

## CHEMICAL CONTROL OF AVOCADO DISEASES

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### **March 1995 AVOCADO ROOT ROT. *Phytophthora cinnamomi***

There are currently five ongoing avocado root rot trials, one trial in the process of installation and one trial being terminated for a total of seven trials. These trials are quite large ranging in size from 200 to 500 trees and up to 24 different treatments. The emphasis is on integrated control to maximize the impact on the pathogen, to maximize benefit to the grower, to minimize cost and to minimize the impact on the environment. Based upon data gathered from field 30 at South Coast Field Station we believe that a combination of resistant rootstocks, mulches and reduced chemical applications is the best overall treatment for avocado root rot. However, this supposition must be verified. To verify these findings the majority of our current trials are combinations of resistant rootstocks, mulch and chemical treatment. The purpose is to control root rot with materials that are readily available and inexpensive to use. Two of the on-going trials are chemical trials without mulch. In one we are comparing application methods and it is the only trial with trunk injections. We have de-emphasized trunk injections due to two factors; one is because of the damage to the trunk caused by multiple injections and the other is due to the fact that Rhone-Poulenc does not intend to label Aliette for that method of application. While foliar sprays are an excellent method of application we feel that the majority of growers with root rot will be better served by chemigation and are therefore emphasizing that method in our trials. Currently, Aliette does not have a label for chemigation on avocados but such a label is supposed to be applied for. The second trial without mulches is a comparison of the response of two different rootstocks to treatment with Aliette.

#### **Trial 1: Field 30, South Coast Field Station:**

This is the trial that is being discontinued. We have gathered quite a bit of information from this trial and are basing many of our other trials on the findings here. We are discontinuing field 30 due to several factors. The original design was for an experiment of three to five years with close spacing. The trees have become crowded and cannot be thinned without affecting the experimental design. Also, this has been the second year that the plot has been under water for an extended period due to rain and poor drainage. Rather than continuing with the plot we feel that much more information can be gathered from new trials based upon what we learned from field 30.

To refresh your memory field 30 was a mulch-chemical combination trial on Duke-7 rootstock with 24 different (Table 1). In this trial we found that alfalfa mulch, gypsum, plastic and chemical one time a year to be the best overall treatment and have designed our subsequent trials to verify these findings (table 2).

### **Trial 2: Field 20 UCR.**

This trial was initiated to further explore the combinations of chemigation and mulches that appear successful in field 30 at the South Coast Field Station. In this trial the trees are Hass on Thomas root stock with the following treatments:

1. Untreated control
2. Aliette chemigation
3. Mulch
4. Aliette chemigation + Mulch
5. Aliette stem paint
6. Aliette stem paint + Mulch
7. Aliette stem paint + Mulch + Aliette chemigation

The mulch used is common yard waste as obtainable from city programs. We have had some difficulty in getting trees established in this trial due to various reasons.

A decision will be made this summer if this trial is to be retained or terminated due to these problems.

### **Trial 3. Miller's, Santa Barbara County**

The third and fourth trials are on the Miller ranch in Santa Barbara County and was initiated in 1992. Trial three is Hass on G755 and is a trial to compare different methods of application of Aliette. Treatment methods used were foliar, chemigation, trunk injection and trunk paint with 16 replicates per treatment. A visual rating in the fall of 1993 did not find any significant differences between treatments but trunk injection was significantly better than the control. Recent evaluations have not found any differences apparently due to poor disease pressure.

### **Trial 4. Miller's Santa Barbara county**

This trial is on trees that are 4 years old. The trees are Hass on Duke 7 or Thomas rootstocks. Treatments are Aliette chemigation or stem paint. The trial is designed to test the response of the two rootstocks to the two methods of chemical application. There are no significant differences as yet.

### **Trial 5. Sprinkling, Ventura County**

This trial is situated in the Somis area of Ventura County. The trial was originally planned for 4 rootstocks (Duke 7, Thomas, G2011 and G755A) with 20 replications of each rootstock for each treatment. However, due to a lack of trees G755A was not included and there were only 15 replications of each treatment. Treatments are Aliette 1

X per year, mulch, Aliette 1 X per year + mulch, and the non-treated control. Application of the chemicals is by chemigation. The mulch is city yard waste with added gypsum.

### **Trial 6. Sprinkling, Ventura County**

This trial is planned for installation this spring. It will essentially be the same as trial five but will have the addition of G755A. We feel that the G755A root stock is promising for both avocado root rot and trunk canker. As such it should be thoroughly tested. Because it cannot be added to a trial begun last summer we designed a new trial to compare it to other root stocks.

### **Trial 7. Vanoni, Ventura county**

This trial was initiated in 1994 by Ben Faber and Jim Downer. This is a combination trial using mulch, gypsum and Aliette on Zutano, Duke 7, Thomas and Toro Canyon rootstocks with 20 replications of each treatment. Because it is in a different location from the Sprinkling trials it will be a good comparison.

Both Sprinkling and Vanoni have extensive root rot and heavy soils with lots of disease pressure. Treatments and rootstocks that prove successful in these trials should be good candidates for most planting sites affected by root rot. In these trials are Duke 7, Thomas, G755A, Toro Canyon, and G2011 resistant rootstocks with combinations of mulch and chemical treatment. From these trials we expect to gather data which should be of benefit to avocado growers in the management of groves affected by root rot.

