Protector^{hml} and HML 32

Armour plate for grapes

What are we going to talk about

- **NIWA forecasting**
- **What the Australians are doing with powdery mildew**
- **Dr Rob Beresford- Plant and Food Research seminar May 2015**
- **Dr David Gadoury -** 'Everything you always wanted to know about powdery mildew and several things you really need to forget'
- **Peter Wood** – pruning influences on powdery mildew
- **Implications for growers** – and how Protector and HML32 fit in

NIWA

Seasonal Climate Outlook: September – November 2015

3 September 2015

Strong El Niño conditions are present in the tropical Pacific ocean. Sea surface temperature anomalies in the central and eastern Pacific intensified during August 2015 and are now close to +2°C. The Southern Oscillation Index (SOI) is strongly negative (-2.0 for August 2015, value estimated on the 2nd of September) and westerly wind anomalies (weaker trade-winds) dominate the central and western equatorial Pacific, indicating a strong coupling between the ocean and the atmosphere.

International guidance indicates that El Niño is certain (100% chance) to continue over the next three months (September – November 2015) and extremely likely (above 90% chance) to persist into summer 2015/2016. The current state of the ocean-atmosphere in the Pacific and the international consensus forecast suggest that this event could then rank amongst the 4 strongest El Niño events recorded (along with 1972/73, 1982/83 and 1997/98).

Powdery mildew control in Australia

Sulphur

- Remains the backbone to powdery mildew control - cheap and effective.
- Application rates are normally 6kg/ha upwards.
- In many hotter drier areas, sulphur is the only product used.

Other issues

- In the cooler areas chemistry as well as sulphur are used for control.
- Many of their chemicals have resistance issues as ours.
- In some areas 2 spotted mite and scale are becoming an issue - suspected that use of high sulphur rates is disturbing biological controls.
- The hotter drier areas are becoming subject to problematic later season powdery mildew outbreaks following overcast days and humid weather.

Science and Practice Workshop on Grapevine Powdery Mildew

Dr Rob Beresford, Plant and Food Research
Auckland 6 May 2015

- The best meeting on powdery mildew I have ever attended.
- Genetics, life cycle, NZ history, chemical resistance, and recent research.
- The scientific presentations are available by drop box link or via our website.
- https://www.dropbox.com/sh/482kloo6r79k5o7/AABYkQFoMKJR4LhmaYXvIOnwa?dl=0

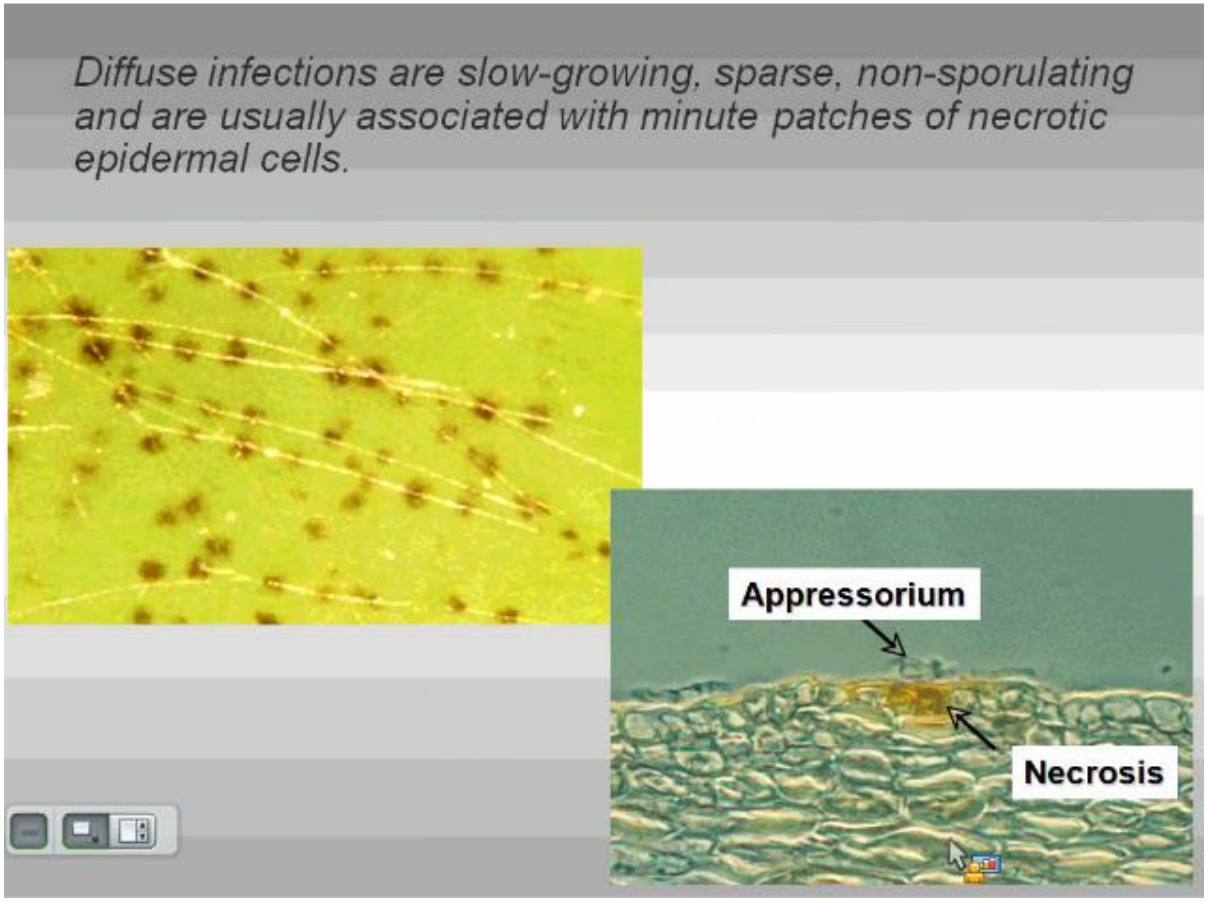
Dr David Gadoury
Cornell University Geneva USA

- David Gadoury and Wayne Wilcox are regarded by many as the leading scientists on grape diseases world wide – lifetimes of high level scientific research. David Gadoury is regarded as the leading expert on powdery mildew and chasmothecia specifically.

