Grape Powdery Mildew Prevention Trial 2016-17

Salvare Vineyard, Ngatarawa Rd, Hawke's Bay

Final

9 June 2017

Chris Henry

Landline 06 874 2921
Mobile 027 294 1490
Email chrishenry@actrix.co.nz

Table of contents

1.0 Introduction

In 2015-16, Henry Manufacturing Limited undertook a hand sprayed powdery mildew prevention of a block of Chardonnay on Dartmoor Rd, Puketapu, Hawke's Bay. Four treatments using various combinations of HML32, Sulphur, Copper and HML Silco (a potassium silicate product that was under development at the time) demonstrated a high level of efficacy, as good as, if not better than the chemical control.

In 2016, Henry Manufacturing Limited commissioned treatments in Professor Doug Gubler's UC Davis California grape powdery mildew product screening trials. The combination of HML32, Sulphur and HML Silco led efficacy in the trial it was involved in, which included robust chemical treatments. The powdery mildew infection in the untreated control was assessed at 100% incidence and 90.4% severity.

There is a trend in New Zealand to reduce copper use, as there is a trend in the US to reduce sulphur use. HML Silco appears to improve efficacy of sulphur without the presence of HML32 as well as potentially being able to substitute both sulphur and copper when in combination with HML32 for the prevention or eradication of powdery mildew.

The purpose of this trial was to confirm that similar efficacy could be achieved using a commercial machine sprayer, applying with conventional water rates and timings, as well as to further test the attributes shown by the addition of HML Silco, within programs based on the use of HML32 and compared to a robust chemical programme.

2.0 Trial Objectives

The objectives of the trial is to address the following questions:

- Can the results of the 2015-16 handsprayed trial, and the 2016 UC Davis's screening trials be replicated when applied using a commercial sprayer?
- How do the three HML32 based treatments compare against each other in terms of efficacy?
- Are there plant safety issues arising out of any of the treatments?

3.0 Trial Site

The trial site was located on the Salvare Vineyard on Ngatarawa Rd, Hastings (see Figure 1).

Salvare vineyard contains approximately 3ha of Chardonnay that has a recent poor history of powdery infection. It is an older vineyard, 2.5m rows trellised as 2 cane VSP. The soil is silt loam with moderate water holding capacity and fertility. It was not irrigated.

It received basic viticultural attention during the growing season: leaf plucking using a Collard occurred post flowering, lifting, tucking and trimming was often late, providing less than ideal canopy spraying conditions. The level of bunch exposure was variable - overall about 40% at best.

3.1. Trial Design

The trial site consisted of 43 rows of about 600metres in length.

There are 4 treatments, described in Table 1. Each treatment was repeated 5 times, with each plot being 2 rows. Each treatment therefore had 10 rows in total. The spare 3 rows were sprayed with the chemical treatment.

There was no untreated control given the commercial scale of the trial and the certainty of powdery mildew infection.

Treatments were applied at 7-10 days intervals.

Figure 1: Trial Location and Site

Table 1: Trial Treatments and Application Dates

	Growth stage		**Pre-flowering**			**5% flowering**		**80-100% flowering**	**Before Pre-bunch Closure**	**Prebunch Closure**	**Pea-size**	
Trt No.	Date of Application	?	23-Oct-16	31-Oct-16	10-Nov-16	16-Nov-17	26-Nov-17	4-Dec-17	15-Dec-17	24-Dec-17	30-Dec-17	14-Jan-17
1	Red	3.5%Lime sulphur	0.5% Protector, 3 kg Thiovet	3kg Thiovet, 200g Manzate	3kg Thiovet, 200g Manzate	3kg Thiovet, 200g Mancozeb	Spiral (120ml), PunchUp (80g)	Nando (100ml), PunchUp (80g)	Nando (100ml), Thiovet (3kg)	0.5% Protector, 3kg Thiovet , 60g Nordox	Pendant (12.5ml), Nando (100ml)	2% Protector, 60g Nordox
2	Blue	3.5%Lime sulphur	0.5% Protector, 3 kg Thiovet	1.25L HML32, 3kgThiovet, 60gNordox	0.5% Protector, 3kg Thiovet	1.25L HML32, 3kgThiovet, 60gNordox	1.25L HML32, 3kgThiovet, 60gNordox	1.25L HML32, 3kgThiovet, 60gNordox	1.25L HML32, 3kgThiovet, 60gNordox	1.25L HML32, 3kgThiovet, 60gNordox	1.25L HML32, 3kgThiovet, 60gNordox	1.25L HML32, 3kgThiovet, 60gNordox
3	Yellow	3.5%Lime sulphur	0.5% Protector, 3 kg Thiovet	1.25L HML32, 3kgThiovet, 60gNordox	0.5% Protector, 3kg Thiovet	1.25L HML32, 3kgThiovet, 425g HML Silco	1.25L HML32, 3kgThiovet, 425g HML Silco	1.25L HML32, 3kgThiovet, 425g HML Silco	1.25L HML32, 3kgThiovet, 425g HML Silco	1.25L HML32, 3kgThiovet, 425g HML Silco	1.25L HML32, 3kgThiovet, 425g HML Silco	1.25L HML32, 3kgThiovet, 425g HML Silco
4	White	3.5%Lime sulphur	0.5% Protector, 3 kg Thiovet	1.25L HML32, 3kgThiovet, 60gNordox	0.5% Protector, 3kg Thiovet	1.25L HML32, 425g HML Silco	1.25L HML32, 425g HML Silco	1.25L HML32, 425g HML Silco	1.25L HML32, 425g HML Silco	1.25L HML32, 425g HML Silco	1.25L HML32, 425g HML Silco	1.25L HML32, 425g HML Silco
	Water Rate	300L/ha	300L/ha	300L/ha	350L/ha	350L/ha	450L/ha	450L/ha	450L/ha	500L/ha	600L/ha	600L/ha
	Note: rates specified based on 100L water											

