

Note on Two Citrus Leaf Patterns Suspected of Being Virus-induced

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This paper describes two unusual leaf chlorosis patterns on mature leaves of two Spanish citrus varieties and reports transmission by budding to healthy seedlings. The first abnormality was found on the Salustiana variety of sweet orange, and the second on Clementina

de Nules, a larger-fruited mutant of Clementine. Despite the very unusual symptoms of both diseases, we are not giving a specific name to either pending further studies to elucidate a possible relationship to previously described diseases.

SALUSTIANA ORANGE VARIETY

Symptomatology. This abnormality has been observed on only a few trees. The most conspicuous symptom is a continuous bright yellow chlorosis along the veins of mature leaves. It develops first on the midrib and principal veins, and then spreads to the veinlets. The chlorosis is generally confined to the veins, but occasionally it spreads beyond the veins, and may develop into an oak-leaf pattern over most of the leaf.

The chlorosis finally becomes more conspicuous on the upper surface of the leaf, but is seen first on the lower surface. It appears first on leaves five to six months old, beginning as discontinuous lines along the veins, but joining together later. Leaves with symptoms are distributed irregularly over the affected tree—that is, some branches develop leaves with symptoms, whereas others have normal leaves.

Sometimes yellow blotches develop on the twigs bearing abnormal leaves, and occasionally brown gum spots are associated with the yellow blotches. Fruits of affected branches frequently show large, more or less rounded, pale areas. No depressions or furrows are present.

Transmission. Transmission tests were carried out by grafting bark from affected branches into seedlings of sweet

orange and sour orange (eight seedlings of each variety). Symptoms were obtained on inoculated seedlings (one sweet orange and two sour orange) about four months after the bark was grafted.

Symptoms were as described above, but the yellow oak-leaf pattern and spots on the small veinlets appeared more frequently on inoculated indicator plants than on the leaves of field trees.

The transmission tests described here demonstrate that the yellow discoloration of veins on mature Salustiana leaves is of an infectious nature. The scattered distribution, on the tree, of branches and leaves with symptoms, as well as the low percentage of positive transmission, may indicate an irregular distribution of the infectious agent in the tree.

There are some similarities between this abnormality and the "leaf variegation with ring spots" described by Planes and Marti (1), but the dominant vein distribution that is very conspicuous here does not appear in that disease, which was also observed to affect a Salustiana orange tree. This abnormality does not seem to have any economic importance, but its propagation must be avoided.

CLEMENTINA DE NULES VARIETY

Symptomatology. The characteristic symptom of the disease is the presence of chlorotic spots between the main veins. These appear similar to mesophyll collapse, their size ranging from a dot to a spot several millimeters in length, irregular in form, with a diffuse border. Spots may coalesce to cover most of the leaf. Sometimes ring spots appear.

The clearest symptoms can be seen on mature, dark green leaves. Usually, they are best seen against the light, but in severe cases, in which the spots are bright yellow, they can be seen more easily without light. Paler new leaves do not show spots, but occasionally are distorted and exhibit vein clearing.

The chlorosis that appears on leaves of Clementina de Nules can be seen frequently in orchard trees. It shows different degrees of intensity, depending on the tree or on special conditions which are not well understood. Sometimes the entire tree appears chlorotic.

The mother trees from which all trees of this variety were propagated display this symptomatology in a very mild form. These trees also show flecking and oak-leaf pattern on young leaves and are carriers of xyloporosis and exocortis viruses.

Transmission. Transmission was attempted by budding seedlings of sweet orange, sour orange, and Mexican lime.

The sources of inoculum were four orchard trees showing clear symptoms and two mother trees showing very mild symptoms.

In one test, five sweet orange, five sour orange, and three Mexican lime seedlings were budded with material from each source. No sweet orange trees developed symptoms; six sour orange and six Mexican lime seedlings developed symptoms.

In a second test, five sour orange and five Mexican lime seedlings were used for each source. Seven Mexican limes developed symptoms; no sour orange seedlings did.

Tests were considered positive when dots, ring spots, or leaf mottle were observed. In some cases the test plants developed flecking or oak-leaf patterns.

The transmission tests show the infectious nature of this abnormality. The presence of ring spots indicates that it may be related to the ring spot disease described by Wallace and Drake (2). The possibility that more than one pathogen is involved should be investigated.

The disease is widespread in this variety, and in the most severe cases a reduction in tree size was observed. Clementine is an important variety, and freeing it of this and other diseases is of commercial importance.

LITERATURE CITED

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