- ‘Everything you always wanted to know about powdery mildew and several things you really need to forget’

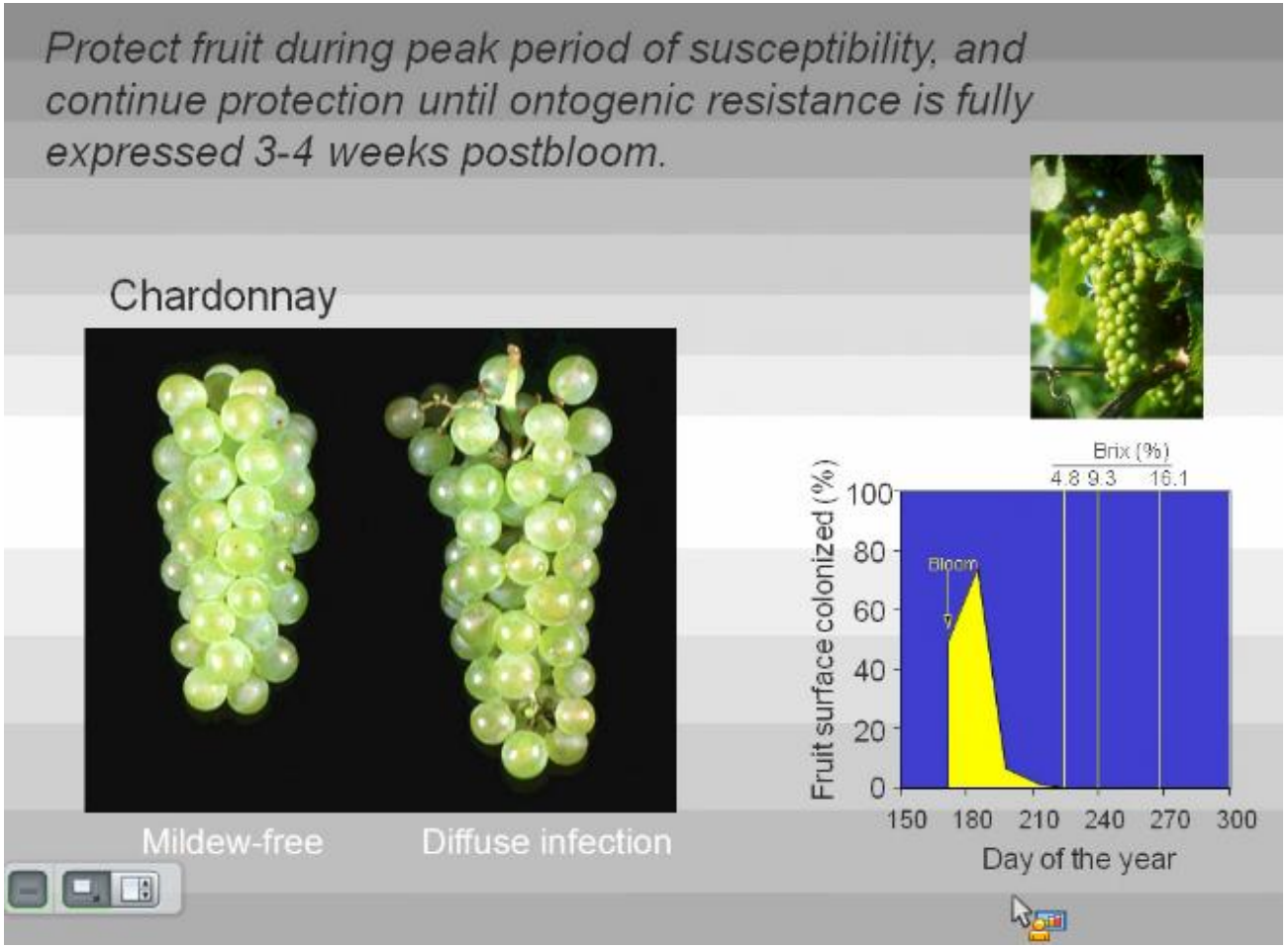
- This presentation is widely published on the internet.

Diffuse infections – what are they?



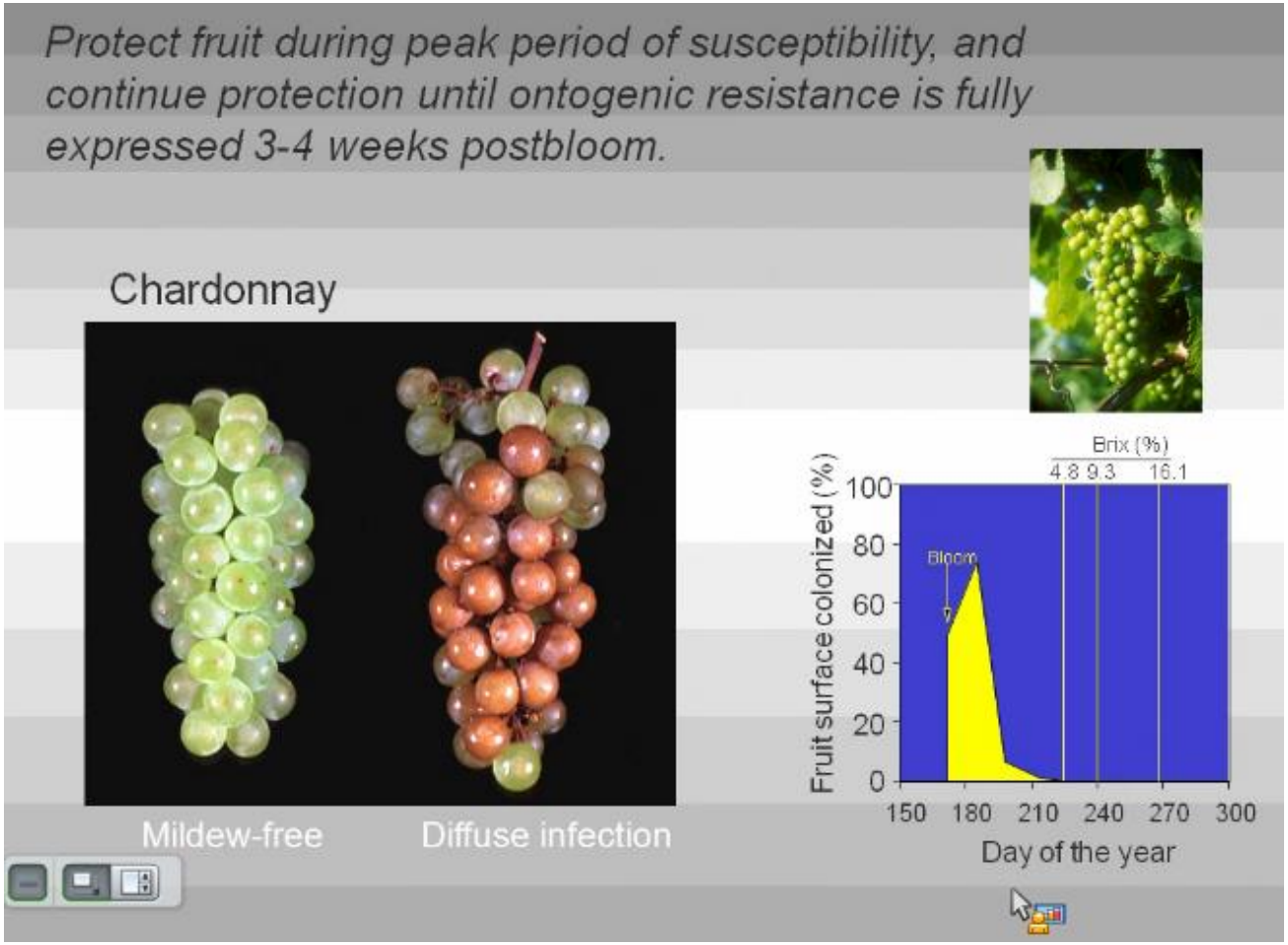
Source: Presentation by David Gadoury titled 'Everything you always wanted to know about powdery mildew and several things you really need to forget'

Diffuse Powdery Mildew Infection
You cannot see it!



