Susceptibility and Symptomatology of Mapo Tangelo to Xyloporosis

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ABSTRACT. Mapo tangelo (hybrid of Avana mandarin and Duncan grapefruit was found to be susceptible to xyloporosis-cachexia. Symptoms of the disease on trunk of Mapo tangelo include gum-like substances on wood and inner face of the bark and bark-scaling. These symptoms were also found on Mapo tangelo on sour orange rootstock with a sandwich of Comune clementine. The disease also induced sticky exudations on the lower leaf surface and also dieback of whole large branches of Mapo tangelo.
Index words. Mapo tangelo, xyloporosis-cachexia.

Mapo tangelo is a hybrid between Avana mandarin and Duncan grapefruit obtained in 1950 at the Citrus Experimental Institute of Acireale (Italy) and was released for cultivation in 1972 (5). It is widely grown in Italy where it is valued for its earliness, juiciness and taste.

Unfortunately, this hybrid has proved to be susceptible to xyloporosis-cachexia (3, 4), the presence of the viroid having been established by biological assay (6). Its symptomatology in Mapo tangelo differs in some ways with that of other xyloporosis-cachexia susceptible species. We believe a description of this symptomatology to be of interest.

DESCRIPTION OF SYMPTOMS

The first symptom consists of numerous small pustules containing sticky exudations on the lower leaf surface (Fig. 1). These leaves fall resulting in twig and some branch dieback. In some cases the whole tree canopy above the bud union is involved and the trunk shows bark-scaling (Fig. 2, 3). This symptomatology appears when the plant reaches the age of 7-8 yr and

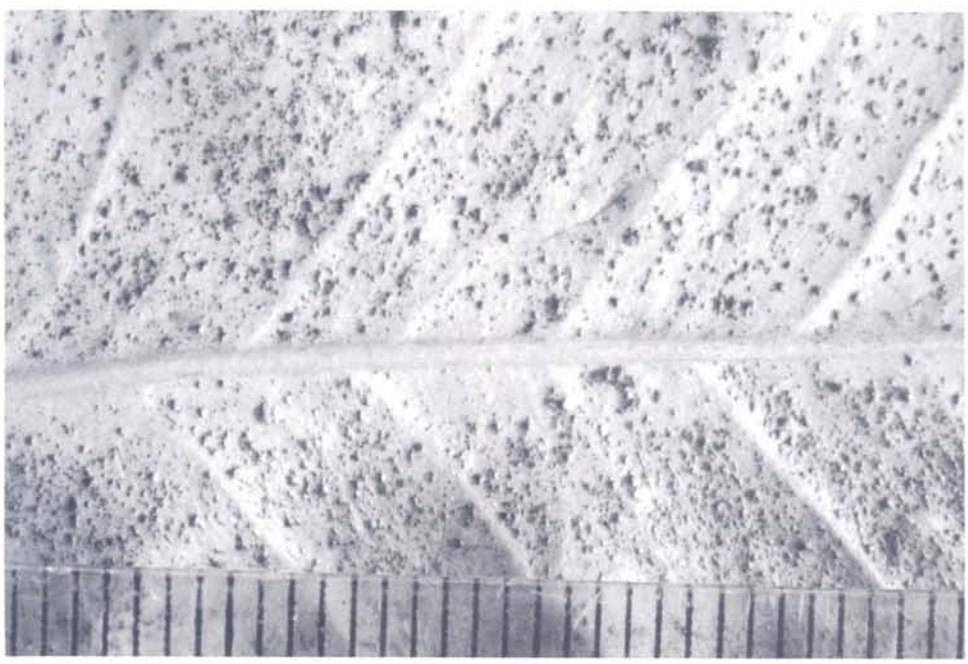

Fig. 1. Gum deposits on lower surface of Mapo tangelo leaf.

Fig. 2. Infected 11-yr-old Mapo tangelo grafted on sour orange, showing defoliation and dieback due to xyloporosis-cachexia.

occurs on both Mapo tangelo grafted on sour orange rootstock and on top-worked Mapo tangelo.

When the bark is removed, the wood is a deep chestnut or brown, but lightens color, after a short exposure to sunlight (Fig. 4).

This condition extends along the affected branch to within 20-30 cm of the bud union point, but does not generally involve the whole branch circumference.

The presence of gum-like substances, arranged along the vascular tissues can be observed in cross sections of branches from affected trees (Fig. 5). Impregnations can also be seen on both the wood and inner face of the bark of twigs 1 cm thick (Fig. 6).

The bark and wood of the sour orange below the bud union appear perfectly normal, without deformations or particular colourings.

