

# Progress report on evaluation of alternative fungicides for control of *Cercospora* spot

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## ABSTRACT

*Trials carried out during the 2000/01 season in a high disease pressure orchard showed that certain products should be evaluated further. Ortiva (azoxystrobin) was therefore evaluated in the 2001/02 season. Thiovit Jet (sulphur) and Bravo (chlorothalonil) were evaluated for the first time as well as other non-copper compounds mixed with lowered rates of CuOCl. The experiment was carried out at Westfalia Estate and treatments were applied by standard high volume spraying with hand guns.*

*Fruit of different treatments were evaluated for incidence of black spot, sooty blotch and visible spray residues in the orchard. A sample of fruit from each treatment was stored at 5.5°C for 28 days, and evaluated for postharvest diseases and disorders after ripening at 20°C.*

*In 2001/02 disease pressure was extremely high in the experimental orchard and 2 to 3 applications of CuOCl gave the best control of black spot. The lower rate of CuOCl combined with Ferric chloride gave fair results. Ortiva and Bravo yielded disappointing results for black spot control, however Ortiva did result in lower incidence of postharvest anthracnose than standard CuOCl.*

## INTRODUCTION

Avocado black spot (*Cercospora* spot caused by *Pseudocercospora purpurea*) is still the most serious pre-harvest disease of avocado in South Africa. The disease is characterised by raised shiny black spots, 1 mm – 6 mm in diameter in the early stage, with spots becoming sunken in later stages (Darvas, 1982). *Cercospora* spot is usually controlled by two to five applications of copper fungicides during the rainy period (October to February) with Benomyl often being included once per season. The presently growing need to reduce the amount of copper applied to orchards, thereby reducing copper build-up in

soils, is driven by export markets as well as the future sustainability of farming operations. Trials carried out during the 2000/01 season in a high disease pressure orchard showed that certain products should be evaluated further. Treatment with CuOCl followed by Lime Sulphur, Ortiva, Solanacure or Avogreen gave similar control. Avogreen and Solanacure are both antagonists, and as Avogreen is already a registered commercial product, neither was tested further. Of the strobilurins tested, Ortiva (azoxystrobin) gave the best control of *Cercospora* spot and showed potential for anthracnose control, therefore it was evaluated further in the 2001/

02 season (Duvenhage, 2002). Thiovit Jet (sulphur) and Bravo (chlorothalonil) were evaluated for the first time in the 2001/02 season, as well as other non-copper compounds mixed with lowered rates of CuOCl. The aim of this project was therefore to test promising fungicides and new products as pre-harvest sprays for control of Cercospora spot and postharvest diseases.

## MATERIALS AND METHODS

Bravo 500SC (chlorothalonil, Zeneca Agrochemicals [Pty] Ltd), Ortiva (azoxystrobin, Zeneca Agrochemicals [Pty] Ltd) and Thiovit Jet (sulphur, Novartis SA [Pty] Ltd) were tested in comparison with standard Demildex (CuOCl, Delta Chemicals [Pty] Ltd). Lowered rates of Demildex were tested with various additives; Ferric chloride ( $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ , Protea Chemicals [PTY] Ltd); Tecsaclor (chlorine dioxide, BTC Products & Services cc) and Prasin Agri (QAC combination product, S.I.D.L. cc). Ferric chloride has been used as an additive to lowered rates of CuOCl with good results in controlling bacterial black spot of mango (Manicom & Schoeman, 2001), therefore this

treatment was evaluated for avocados in 2001/02.

The experiment was carried out at Westfalia Estate near Duiwelskloof in the Limpopo Province and seven 22 year old Fuerte trees were used for each treatment. Treatments were applied by standard high volume spraying with handguns.

One hundred and forty fruit were randomly picked from each treatment and evaluated for incidence of Cercospora spot, sooty blotch and visible spray residues in the orchard during March 2002. A 0 – 3 scale was used for evaluations as described previously (Duvenhage, 2002).

