

# **BOTRYTIS CONTROL AND RESIDUE FREE WINES GISBORNE 2004/05**

Report to Winegrowers of New Zealand

T S Lupton  
Lewis Wright Ltd  
P O Box 2038  
Gisborne  
September 2005

## CONTENTS

	Page
Summary	3
Introduction	4
Objectives	4
Experimental Details	4
Site	4
Crop	4
Trial Design	4
Plot Size	5
Application	5
Treatments and Timing	5
Results and Discussion	6
Conclusions	8
Acknowledgements	8
References	8

## TABLES

1. Treatments, Timing, Rates and Growth Stage
2. Number of Bunches Infected with Botrytis Per Plot, 23 March 2005
3. Assessments of Botrytis 26 March 2005, 3 Days After Commercial Harvest
4. Assessments of Fruit Maturity, 26 March 2005
5. Summary of Weather Data 2004/05 and Long Term Average
6. Gisborne Airport Rainfall, Broome Botrytis Infection Risk and Trial Applications

## APPENDICES

1. Trial Application Reports 1-8
2. BOTRY-Zen Colonisation, Ormond: Winegrowers Trial and ADNZ Whitmore Vineyard
3. Spray Coverage Assessment: Water Sensitive Paper
  - Solo 412 Mistblower, Late Flowering, November 2001
  - Solo 450 Mistblower Pre Bunch Closure, December 2002
  - Silvan GII, Whitmore Vineyard, November 1999
4. Hill Laboratories, Residue Testing of Wine for Cyprodinil and Fludioxinil

## SUMMARY

In a trial located in a commercial chardonnay vineyard in Gisborne, New Zealand, various Botrytis fungicide programmes applied between late flowering and pre bunch closure were compared against:

1. an untreated control
2. a full season programme which included Scala/Pyrus (pyrimethanil) at veraison.
3. the bio control BOTRY-Zen

The BOTRY-Zen treatment included three applications from early flowering to berries pea size. This was followed by either two Captan applications to veraison, or four applications of Bz-e-1 or NP1 to one month pre harvest. NP1 and Bz-e-1 are novel bio controls derived from natural sources.

The trial was compromised as two replicates were machine harvested prior to detailed assessments of disease being made.

Key findings were:

1. The standard programme including Scala at veraison had significantly lower levels of Botrytis bunch rots at harvest than the untreated control when assessed at commercial harvest.
2. The application of Switch at Pre Bunch Closure with no subsequent Botrytis fungicides showed a non-significant trend towards lower Botrytis levels at harvest than the untreated.
3. There was no detectable residue of the Switch components cyprodinil and fludioxinil in wine made from grapes from this trial treated with Switch at pre bunch closure. Two wines made from a commercial vineyard treated with Switch at pre bunch closure also showed no residues of Switch.
4. BOTRY-Zen compared with the untreated control showed a non significant trend towards lower Botrytis bunch rot levels at harvest. Assessment of BOTRY-Zen colonisation of bunch trash two months pre harvest indicated sub optimal colonisation which may have reduced efficacy of this treatment.

# BOTRYTIS CONTROL AND RESIDUE FREE WINES

## INTRODUCTION

The use of the Botrytis fungicides Switch® (cyprodinil/fludioxonil), Scala®/Pyrus® (pyrimethanil) and Teldor® (fenhexamid) in recent years has improved the ability to control Botrytis bunch rot and harvest grapes at higher levels of ripeness, particularly in seasons of higher rainfall..

In particular, the use of Scala®/Pyrus® at veraison has provided good control of Botrytis through to harvest and become an industry standard.

In a previous study (Lupton 2003), applications of Switch to pre bunch closure provided Botrytis control similar to an industry standard, with no detectable residues in wine.

In the same study, two treatments with Teldor applied at berries pea size resulted in Teldor residues in the wine either being non detectible, or 0.01mg/kg (the limit of detection).

Regulatory authorities set Maximum Residue Limits (MRL) for a fungicide in wine. However residues may be detected at levels which may be one hundred times lower than the MRL.

