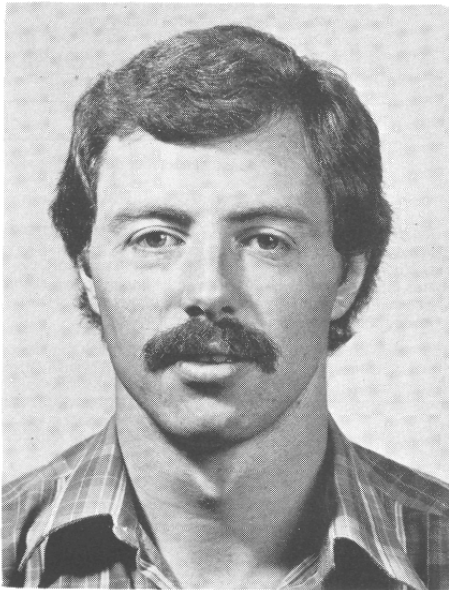


## THE EVALUATION OF NEW APPLICATION METHODS OF FUNGICIDES FOR THE CONTROL OF AVOCADO ROOT ROT

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### OPSOMMING

*Metalaxyl en fosetyl-Al sponsband and stamverf aanwendingsmetodes is getoets vir effektiewe beheer van Phytophthora wortelvrot van avokado-bome. Hier-die proewe was uitgevoer op avokadobome van twee tot agt jaar oud. Die inspuiting van sistemiese swamdoders toon belofte en die sponsband aanwending het ook wortelvrot beheer. Die stamverf aanwendings, onder die toestande wat in hierdie proewe geheers het, was teleurstellend*

### SUMMARY

*Metalaxyl and Fosetyl Al sponge band and steam paint application methods were tested for effective control of Phytophthora root rot of avocado trees in the field.*

*These experiments were carried out on trees, two to eight years old. The injection of systemic fungicides showed promised and the sponge band applications also controlled root rot. The steam paint applications of the fungicides, under the conditions of these*

*experiments, were disappointing.*

## **INTRODUCTION**

Reports of preventative treatments for the control of Phytophthora root rot of citrus have been published by Timmer (1977 and 1979) and Davis (1982). Both stated that CGA-48988 (Metalaxyl) applied as a stem paint, showed preventative as well as curative effects on sour orange root stock. In recent years Snyman (1982) and Snyman and Kotzé (1983b) have studied various application techniques of systemic fungicides for the control of avocado root rot on Edranol seedlings in the glasshouse. These experiments served as a guideline for further testing of new application, techniques under field conditions (Snyman and Kotzé 1983a) Darvas (1983b) studied the effect of systemic fungicides applied as a trunk paint. In another study Darvas (1983a) reported on spectacular control of root rot, using a fosetyl-Al injection technique.

In this study the efficacy of various new application methods of systemic fungicides for the control of Phytophthora root rot on naturally infected avocado trees were evaluated in the field.

## **MATERIALS AND METHODS**

The application methods of systemic fungicides were tested in three separate experiments:

### **1. Louis Trichardt — Fuerte/Edranol trees (3 years old)**

This experiment started in December 1981 to evaluate various stem paints as preventive treatment for young avocado trees. The trees were planted next to an established avocado orchard in soil infested with *P cinnamomi*. The presence of the pathogen was monitored, using the lupin bait technique. The following treatments were applied every three months in the season to the stems of the young trees:

Metalaxyl (WP) (100/g ai/l)

Fosetyl-Al (WP) (100/g ai/l)

Dowco 4562 (EC) (As such, 2 times)

The fungicides were mixed with water and painted onto the main stem of the trees until runoff. Six trees were left untreated as control trees. Metalaxyl and fosetyl-Al treatments were applied to twelve trees each. Nine trees were painted with Dowco 4562. Treatments were applied in the summer season, in December and March for the first season (1981/1982) and in August, November and February for the second season (1982/1983).

### **2. Louis Trichardt Fuerte/Edranol trees (5 years old)**

At the commencement of the experiment (September 1981) all the trees looked healthy and had a rating of 0-1 on a 1-10 scale. The presence of Phytophthora was also established in the orchard soil. The following treatments were evaluated for preventive

control of root rot. Treatment concentrations applied were calculated per 3 cm trunk circumference measured directly above the bud union.

#### Stem Paint

Dowco 4598 (OE) 0,5 g ai

Fosetyl-AI (WP) 0,5 ai

The fungicides were mixed with water and the total amount painted onto the stem to cover as much as the main trunk and branches as possible.

#### Sponge band

Metalaxyl (WP) 0, 5 g ai

Fosetyl-AI (WP) 0, 5 g ai

The fungicide powder was weighed onto a thin (5 mm) sponge strip (200 mm 300 mm depending on stem circumference) and evenly spread over the length of the strip on one half of the strip. The other half of the sponge strip was then folded to enclose the fungicide. This strip (100 mm 300 mm) was kept in place against the tree trunk and sealed off from rain and insects by the plastic strip (150 mm -1000 mm) wound tightly around the tree trunk. To improve the technique the thin sponge strip was replaced with an absorbant Paper strip (Carlton roll) that worked as well and was easier to prepare. This was stuck to the inside of the long plastic strip with tape. "Sponge bands" prepared in this way could be wrapped around a tree trunk in about two minutes. Ten single tree replications were used for each treatment. Ten untreated trees served as control trees. Treatments were applied in September and December during the first season (1981/1982). There were indications that the effective period was approximately 3 months (Snyman and Kotzé, 1983). The sponge bands were applied in August, November and February during the second season.

