

Alternative control of Cercospora spot on 'Fuerte' – progress report

A Willis and Z Mavuso

Westfalia Technological Services,
PO Box 1103, Tzaneen 0850, South Africa
E-mail: anitaw@hansmerensky.co.za

ABSTRACT

In the 2005/06 season, the best control of Cercospora spot (*Pseudocercospora purpurea*) was again obtained with two applications of Ortiva™ (October and November) followed by two applications of Demildex (December and January). In the 2006/07 season the aim of this project was to evaluate alternative copper formulations in order to reduce the amount of copper applied in a season and the cost of copper treatments. The experiment was carried out at Westfalia Estate, and about seven large Fuerte trees pruned into hedge rows were used for each treatment. Due to the relatively dry season fruit were evaluated for the incidence of Cercospora spot, sooty blotch and visible spray deposits at the end of June, rather than May 2007. Fruit samples from each treatment were cold-stored for 28 days, and evaluated for post-harvest diseases and disorders upon ripening. The disease pressure in the orchard was high, as indicated by the high incidence of Cercospora spot in the untreated control (87.82%). The best control of Cercospora spot was obtained when two applications of Demildex (October and November) were followed by two applications of Copper count-N (December and January). Equally good control was obtained with two applications of Ortiva™ followed by two applications of Demildex. These treatments were not significantly different from each other nor from the standard commercial treatment of Demildex applied four times in a season with mistblowers. The incidence of visible spray deposits on fruit treated with Demildex and Copper count-N was significantly lower than on fruit treated with Ortiva™ and Demildex and the commercial standard. The incidence of post-harvest diseases was very low in all treatments and no significant differences between treatments were detected. Either Copper count-N or Ortiva™ can replace two applications of Demildex in a spray program and both result in significantly less copper being applied in a season.

INTRODUCTION

Research into finding alternative products to copper oxychloride for the control of Cercospora spot has been conducted at Westfalia Estate since 1999 and the most promising alternative product evaluated thus far is Ortiva™ (azoxystrobin) (Willis, 2007; 2006; 2005; Willis & Mabunda, 2004; Willis & Duvenhage, 2003; Duvenhage, 2002). It has been shown that this fungicide can replace two applications of copper oxychloride in a program of four applications, thereby reducing the amount of copper applied by 50% (Willis, 2007; 2006). It is important to manage resistance to strobilurins by limiting their use and by using them as a component of an integrated program with other fungicides. This is the standard approach for managing resistance with all fungicides that have potential for resistance development. It is also recommended that no more than half of the applications in a season should include strobilurins (McGrath, 2003). Therefore Ortiva™ should only ever replace two applications of copper oxychloride or other copper products in a program of four applications.

Other products that have showed some potential as

alternatives to copper oxychloride and possibly need further investigation, include Messenger and Bravo™ (chlorothalonil) (Willis, 2006; 2005). The amount of copper applied to our orchards can also be reduced by reducing spray volumes. In the 2005/06 season it was found that the addition of Break-thru® (super-spreader adjuvant) to lowered volumes of Demildex (copper oxychloride) did not provide sufficient control of Cercospora spot and resulted in significantly less spray residues at harvest than the commercial standard treatment. This result implied that spray coverage was less efficient when Break-thru® was used (Willis, 2006). However, this concept will be further investigated in the current research project by evaluating an alternative spray adjuvant called Wetcit. Since Syngenta SA is conducting the further necessary research with Ortiva™ and copper prices have continued to remain high, the focus of this investigation was on alternative copper formulations that either contain less copper or result in less copper being applied. The long term aim of this project remains the same, that is to reduce the amount of copper applied to orchards by evaluation of alternative fungicides, additives and copper products for the control of Cercospora spot and post-harvest



diseases on 'Fuerte'.