Source: Presentation by David Gadoury titled 'Everything you always wanted to know about powdery mildew and several things you really need to forget'

Diffuse Powdery Mildew
Now you can!



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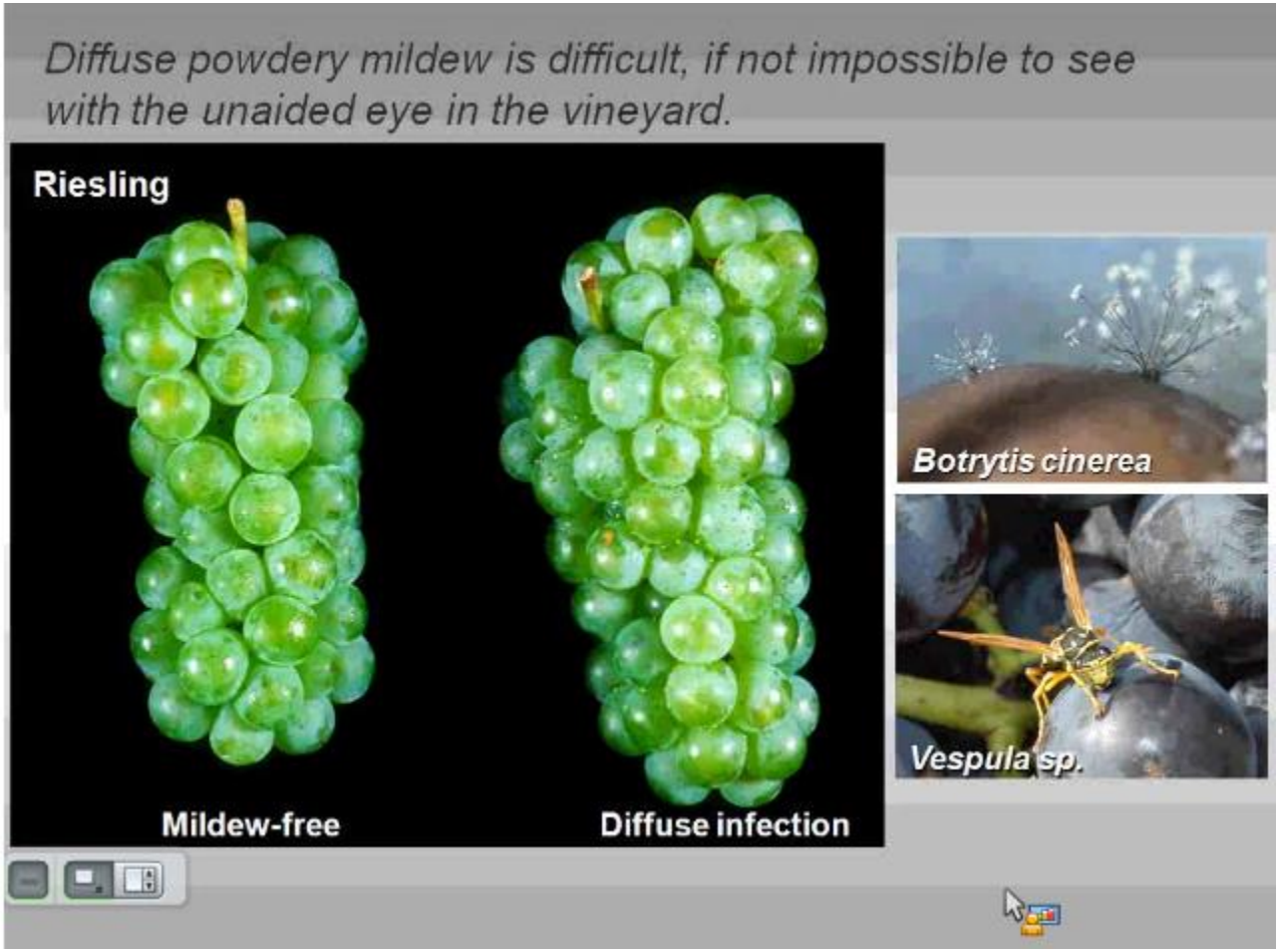
Diffuse infections – their connection to other major issues



Source: Presentation by David Gadoury titled 'Everything you always wanted to know about powdery mildew and several things you really need to forget'

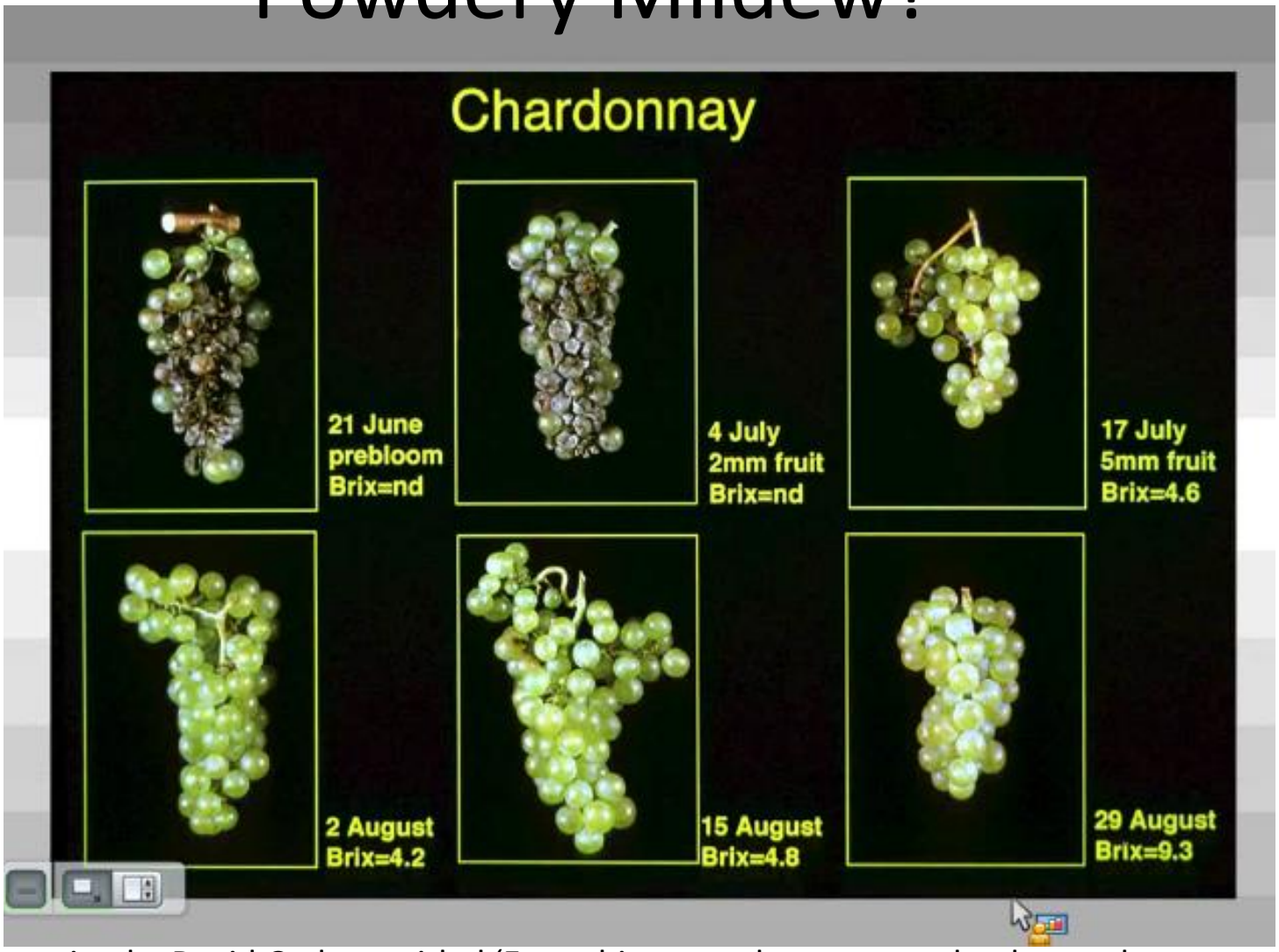
Wine defects from diffuse infections are unpredictable

