

## **OMEGA\* (PROCHLORAZ), A FUNGICIDE FOR POST-HARVEST CONTROL OF ANTHRACNOSE, THE *DOTHIORELLA/COLLETOTRICHUM* COMPLEX AND STEM-END ROT IN AVOCADOS**

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\*OMEGA is the registered trade-mark of Schering AG, Federal Republic of Germany.

### **SUMMARY**

*Omega contains prochloraz, which is an imidazole-type fungicide acting as a sterol inhibitor and affecting the vegetative structures of certain fungal pathogens which infect various fruit post-harvest. Research conducted over several seasons has shown that good control of anthracnose, the Dothiorella / Colletotrichum complex and stem-end rot can be achieved by dipping avocados for 5 minutes in a solution containing 500 ppm of the active ingredient, prochloraz. An alternate method of treatment is by ultra-low volume application to the fruit on the conveyor line of a solution containing 5000 ppm of the active ingredient, prochloraz. Application for registration of the above treatments is in progress.*

### **OPSOMMING**

*Omega bevat prochloraz, 'n imidasool-tipe swamdoder met 'n sterool-inhiberende werking. Die middel is aktief teen die vegetatiewe dele van sekere plantpatogene wat na-oesbederfsiektes by sekere vrugtesoorte veroorsaak. Navorsing oor 'n aantal seisoene het bewys dat goeie beheer van antraknose, die Dothiorella / Colletotrichum siektekompleks en stingel-entvrot, verkry kan word deur avokado's vir 5 minute te doop in 'n mengsel wat 500 dpm prochloraz-aktiewe bestanddeel bevat. 'n Ultra-lae-volume bespuiting van vrugte op die vervoerband met 'n oplossing bestaande uit 5000 dpm prochloraz-aktiewe bestanddeel kan alternatiewelik gebruik word, 'n Aansoek vir die registrasie van bogenoemde behandelings word tans voorberei.*

### **INTRODUCTION**

The results of research into the control of post-harvest diseases have been presented at several S.A. Avocado Growers' Association Symposia in the past, but no definite practical recommendations have been offered to date. (Darvas 1984; Rowell 1983; Le Roux *et al*, 1985). A means of reducing the post-harvest incidence of anthracnose, the *Dothiorella/Colletotrichum* complex and stem-end rot, by treatment with a fungicide. Omega (prochloraz) is discussed in this paper.

## **CHEMISTRY AND BACKGROUND OF OMEGA (PROCHLORAZ).**

Prochloraz, the active ingredient of Omega, was discovered in 1974 in the U.K. by The Boots Company Limited. Its fungicidal properties were described in the "Proceedings of the British Crop Protection Conference" in 1977. Prochloraz is an imidazole-type compound and is chemically related to compounds such as imazalil which is used for control of post-harvest diseases in citrus. Prochloraz is very active against certain fungal pathogens which are classified as Ascomycetes and Fungi Imperfecti, and control of these diseases is possible in many crops such as cereals, bananas and mushroom cultures. Fungal genera controlled include amongst others *Gloeosporium*; *Penicillium*; *Alternaria*; *Botrytis*; *Fusarium*; *Phoma*; *Sclerotinia*; and *Colletotrichum*.

It has been established that prochloraz controls fungi by inhibition of the fatty acid, ergosterol, the synthesis of which is vital to structural formation of fungal cell membranes. Prochloraz is thus most active on vegetative structures and prevents mycelial growth. Both preventative and curative action have been shown. Prochloraz is non-systemic and should therefore be less affected by development of fungal resistance, than true systemics.

## **RESEARCH RESULTS**

### **Literature**

Results of research done by Muirhead, Fitzell. Davies and Peterson (1982) in Australia; Rowell (1983), Darvas (1984) and by F.B.C. Holdings (Pty) Ltd in South Africa, were reviewed and are summarised in tabular form.

