

## Presence of Citrus Tristeza Virus in Albania

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**ABSTRACT.** To assess of the sanitary status of the Albanian citrus industry, a survey for citrus tristeza virus (CTV) was carried out in the main citrus-growing areas of the country. Samples were collected from commercial groves and from the varietal collection of the Pomology Institute of Vlore and analyzed by immunoprinting and DAS-ELISA. Nineteen of 543 trees tested were CTV-infected; 12 came from commercial groves (including varieties satsuma, mandarin and sweet orange) and seven from the varietal collection (including Washington navel orange, Meyer lemon, Diamante citron and Miagawa satsuma). When indexed by graft-transmission, all CTV isolates induced severe vein clearing, leaf cupping and stem pitting symptoms in Mexican lime seedlings. No clear-cut symptoms of CTV were apparent in any of the infected trees in the field. This condition and the fact that CTV-positive plants had a random distribution in the groves, can be taken as an indication that currently, there are no CTV outbreaks in Albania. However, as CTV is present in the country, the eradication of the infection foci becomes a priority which will be dealt with in a cooperative project between Italy and Albania for the establishment of a certification program.

Citrus is one of the most important fruit crops in Albania and is grown primarily in the southwestern area along the Ionian Coast up to the border with Greece. A dramatic decrease in the acreage of this crop has taken place because of political and economic factors. In 1990, the cultivated areas dropped from about 2,500 ha to 500 ha when many citrus plantations were abandoned (1). Cultivars obtained from other countries are more widespread than local varieties, and they are mostly grafted onto sour orange rootstock. Sweet orange (Tarocco, Washington navel, Moro, thin-rind and thick-rind local varieties) represents nearly 70% of the total citrus, followed by mandarin (Avana) and lemon (Femminello S. Teresa, Interdonato and Babali).

Little is known about the sanitary status of citrus, especially concerning virus and virus-like diseases. Citrus tristeza virus (CTV) can be one of the most devastating diseases of citrus in the Mediterranean where it has caused serious damage to the Spanish and Israeli citrus industries, killing millions of trees on sour orange rootstock (6). With this in mind, a project between Italy and Albania for the "Production, Conservation and Use of Certified Propagative Material for the

Establishment of a Qualified Nursery Activity in Albania" was developed and a survey for CTV was conducted in the main Albanian citrus-growing areas. The results of this survey are reported here.

### MATERIALS AND METHODS

Field surveys were carried out in November, 1997 and June, 1998 in commercial orchards of the main citrus-growing areas and in the varietal collection at the Pomology Institute of Vlore which is located partly in the open field and partly in a greenhouse. Samples (10-15 cm long apical budsticks) were collected from each of the 62 trees in the varietal collection and 481 trees were sampled randomly from commercial groves. Trees of different varieties and ages were sampled. Preference was given to the varieties of satsuma, Meyer lemon and kumquat, which are known to be symptomless CTV carriers and were likely imported from Spain and/or Turkey where CTV is present.

All the samples were analyzed for CTV by immunoprinting (2) using a commercial kit (Plantprint, Spain) and by DAS-ELISA (3) using a monoclonal antiserum (Direction des Domaines Agricoles, UCP, Morocco). Positive samples were