Defects are more numerous in wines prepared from berries with diffuse powdery mildew, but occur in the "diffuse infection treatment" without pattern or consistency.

- Defects found: tastes of unripe fruit, hay, increased bitterness, various obnoxious flavors and odors, burlap, and plastic.
- Inconsistent and even rare defects are still of great concern in production and marketing.

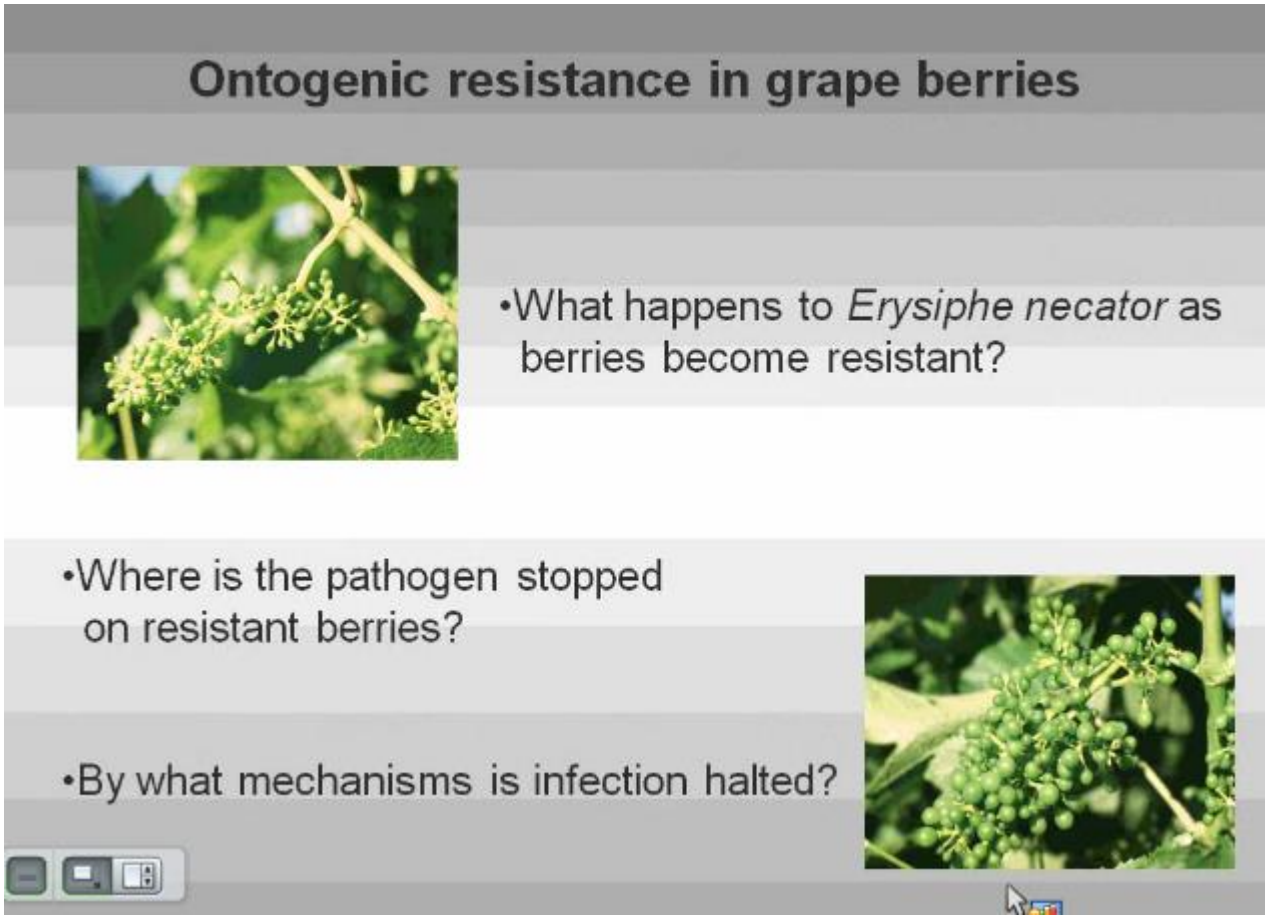
Source: Presentation by David Gadoury titled 'Everything you always wanted to know about powdery mildew and several things you really need to forget'

When do bunches become resistant to Powdery Mildew?



Source: Presentation by David Gadoury titled 'Everything you always wanted to know about powdery mildew and several things you really need to forget'

By what mechanism is infection halted? They do not know!!!!



Source: Presentation by David Gadoury titled 'Everything you always wanted to know about powdery mildew and several things you really need to forget'

The connection between Pruning and Powdery Mildew outcomes

Peter Wood - Plant and Food Research 2014

Unpublished work that I am very privileged to present.

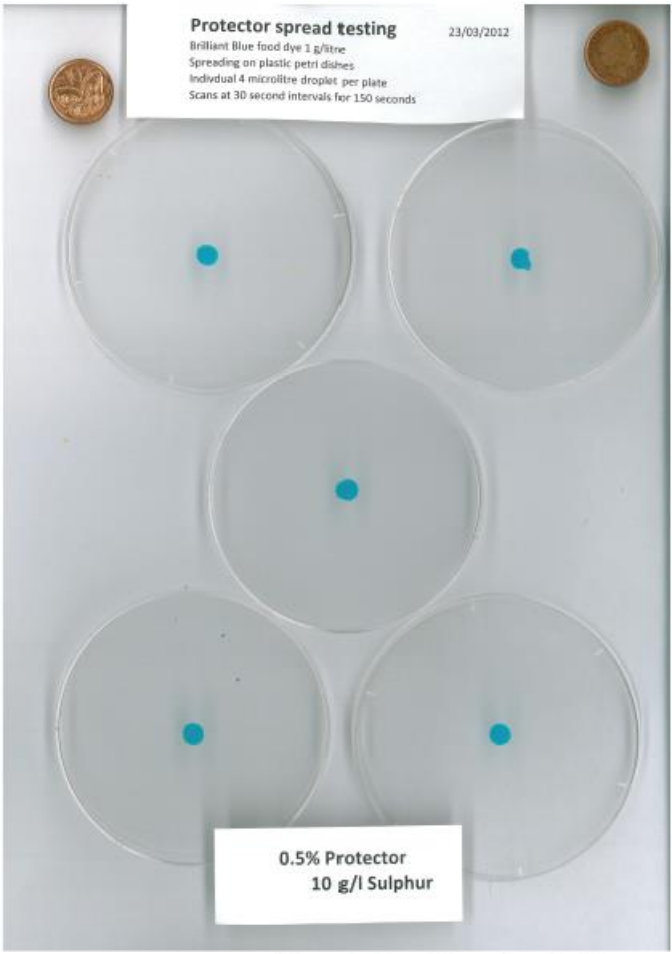
So how do growers achieve effective Powdery Mildew Control

