

# Strains of Citrus Tristeza Virus in the Philippines

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**ABSTRACT.** Stem pitting of pummelo caused by citrus tristeza virus (CTV) has become a problem in the Philippines and a study was conducted to identify the strains of CTV present in the islands. Field symptoms varied from severe stem pitting in 'Ladu' mandarin to no symptoms in other mandarins; leaf cupping, vein corking, stem pitting, and stunting in pummelo; and vein clearing on limes and calamansi (calamondin). Presence of CTV was confirmed by ELISA. Sample extracts from field trees reacted with a monoclonal antibody from serogroup CTV-D from Taiwan. Biological indexing showed varied symptoms in Key lime ranging from mild vein clearing with no stem pitting to severe vein clearing with severe pitting on stem and branches. No seedling yellows reaction was observed in sour orange indicator plants. These data indicated presence of both mild and severe strains of CTV in the Philippines.

There is an increasing problem of citrus tristeza virus (CTV) stem pitting on pummelo in the Philippines and a study was made to try to identify strains of CTV present. Field symptoms varied from vein corking and stem pitting in 'Ladu' mandarin to no symptoms in other mandarins. Leaf cupping, vein corking, stem pit-

ting and stunting are common symptoms in pummelo (Fig. 1). Vein clearing was observed on limes and calamansi (calamondin).

In 1990, budwood was collected from citrus in Luzon and Mindanao Islands where stem pitting is endemic and the pummelo is one of the primary varieties grown. A poly-



**Fig. 1.** Shortening of internodes and leaf cupping which resulted in dwarfing in pummelo caused by CTV.

clonal antiserum obtained from Dr. S. M. Garnsey (Orlando, FL) was used to confirm presence of CTV. In an attempt to identify the strains of CTV present, biological indexing was done to Key lime and sour orange indicator plants. Samples were also tested by ELISA using double antibody sandwich indirect (DAS-I) ELISA with 3E10, 4G12 and 10E3 monoclonal antibodies obtained from Dr. H. J. Su (Taipei, Taiwan).

Key limes inoculated from various pummelos showed varied symptoms ranging from mild vein clearing with no stem pitting to

severe vein clearing with severe pitting on stem and branches, suggesting presence of both mild and severe strains of CTV. The seedling yellows reaction was not observed in sour orange indicator plants.

Budwood collected from pummelo, grapefruit, Ladu and calamansi obtained from Davao, Batangas and Los Banos showed positive reactions with the three monoclonal antibodies assayed, indicating presence of CTV strains of the same serogroup of the CTV-D strain described by Su (1) as causing pummelo dwarf in Taiwan.

#### LITERATURE CITED

1. Su, H. J.  
1981. A tristeza virus strain causing dwarf of pummelo and grapefruit. *Proc. Int. Soc. Citriculture* Vol. 1: 423-426.