3.2. Application Method

All treatments were applied using a modified Silvan G2 sprayer (Figure 2). The modification (referred to as the Matt Fox modification after the person who proposed the idea) involved adding three additional nozzles at the lower end of the dropper.

Three of the six nozzles were forward facing and three were backward facing, thus creating two areas of turbulence instead of one in the bunch zone.

Figure 2: Modified dropper on Sylvan G2 - 3 additional nozzles

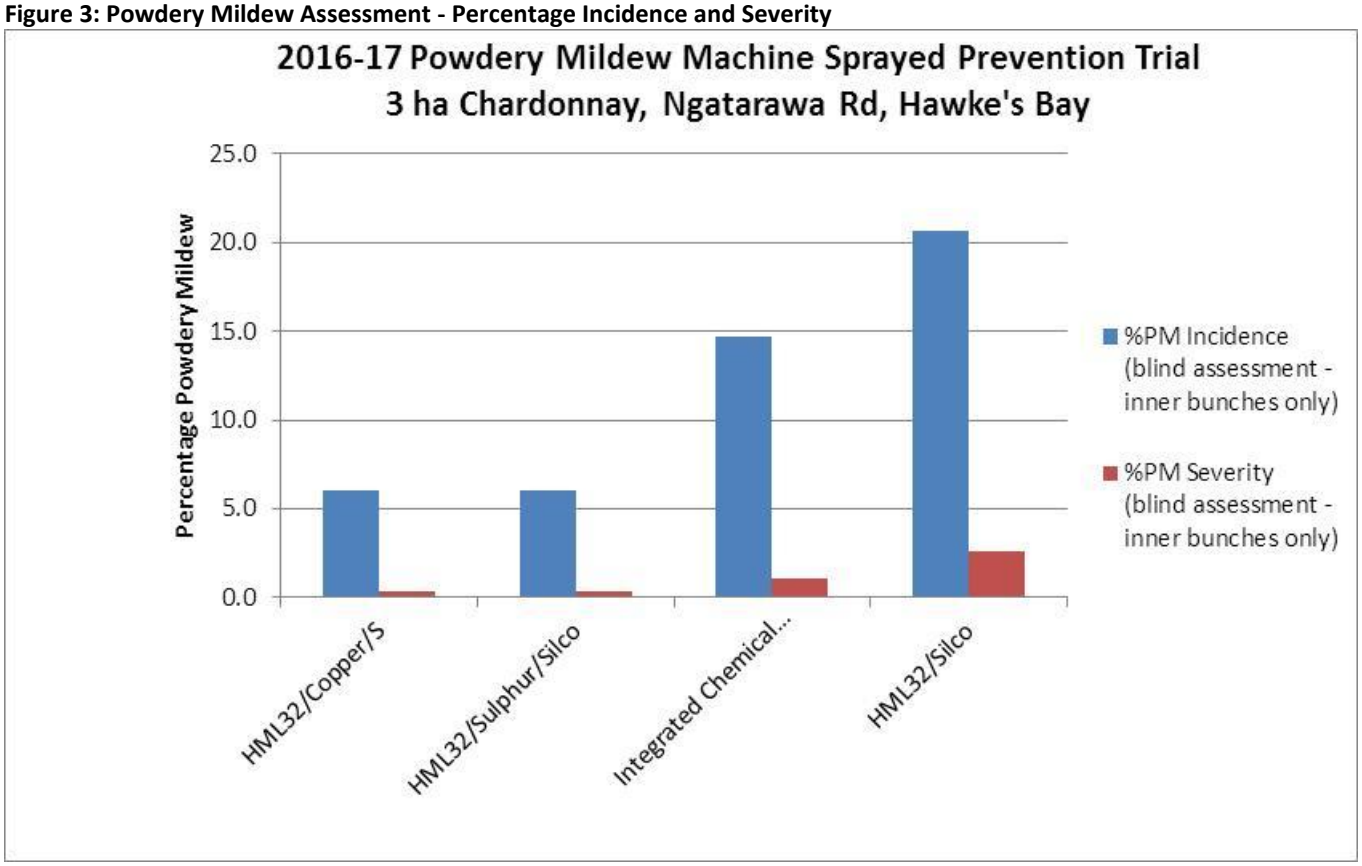
4.0 Assessment and Results

The plots were evaluated in the field for the incidence and severity of powdery mildew based on 30 randomly selected bunches per plot (150 bunches per treatment). This was undertaken **blind** by Bridget Wilton (CV in Appendix 1). Only the inner bunches were assessed as there was no powdery mildew observed on the outside bunches.

The field assessment was undertaken during the week of 9th- 15th January 2017. In Hawke's Bay conditions this period is only slightly pre-veraison, but when powdery mildew infection is the most obvious.

The results are shown in Figure 3.

Figure 3: Powdery Mildew Assessment - Percentage Incidence and Severity



4.1. Statistical Analysis

Statistical analysis was undertaken on the powdery mildew infection assessments. The results are shown in Table 2.

Table 2: Statistical Analysis

Fisher's protected least significant difference test

Treatment	Mean % inc		Mean % Crop	
HML32 + sulphur + copper	6.0	a	0.3	a
HML32 + sulphur + potassium silicate	6.0	a	0.4	a
Chemical PM program	14.7	b	1.1	b
HML32 + potassium silicate	20.7	c	2.6	c
LSD	*3.728*		*0.682*	

Within each column, means followed by the same letter are not significantly different (LSD, α = 0.05).
The P value was < 0.001 for both incidence and severity indicating a high level of confidence (99%) that treatment effects were real.

Data were analysed using GenStat Release 17.1.0.14713 (PC/Windows XP) Copyright 2014, Lawes Agricultural Trust (Rothamsted Experimental Station). Before analysis incidence and severity data were subjected to angular transformation. The untransformed means are reported in the tables and figures. Analysis of Variance (ANOVA) and Fisher's Protected Least Significant Differences of Means (LSD, α = 0.05) were used to determine statistical differences between treatments.

Note: potassium silicate is HML Silco

It shows that the HML32 and Sulphur programme with either copper or HML Silco is statistically better than the integrated chemical programme. It also indicates that copper and potassium silicate can be substituted without a change in efficacy.