Wine companies are reporting increasing consumer and supermarket pressure to supply wines free of detectable residues.

Surveys conducted by Winegrowers of New Zealand indicate that where agrichemical residues are detected in wine, they are almost exclusively Botrytis fungicides.

## OBJECTIVES

1. To evaluate and demonstrate the efficacy of Botrytis fungicide options against an Industry Standard including the use of Scala®/Pyrus® at veraison.
2. To evaluate the efficacy of Botry-Zen® with non chemical companions against current chemical fungicides for late season Botrytis control.

## EXPERIMENTAL DETAILS

**Trial Site** Whitmore Vineyard (Allied Domecq NZ Ltd)  
Ormond, Gisborne  
(NZMS 260, Y17 393 830)

**Crop** Chardonnay clone 15, trained to sylvos with vines spaced 1.8m by 2.9m

**Trial Design** Randomised complete blocks design with four replications. The trial was located in four adjacent rows with one replication in each row.

**Plot Size** Plots were 7.2 metres long and contained four vines. A 0.5 metre buffer at each end of the plot was treated but excluded from assessments. The rows adjacent to the trial received the normal vineyard spray program, but were sprayed away from the trial.

**Application** Treatments were applied with a Solo 450 Mistblower at water rates of 750-800 litres per hectare

### Treatments and Timing

	5% Capfall	70% Capfall	Berries Pea Size	Pre Bunch Closure	Mid Bunch Development	Early Veraison	Late Veraison	1 Month Pre Harvest
	17 Nov	24 Nov	8 Dec	28 Dec	5 Jan	29 Jan	13 Feb	20 Feb
1	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated
2	Euparen multi	Switch	Captan	Teldor		Scala		
3	Euparen multi	Switch	Teldor	Switch				
4	Botry - Zen	Botry - Zen	Botry - Zen	Botry - Zen	Captan	Captan		
5	Botry - Zen	Botry - Zen	Botry - Zen	Botry - Zen	Bz-e-1	Bz-e-1	Bz-e-1	Bz-e-1
6	Botry - Zen	Botry - Zen	Botry - Zen	Botry - Zen	NP 1	NP 1	NP 1	NP 1
7	Euparen multi	Switch	Switch	Switch				
8	Euparen multi	Teldor	Teldor	Teldor				
9	Euparen multi	Euparen multi	Euparen multi	Euparen multi				

Treatment 1: untreated for Botrytis, but as with other treatments, received cover for powdery and downy mildew.

Treatment 2: an industry standard expected to provide a high level of Botrytis control. Scala residue would be likely in the resulting wine.

Treatment 3: identified in previous work (Lupton 2003) as a potential alternative for Botrytis control, with no detectible Switch residue in wine.

Treatment 4: BOTRY-Zen provides early season Botrytis control, and Captan some later season control. No wine residues expected.

Treatments 5 and 6: replace Captan with naturally derived products. Bz-e-1 was supplied by Botry Zen Ltd, Dunedin. NP1 was supplied by Hort Research, Ruakura.

Treatments 7, 8 and 9: compare the relative performance of Switch, Teldor and Euparen multi, three early season Botrytis fungicide options.

Further details of treatments including rates per hectare are presented in Table 1. Detailed Reports for the 8 applications are presented in Appendix 1.

## RESULTS AND DISCUSSION

Grape bunches are particularly susceptible to Botrytis infection during two periods:

1. Flowering to Bunch Closure – during this period may establish on dead flower parts (flower caps, stamen) or aborted berries lodged in the bunch following flowering. Latent or symptomless infections may occur within various parts of the bunch (rachis, laterals and pedicles).
2. Pre Harvest to Harvest – during the ripening period Botrytis may infect ripening berries from latent infections, spread from adjacent infected berries or dead flower parts, or from air borne spores (conidial infection).

Wet, warm weather favours infection in both periods.

