

CHEMICAL CONTROL OF AVOCADO ROOT ROT - CHEMIGATION

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Project Objectives: The goals of this project are to evaluate methods and timing of application to arrive at the most economical and effective use of the chemicals that are available for root rot control.

Past research on the chemical control of avocado root rot has resulted in the registration of metalaxyl (Ridomil) for use on bearing and non-bearing avocado trees and in the registration of fosetyl-AI (Aliette) for use on non-bearing avocados and as a trunk injection for diseased trees on a special local need basis. Full registration of Aliette for use on avocados is expected this year.

Because of the cost of metalaxyl and the possibility of its biological utilization by soil micro-organisms resulting in a short usage span current research has focused on the fungicide fosetyl-AI and its application methods.

This past year has seen the termination of some of the field trials and the establishment of others. The chemigation trial at Embarcadero in Santa Barbara County was terminated. This was Hass on Thomas rootstock being treated with metalaxyl and fosetyl-AI injected in the irrigation system. The trial was terminated due to a failure of response of the trees to the chemicals. The main reason for lack of response appears to be due to continuous excessive moisture in the heavy soil which resulted in all of the trees being dwarfed. This saturated soil not only reduced the oxygen levels available to the roots, but due to the trees being planted on mounds excessive salinity also resulted in damage to the roots.

The second termination was the trial in field 20 at UCR. This trial was in integration of chemical control, cytokinins, and micro-nutrients. Over the period of this trial the trees did not demonstrate any differences that could be attributed to treatments. The trial was terminated due to lack of response and will be replaced with another trial as described later.

There are currently four non-trunk injected chemical trials with the upcoming field 20 trial being the fifth site. The current trials include the 3 year old trial on field 30 at South Coast Field Station, one trial on 8-10 year old trees and one on newly planted trees in Santa Barbara County and one trial on 20+ year old trees in Riverside.

Field 30 South Coast Field Station

This is a chemigation-amendment trial consisting of 24 treatments with 20 replications

of each treatment. The experimental design is a randomized block. The trees are Hass with Duke 7 rootstocks planted in May of 1990. Amendments are added once per year as top dressings

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. 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

Measurements are taken each June of trunk diameters, canopy volume and a visual evaluation. Evaluations in 1992 have demonstrated differences in all three parameters. When the data are evaluated by a one way anova the data shown in tables 1, 2 and 3 are apparent. It is interesting to note from the data that in all three charts that a combination of mulches and chemicals applied once a year consistently occur among the best treatments indicating that both have a definite place in a *Phytophthora* management program. What we must do now is to find readily available, inexpensive

mulches that will serve the same purpose. Note that while the rootstock diameters and canopy volume charts are read from the top down the visual evaluation is rated with 1 being healthy and 5 being dead so that the best treatments are at the bottom of this chart.

The tables are Duncan's multiple range test. Means followed by different letters are significantly different at the 5 percent level.

Results of this trial have been a main factor in the design of the new trial planned for field 20 at UCR as described below.

Field 20 U.C.R.

This is the new trial that will be planted in field 20 at UCR this spring. The trial is a chemigation-mulch experiment that will combine the best treatments that we have encountered to date. The trees will be Hass on Duke 7 with 16 replicates of each treatment. Treatments will consist of a mulch of yard waste plus lime, Aliette at label rate, Aliette at 1x per year, mulch plus Aliette at 1x per year and an inoculated control. Other parameters may be added before planting time. Yard waste was chosen because it should be more available and less expensive than many alternates and Dr. Menge's trials suggest that it may be very good for our purposes.

Miller I

This is a recently initiated trial in Santa Barbara County. The trees are approximately 8 to 10 years old and are Hass on G755B in soil infested with *Phytophthora cinnamomi*. The objective of the trial is to compare methods of application of fosetyl-AI to determine the most effective, least expensive, environmentally friendly and least damaging treatment. There are 18 replicates of each treatment that will be evaluated by visual criteria and yield. Treatments consist of fosetyl-AI applied at 20 grams per tree 2 times per year. Application methods are chemigation, foliar spray, trunk paint and trunk injections. Another treatment consisting of a silicone band impregnated with fosetyl-al wrapped around the trunk was planned. However, deterioration of the bands prevented their use.

Miller II

This second trial is at the same location in an adjacent grove that was recently planted to Hass on G755B or Thomas rootstocks in an alternate pattern. The objective is to compare the response of the two rootstocks to two application methods of fosetyl-AI. There are three treatments consisting of the control, trunk paint and chemigation applied twice per year. There are 11 blocks with 1 tree of each treatment per block. Evaluation will be by trunk diameters and visual.

Chapman

This is a small trial adjacent to UCR and consists of older Hass on seedling rootstocks. There are three treatments of 20 trees each. Treatments are control, trunk paint of fosetyl-AI and silicone bands impregnated with fosetyl-AI wrapped around the trunks. Application is 2x per year and evaluation will be visual. This trial may be modified or terminated depending on how the bands hold up to the environment.