### **3. HL Hall-Fuerte/Edranol trees (8 years old)**

All the trees used in this experiment had a rating of about 5-6 on a 1 -10 scale. The objective was to test the various treatments for curative effects. The following treatments were used: Fosetyl-AI injection 0, 12 g ai/cm trunk circumference

Fosetyl-AI (WP) sponge band 0, 5 g ai/3 cm trunk circumference

Fosetyl-AI (G) sponge band 0, 5 g ai/3 cm trunk circumference

Fosetyl-AI stem paint 0,5 g ai/3 cm trunk circumference

Fosetyl-AI foliar spray 3% ai

Metalaxyl sponge band 0, 5 g ai/3 cm trunk circumference

Metalaxyl stem paint 0, 5 g ai/3 cm trunk circumference

Eight single tree replications were used per treatment. Fungicides were applied twice, in December 1982 and March 1982, except for the fosetyl-AI foliar spray (every six weeks).

## RESULTS

### 1. Louis Trichardt-Fuerte/Edranol (2 years old):

Trees treated with the various stem paint treatment were monitored for root rot control by measuring the increase in stem circumference. The results are summarised in Table 1.

TABLE 1. Mean increase in stem circumference of avocado trees painted on the stem with systemic fungicides.

Treatment	Increase in stem circumference	percentage difference
Untreated control	4,75 b	0%
Metalaxyl stem paint	6,50 a	36%
Fosetyl-Al stem paint	4,83 b	2%
Dowco 4562 stem paint	4,50 b	-5%
C.V.	34,27%	

1: Means followed by the same letter do not differ significantly (Duncan, P=0,05).

Trees treated with metalaxyl stem paint had a significantly higher Increase (36%) in stem circumference compared with the control trees. Trees treated with fosetyl-Al and Dowco 4562 stem paint treatments did not differ significantly from the control trees. Dowco 4562 caused phytotoxic symptoms on the stems of the avocado trees.

### 2. Louis Trichardt Fuerte/Edranol trees (5 years old)

The effect of the trunk paint and sponge band as application methods on 5 year old avocado trees in the field as measured by increase in trunk circumference is summarized in Table 2.

TABLE 2: Mean increase in trunk circumference of avocado trees (5 years old) treated with sponge band and trunk paint applications of systemic fungicides.

Treatment	Increase in trunk circumference	Percentage difference
Untreated control	1,80 b	0%
Metalaxyl sponge band	3,80 a	111%
Fosetyl-Al sponge band	3,10 ab	72%
Fosetyl-Al trunk paint	2,20 b	22%
Dowco 4598 trunk paint	2,05 b	14%
CV	60,48%	

1: Means followed by the same letter do not differ significantly (Duncan, P=0,05).

Metalaxyl sponge band treated trees had a significantly higher increase (111%) in trunk circumference compared to the control trees. Metalaxyl sponge band and fosetyl-Al sponge band treated trees did not differ significantly. Trees treated with fosetyl-Al and Dowco trunk paint applications did not differ significantly from the control trees.

### 3. HL Hall-Fuerte/Edranol trees (eight years old)

Various application techniques of new systemic fungicides were tested for their efficacy to cure avocado trees from root rot. Results are presented in Table 3.

Although trees differed to a great extent numerically, none of the trees treated had a significantly higher increase in trunk circumference compared to control trees.

Trees treated with fosetyl AI injection and metalaxyl sponge band had the highest increase in stem circumference followed by trees treated with fosetyl-AI foliar spray, fosetyl-AI (WP) sponge band and trees treated with metalaxyl stem paint.

TABLE 3. Mean increase in trunk circumference of avocado trees treated with various application techniques of metalaxyl and fosetyl-AI

Treatment application	Mean increase in trunk circumference	percentage difference
Untreated control	1,625 a	0%
Metalaxyl sponge band	2,188 a	35%
Metalaxyl trunk paint	1,938 a	19%
Fosetyl-AI injection	2,250 a	38%
Fosetyl-AI sponge band (WP)	2,063 a	27%
Fosetyl-AI sponge band (G)	1,500 a	-7%
Fosetyl-AI trunk paint	1,500 a	-7%
Fosetyl-AI foliar spray	2,125 a	31%

Coefficient of variation

58,11%

1: Means followed by the same letter do not differ significantly (Duncan, P=0,05).

## DISCUSSION

With the application of systemic fungicides to avocado trees by using the sponge band technique and the trunk paint technique (if applied more regularly), it is possible to obtain preventative control of Phytophthora root rot of avocado trees in naturally infested soil. Observations of tree condition after two years indicate that control trees are starting to fall behind in overall appearance and vigor. It has to be remembered that these experiments were conducted during an exceptionally dry period and the differences between treatments could have been much more significant during years of high rainfall. Evidence on the curative control of root rot with sponge band and trunk paint applications on avocado trees is incomplete at this stage.

The experiment which was started at HL Hall needs to be extended for another one or two seasons. None of the trees treated had a significantly higher increase in trunk circumference compared to control trees in this experiment. This is not the cause of un-effective treatments, but because of the short time allowed for reaction and the severe drought. Darvas (1983) stated that significant recovery of diseased trees treated with fosetyl-AI injections could be achieved within two years of treatment. He used a low concentration of metalaxyl due to low solubility of this product in water. At a more

realistic concentration metalaxyl injection should control root rot, if resistance is not established.

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