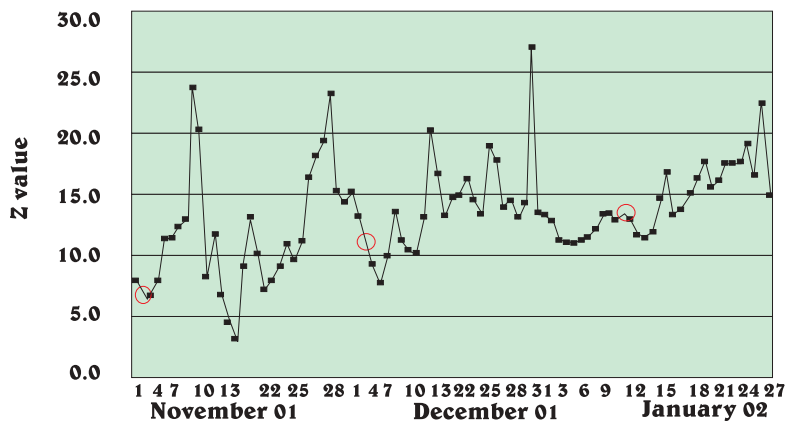
Two cartons of fruit (size 14 to 18) were sampled from each tree and stored at 5.5°C for 28 days to simulate shipment. Fruit were then ripened at 20°C and evaluated for postharvest diseases and disorders upon ripening. Statistical analysis of data was done using Tuckey's test at 95% significance level.

## RESULTS AND DISCUSSION

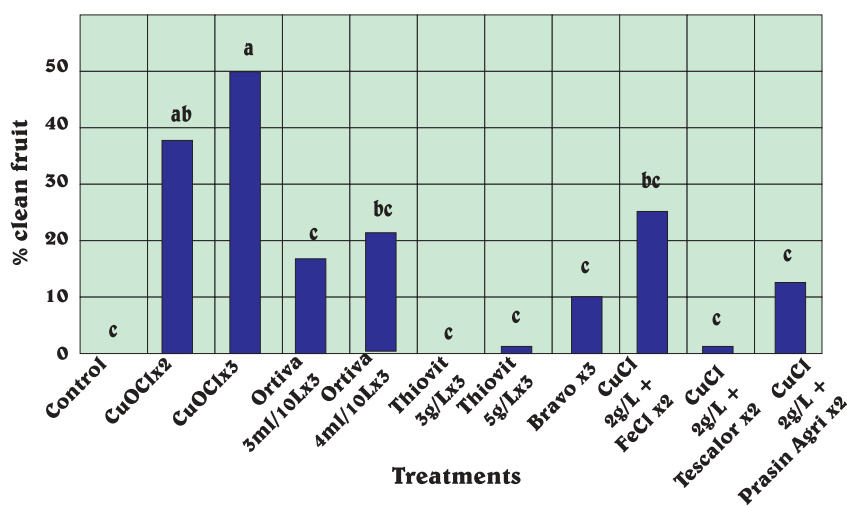
The most critical period for Cercospora spot infection is early in the rainy season (Darvas

**Table 1. Treatments and dates of application.**

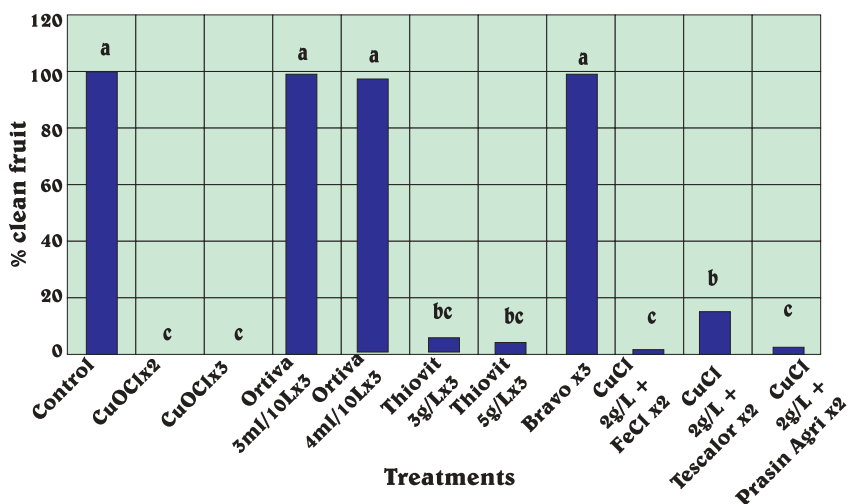
<b>Treatment and date</b>		
<i>2 November 2001</i>	<i>3 December 2001</i>	<i>8 January 2002</i>
Untreated control	-	-
CuOCl (3g/l)	-	CuOCl 3g/l
CuOCl (3g/l)	CuOCl (3g/l)	CuOCl (3g/l)
Ortiva 250SC (3ml/10l)	Ortiva 250SC (3ml/10l)	Ortiva 250SC (3ml/10l)
Ortiva 250SC (4ml/10l)	Ortiva 250SC (4ml/10l)	Ortiva 250SC (4ml/10l)
Thiovit Jet (3g/l)	Thiovit Jet (3g/l)	Thiovit Jet (3g/l)
Thiovit Jet (5g/l)	Thiovit Jet (g/l)	Thiovit Jet (5g/l)
Bravo 500SC (3ml/l)	Bravo 500SC (3ml/l)	Bravo 500SC (3ml/l)
CuOCl (2g/l) + Bladbuff to pH6 + $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ (5g/100l)		CuOCl (2g/l) + Bladbuff to pH6 + $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ (5g/100l)
CuOCl (2g/l) + Tecsaclor(1ml/l)+ Tecsafutas (2ml/10l)	-	CuOCl (2g/l) + Tecsaclor(1ml/l)+ Tecsafutas (2ml/10l)
CuOCl (2g/l) + Prasin Agri (1ml/l)	-	CuOCl (2g/l) + Prasin Agri (1ml/l)



