Citrus Tatter Leaf Virus in the Rio Grande Valley of South Texas

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ABSTRACT. The Rio Grande Valley of south Texas is one of the few citrus regions still with commercial plantings of Meyer lemon. Earlier reports suggested that some Meyer lemon trees were free of citrus tatter leaf virus (CTLV), possibly because they were propagated from the Riekert strain, thought by some to be a seedling. In this study, two budwood source trees and pooled samples from an orchard, all believed to be of the Riekert type, were indexed and found to be infected with CTLV. Furthermore, one budwood source tree was growing adjacent to two other budwood source trees, an Algerian tangerine and a Eureka lemon. Both of these trees also indexed positive for CTLV. The virus may have been mechanically transmitted to these trees from the Meyer lemon, and suggests that CTLV may be widespread in the area.

Citrus tatter leaf virus (CTLV) was first described in 1962 by Wallace and Drake (19) causing a symptomless infection of Meyer lemon. However, when inoculated into Troyer citrange and *Citrus excelsa,* it induced the tatterleaf symptoms. Since then, CTLV has been found in Meyer lemons in several other places (3, 4, 6). In 1975, Timmer (17) reported that during a tristeza survey of Meyer lemons in Texas using Mexican lime as indicator, a blotchy spotting and vein feathering appeared in one indicator. Such symptoms have been attributed to CTLV (20), and inoculation to *C. excelsa* and Troyer citrange confirmed its identity (17). Timmer (17) was unable to confirm the presence of CTLV in 14 other Meyer lemon trees, suggesting either that not all carry CTLV, or that non-detection was due to erratic transmission of the virus from Mexican lime. Roistacher (13) has reported evidence of strong inhibitory or filtering effect of Mexican lime on CTLV. The existence of naturally-occurring CTLV-free Meyer lemon trees has been reported from Florida (7).

While CTLV is symptomless in Meyer lemon and most other citrus types, it is an important virus because it is readily transmitted mechanically (6, 15), and trifoliate orange and its hybrids are sensitive to it. In Japan (10, 12) and China (9), a serious budunion crease and associated decline of trees on trifoliate rootstock is attributed to CTLV, as was a decline of sweet orange on Swingle citrumelo rootstock in South Africa (11). In China it was found symptomless in almost all the trees in Zhejiang province (21).

The Rio Grande Valley of south Texas has long been known as one of the few places with commercial plantings of Meyer lemon (5), and since New Zealand and Algeria had decreasing plantings 30 years ago (1), Texas and Florida (7, 8) are now possibly the only citrus regions currently with commercial plantings, although it is grown elsewhere as an ornamental. Most nurseries in the Valley have a budwood source tree and young trees for sale. The question, therefore, arose as to whether Meyer lemon trees in the Rio Grande Valley are generally infected with CTLV, and whether the virus has been transmitted to other citrus types. Some evidence that this may have occurred was presented by Rouse and Wutscher (16) who reported that old-clone red grapefruit trees on Swingle citrumelo developed a budunion crease resembling that caused by CTLV.

MATERIALS AND METHODS

To test whether CTLV is commonly present in Texas Meyer lemons, budwood was collected from trees in a Meyer lemon orchard, and from budwood source trees in two nurseries, and budded onto either Troyer citrange or *C. excelsa* seedlings in a greenhouse. From the 8-ha planting, five sites were selected in the orchard, and budwood from 12 trees at each site were pooled. For each pooled sample, two Troyer citrange plants were inoculated with four buds taken from different budsticks.

The two budwood source Meyer lemon trees were indexed for CTLV by inoculating two *C. excelsa* seedlings with two buds each. In addition, these two sources were each budded onto a Mexican lime seedling, as Timmer (17) had done. The one Meyer lemon tree was growing closely adjacent to two other budwood source trees, an Algerian tangerine and a Eureka lemon, and they were similarly indexed for CTLV using *C. excelsa*. Three *C. excelsa* seedlings were inoculated with CTLV-100 as a positive control. All the inoculated plants were observed for symptoms in the new growth.

RESULTS AND DISCUSSION

All five samples from the 8-ha orchard induced CTLV symptoms in Troyer citrange. The two budwood source Meyer lemons as well as the Eureka lemon and the Algerian tangerine indexed positive for CTLV, but no symptoms appeared in the Mexican lime seedlings inoculated with the Meyer lemon tissue. The positive control *C. excelsa* plants developed typical tatter leaf symptoms.

As has been found elsewhere, except Florida (6), all Meyer lemon trees which have not undergone thermotherapy carry CTLV. The non-appearance of symptoms in the Mexican limes is similar to earlier findings (17) where only one source gave symptoms, but this should not be interpreted as meaning the Meyer lemon tree is free of the virus.

Our findings clearly indicate that the suggestion that the Riekert strain of Meyer lemon may be a seedling and, thus, is largely CTLV-free (17) is false. Since all Meyer lemons in the lower Rio Grande Valley are thought to be derived from the Riekert strain (18, and R. A. Hensz, pers. comm. 1995), initial CTLV spread was likely from the nursery.

The finding of CTLV in the Algerian tangerine and Eureka lemon budwood source trees growing adjacent to an infected Meyer lemon tree clearly illustrates the danger of having CTLV-infected material in a nursery. It is not unreasonable to presume that the virus was transmitted mechanically to these trees from the Meyer lemon, and that similar transmissions may have occurred in other nurseries in Texas. The appearance of a budunion crease in grapefruit on Swingle citrumelo (16) indicates that this has occurred, and that the virus may be more widespread in the area.

Tatter leaf-free Meyer lemon can be obtained via thermotherapy alone (2, 14) or in combination with shoot tip grafting (10), and, since this cultivar is grown commercially in Texas, it is vital that a virus-free source is established for nurseries. In addition, it is possible that tristeza tolerant rootstocks, some of which are sensitive to CTLV such as the citrange and citrumelo, will replace sour orange in the future because of the possible spread of severe isolates of tristeza. Thus, it is vital that CTLV-free budwood of all varieties be available. Virus-free Meyer lemon sources trees have been obtained from California and CTLV-free budwood is now available in Texas.

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