### Seasonal Weather Conditions (see Tables 6 & 7)

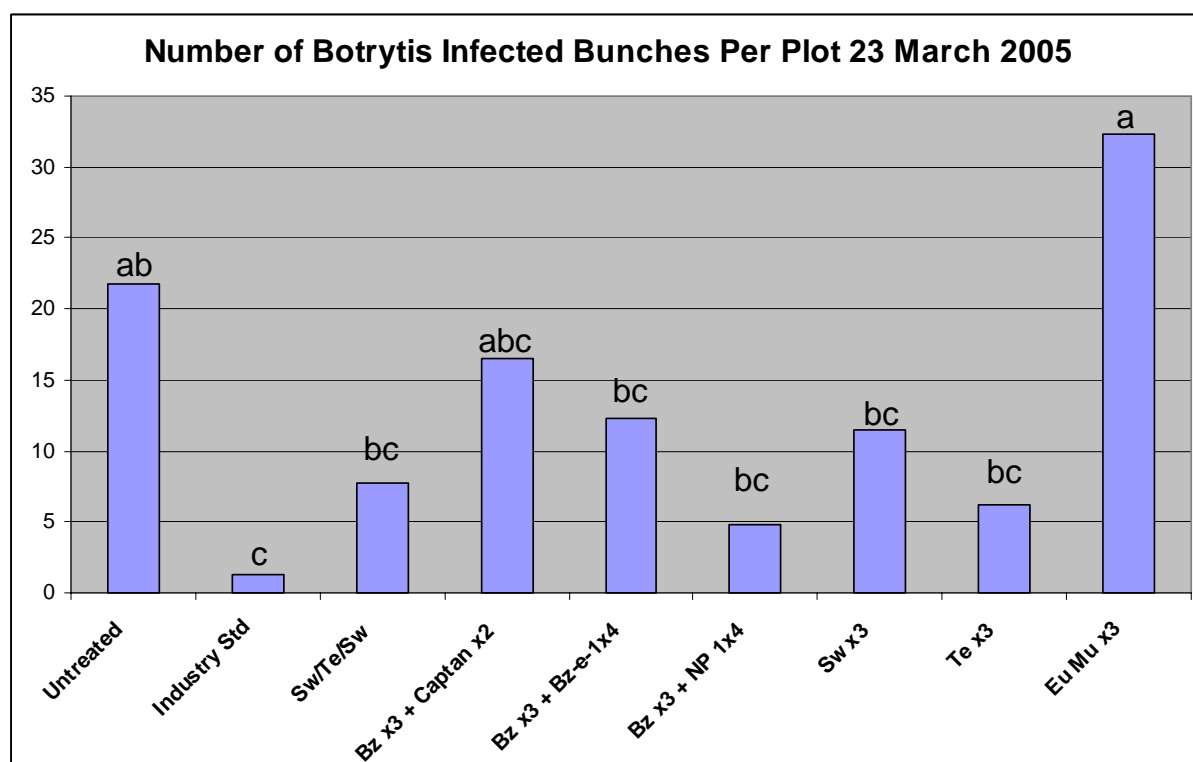
Weather conditions from flowering (mid November) to bunch closure (late December) were drier and cooler than average. Two severe Broome Botrytis Infection risk periods were recorded during this period.

January and February were hotter and drier than normal. February rainfall was 49% of long term average and this dry spell continued until 15 March. There was no Botrytis Bunch Rot evident in any treatment at this stage.

From 15-23 March (late ripening period), 82mm of rainfall was recorded. Temperature averaged 19°C (range 15-25°C). Botrytis developed rapidly and the first assessment was conducted on 23 March, during commercial harvest.

### Assessment 1: Botrytis Infected Bunches Per Plot at Commercial Harvest

On 23 March 2005 (the day of commercial harvest), the number of bunches in each plot with visible Botrytis infection was recorded (see Table 2 for further details).



Botrytis infection pressure was high and grape condition was deteriorating following nine days rain. There was notable variability between plots within a treatment. Only the Industry Standard including Scala at veraison provided control significantly better control than the untreated. There was a trend for other treatments (apart from three applications of Euparen multi) to have lower levels of Botrytis infected bunches than the untreated control.