**Figure 1. Z-values recorded at Merensky Technological Services for the 2001-2002 season, showing application dates of treatments.**



**Figure 2. Percentage clean fruit: Cercospora spot 2002.**



**Figure 3. Percentage clean fruit: Visible spray residues 2002.**

& Kotze 1979). SAAGA recommends that the first spray of a season should be applied when fruit is bigger than pigeon egg size and Z value is greater than +5, as infection can occur when the Z value is +15 or greater (Boyum & Bard, 2002). The Z values for the 2001/02 season were monitored by MTS and first spray was applied when Z= 6.7 (Figure 1). There was extremely high disease pressure in the trial orchard probably due to a build up of inoculum in the trees over the past three seasons during which the orchard was used as a trial site. Therefore the untreated control had no clean fruit at all. Two or three applications of CuOCl gave the best control of Cercospora spot, and there was no significant difference between two or three CuOCl sprays. Treatment with Ortiva (4ml/10l) gave some disease control, though not significantly better than the untreated control and would probably be useful as a second spray following a copper spray. The lowered rate of CuOCl combined with Ferric chloride also gave some control and could be useful to further decrease copper levels applied to orchards. In comparison, the lowered rate of CuOCl combined with Tecsacor or Prasin Agri gave no significant control. Thiovit Jet and Bravo also gave disappointing results in this regard. (Figure 2).

Incidence of sooty blotch was low and no significant differences between treatments were observed. As could be expected, the CuOCl and Sulphur

containing products resulted in high incidence of visible spray residues, while the fruit from other treatments (Ortiva and Bravo) were free of visible spray residues (Figure 3).

Although no significant differences in the incidence of postharvest anthracnose were observed, standard CuOCl, lowered CuOCl with Tecsacor, and Ortiva treatments tended to result in lower incidence of anthracnose when compared to other treatments (Figure 4). There were no significant differences observed in the incidence of stem-end rot, cold damage, vascular browning or other physiological disorders.

### CONCLUSION

None of the products tested outperformed CuOCl (3g/l) for *Cercospora* spot control. However, Ortiva did reduce postharvest anthracnose more than any other product tested, although not significantly.

Future trials will focus on low volume application techniques and low copper products, in order to reduce amount of copper applied to orchards.

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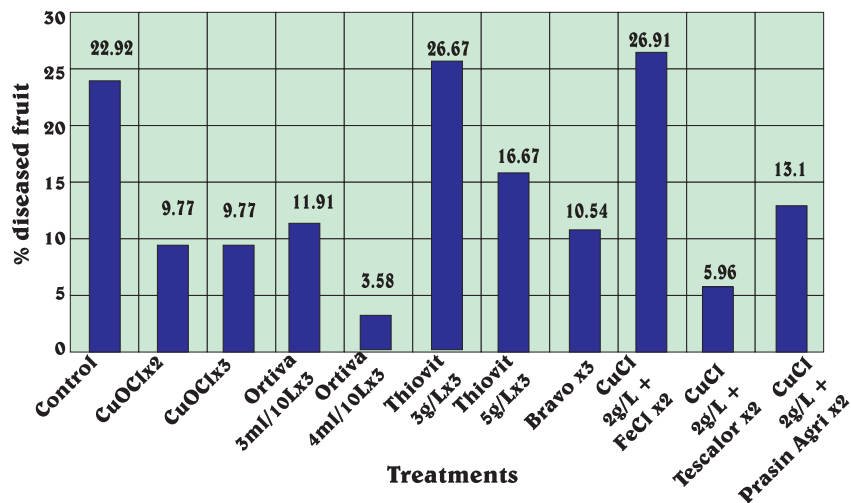


Figure 4. Incidence of postharvest Anthracnose 2002.

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