

Studies on Sour Orange Stem Pitting in Sicily

G. SCARAMUZZI and A. A. CATARA

STEM PITTING of the type described in Corsica by Vogel and Bové (1) is frequently observed in citrus orchards in Sicily. Field investigations to ascertain the distribution of the disease and its possible relation to other known citrus virus diseases are discussed.

Investigation Results

SYMPTOMATOLOGY.—The external symptoms of this disease* are narrow depressions in the bark and wood somewhat similar to those of

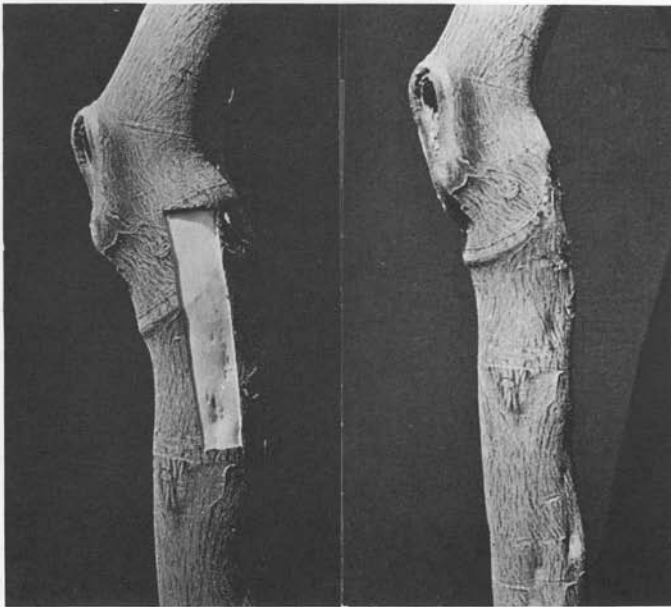


FIGURE 1. *Femminello* lemon tree showing symptoms of stem pitting only on sour orange rootstock.

concave gum and blind pocket psorosis. The characteristic and remarkable pitting of the wood and pegs in the inner surface of the bark can be observed by removing the bark at the depressed areas (Figs. 1 and 2). In some cases, small deposits of gum can be observed in the pits

*Ed. note. Vogel and Bové have given the name *crisacortis* to this disease.

between wood and bark, more especially on Tarocco orange [*Citrus sinensis* (L.) Osb.] and Avana mandarin (*C. reticulata* Blanco) (Fig. 3). No gum occurs in the bark tissues. In the early stages of the disease, the depressions can be perceived only by touching.

The symptoms described may be found on the rootstock sour orange (*C. aurantium* L.) (Fig. 1), on the scion, or on both rootstock and scion (Fig. 2). The same symptoms also occur on the main branches and on

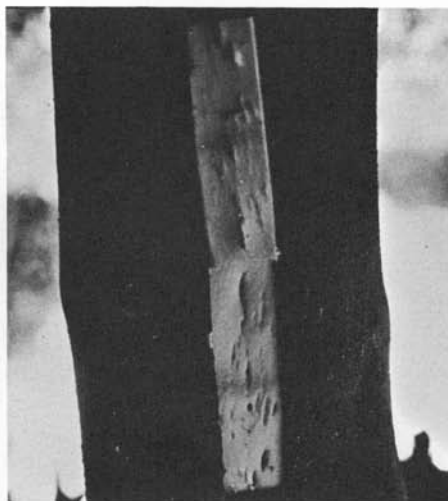


FIGURE 2. *Ovale* sweet orange tree showing symptoms on both rootstock and scion.

1-year-old stems of mandarin and grapefruit (*C. paradisi* Macf.). Affected trees may show slight stunting, but no particular symptom has been found on leaves or fruits.

The disease symptoms are somewhat analagous to those of blind pocket, tristeza, and xyloporosis, but seem more like those of blind pocket than of concave gum. The more evident peculiarities are the pits that occur in the wood under the depression visible on the bark, and the high susceptibility of sour orange which is tolerant to blind pocket. However, symptoms in the wood such as small deposits of gum, as shown in cross section (Fig. 4), are similar to those of blind pocket. These may be considered the initial manifestations of the disease. On young stems of grapefruit and mandarin, the pitting is very similar to tristeza on grapefruit and Mexican lime [*C. aurantifolia* (Christm.) Swing.].

The pits caused by xyloporosis are smaller, more numerous, and most

pronounced near the bud-union. At that point, tissues are often impregnated with gum. Finally, sour orange is tolerant to xyloporosis.

OCCURRENCE OF THE DISEASE.—Investigations of the main citrus species and varieties grown in Sicily were made in different orchards. Trees along two converging diagonals in each grove were examined for symptoms by removing pieces of bark at different points of the trunk, branches, and stems. More than 3,000 trees were examined.

