MANAGEMENT OF CITRUS LEPROSIS

Elliot Watanabe KITAJIMA

Luiz de Queiroz Agriculture School / University of São Paulo (ESALQ/USP)

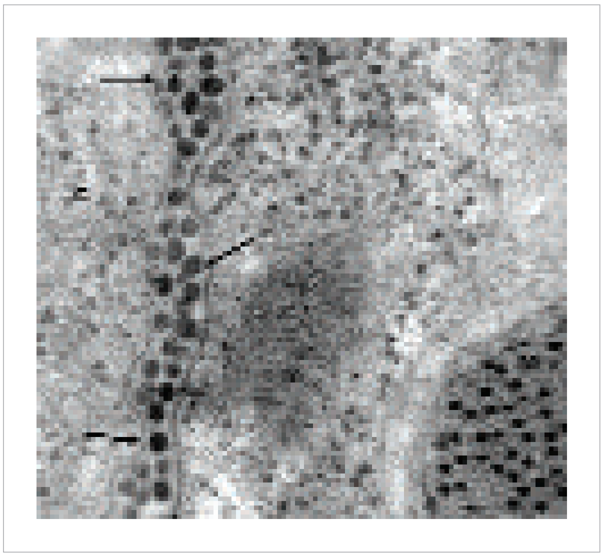

Figure 1. Transmission electron micrograph of particles of CiLV-C (arrows) between membranes of caeca epithelial (C) and intersticial (I) cells near the prosomal glands of a viruliferous Brevipalpus phoenicis *adult female. M- muscle cell; m- mitochondrion*

Leprosis is considered one of the main citrus diseases in Brazil. It is caused by a virus transmitted by the polyphagous and cosmopolitan tenuipalpid mite *Brevipalpus sp.*

This mite has been the main target for the control of leprosis, essentially by large scale use of chemical acaricides, resulting in high financial and environmental cost, which could be much smaller with a rational disease management in the field. In the last ten years, impressive progresses have been made on the understanding of the citrus leprosis pathosystem including molecular tools for virus detection, viral genome,biology of the mite vector, geographic distribution of the disease, genetic resistance, host range and natural predation, etc. This project intends to use the available information to implant new integrated and cost effective leprosis management concentrating the control in the prevention of the virus entry and localized control of the focus, playing with all parts of the pathosystem chain. These comprehensive, multidisciplinar and multinstitutional works include evaluation of the lesion type as source of inoculum for the mite, the efficiency of different pruning type associated with the use of acaricides and its cost/benefit, the mite population in organic orchards, the spatial distribution of the mites in the field, the role of alternative hosts on the epidemiology, the resistance of different citrus types, of the virus/vector relationship, and the role of predator mites on the population of *Brevipalpus* mites.

SUMMARY OF RESULTS TO DATE AND PERSPECTIVES

Some of the subprojects have already produced relevant informations. The effects of pruning combined with chemical control, started in 2003, clearly have indicated that a light pruning combined with acaricides (spirodiclofen and cyhexatin) is more cost effective. Turk's hat (*Malvaviscus arboreus*), among the plants used as wind break in citrus orchard, is susceptible to *Citrus leprosis* virus C (CiLV-C) and excellent host for *B. phoenicis* mites under field conditions. This plant may play a role on the epidemiology of this virus. Transmission electron microscopy led to the detection of CiLV-C particles in the mite tissues, confirmed by *in situ* immunolabeling. The pattern viral distribution within the mite body is suggestive of a circulative rather than circulative/propagative type of virus/vector relationship. The use of bean (*Phaseolus vulgaris*) as indicator plant results in necrotic local lesions five days after infestation by mites viruliferous for CiLV-C. This permitted the establishment of some parameters as the virus acquisition, inoculation feeding period and efficiency of viral acquisition by the vector. Experimental infection was achieved also on *Arabidopsis thaliana,* which will open opportunities to follow the gene activation and metabolic changes during the infection process. A retrospective study, based on published images and samples kept in herbarium, strongly suggests that the citrus leprosis that occurred in Florida might have been of the nuclear (CiLV-N) rather than cytoplasmic type. A study on the variability of the CiLV-C from varied origins (Argentina, Bolivia, Colombia, Panama, Costa Rica, Mexico and several parts of Brazil) have indicated that genetic variability of this virus is rather low.

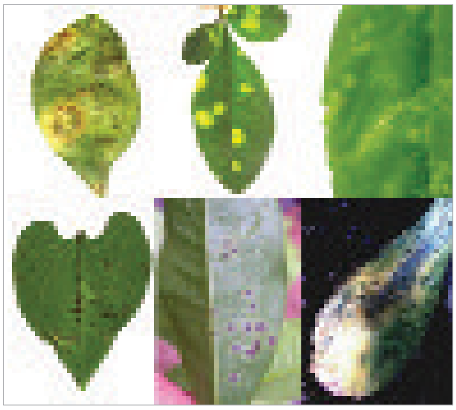

*Figure 2. Localized leaf lesions caused by CiLV-C in natural (A-Valencia sweet orange; B-*Swinglea glutinosa*) and experimental (C-*Hibiscus rosa sinensis*; D-*Phaseolus vulgaris*; E-*Glycosimis pentaphyla*; F-*Arabidopsis thaliana*) infection*

MAIN PUBLICATIONS

Bastianel M, Novelli VM, Kitajima EW, Kubo KS, Bassanezzi R, Machado MA, Freitas-Astua J. 2010. Centennial of an unusual mite-virus pathosystem. *Plant Disease.* **94 (3)**: 284-292.

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Leon MG, Becerra CH, Freitas-Astua J, Salaroli RB, Kitajima EW. 2008. Natural infection of *Swinglea glutinosa* by the *Citrus leprosis* virus cytoplasmic type (CiLV-C) in Colombia. *Plant Dis.* **92(9)**: 1364. 2008. [chosen as "key research" by the journal].

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Elliot Watanabe Kitajima

Escola Superior de Agricultura Luiz de Queiroz (ESALQ)
Universidade de São Paulo (USP)
Caixa Postal 9
13418-900 – Piracicaba, SP – Brasil

+55-19-3429-4405
ewkitaji@esalq.usp.br