MATERIALS AND METHODS

The application volumes employed in this trial were based upon commercial application rates used at Westfalia Estate for large Fuerte trees. Ortiva™ (Azoxystrobin, Syngenta [Pty] Ltd) applied in a program with Demildex (Copper oxychloride WP 50% Cu, Delta Chemicals [Pty] Ltd); Copper count-N (Copper ammonium acetate SL 8% Cu, Hygrotech SA [Pty] Ltd); Microgreen (Copper oxychloride SC 33% Cu, Nigelchem); Copper oxine (Copper-8-quinolate WP 50% Cu, Quemico Distributors cc); CungFu 538SC (Copper hydroxide SC 35% Cu, Plaaskem [Pty] Ltd); HTCOP001 (Copper complex SL 6% Cu, Hygrotech SA (Pty) Ltd and Wetcit (Borax/orange oil SL, Citrus Oil Products (SA) (Pty) Ltd added to lowered volumes of Demildex, were compared with the commercial treatment of Demildex applied four times in a season with mistblowers (**Table 1**). The experiment was carried out in a high disease pressure orchard on Westfalia Estate, near Tzaneen in the Limpopo Province. Trees were about 27 years old and planted at a spacing of 10 m x 10 m (<100 trees / ha). A row of about eight trees was used for each treatment and treatments were applied using an Ultima mistblower and a Bateleur mistblower in order to obtain efficient coverage of the large trees. Two buffer rows were allowed between each treated row in the block. The trial was harvested at the end of June rather than May 2007, in order to allow for maximum disease development in a relatively dry season. In each treatment, 20 fruit from each quarter of the tree canopy from each of the data trees were evaluated for the incidence of Cercospora spot, sooty blotch and visible spray deposits. A rating scale of 0 to 3, as described previously by Duvenhage (2002),

was used for the evaluations. Fruit samples from each treatment were stored at 5.5°C for 28 days, and evaluated for post-harvest diseases and disorders after ripening at 20°C. Statistical analysis of data was done using StatSoft, Inc. (2003). STATISTICA (data analysis software system), version 6. www.statsoft.com.

RESULTS AND DISCUSSION

Although the 2005/06 season was relatively dry, disease pressure remained high in the test orchard as indicated by the high incidence of Cercospora spot (87.82%) in the untreated control. The best control of Cercospora spot was obtained when two applications of Demildex (October and November) were followed by two applications of Copper count-N (December and January). Equally good control was obtained with two applications of Ortiva™ followed by two applications of Demildex. These treatments were not significantly different from each other nor from the standard commercial treatment of Demildex applied four times in a season with mistblowers (**Figure 1**). This is the third season during which Ortiva™ was tested and results have once more revealed that Ortiva™ can replace two applications of Demildex (copper oxychloride), thereby reducing the amount of copper applied in a season by 50% (**Table 1**). Microgreen was also as effective as the standard commercial treatment for Cercospora spot control, however only resulted in slightly less copper being applied. Unfortunately both Copper Oxine and the experimental copper formulation (HTCOP001) did not perform well, though both resulted in significantly less copper being applied (**Table 1; Figure 1**). CungFu also performed badly, however the rate tested (180 ml/100 l) was lower than the registered rate for avocados (225 ml/100 l). The addition of Wetcit to a lowered volume of Demildex (6000 l/ha) resulted

Table 1. Treatments and amount of copper applied per ha per season in the 2006/07 season

Tmt	Oct 06	Nov 06	Dec 06	Jan 07	Cu/ha
1	MicroGreen 4 ml/L 8200 L/ha	MicroGreen 4 ml/L 8200 L/ha	MicroGreen 4 ml/L 8200 L/ha	MicroGreen 4 ml/L 8200 L/ha	43.29 kg
2	Cu Oxine 1 g/L 8200 L/ha	Cu Oxine 1 g/L 8200 L/ha	Cu Oxine 1 g/L 8200 L/ha	Cu Oxine 1 g/L 8200 L/ha	16.4 kg
3	Cung Fu 2.25 ml/L 8200 L/ha	Cung Fu 1.8 ml/L 8200 L/ha	Cung Fu 1.8 ml/L 8200 L/ha	Cung Fu 1.8 ml/L 8200 L/ha	21.95 kg
4	HTCOP001 3.5 ml/L 8200 L/ha	HTCOP001 3.5 ml/L 8200 L/ha	HTCOP001 3.5 ml/L 8200 L/ha	HTCOP001 3.5 ml/L 8200 L/ha	14.35 kg
5	CuOCI 3 g/L + Wetcit 1 ml/L 6000 L/ha	CuOCI 3 g/L + Wetcit 1 ml/L 6000 L/ha	CuOCI 3 g/L + Wetcit 1 ml/L 6000 L/ha	CuOCI 3 g/L + Wetcit 1 ml/L 6000 L/ha	36 kg
6	Ortiva 0.3 ml/L 5500 L/ha	Ortiva 0.3 ml/L 5500 L/ha	CuOCI 3 g/L 8200 L/ha	CuOCI 3 g/L 8200 L/ha	24.6 kg
7	CuOCI 3 g/L 8200 L/ha	CuOCI 3 g/L 8200 L/ha	Cu cnt 5 ml/L 8200 L/ha	Cu cnt 5 ml/L 8200 L/ha	31.16 kg
8	CuOCI 3 g/L 8200 L/ha	CuOCI 3 g/L 8200 L/ha	CuOCI 3 g/L 8200 L/ha	CuOCI 3 g/L 8200 L/ha	49.2 kg
9	Untreated				



