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PRE-HARVEST CHEMICAL CONTROL OF ANTHRACNOSE, SOOTY BLOTCH AND CERCOSPORA SPOT OF AVOCADOS

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Progress Report

OPSOMMING

Sewe swamdoders, CGA 64250, CGA 64251, prosimidoon, benomil, prosimidoon/benomil, benomil / kaptab en koper-oksichloried is gedurende die somermaande as boordbespuitings afsonderlik toegedien aan Fuerte avokadobome vir die beheer van antraknose, Cercospora-vlek en roetvlek. Koper-oksichloried, benomil, prosimidoon / benomil, benomil / kaptab en CGA 64250 net statisties betekenisvolle verminderings in die voorkoms van antraknose-letsels tot gevolg gehad. Met die uitsondering van CGA 64250 het hierdie swamdoders ook betekenisvolle verhogings in die persentasie skoon vrugte teweeggebring. Betekenisvolle verminderings in die voorkoms van Cercospora-vlek is waargeneem na behandeling met koper-oksichloried, benomil / kaptab en benomil, terwyl roetvlek betekenisvol verminder is deur koper-oksichloried en CGA 64250.

SUMMARY

Seven fungicides, CGA 64250, CGA 64251, procymidone, Benomyl, procymidone / Benomyl, benomyl / captab and copper oxychloride, were evaluated separately in pre-harvest field spray trials for the control of anthracnose, Cercospora spot and sooty blotch. Application of copper oxychloride, Benomyl, procymidone / Benomyl, benomyl / captab and CGA 64250 resulted in statistically significant reductions in the incidence of anthracnose lesions. Significantly more clean fruit was also produced after application of these fungicides, except in the case of CGA 64250. A significant reduction in the incidence of Cercospora spot was observed after treating fruit with copper oxychloride, benomyl / captab and Benomyl, while sooty blotch was significantly reduced by copper oxychloride and CGA 64250.

INTRODUCTION

Anthracnose remains a serious problem facing avocado growers world-wide. In the

South African export anthracnose caused by Colletotrichum gloeosporioides Penz. and Dothiorella aromatica are major fruit diseases. Sooty blotch caused by an Akaropeltopsis sp (Theron etal, 1981) spoils the appearance of the fruit, making it unacceptable for the export market. Cercospora spot (Pseudocercospora purpúrea (Cke) Deighton is an important pre-harvest disease. In all three of these instances, infection or colonization of the fruit takes place before harvest. Pre-harvest application of fungicides would thus seem a feasible means of controlling these diseases. This paper reports on a follow-up survey of a previous experiment (Kotzé et al, 1981) evaluating various fungicides as pre-harvest sprays on Fuerte avocado trees at HL Hall & Sons, Mataffin.

PROCEDURE

The following fungicides were evaluated.

Benomyl — 37,5g a.i./100ℓ + 0,25% Orchex oil spray
Procymidone — 50,0g a.i./100ℓ + 0,022% Nu-film sticker
CGA 64250 — 5,0 ml a.i./100ℓ + 0,022% Nu-film sticker
CGA 64251 — 5,0g a.i./100ℓ + 0,022% Nu-film sticker
Copper oxychloride — 340,0g a.i./100ℓ + 0,022% Nu-film sticker
Benomyl/captab — 37,5 and 50,0g a.i. respectively/100ℓ + 0,022% Nu-film sticker
Procymidone/benomyl — 50,0g a.i. each/100ℓ + 0,022% Nu-film
Control — untreated

A high volume applicator with hand lances, was used to apply the fungicides. Fully grown trees received 50ℓ of spray mixture while smaller trees were sprayed till dripping commenced. The experiment was laid out in a randomised block design with five replicates of two tree plots each per treatment.

The spray treatments commenced on 1980-11-19. Due to rain the same day, the application was repeated on 1980-11-27. Further applications took place on 1981-01-12 and on 1981-03-26.