TABLE 1  
CTV INCIDENCE IN COMMERCIAL ORCHARDS AND IN A VARIETAL COLLECTION OF  
CITRUS IN ALBANIA

Area	Species/Cultivars	Trees surveyed		
		Test	Infected	%
<b>Groves</b>				
Elbansa	Sweet Orange	51		
	Mandarin	105	4	4
Vlore	Clementine	69		
	Mandarin	3		
	Satsuma	21		
	Lemon (Meyer, Femminello S, Teresa, Interdonato)	42		
	Sweet Orange (Moro)	6		
Durres	Sweet orange	50	1	2
Lushnja	Satsuma	92	7	8
	Sweet orange (Tarocco, Moro, Jaffa, Thin-rind, and Thick-rind local variety)	32		
Himara	Mandarin (Common)	6		
	Lemon (Interdonato and local variety)	4		
		481	12	2
<b>Varietal Collection, Vlore</b>				
	Sweet Orange (Tarocco, W. Navel, Ovale calabrese, Jaffa, Thin-rinded; Thick-rinded, Pandalimon, local variety)	16	1	6
	Mandarin (Common Cleopatra)	2		
	Clementine	2		
	Satsuma	4	1	25
	Lemon (Meyer, Eureka, Femminello S. Teresa, Interdonato, local Gaxhgau and Babalie, Nelkamarian)	15	3	20
	Citron (Diamante and local Borshi)	5	2	
	Lime (Israeli variety)	1		
	Kumquat	1		
	Rootstocks (Trifoliolate orange, Carrizo citrange, Troyer citrange, Cleopatra mandarin, Citrumela, Rubidoux, Israeli hybrids)	16		
		62	7	11
Total trees		543	19	3

also grafted into Mexican lime and held at 24°C (6). Observations were made by electron microscopy of virus particles from concentrated, partially purified extracts from cortical scrapings (5).

## RESULTS AND CONCLUSIONS

As shown in Table 1, 19 of 543 trees were CTV-positive by serological tests, 12 from commercial groves and seven from the varietal collection. One mo after graft inoculation, all Mexican lime seedlings inoculated from CTV-infected plants

induced strong vein clearing and cupping of the leaves and, 4 mo later, severe stem pitting was observed. In addition, closterovirus-like particles were observed under the electron microscope.

The 12 samples which were CTV-positive were from satsuma, mandarin and sweet orange from three of the five areas surveyed. The seven CTV-positive trees from the varietal collection included Washington navel sweet orange, Meyer lemon, Diamante citron and satsuma. The incidence of infection by variety was satsuma (6.9%), lemons (4.9%), man-

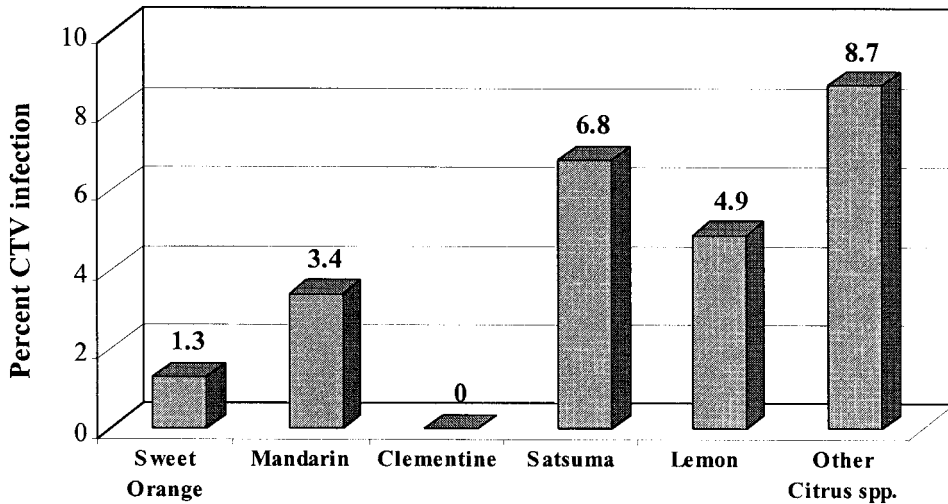


Fig. 1. Percent citrus tristeza virus infection in citrus species during a survey conducted between 1997 and 1998.

darins (3.4%), sweet oranges (1.3%) and other *Citrus* spp. (8.7%) (Fig. 1).

These results are the first report that CTV is present in Albania. It is likely that CTV entered Albania through infected plants imported from other countries. Most of the CTV-positive trees were in abandoned groves where it was difficult to clearly determine the presence of CTV decline. Trees in the varietal collection were too young to display symptoms. Considering that most of the citrus propagating budwood is taken from this collection and grafted

onto sour orange rootstock, and that the aphid vectors *Aphis gossypii* and *Toxoptera aurantii* are present in the country (4), an immediate mandatory eradication program is therefore needed in view of the proposed establishment of a citrus certification program for Albania (7).

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