



Grape Powdery Mildew Prevention Trial

Ngatarawa Rd, Hastings, Hawke's Bay

2022-23

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1.0 Introduction

The purpose of this trial was to demonstrate the efficacy of NSA, a registered potassium soap fungicide, against Powdery Mildew, Downy Mildew and Botrytis, at 1% and 2% and with different rates of the cuprous oxide fungicide Norshield. NSA is currently registered with Powdery Mildew claims at 1% when premixed with additives including cuprous oxide fungicides and with claims for botrytis and downy mildew at 2% only.

This report presents the Powdery Mildew results only. Downy Mildew and Botrytis results are separately reported.

2.0 Trial Objectives

The objective of the trial was to evaluate the efficacy of 1% NSA with various rates of Norshield and a single rate of Nordox in relation to the current registration claims for Downy Mildew and Botrytis specifically and to provide further confirmation of the efficacy against Powdery Mildew.

3.0 Trial Site and Conditions

3.1. Vineyard description

The trial site was in a vineyard on Ngatarawa Rd, Hastings, Hawke's Bay, New Zealand in a winegrowing area known as the Triangle. It is contract managed by Great Vine Services Limited.

The variety was Merlot trellised as 2 cane VSP. The row width was 2.5m with 1.44m between vines (5 vines/bay). The vines are grafted and approximately 20 years old with a cropping level of approximately 15t/ha.

The trial is located over 4 rows which also included a powdery mildew eradication trial. Powdery mildew pressure was therefore high for the prevention trial.

Figure 1 shows the location of the trial and the configuration of the prevention trial and the Powdery Mildew eradication trial.

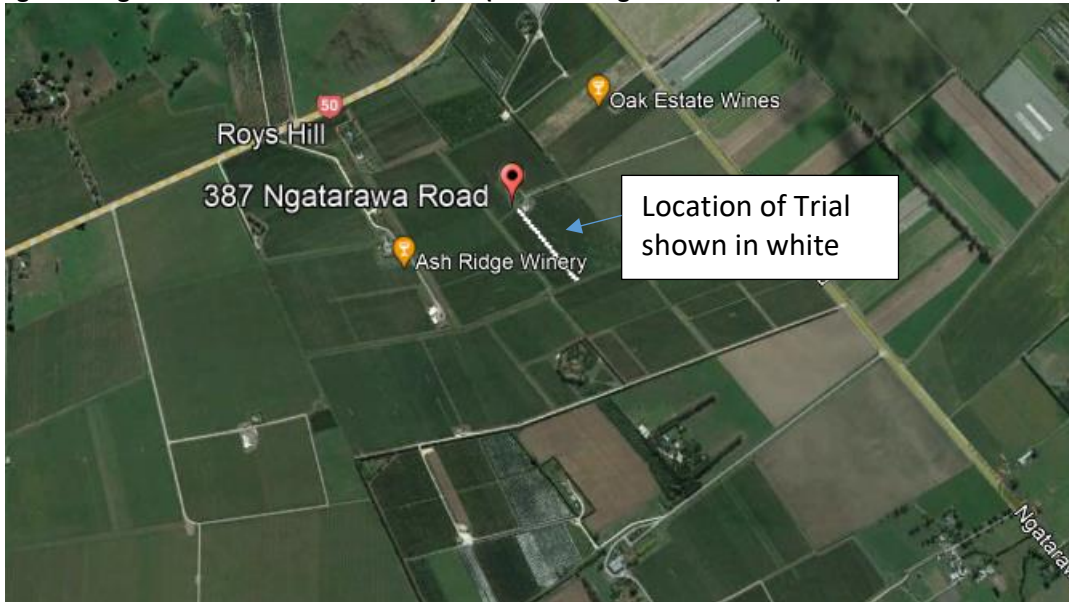
Spraying for disease control up until the end of October was undertaken by the contract manager, and thereafter the trial area was the responsibility of Henry Viticulture Limited. There were 2 machine applied applications of sulphur with an adjuvant.

The manager applied the same viticultural practice during the growing season to the trial area as was applied to rest of the block, including tucking, leaf plucking, mowing and herbicides. The canopy cover was reasonably dense over the flowering period before the vines were trimmed and topped in mid December. The vines were further trimmed and 'collarded' late December when berries had reached about pea size– bunch exposure of approximately 70% was achieved, but with the high vigour of these vines and the constant rain events this bunch exposure quickly lowered to something considerably less and not consistent. Additionally as a comment, the viticultural practice applied to these vines fits a model of low cost and highest possible yield – as the crop was destined to be used

as a 'filler' in some other wine variety, probably Sauvignon Blanc and the intention was to harvest at early, say 18 brix. Picking at this level of maturity, most times, avoids end of season rots such as Sour Rots or Botrytis.

