Tristeza in French Polynesia

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ABSTRACT. Citrus tristeza virus was observed for the first time in Tahiti and the adjacent islands of Moorea, Huahine and Raiatea in 1977. Eighteen years later, the phytosanitary status was assessed and extended to other archipelagos of French Polynesia. *Toxoptera citricida* was found to be limited to Windward and Leeward Islands where severe strains of tristeza are endemic. The Marquises archipelago was found tristeza-free although *Aphis spiraecola* colonies commonly develop on citrus trees there. The Australes archipelago (Rurutu) is free of both tristeza virus and vector.

French Polynesia covers a vast territory of 4 million km² of which only 1% is occupied by islands. There are six major archipelagos: Windward Islands (Tahiti, Moorea), Leeward Islands (Raiatea, Huahine, Taha, Bora-Bora), Tuamotu (72 islets), Gambier (12 islands), Marquises (12 islands) and Australes (4 islands). The Polynesian civilization which emerged in Marquises two millenia ago has always used the key lime (probably obtained from the West). It is only with the visit of Captain Cook that oranges were introduced as seeds. At the end of the last century, Tahiti was exporting 1,700 tons of oranges per year to California (4). In the early 1920's, pummelo and mandarin seeds were introduced from Asia. More recently, in 1976, budsticks of 19 cultivars were introduced into Tahiti from the Station de Recherches de San Giuliano (SRA) in Corsica (6) together with citrange and volkameriana rootstocks. The Service de Développement Rural of Tahiti (SDR) established a foundation stock and developed a nursery for supplying elite citrus plants to growers. Unfortunately, at the same time some planting material was fraudulently introduced from the Cook Islands by private owners. This material was contaminated by tristeza and infested with the brown citrus aphid, *Toxoptera citricida* (Kirkaldy). Vogel, who had carried out a first survey in 1975 (5), concluding that Tahiti and the neighbouring islands were tristeza-free, but returned to the area in 1976 (6) and 1978 (7) for witnessing the extent of tristeza outbreaks. Since then no official survey had been made and the tristeza status was not clear in the other archipelagos. This paper gives the result of a recent inspection carried out in August 1995.

Our survey comprised the four major archipelagos: Windward and Leeward Islands, Marquises and Australes. The detection of tristeza was conducted as follows: i) scouting the key lime trees to observe the presence or absence of vein clearing and stem-pitting, ii) inspecting the trees grafted on sour orange, iii) sampling young shoots and analyzing them by direct tissue blot immuno assay DTBIA (2), and iv) collecting aphids for taxonomic identification.

Special attention was paid to the Marquises and Australes. In the former archipelago, 157 lime trees, 609 orange trees grafted on sour orange and 143 pummelo trees were inspected and 118 DTBIA analyses carried out following the technique of Garnsey et al (2). In the latter archipelago, a similar sample was conducted covering the inspection of 120 adult trees in addition to 50 DTBIA assays.

French Polynesia can be divided into two groups of islands: 1) tristeza-free; or 2) tristeza infected.

The tristeza infected area included the Windward and Leeward Islands, with a total of 6 main islands, where *T. citricida* is now endemic and where severe strains of tristeza are commonly found. Trees of a local pummelo are severely affected by stem pitting and inverse stem pitting with short internodes, brittle wood, and very poor yield. This is reminiscent of the CTV strain described by Tsai et al. (3) in Taiwan. Key lime trees are exhibiting severe to very severe stem-pitting. In the tristeza-free area, no budwood has apparently circulated from contaminated territories and, as a result, all the DTBIA tests carried out in the Marquises and Australes were negative, and no vein clearing nor stem pitting could be found on key limes. Moreover, in the Marquises sizable orange groves grafted on sour orange are performing well. While the Australes were found citrus-aphid-free, the Marquises are hosting *Aphis spiraecola* Patch but without CTV.

Strict quarantine measures are now enforced for avoiding the movement of citrus plants and budwood from the Windward or Leeward Islands to the other Eastern or Southern archipelagos. Two foundation blocks were recently established with SRA budwood taken from Corsica. The largest foundation block is in the Island of Ua Huka (Northern Marquises) and comprises 103 cultivars. A second foundation block established in Rurutu (Australes) is comprising 24 seedless easy-pealing mandarins. The above islands will be entitled to send registered budwood to other islands of French Polynesia but only after a yearly inspection that will guarantee the tristeza-free maintenance of the foundation blocks.

There is a project of sending to Ua Huka an efficient parasite of *Aphelinus spiraecolae* Evans and Schauff (1). This will be made after quarantine in Antibes (continental France).

Finally, cross protection will be necessary to protect the key lime productions of Windward and Leeward Islands. An eradication campaign is also being launched for eliminating the very severe strain found on local pummelo.

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