- Robust preventative programs for powdery mildew
- Adjuvants with sulphur from bud-burst
- Use higher sulphur rates – my suggestion is not to exceed 5kg/ha
- Close spray intervals – my suggestion 10-14 days and re-cover after every major rain event.
- Use materials with eradicant properties at times within a preventative programs
- Early monitoring for disease and early action on eradication
- Alternate direction of preventative spray applications
- A decent sprayer audit once you have sufficient canopy to see what is going on

How do Protector^{hml} and HML32 assist with the above?

the spreading activity of Protector^{hml}

Example – Protector^{hml} and Sulphur



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the spreading activity maths of

Protector^{hml}

Droplet spread areas from single droplet deposit tests (one 4 micro litre droplet per plate)

Protector	Potassium bicarbonate	Sulphur g/l	Droplet diameter (mm) 1	2	3	4	5	Average diameter	Diameter Std dev	Area/drop mm2
nil	nil	nil	2.7	2.6	2.9	2.7	2.7	2.7	0.10	5.8
nil	nil	10	2.7	2.7	2.7	2.7	2.7	2.7	0.02	5.7
0.5%	nil	10	6.5	6.5	6.4	6.3	6.4	6.4	0.08	32.2

1X 4 micro litre droplets on each of 5 plates

30 sec to deposit

30 sec scan intervals out to 2.5 min from last deposit

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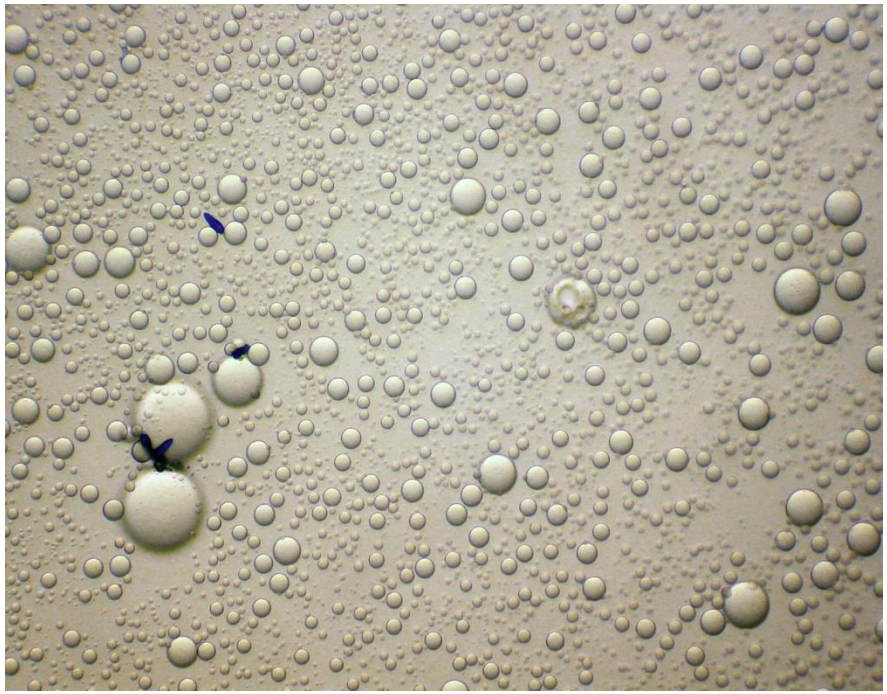
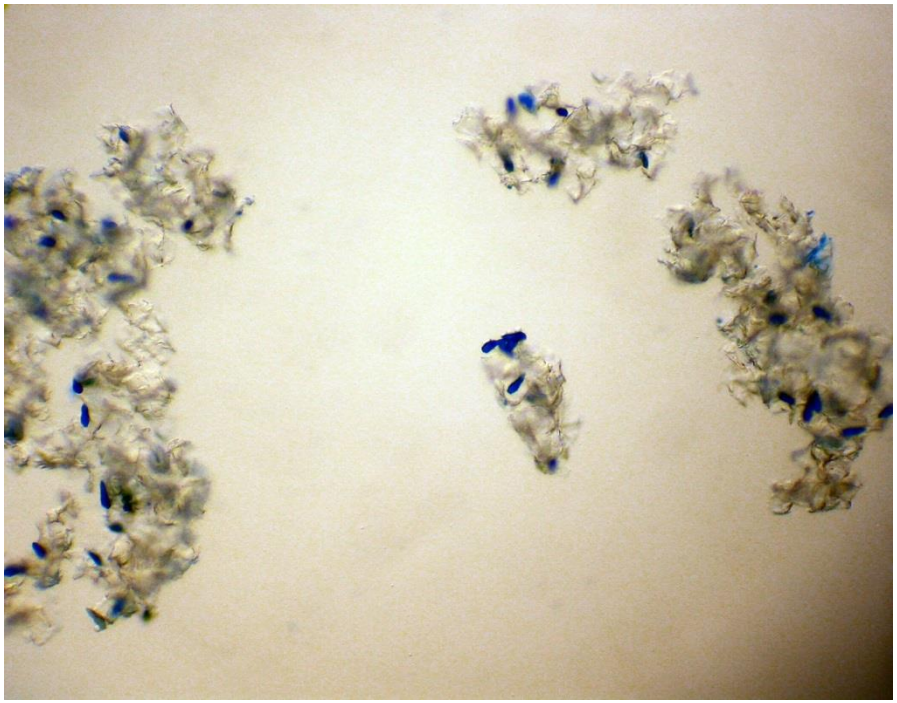
Protector^{hml} is an anionic surfactant – attracts spores