The rows were trimmed on 28 February 2023 prior to assessment of mature leaves on March 2 2023.

Figure 1: Ngatarawa Rd trial site and layout (source Google Earth 2016)



Row 64 Fence end	Row 65 Fence end	Row 66 Fence end	Row 67 Fence end
Prevention Trial			
	Eradication Trial		
Row 64 shed end	Row 65 shed end	Row 66 shed end	Row 67 shed end

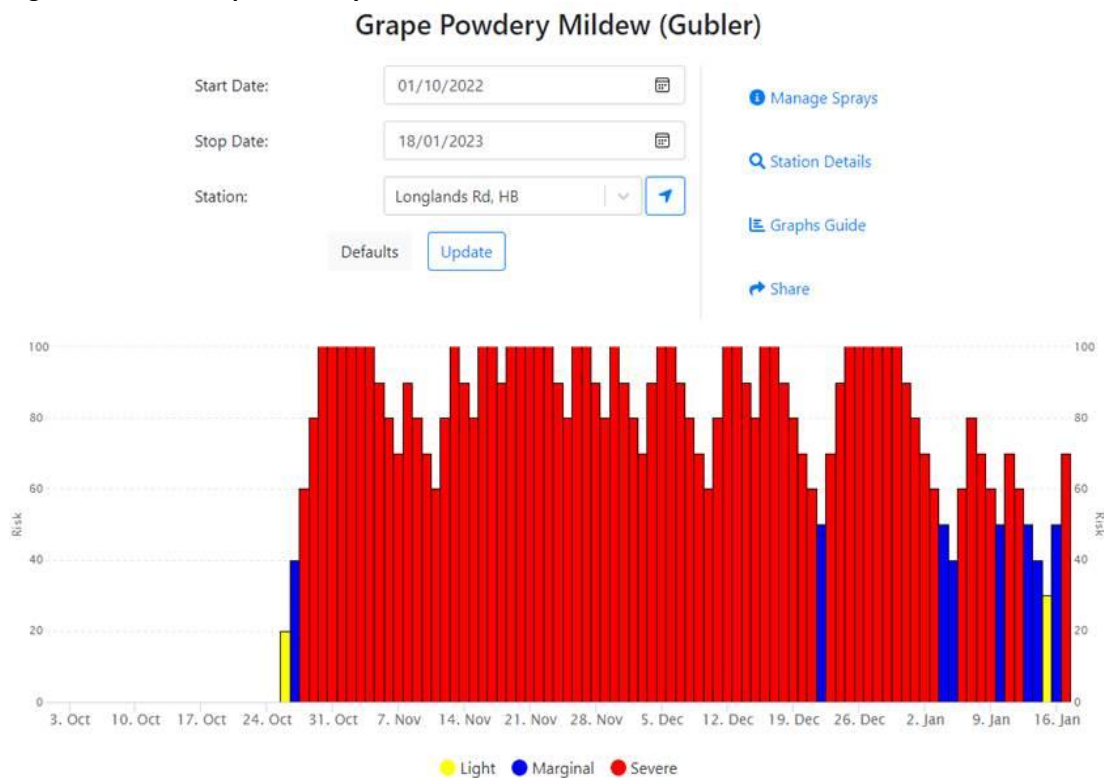
3.2. Previous history of Grape Fungal Diseases

In the previous season, some downy mildew was observed in this vineyard block.

4.0 Seasonal weather conditions

The 2022-23 season was regarded by most growers in Hawke’s Bay as one of the most difficult seasons due to the multiple and prolonged incidences of rain, particularly over the flowering and post flowering period. The 2022-23 outputs from the ‘Gubler Grape Powdery Mildew Prediction model’ for the Longlands Rd Climate Station is shown in Figure 2.

Figure 2: Gubler Grape Powdery Mildew Prediction Model for 22-23 season



Powdery Mildew was first observed in the untreated controls (basal leaves on shoots in the head) around 5 December 2020. The plant growth stage was 80% to complete capfall.

5.0 Trial Design

The trial design used one bay of vines (5) as a plot. There were 4 replicates in which the treatments (17) were randomised within. Three additional treatments (Trt No. 18, 19 and 20) were included in spare bays at the end of Row 67 and these were randomised within themselves.

5.1. Treatments

The 20 treatments in this trial are described in Table 1 along with the product rate information. Details of the programme for the Full Chemical Standard treatment is provided in Table 2. Where there was both NSA and Nordox or Norshield in the treatment, these were premixed prior to adding to the tank. Protector and Nordox was also pre-mixed as per the label.

