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Stamo B., D'Onghia A.M.

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INVESTIGATIONS ON CITRUS PSOROSIS VIRUS (CPsV) AND CITRUS INFECTIOUS VARIEGATION VIRUS (CVV) IN ALBANIA

B. Stamo
Plant Protection Institute, Ministry of Agriculture
Durres- Albania

A.M. D'Onghia
CIHEAM/Mediterrannean Agronomic Institute
Valenzano, Bari - Italy

SUMMARY - Sanitary problems are surely affecting citrus in Albania, but a few reports are available, which were only based on visual inspections. The monitoring by the use of ELISA, which has already been carried out for CTV, has been conducted for the detection of CPsV and CVV. The low virus infection of CPsV (2.3%) and CVV (2.9%) indicates that these viruses do not represent a real threat to the citrus industry because they can be significantly reduced by the establishment of a certification program.

Key words: Citrus, citrus psorosis virus, citrus infectious variegation virus, ELISA, Albania.

RESUME - *Même si l'agrumiculture albanaise affiche plusieurs problèmes sanitaires, peu d'études sont disponibles. Le monitorage par le test ELISA, déjà réalisé pour le CTV, a été mené pour la détection de CPsV et CVV. Le taux d'infection limité au CPsV (2.3%) et au CVV (2.9%) indique que ces virus ne représentent pas une menace pour l'agrumiculture vu qu'ils peuvent être éliminés à travers un programme de certification.*

Mots clés*: Agrumes, virus de la psorose des agrumes, virus de la panachure des agrumes, ELISA, Albanie.*

INTRODUCTION

In Albania, citrus production is located in the South-Western part of the country along the Ionian coast, which enjoys favorable climatic conditions.

Despite the sharp reduction in the citrus growing area due to political and economic factors, citrus still remains one of the most important fruit crops in the area.

Several occasional reports have repeatedly highlighted the presence of serious sanitary problems affecting citrus in Albania (Kaltani and Stani, 1973). This was based on visual observations alone, except for citrus tristeza virus (Stamo *et al*., 1999; 2000). Virus and virus-like diseases are expected to be relatively widespread due to the absence of quarantine controls and proper sanitary indexing of propagative material.

CPsV, an ophiovirus widely spread in all citrus growing countries worldwide, inducing symptoms in most citrus species (Roistacher, 1991; Milne, 1998), and CVV, an ilarvirus which is apparently less spread than CPsV (Roistacher, 1991), are both considered 'quality pathogens', therefore included in the list of the agents to be controlled in the certification programme.

ELISA was successfully used in the detection of CVV (Davino *et al*., 1984) and of CPsV (Potere *et al.,* 1999), therefore a ring test programme was set up in the framework of the activities of the CIHEAM/Mediterranean Research Network on Certification of Citrus (MNCC), aimed at evaluating the performances of the ELISA kits available in the market.

This paper reports the results of a survey in the main citrus growing areas of Albania to assess the presence of citrus psorosis virus (CPsV) and citrus infectious variegation virus (CVV) by the use of ELISA.

MATERIALS AND METHODS

Sampling, which included the main citrus species (orange, lemon mandarin), was conducted in commercial orchards in the Southern part of Albania, during the Spring when symptoms of viral origin are showing.

Serological assays by the use of ELISA were carried out for 350 trees randomly selected and from trees showing psorosis-like symptoms (bark scaling, leaf mottling, discoloration, ringspot, etc).

ELISA was carried out following the protocols of the commercial kits against CPsV (Potere *et al.,* 1999) of Agritest, Italy and against CVV (Zemzami, unpublished data) of Domaines Agricoles UCP, Morocco.

Extracts were prepared from young and mature leaves for both viruses. Approximately 0.5 g of plant material was homogenized with 5ml of extraction buffer (Polyvinylpyrolidone 2%, egg albumin 1%, 0,05% Tween 20 in PBS 1X, pH 7,4) . The results were considered positive when the value was 3 times higher than the healthy control. Positive and negative controls were included in all assays.

RESULTS AND DISCUSSION

Field symptoms were generally difficult to observe and associate with the presence of specific viruses due to the poor growth of visited orchards, most of them abandoned. Bark scaling, symptomatic for psorosis infection, was observed in the trunk of sweet oranges. Variegation and crinkle-like symptoms were observed in lemons and sweet oranges, whereas mottling and flecking were rarely seen due to the high nutritional deficiencies present on leaves of most of the trees (Fig.1).

Fig. 1. Typical Albanian citrus grove showing clear nutritional deficiencies

In this study, ELISA was shown to be very successful in the detection of both viruses, thus indicating the importance of using this rapid assay within a certification program as complementary to the traditional biological indexing.

As shown in Table 1, the incidence of infection for both viruses was found to be low for all tested species. Sweet oranges were the most infected by both viruses at 5% and 3.6% for CVV and CPsV, respectively, whereas mandarins were apparently found to be free. The rate of infection for both viruses in lemon was at 2.5 %.

Table 1. Occurrence of CPsV and CVV in citrus species in Albania

Citrus source	CPsV		CVV	
	Samples tested/infected	%	Samples tested/infected	%
Sweet orange (Tarocco, Moro, Washington navel, local thin-rinded and-thick rinded)	138/5	3.6	138/7	5
Mandarin (Common)	93/0	0	93/0	0
Lemon (Femminello, S. Teresa, Interdonato, local Gaxhgau and Babaliu)	119/3	2.5	119/3	2.5
TOTAL	350/8	**2.3**	350/10	**2.9**

These preliminary results provide a picture of the presence and incidence of CVV and CPsV which was not dramatic, probably due to the fact that Albania has been closed to any exchange of citrus budwood or plants with other countries for many years and most of the tested varieties were native. Beside CTV, which was previously detected, CPsV and CVV do not represent a real threat to the citrus industry because they can be significantly reduced by the establishment of a certification program of citrus propagating materials.

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