### **Materials and Methods**

Mature unripe avocados were harvested and exposed to various treatments

A number of avocados (varying from researcher to researcher, but usually 64 in number) was selected and dipped in various concentrations of Omega (prochloraz) for a time (from 1 minute to 5 minutes), usually 4-5 minutes. The fruits were allowed to dry and then packed into boxes and stored for at least 28 days at 5°C. They were then removed from cold storage and kept at room temperature to ripen. Evaluations of post-harvest disease control were then done at various intervals.

Avocado fruits were treated on a conveyor belt (or under simulated conditions) by means of an ultra-low volume application of an Omega (prochloraz) solution. A hand held ULV applicator was used, to apply the solution at a rate of 1,6 litres per ton of fruit.

Storage and subsequent evaluation of disease control were as described in above.

### **Results of various research workers**

The results obtained are presented in Figure 1 and Tables 1 to 6 below:

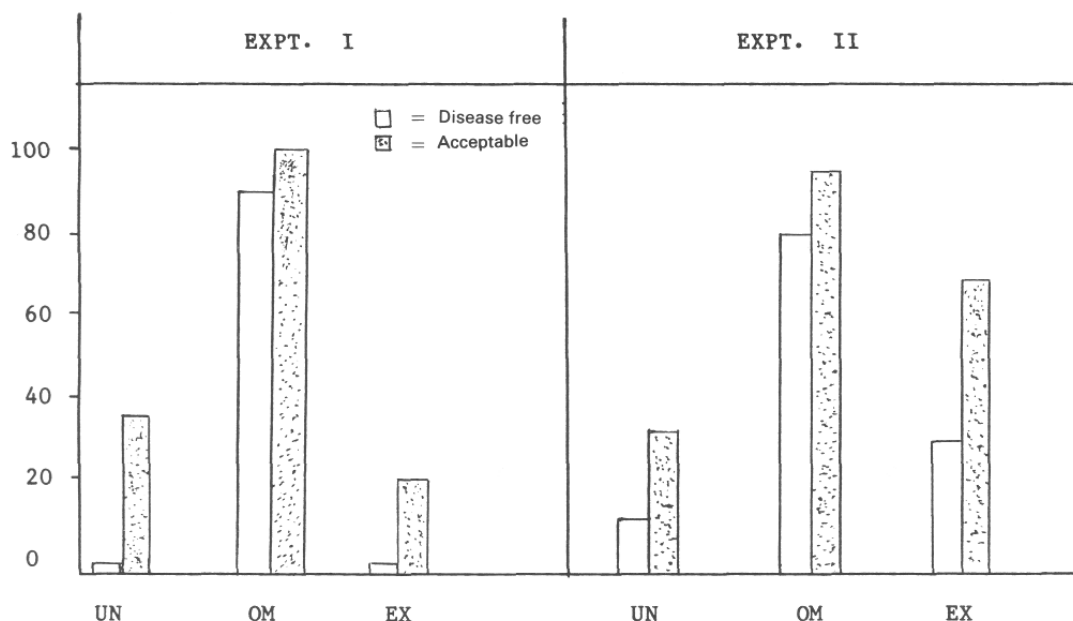


Fig. 1. Results according to Muirhead *et al* (1982), where avocado fruit were dipped in prochloraz (1000 ppm) and evaluated after 14 days.

UN = Untreated  
OM = Omega (prochloraz)  
EX = Experimental product (best in tests)

TABLE 1

Summary of results according to Darvas (1984) where avocado fruits were dipped in prochloraz (400 ppm) and evaluated after 30 days.

	Mean Disease Severity		
	D/C Complex	Anthrachnose	Stem-end rot
<b>Trial 1</b>			
Untreated	2,03 a	0,91 a	0,56 a
Omega	0,69 b	0,22 b	0,25 b
<b>Trial 2</b>			
Untreated	3,14 a	1,25 a	0,69 a
Omega	1,91 b	0,17 b	0,32 b

TABLE 2

Summary of results according to Rowell (1983), where avocado fruits were dipped in prochloraz (500 ppm) and evaluated after 28 days.