The above will be followed closely and results reported to avocado growers in a timely

fashion

TABLE I
TRUNK DIAMETERS
FIELD 30 SOUTH COAST FIELD STATION
JUNE 1992

Aliette 1x \Alfalfa\Plastic	=	62.87	A
Aliette1x\Alfa\Plastic\Manure\Lime	=	62.40	AB
Alfalfa\Plastic\Lime	=	60.79	ABC
Aliette (label)	=	59.89	ABCD
Alfalfa/Plastic	=	59.85	ABCD
Alfalfa\Lime	=	59.47	ABCD
Ridomil1x\Alfa\Plastic\Manure\Lime	=	56.60	ABCDE
Ridomil 1x \Alfalfa\Plastic	=	56.22	ABCDEF
Alfalfa\Plastic\Manure\Lime	=	55.56	ABCDEFG
Plastic\Lime	=	55.35	BCDEFG
Alfalfa	=	54.84	CDEFGH
Plastic\Manure\Lime	=	54.59	CDEFGH
Aliette 1x/yr	=	53.22	DEFGHI
Alfalfa\Manure\Lime	=	52.95	DEFGHI
Plastic\Manure	=	51.22	EFGHIJ
Alfalfa\Plastic\Manure	=	50.88	EFGHIJ
Manure\Lime	=	50.45	EFGHIJ
Lime	=	49.30	EFGHIJ
Alfalfa\Manure	=	49.05	EFGHIJ
Manure	=	49.00	FGHIJ
Plastic	=	48.29	GHIJ
Ridomil (label)	=	47.70	HIJ
Inoculated Control	=	46.00	IJ
Ridomil 1x/yr	=	44.95	J

Duncan's multiple range test. Numbers followed by different letters are significantly different at the 5 percent level.

TABLE II
 CANOPY VOLUMES
 FIELD 30 SOUTH COAST FIELD STATION
 JUNE 1992

Aliette 1x \Alfalfa\Plastic	=	324.8	A
Aliette1x\Alfa\Plastic\Manure\Lime	=	285.1	AB
Alfalfa\Plastic\Lime	=	284.3	AB
Alfalfa/Plastic	=	272.2	ABC
Aliette (label)	=	271.5	ABC
Alfalfa\Lime	=	265.5	ABC
Plastic\Manure\Lime	=	252.7	ABCD
Ridomil 1x \Alfalfa\Plastic	=	251.8	ABCD
Alfalfa\Plastic\Manure\Lime	=	241.9	BCDE
Ridomil1x\Alfa\Plastic\Manure\Lime	=	231.7	BCDEF
Plastic\Lime	=	226.5	BCDEF
Aliette 1x/yr	=	225.2	BCDEF
Alfalfa\Plastic\Manure	=	209.2	BCDEFG
Alfalfa\Manure\Lime	=	203.2	CDEFG
Alfalfa	=	185.5	DEFG
Lime	=	185.2	DEFG
Manure\Lime	=	181.2	DEFG
Plastic	=	169.8	EFG
Ridomil (label)	=	168.1	EFG
Alfalfa\Manure	=	164.8	EFG
Plastic\Manure	=	159.3	FG
Inoculated Control	=	154.2	FG
Manure	=	140.0	G
Ridomil 1x/yr	=	133.3	G

Duncan's multiple range test. Numbers followed by different letters are significantly different at the 5 percent level.

TABLE III
 VISUAL EVALUATIONS
 FIELD 30 SOUTH COAST FIELD STATION
 JUNE 1992

Inoculated Control	=	1.1000	A
Ridomil 1x/yr	=	0.8250	AB
Plastic	=	0.7059	ABC
Lime	=	0.7000	ABC
Aliette 1x/yr	=	0.6389	BCD
Alfalfa\Manure	=	0.6053	BCDE
Manure\Lime	=	0.5500	BCDEF
Ridomil (label)	=	0.4000	BCDEFG
Manure	=	0.3824	BCDEFG
Alfalfa\Lime	=	0.3421	CDEFG
Aliette (label)	=	0.3158	CDEFG
Plastic\Manure	=	0.2778	CDEFG
Plastic\Manure\Lime	=	0.2647	CDEFG
Alfalfa	=	0.2368	CDEFG
Plastic\Lime	=	0.2250	CDEFG
Alfalfa\Plastic\Manure	=	0.1765	DEFG
Alfalfa\Plastic\Lime	=	0.1579	DEFG
Ridomil1x\Alfa\Plastic\Manure\Lime	=	0.1333	EFG
Alfalfa\Plastic\Manure\Lime	=	0.1250	EFG
Alfalfa\Manure\Lime	=	0.1250	EFG
Aliette 1x \Alfalfa\Plastic	=	0.1000	FG
Ridomil 1x \Alfalfa\Plastic	=	0.0556	G
Aliette1x\Alfa\Plastic\Manure\Lime	=	0.0500	G
Alfalfa/Plastic	=	0.0250	G

0=healthy, 5=dead. Duncan's multiple range test. Numbers followed by different letters are significantly different at the 5 percent level.