An assessment of colonisation by BOTRY-Zen of flower caps trapped within bunches in early January indicated sub optimal colonisation in both the trial, and the adjacent vineyard which had received three applications of BOTRY-Zen with a Silvan GII sprayer.(see Appendix 2).

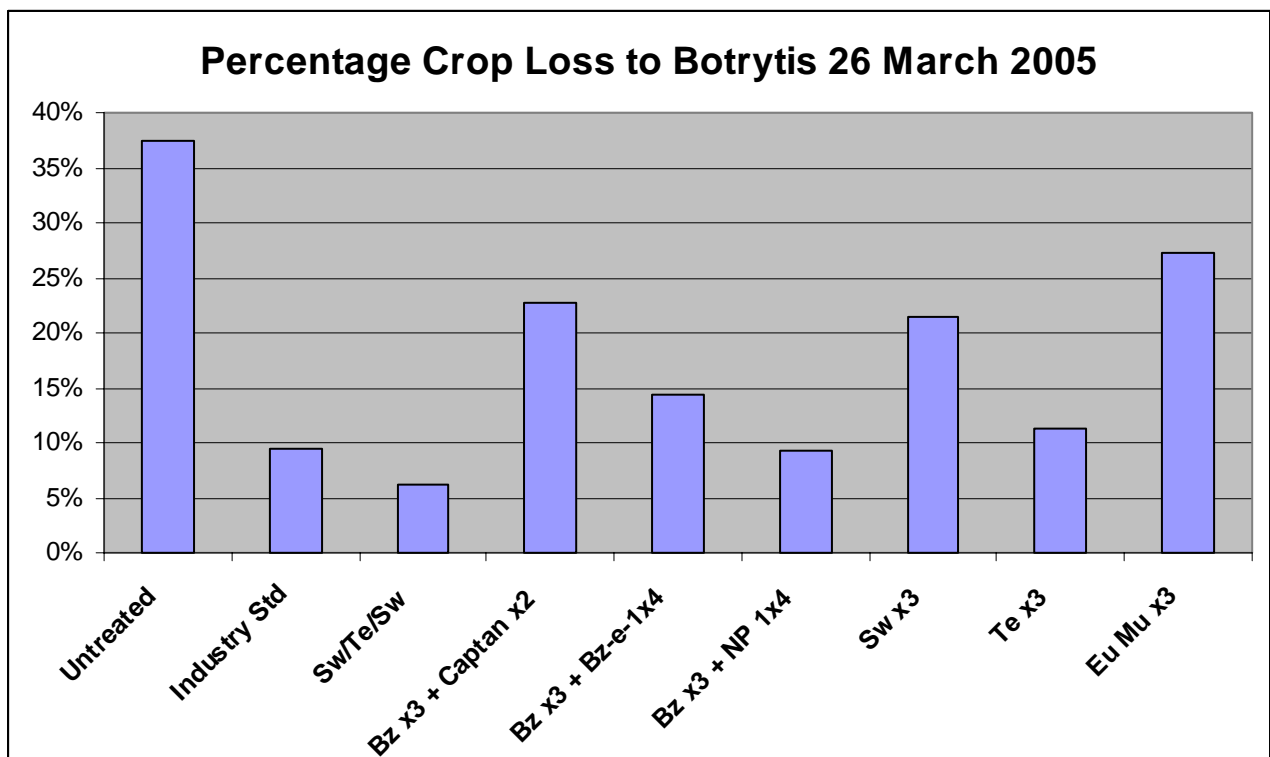
Studies in Hawkes Bay and Marlborough during 2004/05 with moisture sensitive papers suggest poor BOTRY-Zen colonisation may relate to inadequate sprayer coverage of bunches. (Wood & Agnew pers. comm.) In previous seasons sprayer coverage has been assessed for the trial plot sprayer at late flowering and pre bunch closure, and with Whitmore Vineyard's Silvan GII sprayer at late flowering. Moisture sensitive papers suggest adequate coverage was obtained. Scans of the moisture sensitive papers are presented in Appendix 3.

### Assessment 2: 3 Days after Commercial Harvest

Following the initial visual assessment, machine harvesting inadvertently removed all fruit from replicates 1 and 2.