in a good level of control (7.5% disease) which was not significantly different to the standard volume application (8200 l/ha). A similar result was observed in the 2005/06 season, when Break-thru® was added to the same lowered volume of Demildex, however the control obtained in this case was not commercially acceptable (Willis, 2007). This could indicate that when reducing spray volumes by about 25%, Wetcit is a more appropriate spray adjuvant to use. Alternatively perhaps the application rate of Break-thru® was too high, as Gaskin *et al.* (2004) found that spray retention was reduced when the adjuvant rate was increased and this was attributed to adjuvant-induced loss to runoff.

The incidence of visible spray deposits on fruit treated with Demildex followed by Copper count-N was significantly lower than on fruit treated with Ortiva™ followed by Demildex and the commercial standard treatment (**Figure 2**). Treatment with Copper Oxine and HTCOP001 resulted in a very low incidence of visible spray deposits. The lowered volume treatment resulted in a similar amount of spray deposits as the standard commercial volume application contrasting with the results observed with Break-thru® in the 2005/06 season (Willis, 2007). The incidence of post-harvest diseases was very low in all treatments and no significant differences between treatments were detected (**Figure 3**).

CONCLUSIONS

Either Copper count-N or Ortiva™ can replace two applications of Demildex in a spray program and both result in significantly less copper being applied in a season. The use of Copper count-N as the last two applications in a program also resulted in significantly less visible spray deposits on the fruit than the standard treatment of four applications of Demildex.

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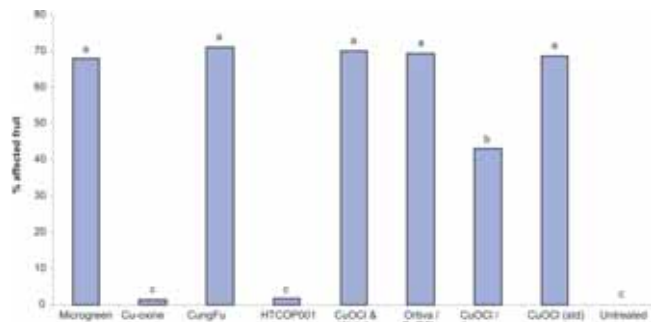


Figure 2. Percentage fruit affected by visible spray residues in 2007 (CuOCl = Demildex)

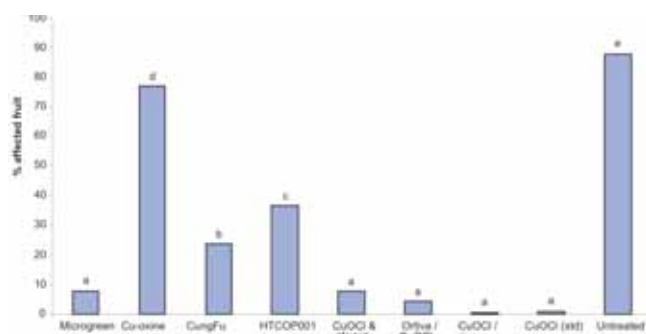


Figure 1. Percentage fruit affected by Cercospora spot in 2007 (CuOCl = Demildex)

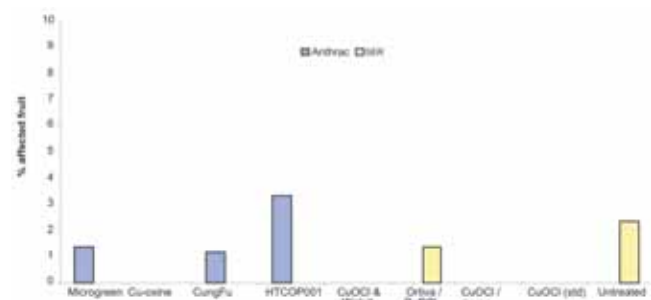


Figure 3. Percentage fruit affected by anthracnose and stem-end rot (SER) in 2007 (CuOCl = Demildex)