The most severe symptoms of xyloporosis-cachexia were observed

Fig. 3. Bud union of Mapo tangelo on sour orange. Bark-scaling on the scion is evident.

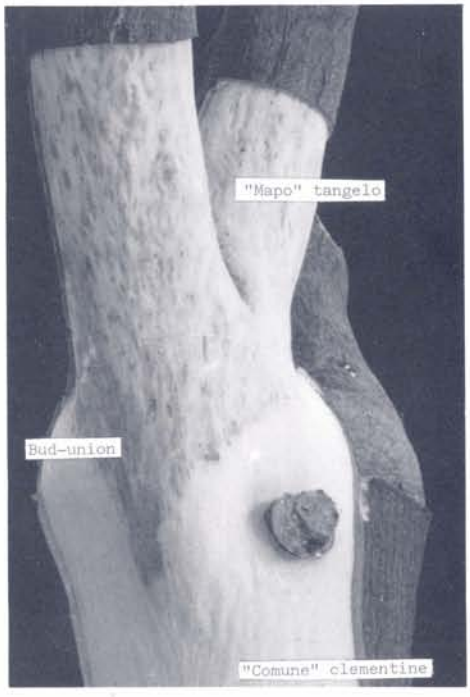

Fig. 4. Trunk of Mapo tangelo top-worked on Comune clementine, showing on the wood of tangelo underlying veins of a deep chestnut colour.

Fig. 5. Cross section showing gum impregnation of the wood of scion.

Fig. 6. Twigs about 1 cm thick showing gum impregnations on wood and inner face of bark.

on the hottest areas and on that part of the tree canopy facing south. Hence it would appear that symptom intensity may be affected by environmental factors.

In cases where a piece of Comune clementine trunk was left on during top-working, this section exhibited typical symptoms of xyloporosis-cachexia pitting of bark and small pegs on wood without gum impregnations pitting of bark. These symptoms only occur in the area close to the bud union (Fig. 7).

Infected twigs of Mapo tangelo were cut into sections (12 nm thick) using a sliding microtome. They were then treated with a saturated solution of phloroglucinol in 18% HCL to show the gum. These sections were then examined under a light microscope (x400) (1, 2) (Fig. 8). Examinations was also conducted with the scanning elec-

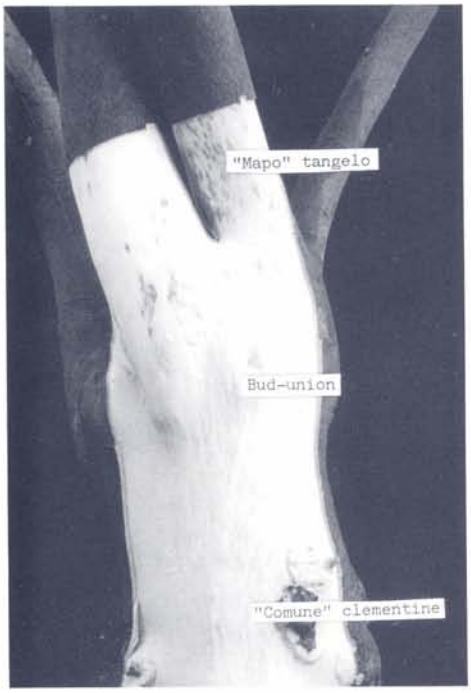

Fig. 7. Trunk of a three membered tree (Mapo tangelo, Comune clementine and sour orange). Veins of a deep chestnut colour are present on the wood of tangelo while the wood of clementine shows the typical symptoms of xyloporosis-cachexia with small pegs without gum impregnations.