5.0 Discussion and Conclusions

5.1. Machine spraying

This trial confirms that the excellent efficacy that was achieved in both the 2015-16 hand sprayed trial at Dartmoor Rd, Puketapu, and the 2016 UC Davis Californian trials was able to be repeated using a commercial sprayer, conventional water rates and timings in the face of a challenging season and a vineyard with a poor previous history of the disease.

5.2. HML Silco as an alternative to copper

The results indicate that HML Silco can be an alternative to the addition to copper, in terms of providing some eradicative properties against powdery mildew within the protectant programme, when using in combination with HML32 and Sulphur.

This is a particularly useful attribute which will provide relief to growers who wish to use sheep for leaf plucking post flowering and have not been able to do this up until now because the issue of copper toxicity and sheep.

5.3. HML Silco as an alternative to sulphur

HML32 and HML Silco without sulphur produced similar rates of powdery mildew severity but the level of incidence was higher than the other three treatments it was compared with – however the outcome still produced an acceptable commercial result under high challenge.

For some winemakers, the use of sulphur creates flavour profiles that are not welcomed, and in many cases wineries as a matter of policy require the use of sulphur to cease at veraison. The attribute of control of powdery mildew without sulphur could provide an earlier cessation of sulphur use, or in some cases of low risk/challenge, may allow the removal of sulphur completely from a preventative program.

6.0 Acknowledgements

Chris Henry would like to acknowledge the lessee of the vineyard (Ant Mckenzie of Ant Mackenzie Wines) for allowing this trial to be undertaken, Bridget Wilton of Farmlands for data collection and Peter Wood, Plant and Food Research's scientist for planning advice and statistical analysis.

Appendix 1: CV for Bridget Wilton

Curriculum Vitae for Bridget Wilton

Farmlands Horticulture Technical Advisor
Bridget.wilton@farmlands.co.nz

Relevant Qualifications

1997 Bachelor of Applied Science (Horticulture)

Relevant Employment History

Farmlands Horticulture - Technical Advisor (Current position)

Eastern Institute of Technology
Pest, Disease and Disorders in Horticulture Tutor

Constellation New Zealand
Technical Viticulturist and Grower Liaison

Montana Wines – Allied Domeq – Pernod Ricard
Assistant Vineyard Manager
Korokipo Estate, Hawke's Bay
Patutahi Estate, Gisborne

Wainawa River Estate - Vineyard Manager