seedlings cv. Kampuchea. The excess sap was rinsed off the leaves and the seedlings were kept for 4-8 weeks for observation of symptom development.

RESULTS AND DISCUSSION

Transmission electron microscopic studies revealed the occurrence of large viral particles in the infected leaves of all three cultivars. The virus particle had a diameter of 58-64 nm (mean 60 nm), was isometric in shape and had an electron dense central area *(Fig. 2)*.

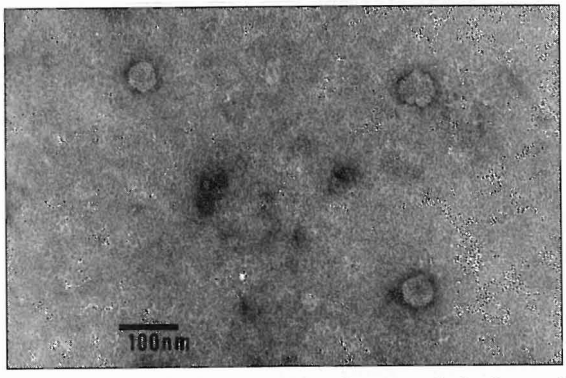

Fig. 2: Isometric virus particles from crude leaf sap of guava cv. Burma Red stained negatively with aqueous acetate. Bar is 100nm.

The virus from the leaves extract of cv. Burma Red was observed to be transmitted mechanically by wounding the leaves of cv. Kampuchea seedlings: symptoms appeared 4-6 weeks after inoculation. No virus-like symptom was seen on cv. Kampuchea seedlings inoculated with extracts from leaves of cvs. Malaysian Seedless and Kampuchea though virus-like particles were observed in the leaf extracts of the inoculum. This might suggest failure of mechanical inoculation or latent infection.

Based on the mosaic symptoms produced, the virus can be designated as guava mosaic virus and it can be tentatively classified under the caulimoviruses group as the size and the geometry of the virus particles subscribed to those described for this group by Hull (1984) and Francki *et al.* (1987). Caulimoviruses have been reported to be transmitted by sap inoculation and by aphids in a non-persistent and semi-persistent manner (Hull 1984; Franki *et al.* 1987). However, confirmation of this still needs further substantiation by nucleic acid analysis, serology, and host index transmission studies.

To the authors' knowledge, no virus disease has been reported on guava in the guava growing countries of the world. This represents the first record on the occurrence of virus infecting guava in the world. Spread of the disease was indicated by occurrence of new infections on plants around the original tree. We also observed that the workers used the same secateur for pruning from tree to tree and this could have invariably helped the spread of the virus from cv. Burma Red to adjacent trees of cvs. Kampuchea and Malaysian Seedless. This indicated that the virus could have been transmitted mechanically by pruning wounds with contaminated implements. This was further supported by the mechanical transmission tests on cv. Kampuchea seedlings using the extract from naturally infected leaves of cv. Burma Red.

The spread of virus diseases by contaminated implements from an infected tree to other trees constitute one of the most common means of virus disease spread. It follows thus, that the sterilization of such implements should be carried out by dipping in a detergent solution such as soap, trisodium orthophosphate or Clorox solution, or by dipping hands or pruning secateurs in milk in between pruning rounds from tree to tree as milk inactivates many plant viruses (Lucas *et al.* 1985) A more stringent measure would be to remove and destroy any tree showing symptoms of virus infection.

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