#### Percentage Crop Loss

70 bunches per plot in the remaining two replicates were visually assessed for Botrytis incidence, severity and crop loss (see table 3). Botrytis levels in all treatments exceeded industry acceptable levels for Botrytis Crop Loss (4%) with the Untreated at 37.5% crop loss. There were no significant differences (due to insufficient replication) and trends between treatments were similar to the previous assessment.



## **Fruit Maturity**

Details of fruit maturity assessments sampled on 26 March are presented in table 5. There was a non significant trend of lower Brix levels in the BOTRY-Zen/ NP1 treatment which has been reported in other trials. (Elmer pers. comm.)

## **Residue Analyses**

Fruit from treatment 3 (Switch/Teldor/Switch) was made into wine by Tairawhiti Polytechnic. Fruit was processed by red winemaking techniques including fermentation on skins to maximise possible fungicide residue in the wine.

The wine was analysed by Hill Laboratories (See Appendix 4) on 8 August 2005 along with two commercial wines which had received Switch at pre bunch closure by vineyard sprayer.

No detectible residues of cyprodinil or fludioxinil, (the components of Switch), were detected in the wines.

## **Conclusions**

1. An Industry Standard programme including Scala at veraison had significantly lower levels of Botrytis bunch rots than the untreated control when assessed at commercial harvest.
2. The application of Switch at Pre Bunch Closure with no subsequent Botrytis fungicides showed a non-significant trend towards lower Botrytis levels at harvest than the untreated. There was no detectible residue of the Switch components cyprodinil and fludioxinil in wine made from this treatment, or from two commercially made wines which had been treated with Switch at pre bunch closure.

## **Acknowledgements**

Whitmore Vineyard for provision and maintenance of the trial site,

Marie Rogers of Tairawhiti Polytechnic for fruit maturity analyses and winemaking.

## **References**

Lupton T S (2003) An Evaluation of Commercial Fungicides for Botrytis Bunch Rot Control in Grapes. Report to Winegrowers of New Zealand, May 2003

**TABLE 1 TREATMENTS, TIMING, RATES AND GROWTH STAGE**

Growth Stage	Early Flowering	Late Flowering	Berries Pea Size	Pre Bunch Closure	Mid Bunch Development	Late Veraison	Late Veraison	1 Month Pre Harvest
Application Date	17 November	24 November	8 December	28 December	5 January	29 January	12 February	20 February
Treatments 1	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated
2	Euparen multi (2.0 kg/ha)	Switch 80W (0.8kg/ha)	Captan WDG (1.25kg/ha)	Teldor (0.75l/ha)		Scala (2.0 l/ha)		
3	Euparen multi (2.0 kg/ha)	Switch 80W (0.8kg/ha)	Teldor (0.75l/ha)	Switch 80W (0.8kg/ha)				
4	BOTRY-Zen (4.0 kg/ha)	BOTRY-Zen (4.0 kg/ha)	BOTRY-Zen (4.0 kg/ha)	Captan WDG (1.25kg/ha)	Captan WDG (1.25kg/ha)			
5	BOTRY-Zen (4.0 kg/ha)	BOTRY-Zen (4.0 kg/ha)	BOTRY-Zen (4.0 kg/ha)	Bz-e-1 (0.24 kg/ha)	Bz-e-1 (0.24 kg/ha)	Bz-e-1 (0.24 kg/ha)	Bz-e-1 (0.24 kg/ha)	Bz-e-1 (0.24 kg/ha)
6	BOTRY-Zen (4.0 kg/ha)	BOTRY-Zen (4.0 kg/ha)	BOTRY-Zen (4.0 kg/ha)	NP 1 (30 l/ha)	NP 1 (30 l/ha)	NP 1 (30 l/ha)	NP 1 (30 l/ha)	NP 1 (30 l/ha)
7	Euparen multi (2.0 kg/ha)	Switch 80W (0.8kg/ha)	Switch 80W (0.8kg/ha)	Switch 80W (0.8kg/ha)				
8	Euparen multi (2.0 kg/ha)	Teldor (0.75l/ha)	Teldor (0.75l/ha)					
9	Euparen multi (2.0 kg/ha)	Euparen multi (2.0 kg/ha)	Euparen multi (2.0 kg/ha)	Euparen multi (2.0 kg/ha)				

