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EXPERIMENTAL CONTROL OF AVOCADO PHYTOPHTHORA ROOT ROT IN SOUTH AFRICA

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ABSTRACT

An effective treatment, previously reported by Zentmyer, Mircetich and Johnson (1967) has been tested with success on avocado trees under South African conditions. Unfortunately, the high rates of application of the experimental material ("Dexon"), makes this treatment uneconomical for large-scale application.

Root rot of avocados, caused by *Phytophthora cinnamomi,* is undoubtedly the most serious disease of avocado trees in South Africa, probably affecting 20 per cent of all trees grown. In some orchards as many as 90 per cent of the trees are already in a severe state of decline (Brodrick, 1971).

In an endeavour to find an effective control measure against this disease, various treatments were applied to debilitated 18-year-old Fuerte trees, commencing in 1969. The trees, which had an average shade area of 36 square metres, were growing on a red loam soil at Rosehaugh, near Nelspruit. Each tree had previously received a light sawdust mulch treatment and the average annual rainfall of 1140mm was supplemented, when necessary, by flood irrigation in the first year of the experiment and with sprinkle irrigation during the second year.

Prior to treatment application, trees were selected on the basis of their disease rating, using the following system of rating.

Index:

1. Healthy trees with dense foliage, dark green leaves and no visible signs of wilt.
2. Trees with reduced vigour, showing clear signs of wilt and chlorosis.
3. Trees obviously starting to decline, with low leaf density, and extensive wilt and chlorosis.
4. Extensively defoliated trees bearing only a few chlorotic and wilted leaves.

For the purpose of the experiment, only trees with an index of 3,0 were selected for treatment. (When assessing at the end of the experiment, intermediate ratings were given. Such intermediate classes, e.g. 2+3— or 1+ , were then increased or decreased

by addition or subtraction, so that the latter series would read 2+ = 2,3; 3— = 2,7 and 1+= 1,3.)

Treatments:

The following treatments were apnlied:

1. 5% granular Dexon (applied at 2.63 gm/m^2 a.i.).
2. Dexon (as above) + 4,5 kg superphosphate per tree.
3. 4,5 kg superphosphate per tree.
4. 10% Mocap (applied at 1,70 gm/m^2 a.i.).
5. Dexon as above + Mocap (as above) + 4,5 kg superphosphate per tree.
6. Untreated control.

All treatments were applied annually with the exception of the Dexon which was applied monthly in treatments 1, 2 and 5. There were five single-tree replications of all treatments. The annual treatments were applied on 12.3.69 and again on 1.5.70.

The Mocap and superphosphate treatments were dug-in at the time of application and all treatments were followed by a light irrigation whenever possible. Initially the Dexon was applied over the full basin area, but when sprinkler irrigation was started the granules were concentrated mainly on the perimeter of the drip area. "Dexon" (p- Dimethylamino benzenediazo sodium sulphonate) is a fungicide known to be effective against certain soil fungi, "Mocap" (O—Ethyl S,S— dipropyl phosphorodithioate) is a nematicide included because of the occurrence of low populations of *Helicotylenchus* and *Tylenchus;* and the superphosphate at double the normal rate was included because of its recorded beneficial effect on conifers affected by *Phytophthora cinnamomi* (Newhook, 1968).

Assessment of tree appearance was carried out in May 1970 and again in February 1971. At the first assessment, the results were somewhat inconclusive but at the second assessment (i.e. approximately two years after treatment commenced and after one year of sprinkle irrigation), significant differences in treatments became apparent. The results are given in Table 1.

Statistical analysis of the results shows that the Dexon treatment on its own is significantly better (P = 0,05) than the untreated controls. Trees treated with Dexon alone were virtually completely healthy after a two year treatment period. At a lower level of statistical significance however (P = 0,1) it appears that the fertilizer application has had a detrimental effect on the Dexon treatments, and in itself has had no beneficial effect on the trees. The nematicide on the other hand, caused a slight, but non-significant beneficial effect. With the addition of superphosphate, the effectiveness of Dexon was greatly reduced in treatments 2 and 5. It is possible that this may have been due to a change in the pH. According to a report by the Avocado Research Advisory Committee (Anon., 1970), Dexon appears to be less effective at pH levels of 4 to 6 than at a higher pH. It therefore appears that monthly applications of Dexon for 24 months can significantly improve the condition of trees seriously infected with root rot. The costs of application (probably in the region of $3.30 per tree per application) are, however, at

present, prohibitive and little is known of the long-term benefits of such a treatment. Until more is known of these long-term effects, or until greater residual action can be obtained, this treatment must be regarded as effective but uneconomical. The use of Dexon in replant sites is at present being investigated and it is hoped that this might lead to results with greater economic potential.

TABLE 1

Effect of various treatments on vigour of root-rot infected avocado trees

Treatment	*Replication:*	*Index after two years of treatment**					*Mean index after two years of treatment*
		I	II	III	IV	V	
1. 5% granular Dexon at 2,63 gms a.i./m²		1,7	1,3	1,0	1,3	1,3	1,3
2. Dexon (as above) + 4,5 kg Superphosphate per tree		1,3	3,0	3,3	4,0	3,1	3,1
3. 4,5 kg Superphosphate per tree		2,3	1,3	2,7	4.0	2,7	2,6
4. 10% Mocap at 1,70 gm/m² a.i		2,7	2,7	1,0	1,7	2,7	2,2
5. Dexon (as above) + 4,5 kg Superphosphate per tree + Mocap (as above)		1,3	1,0	2,0	2,0	3,7	2,0
6. Untreated control		2.0	2,3	3,0	4,0	3,0	2,8

*All trees are rated at an index of 3,0 before treatment.
LSD (0,10) = 1,10.
LSD (0,05) = 1,41.

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