### **SUMMARY**

We currently have seven trials in the root rot program with well over 2000 trees. Five trials are active, one is being installed and one is being terminated. The terminated trial is field 30 at South Coast Field Station. This trial has yielded valuable data that has shown us that the use of mulches allows us to reduce the chemical application frequency from four times a year down to once a year. The combination of mulches and reduced chemical application produced better tree growth and fruit yield than from chemicals or mulches alone. It is the data collected from this trial that has served as the basis for four of our other six trials. If the results from the new trials confirm the findings from field 30 we will then be in a position to make general recommendations to avocado growers.

## **AVOCADO COLLAR ROT. *Phytophthora citricola***

*Phytophthora citricola* is found in all of the major Avocado regions of California and can be a serious problem interfering with tree growth and production. Lesions on diseased trees are generally limited to the crown roots and lower stem but the disease invariably kills the tree due to extensive phloem destruction generally manifesting itself as trunk girdling. Wounds appear to be a pre-requisite for successful invasion by *P. citricola*, and therefore cultural practices that cause wounding should be avoided.

### **Trial 1. San Luis Obispo county**

Trunk and soil applications of Aliette (wp) and/or Ridomil have proved efficacious to varying degrees in the control of *P. citricola* cankers. To date these trials have shown that Aliette in a gel is superior in the control of cankers caused by *P. citricola*. Trunk applications of Aliette in a gel were shown to be most effective in the control of cankers followed by Aliette trunk paint, Ridomil trunk paint and Aliette drench (Table 3). In these trials the outer bark was removed before the trunk paints were applied.

Treatments:

1. Aliette @ 300 g product./liter 100 ml/tree applied as a trunk paint over the scraped lesion area.
2. As 1 + polyacrylamide gel @ 2 g/liter
3. Aliette root drench, 150 g/tree per 10 gallons of water applied to the drip area (1.5m radius)
4. Ridomil 2E paint(25% a.i), 100 ml of product / tree sprayed onto the exposed lesion area.
5. Control, bark scraped.

### **Trial 2. South Coast Field Station rootstock tolerance trial.**

Ten rootstocks grafted to the cultivar Hass were planted and root inoculated in 1992 with **P. citricola**, in the roots. Since then they have also been inoculated in the trunks on three different occasions. The soil around these trees was sampled for **P. citricola** in the rhizosphere with positive results. **P. cinnamomi** was also found on the feeder roots of these trees. The experimental block was visually rated for tree health, lesion development and yield in 1994 (Table 3). Although Toro Canyon was significantly different in terms of yield G755A and G755C fared better in terms of lesion size. There were no statistical differences in canopy health. Yield data will be collected early in 1995 from this trial.

### **Trial 3. San Diego County.**

This is a rootstock comparison trial utilizing Duke-7, Thomas, G755B and seedling rootstocks. The trial was planted in July of 1992. To date no differences attributable to the disease have been observed.

## **SUMMARY**

The results of the collar rot control trials indicate that a reasonable management of this

disease can be accomplished by the use of chemical treatment and resistant rootstocks. Due to the nature of this disease and root rot an integrated system should be used to manage both diseases. We are working to validate this concept and to ensure that management of root rot or collar rot does not have a negative impact on management of the other disease.

**Table 1:** South Coast Field Station: This trial is a chemigation-amendment trial at South Coast Field Station field 30 and consists of 24 treatments with 20 replications of each treatment.

### **TREATMENTS**

1. Inoculated control
2. Aliette 22.6 g/tree 2x/year based on leaf flush
3. Ridomil 2.96 g/tree 2x/year based on leaf flush
4. Alfalfa mulch
5. Plastic ground cover (porous)
- 6 Alfalfa-plastic
7. Steer manure
8. Gypsum
9. Alfalfa-steer manure
10. Alfalfa-gypsum
11. Plastic-steer manure
12. Plastic-gypsum
13. Alfalfa-plastic-steer manure
14. Alfalfa-plastic-gypsum
15. Steer manure-gypsum
16. Alfalfa-steer manure-gypsum
17. Plastic-steer manure-gypsum
18. Alfalfa-plastic-steer manure-gypsum
19. Aliette 22.6 g/tree 1x/yr
20. Ridomil 2.96 ml/tree 1x/yr
21. Aliette 22.6 g/tree 1x/yr-alfalfa-plastic
22. Ridomil 2.96 ml/tree 1x/yr-alfalfa-plastic
23. Aliette 22.6 g/tree 1x/yr-alfalfa-plastic-manure-gypsum
24. Ridomil 2.96 ml/tree 1x/yr-alfalfa-plastic-manure-gypsum

**Table 4.** 1994 ratings of *Phytophthora citricola* root stock trial at South Coast field station.

<b>ROOTSTOCK</b>	<b>CANOPY HEALTH (0-10)</b>	<b>MEAN TRUNK LESION SIZE (CM<sup>2</sup>)</b>	<b>YIELD (KG)</b>
TORO CANYON	0.45	8.6	24.78*
755A	0.7	3.4	10.07
755B	0.7	17.62	9.86
755C	0.7	2.3	5.57
THOMAS	0.7	11.7	8.3
G6	0.85	17.8	7.55
B. DUKE	0.9	11.47	8.7
D-7	0.9	6.6	9.24
1033	1.14	31.3	5.31

\* Only Toro canyon was significantly different in terms of yield from the other rootstocks.