The fruit was picked on 1981-05-14. All the sampling was done at shoulder height and between 30 and 35 fruits were picked from each tree. The fruit was placed in standard carton containers, left on the laboratory bench until ripe, where after it was rated on a scale of 0 — 3 for the incidence of Cercospora spot and sooty blotch. In the case of anthracnose, the number of lesions from 0—10 were counted. Fruit displaying more than 10 lesions were allocated a > 10 rating. Anthracnose in this report refers to well defined lesions which caused half moon-like decay in the flesh of the fruit as well as the depressed necrotic lesions on the skin. The predominant organisms which had been isolated from these lesions were *Colletotrichum gloeosporioides* and *Dothiorella aromática.* It is perhaps better described as avocado anthracnose-complex or *Dothiorella / Colletotrichum* fruit rot complex. All fungicides tested caused a decrease in the incidence of the diseases, though not statistically so in several instances. Copper oxy-chloride performed the best, reducing the severity of anthracnose-complex, sooty blotch and Cercospora spot by 84%, 100% and 100% respectively (Table 1). In the

case of anthracnose, CGA 64250, pro-cymidone/benomyl, benomyl / captab and Benomyl also reduced the severity of the disease significantly. Apart from copper oxychloride a significant reduction in the severity of sooty blotch was achieved by CGA 64250 and in the case of Cercospora spot by benomyl / captab and Benomyl.

TABLE 1: Effect of pre-harvest fungicidal sprays on the severity of anthracnose-complex, cercospora spot and sooty blotch of avocados

Fungicide	Mean number of anthracnose-complex lesions per 100 fruit	Mean number of rating units per 100 fruit	
		Cercospora spot	Sooty blotch
Control	552a	47a	102ab
CGA 64251	416ab	41a	92abc
CGA 64250	292bc	25ab	63c
Procymidone	450a	23ab	79abc
Procymidone/ Benomyl	206cd	19ab	108a
Benomyl/captab	257c	7b	72bc
Benomyl	207cd	4b	99ab
Copper oxy-chloride	87d	0b	0d

Values followed by the same letter do not differ statistically significant (p = 0,05)

TABLE 2: Effect of pre-harvest applied fungicides on the development of varying degrees of anthracnose-severity

Fungicide	Percentage clean fruit	Percentage fruit with 1-10 lesions	Percentage fruit with more than 10 lesions
Control	25a	29ab	46a
CGA 64251	26a	45c	29bc
CGA 64250	47ab	35bc	18cd
Procymidone	32a	32bc	36ab
Procymidone/ Benomyl	61bc	27ab	12de
Benomyl/ captab	54b	30ab	17de
Benomyl	67bc	19ab	14de
Copper oxy-chloride	80c	15a	5e

Values followed by the same letter do not differ statistically significant (p = 0,05)

Fruit quality is strongly influenced by anthracnose. The effect of fungicide application 'reducing the anthracnose-complex is presented in Table 2. Application of benomyl / captab, pro-cymidone / benomyl, Benomyl and copper oxychloride resulted in significant increases in clean fruit. Not one of the fungicides decreased the percentage of fruit

having 1 — 10 anthracnose lesions. In fact, a significant increase in fruit with 1 — 10 lesions was evident in the case of CGA 64251. Except for procymidone, all the fungicides which were evaluated, significantly reduced the percentage fruit with more than 10 lesions. Once again, copper oxychloride caused the greatest reduction.

DISCUSSION

A general purpose fungicide effective against all pathogens involved would be the ideal solution for the post-harvest decay syndrome of avocados. Copper oxychloride seems a promising agent in this regard since it gave the best control of all three diseases investigated in this report and also controls stem-end rot effectively (Darvas, 1981). A reduction of 58% in the incidence of the *Dothiorella / Colletotrichum* complex after pre-harvest treatment with copper oxychloride was reported as well (Darvas, 1981). Although it was found by Allen (1977) that copper fungicide sprays gave variable control of anthracnose in different avocado plantings in Australia, there are a number of reports on the success of these fungicides in the control of post-harvest decay of avocados, including anthracnose (Stevens, 1922; Ruehle, 1943; Darvas, 1981; Kotzé *et al*, 1981). Cost-wise, copper oxychloride also compares favourably with other fungicides available. In a comparison of various fungicides, including copper oxychloride, Darvas (1981) found that the best control of post-harvest diseases was obtained with captafol. However, according to Kotzé *et al* (1981), captafol sprays are slightly phytotoxic to the leaves and also leave a white residue on the fruit which is difficult to remove.

Apart from copper oxychloride, not one of the fungicides tested gave effective control of all three diseases investigated. Benomyl controlled anthracnose and Cercospora spot, but was not effective against sooty blotch. The ineffectiveness of Benomyl against sooty blotch is in accordance with previous findings (Kotzé *et al,* 1981). CGA 64250 reduced the severity of anthracnose and sooty blotch, but did not control Cercospora spot significantly.

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