The rates of Nordox and Norshield are either at or lower than the lowest label rate.

Table 1: Trial Treatments and Product Rate information

Trt No.	Treatment	Active Ingredient g/kg or g/L	Product rate/100L
1	Untreated		
2	Powdery Mildew Grower Standard - Sulphur	800g/kg sulphur	300g
3	Downy Mildew Grower Standard – sulphur and Mancozeb	800g/kg sulphur 750g/kg mancozeb	300g 200g
4	Botrytis Grower Standard – sulphur plus...	Refer Table 2	Refer Table 2
5	Protector ^{hml} + Nordox	750g/kg copper	30g
6	NSA 1%	230g/L fatty acids (potassium salts)	1L
7	NSA 2%	230g/L fatty acids (potassium salts)	2L
8	NSA 1% + Nordox	230 g/L fatty acids (potassium salts) 750g/kg copper	1L 30g
9	NSA 1% Norshield	230 g/L fatty acids (potassium salts) 450g/kg copper	1L 50g
10	NSA 1% Norshield	230 g/L fatty acids (potassium salts) 450g/kg copper	1L 40g
11	NSA 1% Norshield	230 g/L fatty acids (potassium salts) 450g/kg copper	1L 33g
12	NSA 2% Nordox	230 g/L fatty acids (potassium salts) 750g/kg copper	2L 60g
13	NSA 2% Norshield	230 g/L fatty acids (potassium salts) 450g/kg copper	2L 100g
14	Nordox	750 g/kg copper	30g
15	Norshield	450 g/kg copper	50g
16	Norshield	450 g/kg copper	40g
17	Norshield	450 g/kg copper	33g
18	NSA 1% HML Silco Norshield	230 g/L fatty acids (potassium salts) 44% potassium silicate 450 g/kg copper	1L 250ml 20g

19	NSA 1% HML Silco Norshield	230 g/L fatty acids (potassium salts) 44% potassium silicate 450 g/kg copper	1L 250ml 33g
20	NSA 1% HML Silco Norshield	230 g/L fatty acids (potassium salts) 44% potassium silicate 450 g/kg copper	1L 250ml 50g

Table 2: Programme for Full Chemical Standard Treatment and Product Rate Information

Application Round	Date	Treatment	Active Ingredient g/kg or g/L	Product rate/100L
1	26 October 2022	Microthiol Disperss Manzate Evolution	800g/kg sulphur 750g/kg mancozeb	300g 200g
2	3 November 2022	Microthiol Disperss Manzate Evolution	800g/kg sulphur 750g/kg mancozeb	300g 200g
3	15 November 2022	Microthiol Disperss Manzate Evolution	800g/kg sulphur 750g/kg mancozeb	300g 200g
4	24/25 November 2022	Microthiol Disperss Pinnacle	800g/kg sulphur 500g/L fluazinam	300g 100ml
5	29 November 2022	Prolectus Spiral	400g/L fenpyrazamine 500g/L spiroxamine	100ml 120ml
6	5 December 2022	Microthiol Disperss Impulse Merpan	800g/kg sulphur 500g/L spiroxamine 800g/kg captan	300g 120ml 125g
7	12 December 2022	Microthiol Disperss Impulse Merpan	800g/kg sulphur 500g/L spiroxamine 800g/kg captan	300g 120ml 125g
8	16 December 2022	Microthiol Disperss Belanty Merpan	800g/kg sulphur 75 g/L mefentrifluconazole 800g/kg captan	300g 80ml 125g
9	25 December 2022	Microthiol Disperss Nordox	800g/kg sulphur 750g/kg copper	300g 60g
10	31 December 2022	Microthiol Disperss Merpan	800g/kg sulphur 800g/kg captan	300g 60g
11	13 January 2023	Microthiol Disperss Eurozeb Merpan	800g/kg sulphur 750g/kg mancozeb 750g/kg copper	300g 200g 60g
12	23 January 2023	Microthiol Disperss Merpan	800g/kg sulphur 800g/kg captan	300g 60g

5.2. Application Method

Spray applications were made by Chris Henry using a 50 litre Silvan unit mounted on the back of a quad bike. The tank unit was fitted with a 12 volt electric pump delivering an output of approximately

60psi through a hand gun. The handgun was fitted with a '56' swirl plate and D4 cone size which delivered a constant 2.2l/min.

All trial treatments were applied *to the point of run off in one pass* by electric pump assisted hand gun from each side of the row.

