South African Avocado Growers' Association Yearbook 1985. 8:76-77

THE RELATIONSHIP BETWEEN AVOCADO TREE CONDITION AND DOSE RATES OF FOSETYL-AL INJECTIONS FOR ROOT ROT CONTROL

J M DARVAS, J C TOERIEN AND D L MILNE,
WESTFALIA ESTATE, DUIWELSKLOOF

OPSOMMING
*Ondersoeke toon dat fosetiel-Al teen hoér dosisse as 0.3g a.b. > per m^2 driplyn area toegedien moet word vir beheer van **Phytophthora cinnamomi** op avokados. Gesonder borne benodig meer materiaal as sieker borne om hul toestand te behou of te verbeter.*

SUMMARY
During the course of studies on the control of Phytophthora root rot of avocados by trunk injection with fosetyl-Al at Westfalia Estate, it was found that the material must be administered at dose rates higher than 0.3g a.i. per m^2 canopy area to be effective and that injected, but healthier looking trees (heavily foliated) require more material than sick trees, in order to improve or maintain their condition.

INTRODUCTION
Experiments on the control of Phytophthora root rot of avocado *(Persea Americana* Mill.) by trunk injection with fosetyl-AI were first started at Westfalia Estate and results on the efficacy of the method were reported by Darvas, Toerien & Milne (1983). In a later publication Darvas *et al* (1984) discussed the role of fosetyl-Al concentration and the initial disease rating of trees in the first year's reaction to root rot control by trunk injection.
In this paper the practical implications of root rot control by means of trunk injections with fosetyl-At are being discussed.

MATERIALS AND METHODS
Some 2115 randomly selected avocado trees, including Fuerte, Mass, Edranol and Ryan cultivars, varying between 1 and 17 m in drip-line diameter were injected in commercial orchards, using fosetyl-AI doses of between 0.1 and 2.5 g a.i. per m^2 of canopy area. The disease rating of the trees ranged from 0 to 8 on the root rot severity index scale of 0 (healthy) to 10 (dead). Trees were injected with the fungicide solution in the main trunk by using a modified form of the injection technique of Buitendag & Bronkhorst(1980)as described by Darvas *et al.* (1983). Trees were injected in July and again in October 1981 and the reaction was assessed in July 1982.
Disease rating differences that occurred in the first year were then correlated with the dose rates used and the initial disease condition of the trees. A multiple linear regression model was also constructed to forecast the first year's reaction.

RESULTS

A highly significant correlation was found between the quantities of fosetyl-Al injected into the trunk and tree response (Fig.1). This shows that dose rates below 0.3g a.i. per m^2 canopy area are ineffective in the first year of the treatment.

A similar, highly significant correlation was found between the initial disease condition of avocado trees and tree response (fig. 2). This indicates that trees with full foliage require more fosetyl-Al than similar sized, but less foliated trees in order to produce equivalent responses.

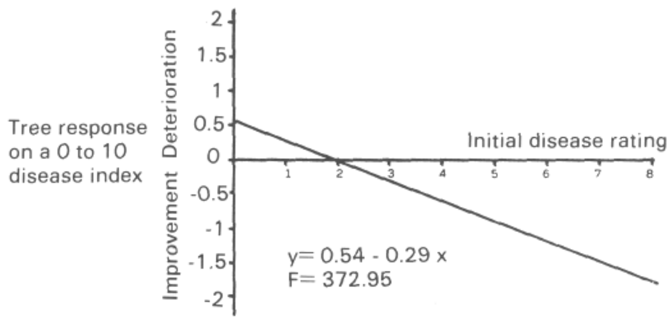

FIG.2: The correlation between initial disease rating of trees and tree response in the first year of fosetyl-Aℓ trunk injection.

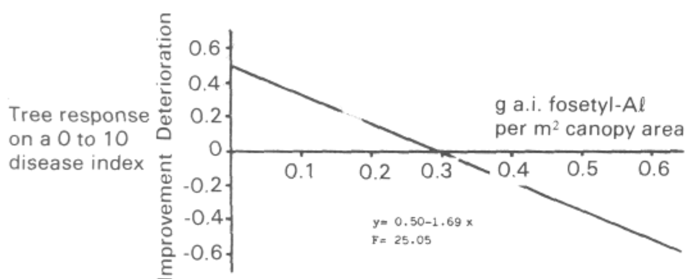

FIG.1: The correlation between fosetyl-Aℓ dose rates by trunk injection and tree response in the first year of the treatment.

It was found possible to compute a forecast of tree response with the following multiple linear regression equation: Z=0.85-1.17x-0.29y, where Z= the forecast of tree response on a disease index scale of 0-10, x= fosetyl-Al dose rate (in g a.i. /m^2 of canopy area) injected twice a year and y= initial disease rating on a disease index scale of 0-10 (FforZ= 198.26, F for x= 20.18 and F for y=378,20).

DISCUSSION

According to the correlation found between fosetyl-Al dosages injected into the trunk and tree reaction, the 0,4g a.i. per m^2 canopy area injected twice a year as reported by Darvas *et. al*. (1983) falls in the effective dose rate regime. Rates under 0.3 g a.i. per m^2 usually failed to control the disease, but caused a slowdown of the rate of tree decline.

Rates above 0.8g a.i. per m^2 produced phytotoxic symptoms on leaves of some trees. Phytotoxicity was more severe in trees in the advanced stages of root rot with considerably less foliage than in healthy trees. However, all trees that developed phytotoxic symptoms continued a normal recovery and these symptoms disappeared in the second year when trees became more densely foliated. These observations indicate that the occasional phytotoxicity at the 0.4g a.i. per m^2 rate is primarily due to inability of defoliated trees to properly dilute and distribute the chemical within the plant.

An important finding with trunk injection with fosetyl-Al was that trees in the more advanced stages of root rot reacted faster to the same amount of material than healthier trees of the same size. This may indicate that trees which have started to recover need progressively more material in order to maintain the rate of recovery. This phenomenon may also be explained by the larger volume of foliage of healthier trees that dilutes and distributes the fungicide in the plant.

The multiple regression equation used to predict the first year's tree response proved to be accurate in commercial applications. It has, however, no value in forecasting recovery rate in the second year of the injection treatment. The second year's reaction *is* generally faster recovery.

It was observed that when trees were injected from only one side, phytotoxicity appeared on that side and tree reaction was also one sided. It is, therefore, important to space the injection holes evenly right around the trunk for a uniform reaction.

Some fosetyl-Al injected trees were recorded which did not respond at the expected rate or showed no response at all. Further investigation of such trees revealed that factors other than Phytophthora root rot may be responsible for the decline at Westfalia. These factors include the chemical and physical condition of the soil and rootstock/scion incompatability.

REFERENCES

BUITENDAG, CH & BRONKHORST, GJ 1980. Injection of insecticides into tree trunks a possible new method for the control of citrus pests? *Citrus and Subtropical Fruit* J. 556: 5 - 7.

DARVAS, JM, TOERIEN, JC & MILNE, DL 1983.Injections of established avocado trees for the effective control of Phytophthora root rot *Citrus and Subtropical Fruit J.* 591: 7 - 10.

DARVAS, JM, TOERIEN, JC & MILNE, DL 1984. Control of avocado root rot by trunk injection with fosetyl-Al. *Plant Disease* 68: 691 - 693.