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Citrus Virus Diseases in Tunisia

AMONG THE CITRUS VIRUS DISEASES, so far only psorosis and xyloporosis have been positively identified in Tunisia. This inventory is unfortunately far from being complete and does not include the possibility of other virus diseases being present, especially stubborn disease.

As regards exocortis, we have never observed it in Tunisia as *Poncirus trifoliata,* citrange, and Rangpur lime are not used as rootstocks. With regard to tristeza, it seems as if North Africa is still unaffected in spite of a few cases recorded in Israel, Italy, and probably even in Spain, following the introduction of Meyer lemon and Satsuma mandarin. This disease, however, has not spread in the Mediterranean region so rapidly as it did in South Africa and South America due to the absence of an efficient vector.

Among the 6 forms of psorosis as described by Klotz and Fawcett, at least 3 occur in Tunisia, namely psorosis A, concave gum, and blind pocket.

Psorosis A occurs in Tunisia on several orange varieties such as Maltaise blonde, Bourouhine, and Thompson Navel. In certain cases, the affected tree seems to react by forming a bulging cicatricial pad surrounding the lesion. The health of the diseased tree remains poor.

There exists a form of psorosis, probably, which is much more severe than psorosis A in its effect on the tree and the rapidity of its development. The scaling in these severe cases involves practically the entire depth of the bark, thereby exposing the wood. Such bark splitting and stripping occurs even on twigs less than 1 cm in diameter. Gum exudation is very frequent in this severe form of infection, which has been ob-

served on a great number of local sweet orange varieties, e.g. Beldi, Lessan Asfour, and Maltaise blonde. The disease also occurs on mandarins of the Beldi variety.

Concave gum is very frequent in Tunisia, occuring on mandarins, clementines, and oranges of the Beldi, Maltaise blonde, and Thompson Navel varieties.

Blind pocket has been observed on the Beldi mandarin variety as well as on the Maltaise blonde orange variety (Fig. 1).

Psorosis in all forms is very abundant in citrus groves in Tunisia. A Citrus Experiment Station exists in Tunisia directed by Dr. Crossa Raymond, who has introduced the technique of nucellar propagation, thanks to which healthy material can now be obtained.

FIGURE 1. *Symptoms of blind pocket on the Maltaise blonde variety of sweet orange.*

Xyloporosis is extremely widespread in Tunisia on mandarins, clementines, and lemons. When the two former varieties are grown on sour orange rootstock the symptoms appear immediately above the bud union, leaving the sour orange tissue unaffected. Lemons are often grown as seedlings, which are extremely sensitive to xyloporosis. The symptoms of "pegs and pits" are similar to those described by Reichert and Perlberger. The external bark surface, mainly on young trees, shows necrotic areas of variable size and shape ranging from a few millimeters to a few centimeters. On adult trees these necrotic areas usually disappear, so that the outer surface looks quite normal.

All these anatomical abnormalities provoke certain disorders in the vascular system of the infected tree by plugging it with gum. The circulation is reduced, resulting in mineral deficiency. The leaves are small and chlorotic. Defoliation is extensive, particularly at the ends of the branches, which ultimately dry up. An infected tree dies prematurely. We have a case of a 35-year-old lemon tree that within 4 years dropped in its yield from 400 to 60 kg. The citrus varieties grown in Tunisia, when budded on sour orange stock, are less affected by xyloporosis than the seedling varieties, such as the lemon. Xyloporosis and concave gum frequently coexist on mandarins and clementines causing a rapid decline of these two varieties.

Tristeza exists in the Mediterranean area where it has been introduced on the Meyer lemon and the Satsuma mandarin. Its efficient vector, *Toxoptera citricidus* (Kirk.), is still absent from that area, but *Aphis gossypii* Glover and *Toxoptera aurantii* B. d. F. are present, though their efficiency in transmission is rather low.

The entomologists have pointed out that the repeated use of highly potent synthetic insecticides might lead to the appearance of new physiological strains of aphids that would prove to be more efficient in the transmission of tristeza. It would therefore be most desirable that all infected Meyer lemon and Satsuma trees in the Mediterranean basin be eradicated. Furthermore, strong measures should be taken to protect the countries so far unaffected by this disease. Only the introduction of seed material should be allowed.