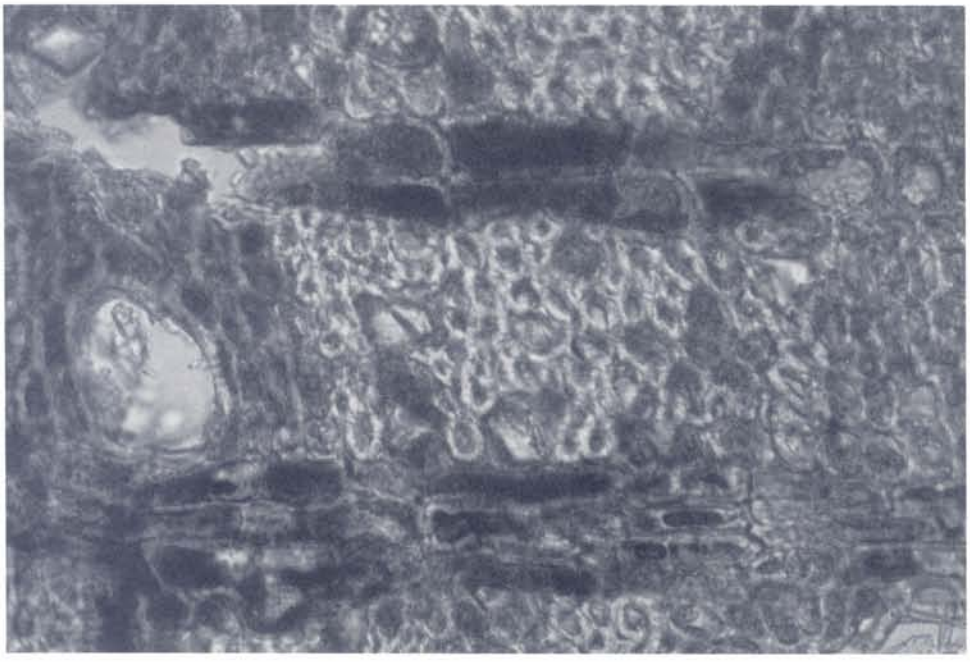

Fig. 8. Schizolysogenous cavities in cross section of branch of Mapo tangelo observed under light microscope (x 400).

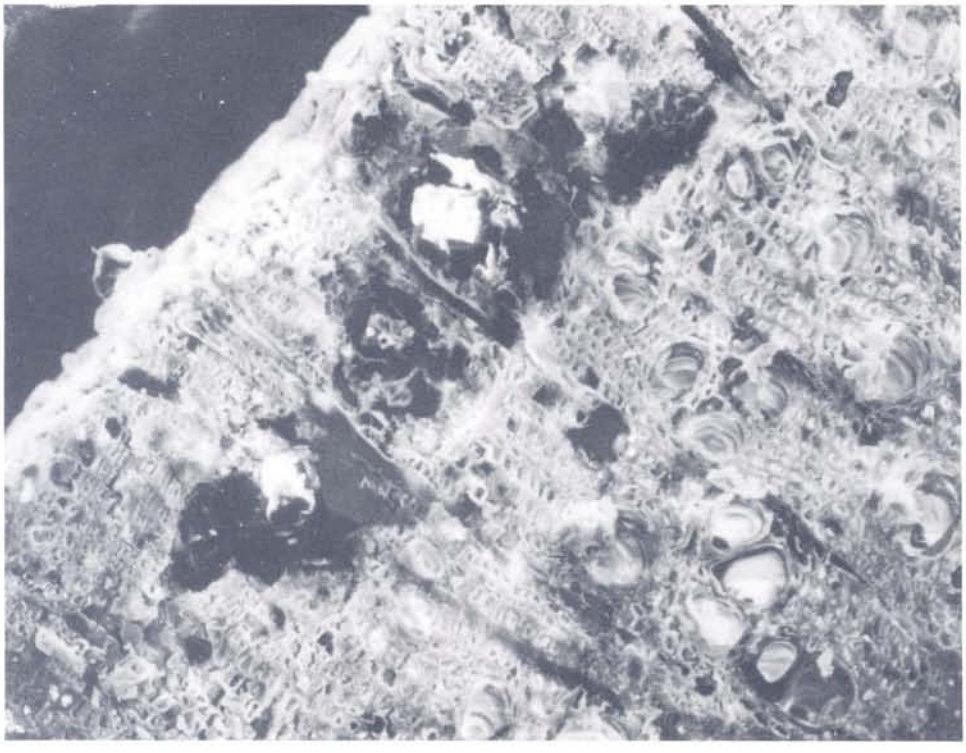

Fig. 9. Schizolysogenous cavities in cross section of branch of Mapo tangelo observed under SEM (x 160).

tron microscope on segments of sectioned twigs washed in absolute alcohol, air dried and gold coated.

Cavities impregnated with gum were observed in the examinations done with the light microscope and in those done with the scanning electron microscope (SEM x 160) (Fig. 9). The cavities are localized in the wood between two or three medullar rays forming an arc. Tissues were disorganized and it was impossible to distinguish the cells that were impregnated with gum-like substances.

CONCLUSIONS

The unusual symptoms of xyloporosis-cachexia observed on the scion of clementine and on the Mapo tangelo part of a top-worked tree lead us to believe that Mapo tangelo is particularly susceptible to this viroid.

This susceptibility is a drawback in the use of top-grafting with Mapo tangelo in varietal conversion programs to renew Italian citrus orchards and adjust varieties to meet market demands. Numerous xyloporosis-cachexia infected Mapo tangelo trees have been found in many orchards. Since these trees were not top-worked, it is highly probable that they were infected by pruning tools.

It is evident that greater care should be taken in the introduction of susceptible varieties to environments where old-line stock exists in which the extent of infection by this group of diseases is not known.

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