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CHEMICAL CONTROL OF AVOCADO ROOT ROT IN CALIFORNIA

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OPSOMMING

*Verskillende benaderings tot beheer van wortelvrot van avokado word bespreek. Inspuiting van borne met fosfiet verbindings mag doeltreffend blyk te wees maar die hoë koste van water en arbeid mag algemene toepassing van hierdie tegniek uitskakel. Bestandheid van **Phytophthora cinnamomi** teen hierdie swamdoders is reeds in die laboratorium gedemonstreer en mag dalk ook in die veld ontstaan. Grondberoking met metiel bromied is gevind om baie duur en ondoeltreffend te wees, 'n Program van gemtegreerde beheer waarin herplanting met borne met verdraagsame onderstokke wat voorafbehandel is met fosetyl-Al, metalaxylofacylanilidegebruik word, en binne 7-10daegevolg word met 'n na-plant behande/ing, gee goeie beheer teen relatiewe lae koste.*

SUMMARY

*Different approaches to avocado root rot control are discussed. Tree injection with phosphite compounds may prove effective but water and labor costs might exclude its general application. Resistance of the **Phytophthora cinnamomi** to these fungicides has been demonstrated in the laboratory and might occur in the field. Soil fumigation with methyl bromide proved to be expensive and ineffective. An integrated control programme in which replanting with tolerant rootstocks pre-treated with fosetyl Al, metalaxyloracylanilide, followed by a post-plant treatment applied within 7-10 days of planting, gives good control at relatively low costs.*

INTRODUCTION

Under Californian conditions, chemical control of avocado root rot on mature bearing trees using either metalaxyl or fosetyl-Al is frequently efficacious (Coffey *et ai,* 1984), but unfortunately extremely expensive. The efficacy of tree injections of 10% fosetyl Al and other phosphite compounds is currently under experimental evaluation. Assuming that the type of results achieved by Darvas and his colleagues at the Westfalia Estate (Darvas *et al.,* 1984) are reproducible in our soils and under our climatic conditions, this may also represent an economical method in California.

However, there are two predictable problems with this method. Firstly, the current high fruit production, and the very high water costs particularly in San Diego county, drastically reduce the amount that the average grower can afford to invest in chemical control. In addition, we have much higher labor costs in California compared to South

Africa. Secondly, the demonstration that *Phytophthora* izo lates highly resistant to fosetyl AI can be produced in the laboratory (Bower & Coffey, 1984) raises concern about the long-term stability of this method. Currently, we are engaged in research in order to learn more about this resistance phenomenon. It should be remembered that resistance to metalaxyl was first demonstrated in the laboratory (Davidse, 1981), and soon after occurred under field conditions (Coffey & Young, 1984; Davidse *et al.,* 1981; Dowley & O'Sullivan, 1981).

Replant Problems and Fumigation

Currently the major thrust of our chemical control program is with the difficult problem of replanting tolerant rootstocks such as Duke 7 and G6, and nowG755. Fumigation with methyl bromide has proved to be a relatively unreliable method in California. The difficult soil profiles, the sloping terrain, an inadequate knowledge of the correct soil moisture and temperature ranges required for good efficacy, and the negative effects on other soil microflara, have all had their part to play. It is also a very expensive method. The costs for a commercial fumigation with methyl bromide in California range from $3,000 to $5,000 per acre. Finally, methyl bromide is likely to be withdrawn from the market in the near future because of problems with ground water contamination.

Systemic Fungicides

As early as 1978 greenhouse experiments were in progress with the systemic fungicides metalaxyl and fosetyl-Al using *Persea indica* and *P. americana* (cultivar Topa Topa) seedlings (Zentmyer & Ohr, 1978). Results indicated that in short term experiments (6-8 weeks) with container-grown plants, metalaxyl soil drenches had high activity in controlling root rot at concentrations as low as 10 mg a.i./litre. Fosetyl-Al soil drenches at concentrations of 1 g a.i./litre or greater gave very similar results. Foliar applications of fosetyl-Al at rates of 1.5 g a.i./litre gave equivalent control of root rot to a soil drench using the same concentration (Fenn & Coffey, 1984).

Integrated Control

In greenhouse experiments with Duke 7 clonal cuttings it was determined that soil drenches of both metalaxyl and fosetyl-Al partially inhibited the production of propagules of *P. cinnamomi over a* 9 week period (Coffey *et al.,* 1983). Over a more protracted period of 18 weeks, fosetyl-Al was particularly effective in sustaining control over propagule production (Coffey *et al.,* 1983).

In 1982, the first field trials with replants (Duke 7/Hass) and fungicides were begun. Results were good with fosetyl-Al, but the levels of fungicide used were uneconomical (Coffey *et al.,* 1984). In 1983 a new field trial with fosetyl-Al, metalaxyl and the related acylanilide oxadixyl (SAN 371 F) established effective rates for all three fungicides. Critical factors were the use of a preplan! Treatment of the tree's roots and a postplant treatment applied within 7-10 days of planting. The annual costs of the most effective treatments were less than $50 per acre.

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