

Project Title: Bacterial Canker of Prune Trees

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Objectives:

1. Determine the relation of pre- and postplant soil fumigation, backhoeing, peach rootstocks, and mycorrhizal fungus to tree vigor and susceptibility to canker; monitor nematode populations in fumigated and nonfumigated soils.
2. Ascertain the effect of pin and ring nematodes on the susceptibility of French prune to bacterial canker and Cytospora canker.
3. Determine the correlation of bacterial canker with soil factors including the presence of plant parasitic nematodes.
4. Ascertain if low temperatures predispose French prune trees to bacterial canker.

Results and Conclusions Obtained During Past Year:

Field studies in orchards near Los Molinos and Chico have shown that the incorporation of either Telone or methyl bromide in backhoe holes has resulted in tree growth (replant sites) significantly greater than that of trees in standard planting sites or in sites where only the backhoe was used. In the Chico orchard sufficient canker has developed to show a significant reduction in disease where backhoeing has been combined with fumigation. Bacterial canker was 6 or more times as severe in the control sites as in the fumigation sites. Backhoeing only was ineffective. In another orchard test (Live Oak), backhoeing and backhoeing plus fumigation with methyl bromide significantly increased trunk circumferences over those in the controls. There also was less canker in sites which were backhoed only or backhoed and fumigated. In a Yuba County orchard, postplant fumigation with DBCP (5 gal/A) has resulted in a 23% increase in tree growth (circumference) and a per-acre reduction in tree loss from 32 to 6 over a 3-year period. Results to date have failed to show any beneficial effect of adding a mycorrhizal fungus to the planting hole.

In controlled tests at Davis, soil infested with *Criconeimoides* (ring nematodes) for 2 years reduced tree weight by 22% and resulted in a 3-fold increase in the size of cankers resulting from inoculation with the canker bacterium. These nematodes also resulted in a significant increase in the size of cankers induced by *Cytospora*. Pin nematodes (*Paratylenchus*), on the other hand, had no significant effect on tree growth or susceptibility to either bacterial canker or *Cytospora* canker during a one-year growth period. The trees used in these tests were French on myrobalan 29C.

Our tests indicate that the use of the backhoe coupled with soil fumigation offers real promise in reducing bacterial canker and enhancing tree growth in the replanting of trees in orchards with a bacterial canker problem. We also have found that ring nematodes are a very important factor in predisposing stone fruit trees (French prune, Marianna plum, and peach) to bacterial canker.

Current Status of Project and Work Planned:

As indicated above, definite progress on this project has been made. We now have at least a partial explanation for the beneficial effects of pre- and postplant soil

Current Status of Project and Work Planned: (continued)

fumigation in controlling bacterial canker. In some areas, however, soil fumigation is ineffective and, therefore, we are conducting trials in two Sacramento Valley orchards to ascertain if peach rootstocks can be used to reduce the severity of this disease. We also must continue to take data from the backhoe and soil fumigation plots to determine how long these treatments provide protection to prune trees. New plots (established a year ago) involving backhoeing, soil fumigation, and peach rootstocks will necessitate observation for one or two more years in order to provide worthwhile information. Final data on the effect of nematodes on Cytospora canker will be taken during the coming year. A test with peach, but pertinent to prune, involves a study of the interaction of soil moisture and ring nematodes on the susceptibility to bacterial canker. This test should be completed during the coming year. It is anticipated that experiments on the predisposing effects of low temperature on bacterial canker can be completed within two years.