5.3. Application Timings

The trial program was preceded by 2 applications of sulphur and applied by machine sprayer over all treatment sites.

There were 12 applications of the trial treatments prior to the assessment being undertaken. Table 3 shows the dates of application and the interval between applications, plant growth stages and weather conditions.

Table 3: Application Dates, Interval, Chemical Standard Treatment, and Climate conditions

Application Round	Date	Interval	Plant Growth Stage	Comment on weather conditions
1	26 October 2022	0	E-L 15 single flowers in compact group	Partly cloudy, fine, 20°C, no wind
2	3 November 2022	8	E-L 17 single flower separated	Partly cloudy, fine, warm, 27 °C, moderate wind
3	15 November 2022	12	E-L 19 Beginning of flowering	Partly cloudy, 19 °C, rain on previous days
4	24/25 November 2022	9/10	E-L 23 50% Cap fall,	Heavy rain interrupted applications. Several rain fronts occurred following this application, 21°C.
5	29 November 2022	5	E-L 25 80% Capfall	Cloudy, 23°C
6	5 December 2022	6	E-L 26 Capfall complete	Fine, 23°
7	12 December 2022	7	E-L 27 Peasize	Fine, 23°C
8	16 December 2022	4		Cloudy, warm, 25°C
9	25 December 2022	9	E-L 29 Berries peppercorn size 4mm	Fine, 22°C, no wind
10	31 December 2022	6	Bunch closure on 50% bunches	Cloudy, 19°C
11	13/14 January 2023	13	E-L 30 Berries Pea size 7mm	Rain halted application. Trts 18-20 and 2,3 and 4 were completed the following day, 19°C
12	23 January 2023	10	E-L 31 Pre bunch closure	Fine, then partly cloudy, 22°C

5.4. Powdery Mildew Assessment

A powdery mildew assessment of the bunches was undertaken on 31 January 2023 at early veraison by Ollie Powrie, Viticultural Consultant.

The bunch sample size per plot was 25, making a total of 100 bunches per treatment.

The assessments were undertaken **blind**, assessing bunches randomly over the length of each plot.

6.0 Powdery Mildew Results

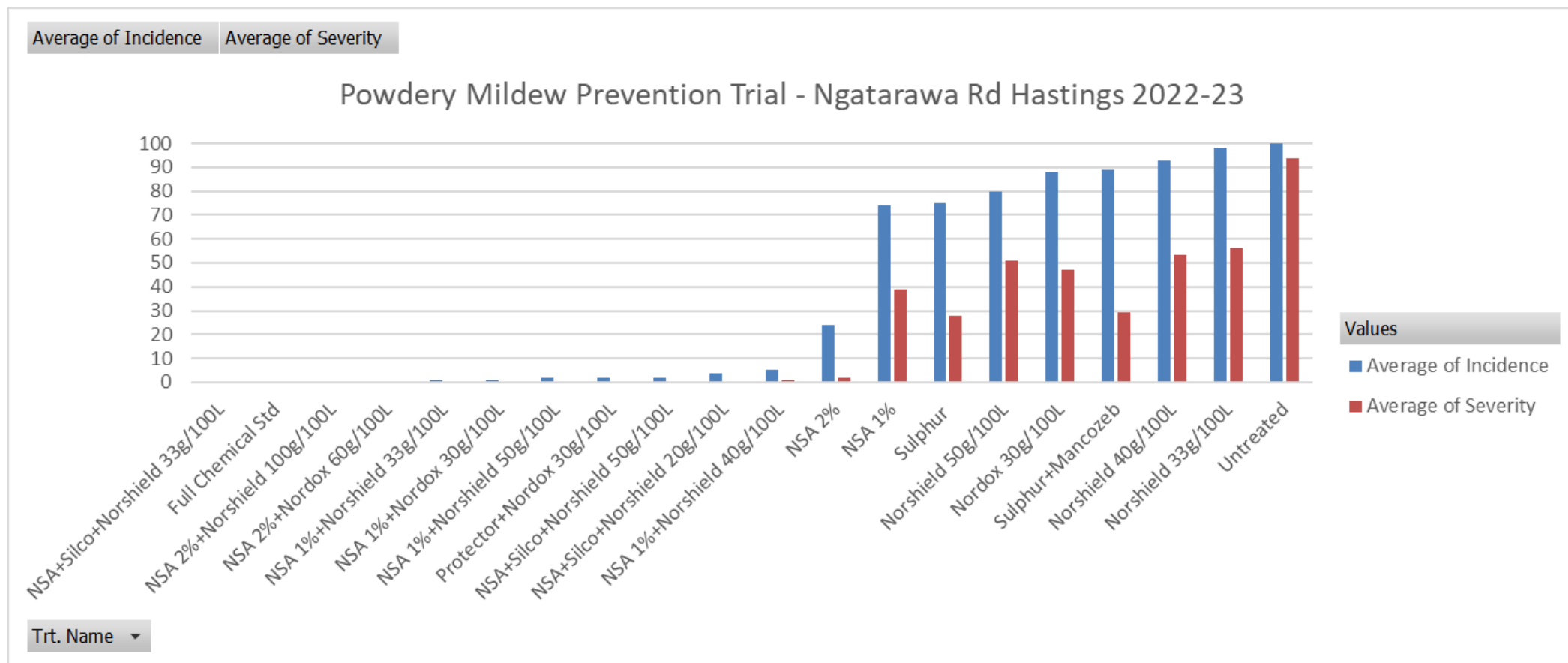
The results are shown in Table 4 and Figure 3.

