

# **Chemical Control of Avocado Root Rot and Stem Canker**

## ***Continuing Project; Year 2 of 4***

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## **Benefit to the Industry**

Effective control and management of Phytophthora root rot and stem canker can only be achieved by planting certified disease-free nursery stock, integrating cultural methods, orchard sanitation, use of tolerant rootstocks and chemical control. The likelihood of developing a rootstock which will be immune to these diseases is very remote owing to the nature of the pathogens involved. Several promising tolerant rootstocks are being developed, but without the use of an integrated management system, relying on these rootstocks alone as a means of controlling these diseases, will be of no avail. Phytophthora stem canker, which was previously uncommon in the California avocado industry, has now become second to Phytophthora root rot in being a major limiting factor to avocado production. This disease is becoming more prevalent in the cooler coastal production areas, where entire orchards have been found to be affected. This disease is also the most difficult of the two diseases to control and the disease can go unobserved for several years, while the pathogen slowly girdles the tree below soil level, until it is too late to take any remedial steps. So far there are no definite chemical control measures to manage this disease and several of the clonal rootstocks which are tolerant to Phytophthora root rot have been found susceptible to stem canker. Conventional methods of application of chemicals used to control Phytophthora root rot have not been successful in controlling stem canker in California.

## **Objectives**

1. To refine and standardize topical treatments for the control of both avocado root rot and stem canker, which are cost effective, efficient and not injurious to the tree.
2. To screen the efficacy of new and currently used chemicals for the control of Phytophthora root rot and stem canker.

## **Summary**

### **Orchard Selection**

A survey was made of orchards in the avocado production areas from San Diego County in the south to San Luis Obispo in the north, Cambria being the northern most area. It was imperative to identify orchards in which both diseases were not prevalent in the same orchard, and orchards which had not been exposed to chemical treatment, as the presence of both diseases and previous use of phosphorous acid, would confound the results. In October 2000 an orchard was found in the Cayucos area in which stem canker appeared to be prevalent. Routine isolations from affected trees, and symptoms confirmed that the stem canker pathogen was the cause of the disorder observed. During March of 2001 another two experimental sites were found in Ventura County, one in Toro Canyon and the other in Somis. The Toro Canyon site exhibited severe root rot pressure in young (2-3 years old) and mature bearing trees (>20 years old) and was selected as it had no previous record of chemical control. The Somis site appeared to be exclusively affected by stem canker. This is a 10 ac block of trees which was planted on virgin land in the early 1980s, and was comprised of trees with ratings of 0-5 (0= healthy ; 5=dead). The high incidence of stem canker at

this site and the one in Cayucos was indicative of infection which originated in the nursery, as both these sites were originally virgin land.

## **Treatment of Selected Orchards**

Unless otherwise stated all chemicals used in treatments were neutralized using potassium hydroxide and were derived from phosphorous acid; the final concentration of phosphorous acid in these products is approximately 50%. The recommended dosage rate of Aliette® was used to calculate the amount of active ingredient used for soil drenches and foliar applications, for injections dosage rates used by South African and Australian researchers were used, in most cases the rate used was 0.5g active ingredient per square meter of canopy.

***Cayucos Experimental Site:*** It was decided to apply the following treatments at this site:

1. Trunk injection\* with 40% neutralized phosphorous acid.
2. Trunk injection with a neutralized commercial product (0-28-25).
3. Trunk injection plus soil drench application of 40% neutralized phosphorous acid.
4. Soil drench with 40% neutralized phosphorous acid.
5. Topical trunk application.

The treatments were applied in the fall of 2000 and spring of 2001

(\* Pressure injection using the Australian designed 'Sidewinder' knapsack injector)

***Toro Canyon Experimental Site:*** The following treatments were applied at this site:

*Non-bearing trees:*

Foliar application of:

1. Aliette®
2. ProPhyt® (EPA registered phosphonate)
3. Phostrol® (EPA registered phosphonate)
4. Phitogard® (South African registered phosphonate)

Soil Drench using:

1. Aliette®
2. ProPhyt®
3. Phostrol®
4. Phitogard®

The treatment applications are scheduled for 60 day intervals. The first treatments were applied during May 2001.

*Bearing trees:*

The trees selected for treatment at this site all had ratings of 3 (0=healthy; 5=dead). The first treatment was applied in June 2001, this will be followed up by spring, summer and fall applications in 2002.. All trees will be stumped to a height of 8 feet during September 2001.

The following treatments were applied:

- A. 'Sidewinder' Trunk Injection with:
  1. ProPhyt®
  2. Phitogard®
  3. Phostrol®
  4. 40% neutralized phosphorous acid

- B. Macro injection using a 7/16" drill bit and squirting the chemical into 2" deep holes, using:
  - 1. Un-neutralized 0-60-0 phosphorous acid.
  - 2. Phitogard®.
  
- C. Topical Trunk Application
  - 1. Phitogard®

*Somis Experimental Site:* The following treatments were applied at this site:

- A. 'Sidewinder' Trunk Injection with:
  - 1. Phitogard®
  - 2. Phostrol®
  - 3. ProPhyt®
  
- B. Topical Trunk Application (with and without removal of bark to expose lesions)
  - 1. Aliette®
  - 2. Phitogard®
  - 3. Phostrol®
  - 4. Ridomil® Gold EC

## **Conclusions**

It is too early to draw any conclusions at the Toro Canyon and Somis sites as the trees at these sites have only just received their initial treatments. Preliminary results at the Cayucos site indicate that topical lesion treatment appears to be more effective in arresting canker development than any of the other treatments. Grower initiated experiments in the Cambria area indicate that trunk injections using the 'macro' and 'Sidewinder' injection techniques, do not arrest canker development or cause a remission of symptoms. The high incidence of stem canker in orchards which were planted on virgin land, may indicate that the nursery stock used was infected in the nursery.