**TABLE 2 NUMBER OF BUNCHES INFECTED WITH BOTRYTIS PER PLOT 23 MARCH 2005**

Treatment			
LF/BPS/PBC *			
1	Untreated	21.76	ab
2	Industry Standard	1.24	c
3	Switch/Teldor/Switch	7.74	bc
4	BOTRY-Zen(x3)/Captan (x2)	16.50	abc
5	BOTRY-Zen(x3)/Bz-e-1 (x4)	12.24	bc
6	BOTRY-Zen(x3)/NP 1 (x4)	6.86	bc
7	Switch/Switch/Switch	11.50	bc
8	Teldor/Teldor/Teldor	6.24	bc
9	Euparen multi/E.multi/E.multi	32.24	a
	LSD 5%	8.30	
	F Prob	0.027	

Numbers in columns with the same letter are not significantly different at P=0.05

\* LF/BPS/PBC: Late Flowering/Berries Pea Size/Pre Bunch Closure

**TABLE 3 ASSESSMENTS OF BOTRYTIS 25 MARCH 2005, 3 DAYS AFTER COMMERCIAL HARVEST**

	<b>Treatment</b>	<b>INCIDENCE</b>	<b>SEVERITY</b>	<b>CROP LOSS</b>
	<b>LF/BPS/PBC *</b>			
1	Untreated	91.5	39.8	37.5
2	Industry Standard	80.0	11.3	9.6
3	Switch/Teldor/Switch	68.6	8.6	6.2
4	BOTRY-Zen(x3)/Captan (x2)	92.9	24.6	22.8
5	BOTRY-Zen(x3)/Bz-e-1 (x4)	83.6	17.0	14.3
6	BOTRY-Zen(x3)/NP 1 (x4)	64.2	14.4	9.3
7	Switch/Switch/Switch	95.0	22.4	21.4
8	Teldor/Teldor/Teldor	82.9	13.5	11.3
9	Euparen multi/E.multi/E.multi	92.2	29.2	27.2
		not significant	not significant	not significant
	LSD 5%	27.18	19.75	22.17
	F Prob	0.226	0.092	0.133

\* LF/BPS/PBC: Late Flowering/Berries Pea Size/Pre Bunch Closure

**TABLE 4 ASSESSMENTS OF FRUIT MATURITY 26 MARCH 2005, 3 DAYS AFTER COMMERCIAL HARVEST**

Treatment		BRIX	pH	TITRATIBLE ACIDITY	
LF/BPS/PBC *					
1	Untreated	21.50	3.23	8.10	abc
2	Industry Standard	21.20	3.30	8.20	bc
3	Switch/Teldor/Switch	21.45	3.27	8.05	abc
4	BOTRY-Zen(x3)/Captan (x2)	21.30	3.28	7.95	ab
5	BOTRY-Zen(x3)/Bz-e-1 (x4)	20.80	3.28	8.15	bc
6	BOTRY-Zen(x3)/NP 1 (x4)	19.10	3.25	8.60	c
7	Switch/Switch/Switch	21.30	3.27	8.25	c
8	Teldor/Teldor/Teldor	21.05	3.29	8.15	bc
9	Euparen multi/E.multi/E.multi	21.35	3.27	7.85	a
		not significant	not significant		
	LSD 5%	1.61	0.054	0.29	
	F Prob	0.13	0.34	0.01	

Numbers in columns with the same letter are not significantly different at P=0.05

**TABLE 5 SUMMARY OF WEATHER DATA 2004/05 AND LONG TERM AVERAGE**

	November	December	January	February	March	Total
<b>Rainfall (mm)</b>						
2004/05		59	59	52	36	105
Long Term Average		62	70	62	72	96
% of Long Term Average		95%	84%	84%	49%	109%

TABLE 6

