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Chemical control of pre- and postharvest diseases of avocados

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ABSTRACT

Cercospora *spot of avocados was effectively controlled by preharvest applications* of *Captab or Benomyl. All the evaluated fungicides, except Benomyl, controlled stem-end rot and* Dothiorella/Colletotrichum *complex. EN600 (experimental additive) did not improve the effectiveness of Benomyl. All the fungicide treatments significantly controlled anthracnose. NuFilm did not significantly improve the effectiveness of copper oxychloride.*

UITTREKSEL

Cercospora-*vlek van avokado's was bevredigend beheer deur vooroes bespuitings met Kaptab of Benomyl. Alle swammiddels wat getoets is, behalwe Benomyl, het stingelendbederf en* Dothiorella/Colletotrichum-*kompleks beheer. Die byvoeging van EN600 (eksperimentele byvoegmiddel) het nie die effektiwiteit van Benomyl verbeter nie. Al die behandelings het antraknose betekenisvol beheer. Die effektiwiteit van koperoksichloried is nie deur die byvoeging van NuFilm beduidend verbeter nie.*

INTRODUCTION

Avocados are subjected to numerous fruit diseases (Darvas & Kotzé, 1987). Sooty blotch caused by *Akropeltopsis* sp (Theron, Kotzé & Wehner, 1981) and *Cercospora* spot caused by *Pseudocercospora purpurea* (Cke) Deighton (Darvas & Kotzé, 1987) are important preharvest diseases. The major post-harvest diseases are stem-end rot caused by any of ten pathogens, the most important being *Thyronectria pseudotricha* (Schw) Seeler (Darvas, 1978); Antracnose *(Colletotrichum gloeosporioides* Penz) and Dothiorella rot *(Dothiorella aromatica). Colletotrichum gloeosporioides* is usually associated with Dothiorella rot, to form the so-called *Dothiorella/Colletotrichum* complex (Darvas, 1978).

In all the above instances, infection of the fruit takes place before harvest. Preharvest application of fungicides is therefore fairly successful in controlling these diseases. There have been many reports published on preharvest chemical control of avocado fruit diseases in South Africa (Darvas, 1977; Darvas & Kotzé, 1978; Darvas & Kotzé, 1981; Kotzé, Kuschke & Durand, 1981; Darvas, 1981; Kotzé, Du Toit & Du Rand, 1982; Darvas, 1982; Labuschagne & Rowell, 1983; Darvas, 1983; Denner & Rowell, 1985, 1987; and Darvas & Kotzé, 1987). This paper reports on further preharvest chemical control trials carried out at Hall & Sons (Nelspruit) during the 1988/98 growing season.

MATERIALS AND METHODS

The field trial was conducted in a six-year-old Fuerte avocado orchard at H L Hall & Sons, Mataffin. A randomised block design was used, with five replicates of one tree plots per treatment. The following fungicide treatments were evaluated:

TABLE 1 Fungicide treatments and dosages

Fungicide treatment	Rate (per 100ℓ water)
Control	—
Virikop WP (850 g/kg ai)	255 g ai
Virikop WP + NuFilm	255 g ai + 25 mℓ
Kocide WP (770 g/kg ai)	231 g ai
Benlate DF	25 g ai
Benlate DF + EN600	25 g ai + 25 mℓ
Captan WP	100 g ai

A high volume applicator with hand lanees was used to apply the fungicides. The spray treatments commenced on 14-11-88. Further applications took place on 22-12-88 and on 16-01-89. The fruit was picked on 30-03-89. All sampling was done at shoulder height and between 30 and 40 fruits were picked from each tree. The fruit was placed in standard carton containers and transported to the laboratory where it was rated immediately for preharvest diseases. The fruit was then allowed to ripen at ambient temperatures until it reached eating-ripe stage when it was evaluated for the occurrence of postharvest diseases.

The various diseases were assessed by rating individual fruit according to the following keys:

D/C complex:

Dothiorella/Colletotrichum complex was rated on a scale 0-10 where 0 represents clean fruit (no lesions) and 10 represents fruit completely covered with lesions.

Bulb-discolouration (physiological damage caused by moisture loss) was assessed according to the following key:

Stem-end rot:

Class 0 = clean fruit
1 = infection limited to the pedicle area
2 = infection less than 5 mm from the pedicle
3 = infection more than 5 mm from the pedicle

Anthracnose:

Class 0 = clean fruit
1 = 1-5 lesions
2 = 6-10 lesions
3 = more than 10 lesions

D/C complex:

Dothiorella/Colletotrichum complex was rated on a scale 0-10 where 0 represents clean fruit (no lesions) and 10 represents fruit completely covered with lesions.

