

CONTROL OF TRUNK CANKER CAUSED BY *PHYTOPHTHORA* *CITRICOLA*

J. A. Menge
Department of Plant Pathology
University of California
Riverside, CA 92521

Cooperating Personnel: Z. El-Hamalawi, H. Ohr, N. Grech, F. Guillemet, S. Campbell, E. Pond, E. Johnson, D. Ferrin, G. Bender, G. Witney, B. Faber

Project Objectives: The project is designed to 1) study the factors which influence bark infection by *Phytophthora citricola* and, 2) implement control measures for bark canker of avocado caused by *P. citricola*.

1) Etiology of the Trunk Canker Disease

The avocado canker disease is present in all avocado areas. *Phytophthora citricola* is present on the feeder roots of many trees that do not exhibit symptoms of avocado canker. *P. citricola* does not cause disease in the same manner as *P. cinnamomi*. *P. citricola* causes only a very mild root rot. *P. citricola* disease becomes serious only when the fungus infects the crown or major roots. These cankers are very slow growing under normal field conditions. Cankers may exhibit many cycles of healing and spread. *P. citricola* can inhabit the crown bark for many years without causing serious damage. Under some circumstances, however, these cankers can girdle and kill trees. There is no evidence that cankers, which spread upward through the cambium and girdle the trunk, result from feeder root infection. Instead feeder roots probably provide the inoculum in the form of zoospores which somehow infect the crown or large woody roots. *P. citricola* was able to cause stem canker of avocado only when inoculated into trunk or crown wounds. The disease can be spread by cutting into a canker and then cutting healthy tissue. Cankers spread rapidly to wounded areas from as far a distance as 10-15 cm from existing cankers. Field investigations indicate that the avocado canker disease can be traced back to wounds caused by: 1) sucker removal, 2) gophers or squirrels, or 3) wound staking. *P. citricola* did not spread directly from roots of nurse seed plants to roots or stems of clonal material. Wounds became resistant to infection by *P. citricola* within 12-14 days after injury. This would suggest that chemicals applied to prevent infection should be effective for at least 14 days.

2) Resistance

Studies involving the inherent resistance to *P. citricola* canker shows that there is no immunity in any rootstock yet tested. In young greenhouse and nursery plants, evidence indicates that rootstocks could be placed in the following order of most resistant to most susceptible: Toro Canyon, Duke 7, D9, Dusa, G6, Topa Topa, G755, Barr Duke, UC

2002, Borchard, UC 2011, Duke 6, G 22, G 1033, UC 2001, Anaheim, Rollie, G 592, UC 2004, Thomas and Hibbard.

Under field conditions with 6-year-old trees, the results were different with G6 and G 755B being most susceptible and G 755C being the most resistant. Rootstocks with moderate resistance included Thomas, Barr Duke, G 1033, Toro Canyon, Duke 7, UC 2011, and G 755a.

Apparently, the time of year greatly affects the susceptibility of avocados to infection by *P. citricola*. Spring and fall are periods of greatest susceptibility with little infection occurring in the winter and the summer.

At one field site in San Diego, Haas trees on Topa Topa, Duke 7, Thomas and G755 were planted in a site heavily infested with *P. citricola*. Natural progression of the disease will be followed in this orchard.

3) Chemical control

Under greenhouse conditions, only stem paint (applied cover lesion and surrounding tissue) treatments with Aliette (0.5 g/ml) proved effective for controlling *P. citricola* canker. Ridomil, bordeaux mix, tree-seal + copper, or tree seal alone was not satisfactory for control of *P. citricola* canker. The chemical protection by Aliette lasted for at least 14 days. Washing with water 24 hrs after treatment with Aliette did not diminish the effects of the Aliette treatments. Scraping the bark or cutting the bark in a fish scale manner prior to the application of Aliette improves the success of the treatments.

Under field conditions at one site in Ventura Co., trunk paints with Aliette reduced *P. citricola* cankers by 26-38%. At a field site in San Louis Obispo Co., Aliette + a wetting agent eliminated growth of *P. citricola* cankers. Ridomil as a stem paint also was effective at this site. Aliette without a wetting agent was moderately effective. Aliette collars reduced growth of *P. citricola* cankers by 39%. Aliette as a soil drench was not different from the control without chemical treatment. Chemical treatments with a stickum polymer appeared to increase *P. citricola* canker size. In addition to these two ongoing trials, we have chemical assessment trials at *P. citricola* locations at South Coast, Ventura and San Diego.

4) Cultural Control

Avocados stressed by root pruning developed cankers more easily and at a greater rate than did non-stressed plants. The rate of disease increased as the degree of stress increased. Irrigation water sprayed onto inoculation sites or avocado bark increased the rate of canker development more than seven-fold.

As a result of these field and greenhouse studies the following recommendations for control of *P. citricola* canker can be made.

- a) Avoid wounding the trunk or large roots of avocado trees. In *P. citricola* areas treat sucker wounds and other injuries with Aliette paint.
- b) Do not make cuts into *P. citricola* cankers unless they are followed immediately with chemical treatments.

- c) Do not stress *P. citricola* infected trees.
- d) Do not place mini-sprinklers so they wet the trunk or crown.
- e) Duke 7 and Toro Canyon are, at the least, moderately resistant to the disease.
- f) Heavy stem painting with Aliette after scraping or cutting the bark like fish scales will reduce lesion growth caused by *P. citricola*.