The disease appears widely distributed in all citrus-growing areas of



FIGURE 3. Symptoms of stem pitting on the wood of young stems of Avana mandarin.

Sicily; it is also present on young trees. Of 36 orchards inspected, symptoms of the disease were observed in 26. The following species and varieties were found affected: Tarocco, Moro, Ovale, Biondo, Sanguinello, and Vaniglia sweet orange; Avana and Tardivo di Ciaculli mandarin; Femminello and Monachello lemon; Marsh seedless grapefruit; and Clementine mandarin. The occurrence of symptoms in the six principal commercial varieties of citrus is shown in Table 1. Tarocco sweet orange on sour orange showed the highest percentage of diseased trees (48.6 per cent), followed by Ovale sweet orange, Avana mandarin, Moro sweet orange, Femminello lemon, and Clementine.

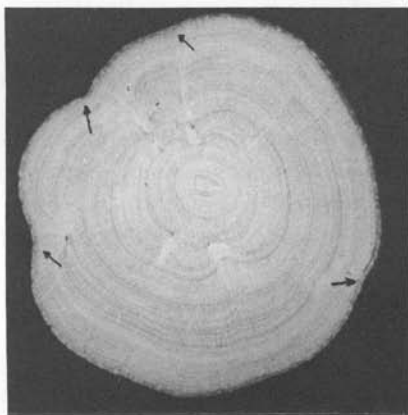


FIGURE 4. Cross section of a sour orange trunk showing symptoms of stem pitting.

To judge from the occurrence of symptoms in these varieties, sour orange appears to be the most susceptible species followed by Avana mandarin, Ovale sweet orange, Tarocco sweet orange, Clementine mandarin, and Moro sweet orange. Femminello and Monachello lemons appear highly tolerant to the disease, judging from the absence of symptoms on all trees examined, even when symptoms occurred on the rootstock (Fig. 1).

Symptoms of the disease were not generally observed on stems younger than 4 to 5 years, with the exception of grapefruit and mandarin which may show symptoms earlier. Grapefruit was not included in Table 1 because of the small number of trees examined. Nevertheless, it and

TABLE 1. OCCURRENCE OF SOUR ORANGE STEM PITTING IN DIFFERENT SPECIES AND VARIETIES AND DISTRIBUTION IN ROOT AND TOP

| Species and variety | Number of trees inspected | Per cent of trees infected | Occurrence of symptoms | | |
|---------------------|---------------------------|----------------------------|------------------------|---------------|-----------------------------|
| | | | Rootstock, per cent | Top, per cent | Rootstock and top, per cent |
| Sweet orange | | | | | |
| Moro | 384 | 17.9 | 69.5 | 8.6 | 27.7 |
| Tarocco | 216 | 48.6 | 31.4 | 5.7 | 62.9 |
| Ovale | 99 | 33.3 | 27.3 | 27.3 | 45.4 |
| Mandarin | | | | | |
| Avana | 525 | 18.9 | 12.1 | 24.3 | 63.6 |
| Clementine | 72 | 16.7 | 50. | | 50. |
| Lemon | | | | | |
| Femminello | 501 | 18.0 | 100. | | |
| TOTAL | 1,797 | 22.7 | 49. | 11. | 40. |

Avana mandarin (Fig. 3) may be considered highly susceptible to the disease.

OTHER FIELD OBSERVATIONS.—In all, 18 different citrus species and varieties showing symptoms of the disease were indexed. All appear to be infected by psorosis and often by exocortis, but never by tristeza.

Clementine trees were found showing symptoms of sour orange stem-pitting disease, alone or together with symptoms of xyloporosis. Some Tarocco trees with symptoms of stubborn also showed stem pitting on the sour orange rootstock. Concave-gum and blind-pocket symptoms were often observed together with stem pitting on different species and varieties.

Discussion

On the basis of field observations, the occurrence of stem pitting does not seem to be correlated with the occurrence of other known viruses affecting citrus. The symptoms of stem pitting may coexist on the same trees with symptoms of xyloporosis, exocortis, and stubborn, but tristeza was never found in our index tests on Mexican lime.

Although all trees showing symptoms of stem pitting are also infected by psorosis, the two diseases are considered different because many trees with symptoms of psorosis show no symptoms of stem pitting, many trees with symptoms of concave gum on the trunk show no symptoms of stem pitting, and combinations such as lemon/sweet orange/sour orange show symptoms of stem pitting on sour orange rootstock and on sweet orange, but not on lemon which is known to be quite susceptible to concave gum and blind pocket.

Transmission trials now in progress may clarify this problem.

Literature Cited

1. VOGEL, R., and BOVÉ, J. M. 1964. Stem pitting sur bigaradier et sur oranger "Tarocco" en Corse: une maladie à virus. *Fruits* 19: 269-274.
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