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International Organization of Citrus Virologists Conference Proceedings (1957-2010)

Title

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Permalink

<https://escholarship.org/uc/item/7vg1t6x8>

Journal

International Organization of Citrus Virologists Conference Proceedings
(1957-2010), 15(15)

ISSN

2313-5123

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Publication Date

2002

DOI

10.5070/C57vg1t6x8

Peer reviewed

Psorosis Bark Scaling on Tarocco Sweet Orange

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ABSTRACT. Tarocco sweet orange has been cultivated in southern Italy for many centuries, but despite the occurrence of leaf flecking, psorosis bark scaling has never been reported. However, during recent surveys in Calabria and Sicily, bark scaling was observed in 14% of the 10-yr-old Tarocco trees in an orchard in Sicily derived by topworking Clementine trees with budwood from symptomless 19-yr-old trees. Samples were collected and tested by ELISA for *Citrus psorosis virus*. The ones with bark scaling all tested positive, as did 60% of the samples from trees without symptoms.

Psorosis is spread worldwide and in some citrus growing countries still represents the most serious disease after tristeza. The presence of the disease has been reported and confirmed in Italy (1, 2, 3). The characterization of the causal agent of the disease, *Citrus psorosis virus* (CPsV), type member of the *Ophiovirus* genus, has given a great input for the definition of the disease and for the development of new diagnostic tools. In spite of the classic disease, characterized by bark scaling of trunk and limbs, leaf flecking of young leaves, positive results in DAS or TAS ELISA and positive reaction in cross protection bioassay, other atypical bark scaling have been reported from several countries but they have not been correlated with psorosis by ELISA, bioassay or cross protection test.

During recent surveys made in Southern Italy (Sicily and Calabria) on different citrus species, classic psorosis bark scaling on Navelina sweet orange was observed and correlated with positive results on TAS and DAS-ELISA and biological assays on indicator plants (Navelina ISA 315, Hamlin and Pineapple sweet orange) (4, 5). Two cases of bark scaling, described as classic and atypical psorosis bark scaling, were also observed on Tarocco sweet orange where, in spite of quite common distribution of leaf flecking in old orchards, no report of psorosis

bark scaling were known on this variety.

Tarocco is a pigmented sweet orange variety originated in the Mediterranean Basin, most likely in Sicily, and has been grown for several centuries. Because of the high quality and attractive appearance of the fruits and red pigmented flesh it is the oldest citrus variety widely planted in Sicily and today is marketed with the EU logo PGI (Protection of Geographical Indications, Reg. CEE 1107/96).

In this investigation we directed our attention to Tarocco sweet orange affected by classic psorosis bark scaling of main limbs in 10-yr-old trees in Sicily obtained by topworking Clementine trees with scions collected from symptomless 19-yr-old Tarocco trees. The syndrome, identical to that often observed on Navelina sweet orange, consists in the first emergence of one or two isolated circular patches of scales in main or secondary limbs. The patches are 5-10 cm in diameter, and gum emission is observed in this first stage. The disease progresses with increasing numbers of the patches that join. The scales develop bark flaking (Fig. 1), and the trees appear grow poorly, with young leaves showing leaf flecking. Different stages of the disease were present in the 14% of the trees of the field.

Following a W-pattern sampling method, leaf samples (110 repre-



Fig. 1. (top) Isolated bark scale on Tarocco sweet orange evolving into bark flaking. (bottom) Scales coalescing to form classic bark scaling on the trunk just above the bud union.

senting 10% of the total number of trees) were collected during the spring flush from trees with and without bark scaling. All the samples were analyzed by DAS-ELISA with mab PS29 (commercial kit of Agritest, Valenzano, Bari, Italy)

using psorosis positive and negative controls as standards. Samples showing OD values of at least three times the value of the negative control were recorded as positive. Twenty-six percent of the samples tested negative, and of the 74% posi-

tive samples, 14% were from trees with bark scaling and 60% (corresponding to 70% of the positive samples) were from symptomless trees.

Biological indexing on Navelina sweet orange ISA 315 and Pineapple sweet orange performed on 10 trees and ISEM with mab 13C5 on five trees confirmed the DAS-ELISA results allowing also the visualization of typical particles of CPsV in all the positive samples. This is the first report of psorosis bark scaling

on Tarocco sweet orange supported by proof of the correlation with the presence of CPsV.

ACKNOWLEDGMENTS

We thank Dr. Robert G. Milne for performing ISEM analyses of field samples. This research was supported by grants from EU (POP 94/99: Miglioramento e valorizzazione della produzione agrumicola siciliana).

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