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Bonavia Gatt M., D'Onghia A.M.

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SEROLOGICAL INVESTIGATIONS ON THE MAIN CITRUS VIRUSES IN MALTA

M. Bonavia Gatt
Plant Health Division, Micropropagation Centre,
Lija - Malta

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

SUMMARY - Detection of the main citrus viruses (CTV, CPsV and CVV) was firstly carried out in the main citrus groves of Malta. CTV was not detected whereas CPsV and CVV were the only pathogens and diseases infecting citrus groves.

Key words: Citrus, citrus tristeza virus, citrus infectious variegation virus, citrus psorosis virus, ELISA, DTBIA, Malta

RESUME - *La détection des principaux virus des agrumes (CTV, CPsV et CVV) a été réalisée pour la première fois, dans les principaux vergers d'agrumes de Malte. Le CTV n'a pas été détecté alors que le CPsV et le CVV se sont avérés les seuls pathogènes et maladies qui infectent les agrumes.*

Mots clés*: Agrumes, virus de la tristeza des agrumes, virus de la panachure infectieuse des agrumes, virus de la psorose des agrumes, ELISA, DTBIA, Malte.*

INTRODUCTION

The citrus production area in Malta covers approximately 74.5 ha (Census of Agriculture, 1990-1991). In the year 2000 the yield totaled 640 Tons (Central Office of Statistics - Malta, pers. comm). The whole of the production is for local consumption. The most commonly cultivated species include sweet oranges (Washington navel, Valencia and Tarocco) and lemon.

To date no report on the sanitary status of the local citrus industry had ever been drawn up. In 1999, within the framework of the ongoing project 29 as part of the IV Italian-Maltese financial protocol, a survey was carried out in the Maltese citrus groves and gardens with a view to gathering first-hand information on the presence of the main citrus viruses, citrus infectious variegation virus (CVV**),** citrus psorosis virus (CPsV) and citrus tristeza virus (CTV). All these pathogens are graft-transmissible and they are present in most Mediterranean citrus growing countries. CTV is also vector transmitted by different aphis species (D'Onghia *et al.,* 1998); it surely represents the most serious threat to the citrus groves, having already damaged the citrus industry of Israel and Spain (Raccah *et al.,* 1976; Moreno *et al.,* 1988; Roistacher, 1991).

The survey could also provide the CIHEAM/Mediterranean Research Network on Certification of Citrus (MNCC) with useful data concerning the performance of the ELISA kits for CPsV and CVV detection, recently introduced in the market.

MATERIALS AND METHODS

The surveys were carried out in the main citrus growing areas in Malta, including a number of public and private gardens, commercial orchards and nurseries.

Samples (budwoods and leaves) were randomly collected from 350 trees in December, when the mean temperature ranged between 18 and 22°C and some symptoms of the surveyed pathogens could be observed (psorosis leaf ringspot and bark scaling, CVV leaf yellowing and crinkle).

Serological assays were carried out by (i) DAS-ELISA (Clark and Adams, 1977) using commercial antisera against CTV (Bioreba, France), CVV (*Domaines Agricoles*, Morocco) and CPsV (Agritest, Italy); (ii) DTBIA (Garnsey *et al.,* 1993) for CTV using commercial kits (Plantprint Diagnostics, Spain).

RESULTS AND CONCLUSION

Results of serological assays showed that no CTV positive finding was yielded by ELISA and DTBIA whereas 10% (13 samples) and 0.8% (1 sample) infection was reported for CPsV and CVV, respectively.

Two out of the 13 CPsV-positive trees (Tarocco and Valencia oranges) showed bark scaling and leaf mottling. The CVV-infected tree was a very old sweet lime with severe leaf yellowing, variegation and crinkle (Fig. 1).

The ELISA kit for the identification of CPsV was able to detect symptomatic and latent virus infections, whereas the CVV kit could only detect a severe symptomatic tree.

By these preliminary assays and field inspections CPsV and CVV are apparently the only viruses infecting citrus in the Maltese islands, whereas CTV is apparently not present. Apart from the severe field symptoms of few trees, virus infection is very low. Hence, stringent prevention measures are required to avert the virus introduction, given its widespread dissemination in the surrounding Mediterranean countries (Djelouah and D'Onghia, 2001; Bové, 1995). This can be achieved by complementing the existing quarantine services with annual surveys for CTV monitoring and advisory work. Moreover, the establishment of a certification programme will easily control all graft transmissible pathogens and diseases affecting citrus, among which CPsV and CVV are the major to concern about.

Fig. 1 . Leaf yellowing in local sweet lime

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