Bulb-discolouration (physiological damage caused by moisture loss) was assessed according to the following key:

Class 0 = undamaged fruit
1 = damage less than 20 mm in diameter
2 = damage greater than 20 mm in diameter but less than 40 mm in diameter
3 = damage greater than 40 mm in diameter

RESULTS

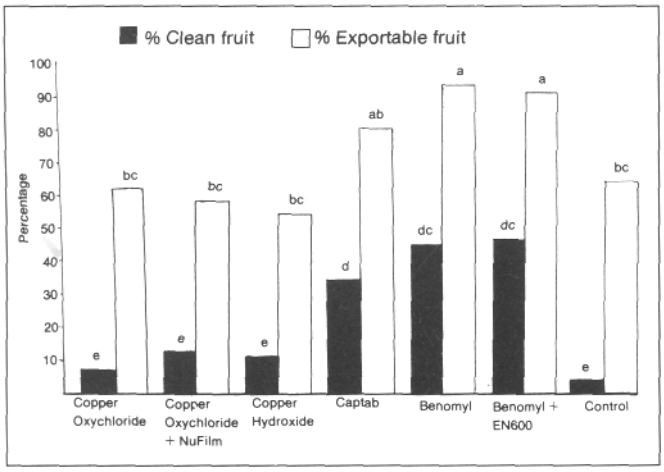

Fig 1 Effect of fungicide treatments on *Cercospora* spot expressed as percentage clean fruit (% 0 ratings) and percentage exportable fruit (% 0 ratings plus % 1 ratings). Bars not sharing a common letter are significantly different (P=0,05) according to Duncan's multiple range test.

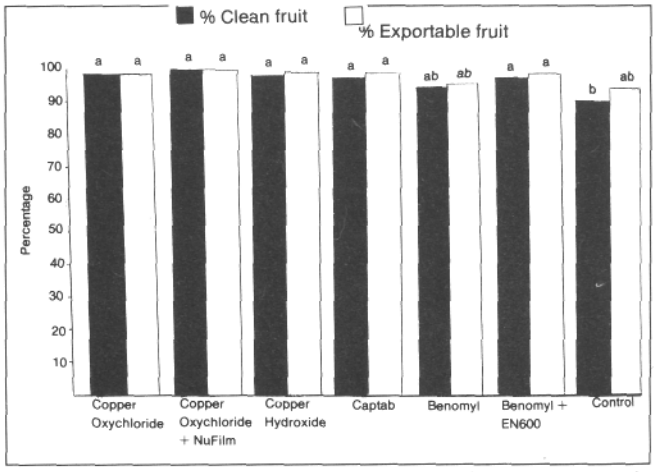

Fig 2 Effect of fungicide treatments on stem-end rot expressed as percentage clean fruit (% 0 ratings) and percentage exportable fruit (% 0 ratings plus % 1 ratings). Bars not sharing a common letter are significantly different (P=0,05) according to Duncan's multiple range test.

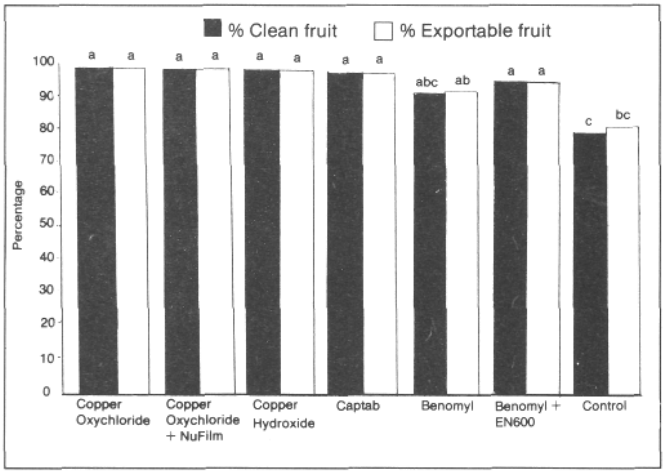

Fig 3 Effect of fungicide treatments on *D/C* complex (*Colletotrichum* and *Dothiorella*) expressed as percentage clean fruit (% 0 ratings) and percentage exportable fruit (% 0 ratings plus % 1 ratings). Bars not sharing a common letter are significantly different (P=0,05) according to Duncan's multiple range test.