	Stem-end rot % Fruit in category			
	0	1	2 (severe)	
Untreated	89,9	4,6	5,5	
Omega	99,1	0,9	0	
	Anthracnose % Fruit in category			
	0	1	2	3 (severe)
Untreated	7,3	31,2	26,6	34,9
Omega	42,2	34,9	17,4	5,5

TABLE 3

Results obtained with prochloraz on Fuerte avocados in 1983.

	Days after treatment	% Fruits Infected			
		Anthracnose		Stem-end rot	
		1 min.	5 min.	1 min.	5 min.
Untreated	34	10	11	0	0
	37	43	30	6	13
	39	74	53	11	16
Omega 500 ppm 5 mins. dip	34	3	0	0	0
	37	21	7	7	0
	39	41	20	14	1

TABLE 4

Results of avocado fruit disease control after post-harvest treatment with prochloraz.

	Days after treatment	% Fruits Infected	
		Anthracnose	Stem-end rot
Untreated	32	8,3	0
	39	64,6	4,2
Omega 500 ppm 5 mins. dip	32	6,3	0
	39	14,6	0

TABLE 5

Results of post-harvest ultra-low volume application of prochloraz (5000 ppm) on the development of avocado fruit diseases (Darvas 1982).

	Mean Disease Severity after 28 days		
	<i>Dothiorella/Colletotrichum</i>	Anthracnose	Stem-end rot
<b>Trial 1</b>			
Untreated	0,79 a	0,17 a	0,15 a
Omega	0,67 b	0,007 b	0,09 b
<b>Trial 2</b>			
Untreated	1,3 a	0,52 a	0,05 a
Omega	0,92 b	0,02 b	0 a

TABLE 6

Results of post-harvest ultra-low volume application of prochloraz (5000 ppm) and storage for 30-38 days.

	% Fruits Infected	
	Anthracnose	Stem-end rot
<b>Trial 1</b>		
Untreated	67,2	1,6
Omega*	17,2	0
<b>Trial 2</b>		
Untreated	64,6	4,2
Omega*	20,8	6,3
<b>Trial 3</b>		
Untreated	75	42
Omega*	33	7

\*1,6 litres Omega per ton of avocado fruits

## DISCUSSION

Omega (prochloraz) used at 500 ppm as a post-harvest fruit dip for 5 minutes provides good control of anthracnose, the *Dothiorella/Colletotrichum* complex and stem-end rot of avocados.

An ultra-low volume application of a 5000 ppm Omega (prochloraz) solution at a rate of 1,6 litres per ton of fruit, gave satisfactory control of anthracnose, the *Dothiorella/Colletotrichum* complex and stem-end rot.

Application has been made for registration of a dip treatment consisting of 110 ml Omega 45 EC per 100 litres water (500 ppm). Fruits must be immersed for 5 minutes.

Application has been made for registration of a ULV treatment consisting of 1100 ml Omega 45 EC/100 litres water (5000 ppm) to be applied at a rate of 1,6 litres solution per ton of fruit. Application should be made onto fruit which is rolling on a conveyor system.

Minimum residue limits (tolerances) have been established as follows:

U.K.	- no MRL required;
Denmark	- no MRL required;
West Germany	- 2 mg/kg;
Spain	- 2 mg/kg;
Holland	- 2 mg/kg;
Belgium	- 8 mg/kg;
France	- not yet established.

Omega (prochloraz) is of medium toxicity (median lethal dosage acute oral — 1600 mg/kg body weight), but great care should be taken to avoid all forms of skin contact.

No applications should be made to fruit until registration has been obtained and clearance has been given on overseas markets.

## BIBLIOGRAPHY AND REFERENCES

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