

DISEASES

Phloem Canker Disease Incidence, and Systemic Spread and Genetic Relatedness of *Erwinia rubrifaciens*: C. I. Kado and J. M. Gardner

The phloem canker disease of Hartley walnuts, caused by *Erwinia rubrifaciens*, continues to be a threat to growers. The disease is spreading at the rate of 3.8% per year in northern California walnut-growing regions. A slightly higher rate is expected for Hartley orchards in the warmer San Joaquin Valley areas. Data from detailed surveys of 27 orchards in 6 counties indicate the disease incidence rose from 1.8% in 1968 to 11.6% in 1971 with a predicted increase for 1972 of about 15%. Yolo County, the most southern of those surveyed in northern California, had the highest increase of 17.4%. Since 1968, the disease has proliferated at least 1000-fold.

Our experimental studies with the mechanical shaker now clearly show that the disease can be transmitted by shaking and wounding healthy trees. Furthermore, the bacteria can be picked up by the shaker from diseased trees. During harvest, only a few bacterial cells (5-10) are needed to establish infection in freshly opened wound in the trunks and large limbs of Hartley trees. We have now found that once the disease is established in the fall, the bacteria migrate systemically along the trunk at the rate of about 15 inches per month until the winter months when dormancy sets in. At this time the trees seem insusceptible to infection. It is not yet known whether the systemically residing bacteria can elicit infection alone or whether an artificial wound is necessary. Experiments along these lines are underway.

We now have obtained evidence which show that *E. rubrifaciens* is closely related to *E. nigrifluens* (the bacterium which causes shallow canker). These organisms are more related to each other than to any other *Erwinia* species tested and to other enterobacteria. *E. rubrifaciens* is as much related to *E. amylovora* (fire blight organism) as to *E. coli*, *Salmonella typhimurium*, and *Klebsiella aerogenes*.

Bark Canker Control: G. S. Sibbett, J. H. Foott, W. B. Moller

Trunks and limbs in a portion of a Hartley walnut orchard have been dormant sprayed with 16-16-100 Bordeaux since 1963. In the unsprayed portion of the orchard 12 cases of shallow bark canker and 18 cases of deep (phloem) canker have developed. In this non-replicated trial, no case of either canker has developed in the sprayed portion of the orchard.