Dilute solution of Potassium soap with free vegetable oil



Dilute solution of Protector^{hml}

Protector^{hml} and Copper

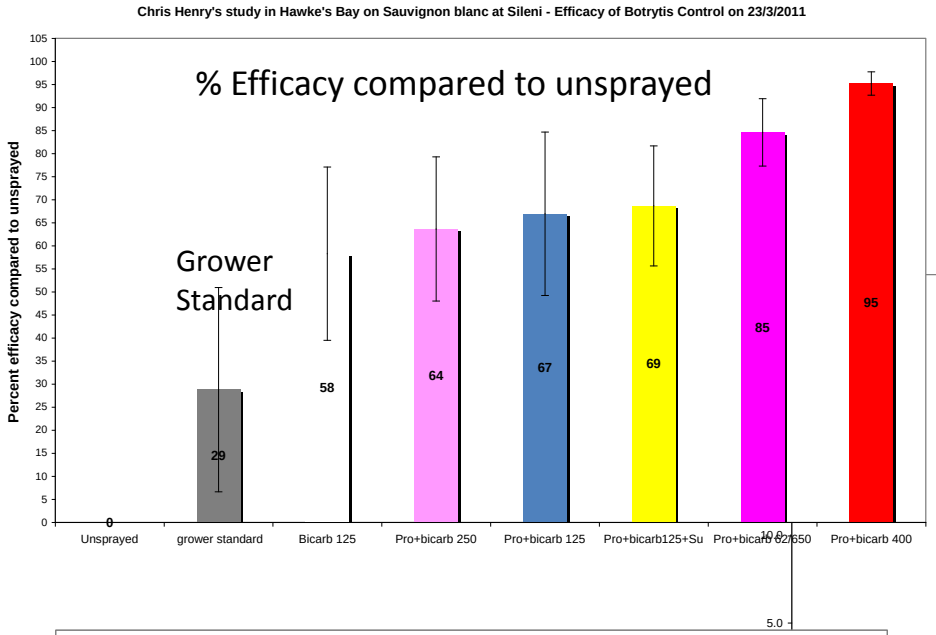
HortResearch Powdery Mildew Trials on Chardonnay in Hawke's Bay

Assessment of Percent Powdery Mildew

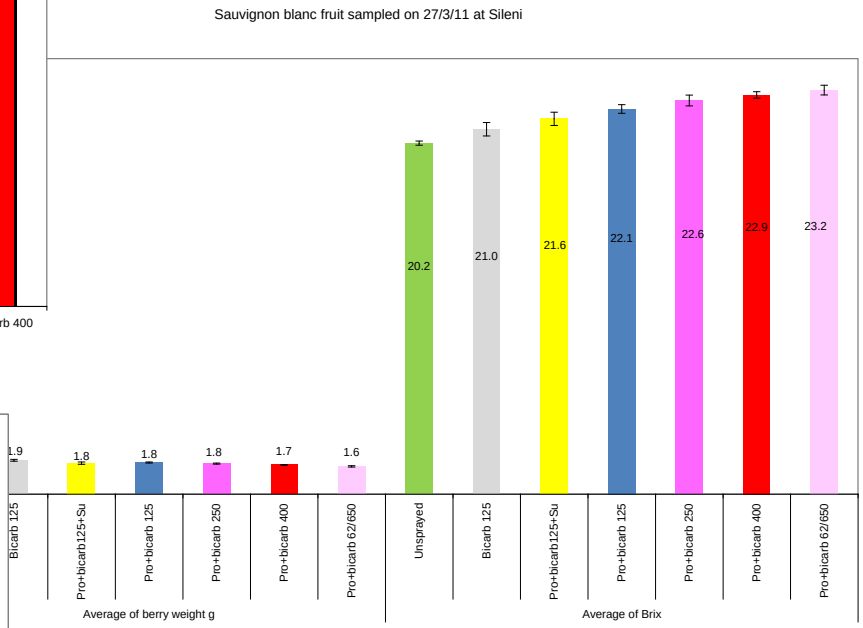
Treatment	1997	1998	1999
Protector and Copper (Protector was at 2% for botrytis studies)	4.2	0	2.1
Standard Treatments	6.3	3	4.4
Untreated	27.1	94	47.8

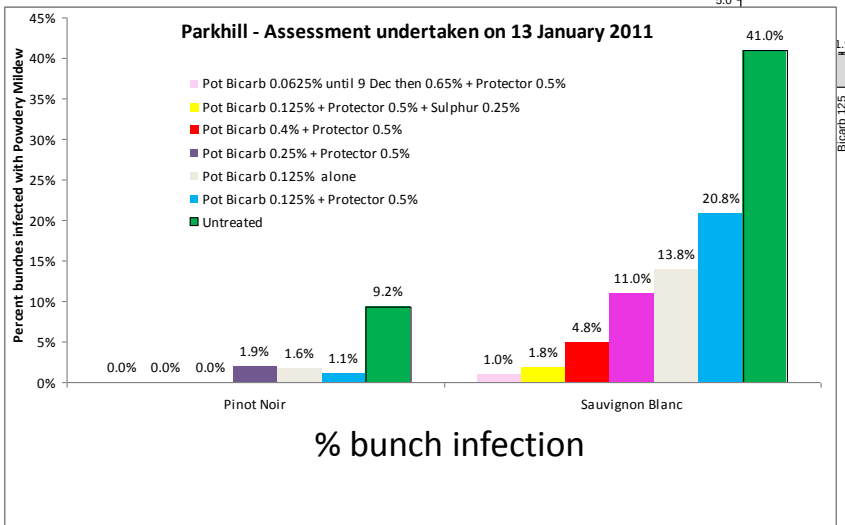
Protector^{hml} and Potassium Bicarbonate trial - 2010/2011

Sileni's Parkhill Estate – Sauvignon Blanc



Fantastic Botrytis Efficacy





% bunch infection

Acceptable Powdery Mildew Efficacy

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Powdery Mildew Eradication Trial
Hawke's Bay 2014