Table 4: Powdery Mildew Prevention Trial - Results

Row Labels	Average of Incidence	Statistical Grouping	Average of Severity	Statistical Grouping
NSA+Silco+Norshield 33g/100L	0		0	
Full Chemical Std	0	c	0	e
NSA 2%+Norshield 100g/100L	0	c	0	e
NSA 2%+Nordox 60g/100L	0	c	0	e
NSA 1%+Norshield 33g/100L	1	c	0.01	de
NSA 1%+Nordox 30g/100L	1	c	0.01	de
NSA 1%+Norshield 50g/100L	2	c	0.03	de
Protector+Nordox 30g/100L	2	c	0.02	de
NSA+Silco+Norshield 50g/100L	2		0.16	
NSA+Silco+Norshield 20g/100L	4		0.04	
NSA 1%+Norshield 40g/100L	5	c	0.68	cd
NSA 2%	24	c	1.95	c
NSA 1%	74	b	39.07	b
Sulphur	75	b	27.91	b
Norshield 50g/100L	80	b	51.09	ab
Nordox 30g/100L	88	b	47.14	b
Sulphur+Mancozeb	89	b	29.49	ab
Norshield 40g/100L	93	b	53.37	ab
Norshield 33g/100L	98	b	56.05	ab
Untreated	100	a	93.65	a

Note: The statistical analysis was undertaken by Certis Belchim. They advised that the assumptions of normality were not met for an ANOVA analysis so the software ARM undertook a non-parametric test (Least Significant Difference/LSD test plus post-hoc Friedman's test. It is noted that this test is not as strong as an ANOVA analysis. They also noted that the 3 treatments containing NSA/Silco/Norshield could not be included given that they were not within the full set of replicates, (they were in one corner of the trial plot)

Figure 3: Powdery Mildew Prevention Results – Percent Incidence and Average Severity in Bunches. Assessment date: 31 January 2023.



7.0 Discussion of Results

It was a high pressure year as demonstrated by the untreated control.

NSA 1% alone had average efficacy, similar to sulphur. NSA 2% alone performed better.

All combinations of NSA1% with Nordox or Norshield at the various rates performed very well and comparable to the Full Chemical Standard.

In terms of a comparison between Nordox and Norshield, Nordox at 30g/100L and Norshield at 50g/100L contains the same amount of active ingredient. When mixed with NSA1%, there is no difference in efficacy between the two treatments.

While the addition of HML Silco does not demonstrate a significant improvement given the already excellent performance of NSA1% and Norshield, the 2020-21 Meadowbank Trial in Marlborough did show good efficacy of NSA 1% and Silco when compared to NSA alone. The application of the treatments with HML Silco demonstrated a very high level of spread.

8.0 Plant Safety

There does appear to be plant reaction to the soap and copper fungicide treatment, showing as red colouration of the basal leaves. It was particularly prominent in the higher rates, particularly NSA2% and Nordox but less so with NSA2% and Norshield, with the same level of active.

9.0 Conclusions

The trial results confirm a very high level of efficacy against Grape Powdery Mildew using NSA at 1% with low rates of Nordox or Norshield fungicide. The addition of HML Silco facilitates the spread of the spray mix.

To avoid significant discolouration of the basal leaves, it is recommended to use NSA at 1% when premixing with Nordox and Norshield.

10.0 Acknowledgements

Chris Henry would like to acknowledge Bridget Wilton and Miles Leicester, managers of the vineyard as well as the owners, Karen and Troy Doherty for allowing this trial to be undertaken. Rob Agnew of Plant and Food Research for disease modelling information. Ollie Powrie for his field assessment and Certis Belchim for the statistical analysis.