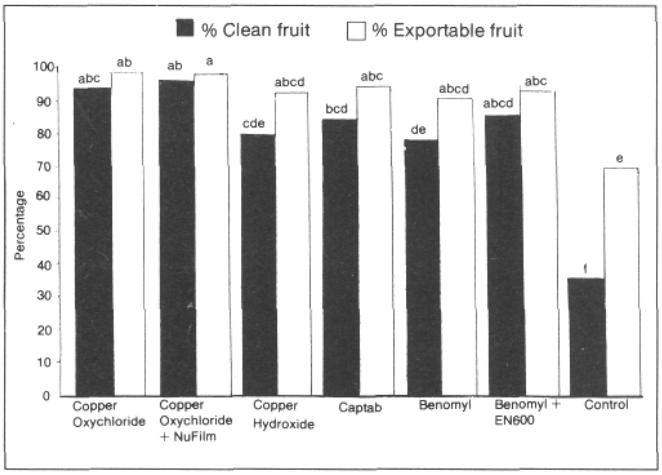

Fig 4 Effect of fungicide treatments on anthracnose expressed as percentage clean fruit (% 0 ratings) and percentage exportable fruit (% 0 ratings plus % 1 ratings). Bars not sharing a common letter are significantly different (P=0,05) according to Duncan's multiple range test.

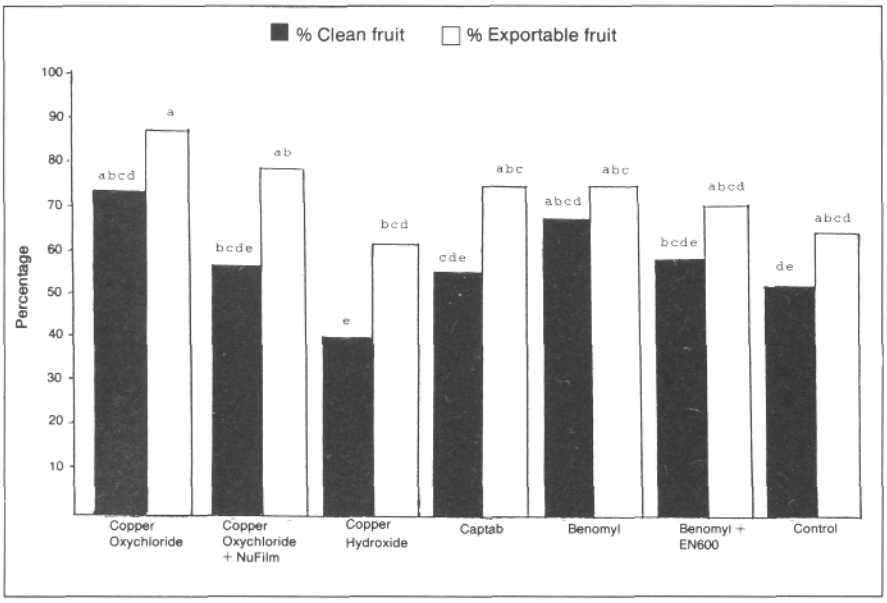

Fig 5 Effect of fungicide treatments on bulb-discolouration (physiological damage) expressed as percentage clean fruit (% 0 ratings) and percentage exportable fruit (% 0 ratings plus % 1 ratings). Bars not sharing a common letter are significantly different (P=0,05) according to Duncan's multiple range test.

DISCUSSION

From the results it is clear that the Benomyl and Captab treatments controlled *Cercospora* spot significantly better than any of the other treatments. Although three Benomyl treatments were applied, two treatments per season are mostly sufficient (Darvas, 1978). The danger of resistance developing against Benomyl mitigates against more than one Benomyl spray per season and in some areas Benomyl has been replaced by fungicides that contain copper.

There was a relatively low incidence of stem-end rot (only 9,6 per cent diseased fruit in untreated control). A Benomyl programme did not control stem-end rot or *D/C* complex. The effectiveness of the Benomyl treatment was not significantly improved by using Benomyl with the additive EN600. The other fungicide treatments, viz, copper oxychloride, copper oxychloride plus NuFilm, copper hydroxide and Captab did, however, control stem-end rot and *D/C* complex significantly better than the control.

Significant control of anthracnose was achieved with all the fungicide treatments.

NuFilm did not significantly improve the effectiveness of copper oxychloride. The addition of additives such as NuFilm for controlling avocado diseases with preharvest coppersprays, is questionable.

The fungicide treatments had no significant effect on the physiological phenomenon called bulb-discolouration.

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