HML32 + Cu + 300 Potassium bicarbonate

11 January 2014

Henry Manufacturing Ltd

HML32 + Cu + 300 Potassium bicarbonate

12 January 2014

Henry Manufacturing Ltd

HML32 + Cu + 300 Potassium bicarbonate

26 January 2014

Henry Manufacturing Ltd

HML32 + Cu + 300 Potassium bicarbonate

8 March 2014

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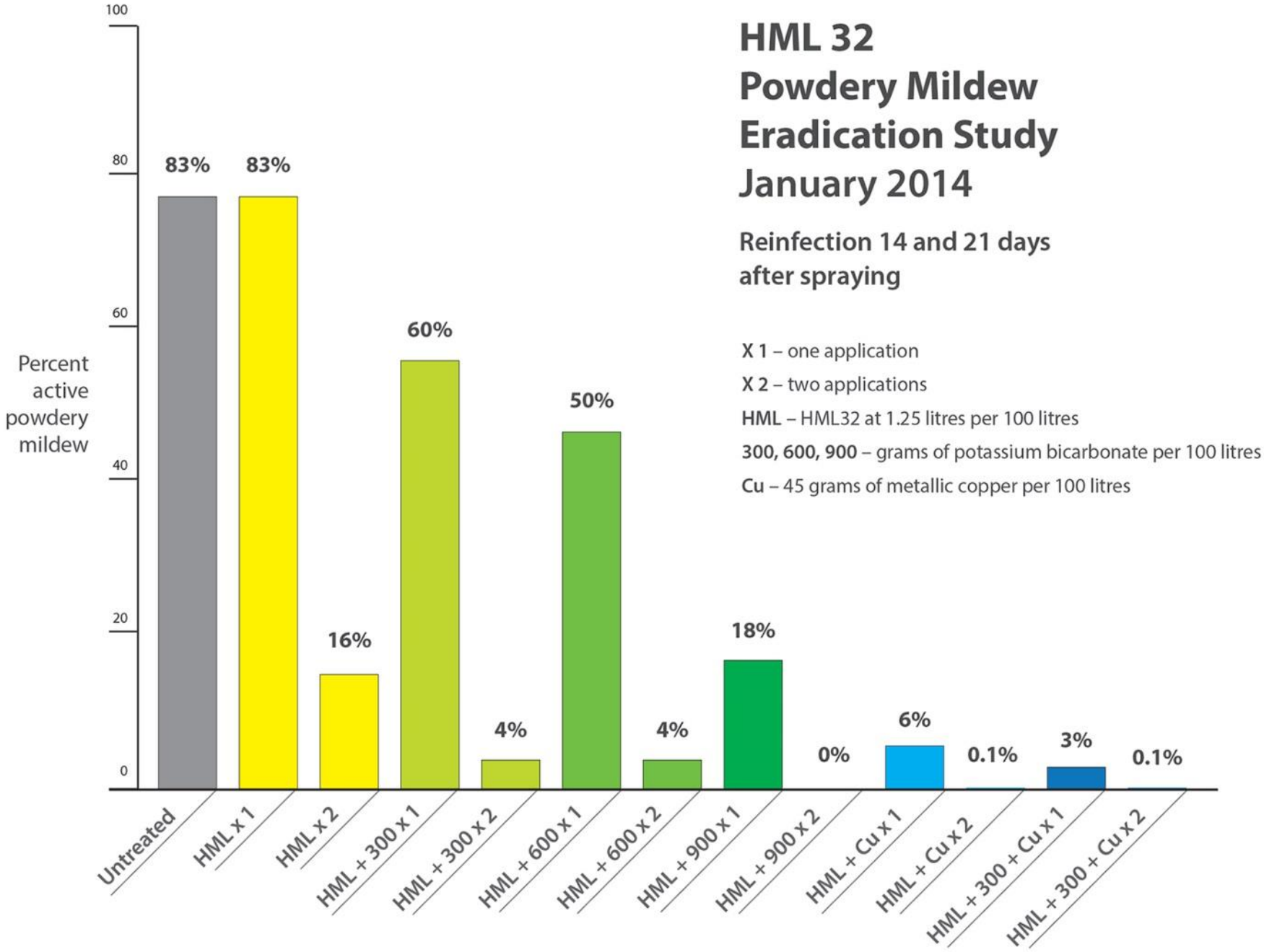
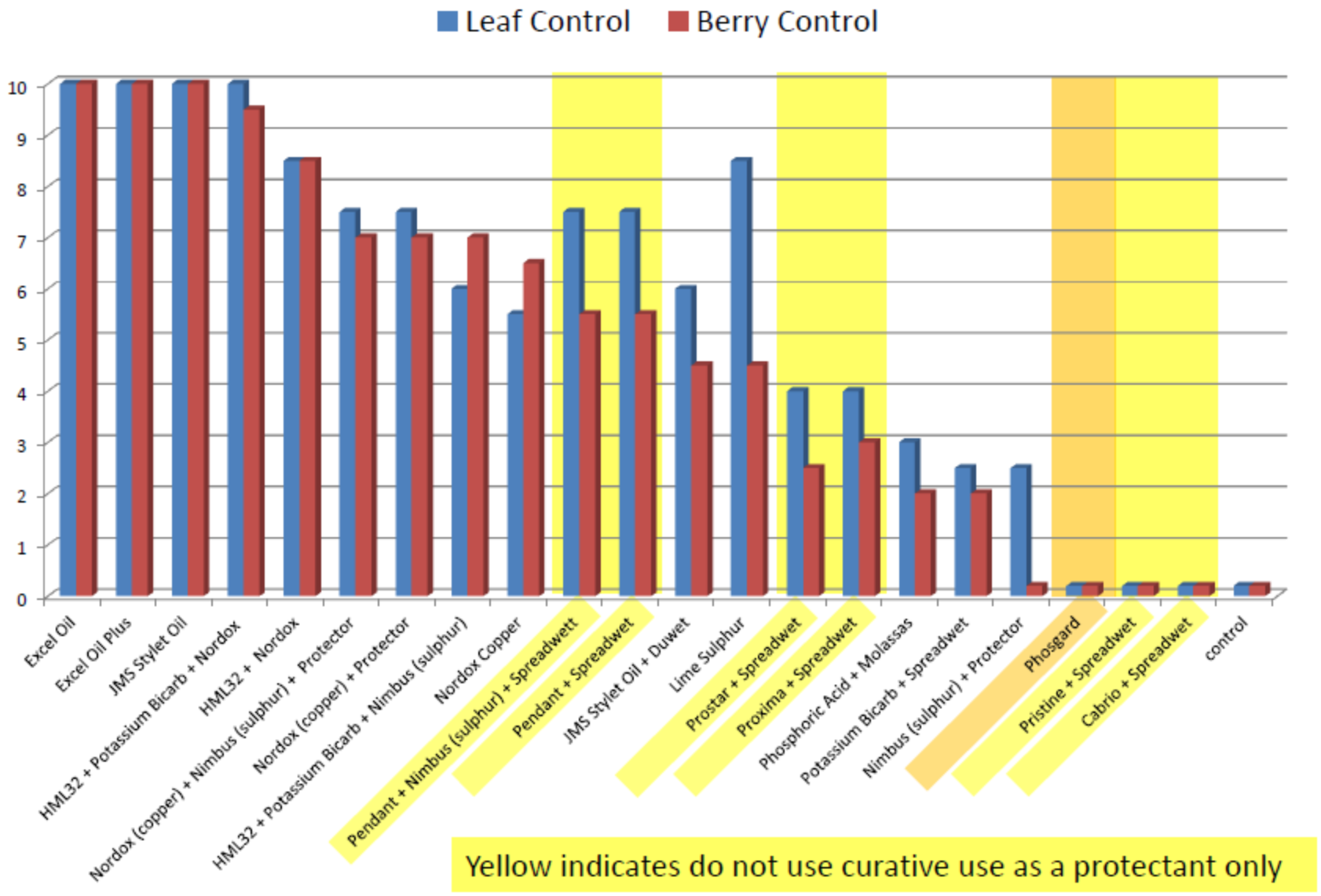
Montepulciano - Near Harvest – 15 April 2014


HML 32
Powdery Mildew
Eradication Study
January 2014
Reinfection 14 and 21 days
after spraying
X 1 – one application
X 2 – two applications
HML – HML32 at 1.25 litres per 100 litres
300, 600, 900 – grams of potassium bicarbonate per 100 litres
Cu – 45 grams of metallic copper per 100 litres
Percent active powdery mildew
100
80
60
40
20
0
83%
83%
16%
60%
4%
50%
4%
18%
0%
6%
0.1%
3%
0.1%
Untreated
HML x 1
HML x 2
HML + 300 x 1
HML + 300 x 2
HML + 600 x 1
HML + 600 x 2
HML + 900 x 1
HML + 900 x 2
HML + Cu x 1
HML + Cu x 2
HML + 300 + Cu x 1
HML + 300 + Cu x 2

