

A Quick Field Test for Exocortis

AT THE Experiment Station in Limeira, tests were undertaken to find a method that would reduce the time required to produce easily visible symptoms of exocortis; such a test is of great importance in a budwood certification program. The new tests and the results obtained are described in this paper.

Top-Working of Plants in the Nursery

Nursery plants of Caipira sweet orange were budded February 17, 1956, with buds from infected and healthy clones representing 4 varieties as follows: Marsh seedless grapefruit, 5 with exocortis and 6 without; Baianinha (navel) orange, 7 with exocortis and 6 without; Hamlin orange, 3 with exocortis and 3 without; and Pera orange, 3 with exocortis and 5 without.

Almost two years later, December 6, 1958, these plants were top-worked with buds from seedlings of Rangpur lime. Within 5 months, some of the Rangpur lime branches growing on infected plants showed yellow elongated blotches and subsequently developed splits with raised borders typical of exocortis. The branches of Rangpur lime that developed on plants without exocortis grew with normal green colour in the bark.

Top-Working Old Plants

In this test, buds of seedlings of Rangpur lime were top-worked on old

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trees of the Hamlin, Pera, and Baianinha orange varieties. Two plants of each variety were of nucellar seedling origin and free from the virus. The top-working was done August 25, 1959, and the budded branches were cut back a month later. The Rangpur lime branches that developed from buds in trees with exocortis showed the elongated yellow blotches in the bark in February of 1960. The Rangpur lime buds in the nucellar clonal trees developed normal green branches.

Top-Working with Trifoliolate Orange

Replication of these two tests using *P. trifoliata* as indicator showed the same results as with the Rangpur lime, but the yellow blotches appeared 1-2 months later. The trifoliolate sprouts were frequently weaker than those from Rangpur lime.

Inoculation of Seedlings in the Nursery

In the third test, buds from infected trees of Hamlin and Baianinha orange varieties were budded directly into 18 seedlings of Rangpur lime that were 2-year-old vigorous nursery plants. These inoculations were made October 12, 1959, and a month later the main stems were cut back to 10 cm above the point of budding. The buds used for inoculation were allowed to develop but were later cut back to within 5 cm of their base,



FIGURE 1. Branches from Rangpur lime sprouts. A. Bark splitting with curled edges. B. Two exocortis-inoculated seedlings (left) and 2 noninoculated ones.

and 4 young Rangpur lime seedling branches were allowed to grow. The rest of the seedling sprouts were removed.

By February of 1960, 17 of the 18 seedlings showed the elongated yellow blotches on the Rangpur lime branches. About 2-3 months later, some of the infected Rangpur lime branches showed bark splitting with curled edges similar to the symptoms recognized as due to exocortis (Fig. 1, A). Leaves of the infected branches show chlorotic symptoms similar to those recognized as due to mineral deficiencies. However, the Rangpur lime seedlings in the same nursery and the same age, but budded with buds from nucellar clones of the Hamlin and Baianinha orange varieties and cut back and subjected to the same treatment as the infected plants, had vigorous normal branches. In fact, growth of the plants budded with the nucellar clones was much greater than growth of plants inoculated with the infected buds (Fig. 1, B).

Results

The search for a field test for exocortis has been based on the bark splitting symptoms in the trunk of trifoliolate and Rangpur lime rootstocks. One of the tests made by Moreira (1) demonstrated that top-working with Rangpur lime or with trifoliolate orange was also a good way to obtain an indication whether the tree is or is not an exocortis carrier. It was mentioned that the first exocortis symptoms were "several yellowing spots on the bark" of the Rangpur lime or of the trifoliolate orange branches. Later the bark splits and shelling appears.

Replications of this test in nursery trees and in old plants showed that it is possible to see the yellow elongated blotches within 5-6 months after top-working. The more vigorous the branches the less time is required for the yellow blotches to appear.

Earlier results were obtained in the nursery by inoculating (budding) vigorous Rangpur lime seedlings and cutting back. The 3 to 4 sprouts growing from the seedlings showed the yellow blotches within 4 months. This later procedure seems to be the best and quickest field test for exocortis in a budwood certification program.

Literature Cited

1. MOREIRA, S. 1959. Rangpur lime disease and its relationship to exocortis, p. 135-140. In J. M. Wallace [ed.], *Citrus Virus Diseases*. Univ. Calif. Div. Agr. Sci., Berkeley.