Curative Trial Results



Yellow indicates do not use curative use as a protectant only

Verdelho in Auckland - close to harvest 2014 after following a season programme of HML32 and copper

Assistance with Sprayer Audits

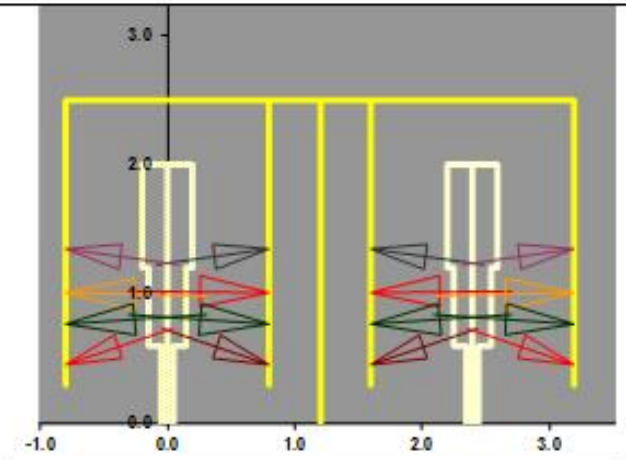
David Manktelow/Jeremy Hyland and Matt Fox

Sprayer deposition studies on Marlborough Sauvignon Blanc canopies 2015

Sprayer and tractor unit

Long view of sprayer operating in block for coverage test

Sprayer setup visualisation



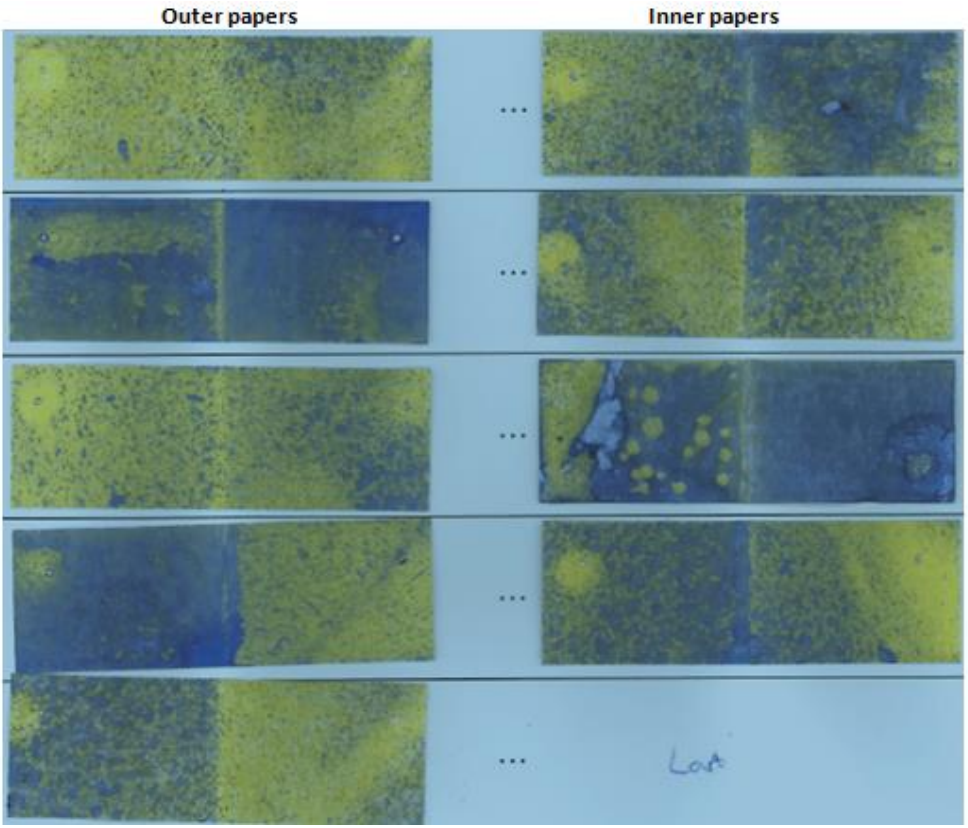
Schematic of sprayer setup to target bunch zone using four nozzles per side

Detail of left hand outer head in operation

Detail of right hand side of sprayer in operation

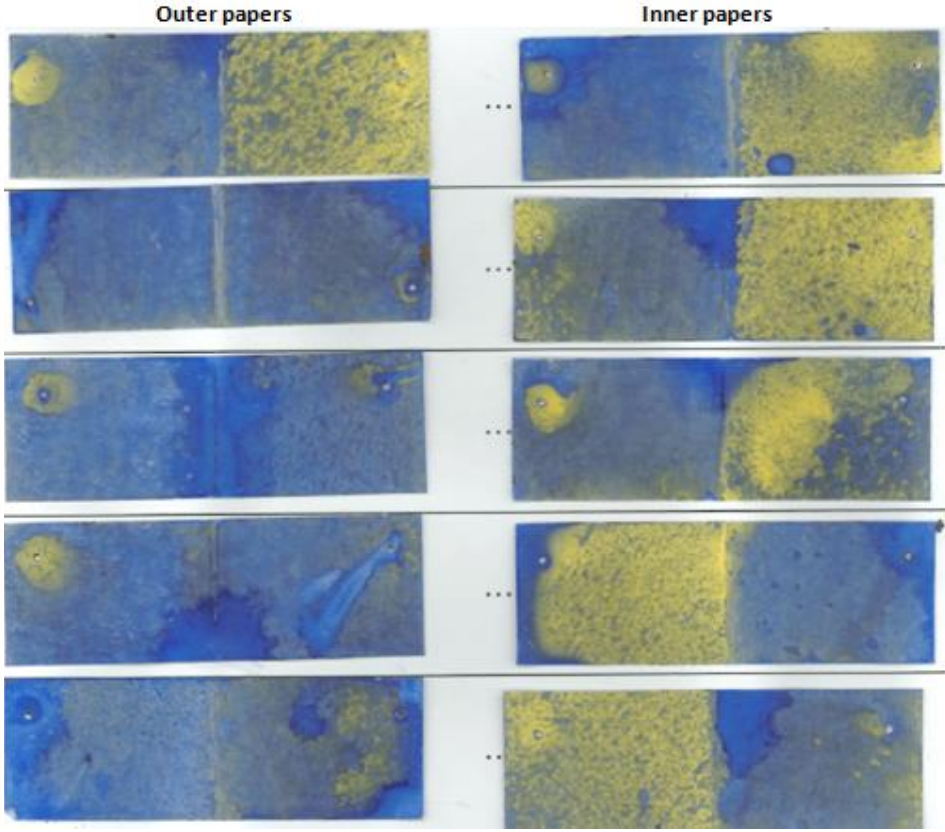
Detail of back end of sprayer in operation

Single pass



Judgement: Good droplet size (fines) giving excellent coverage on all paper surfaces. Runoff evident on 40-50% of surfaces.
Good coverage observed in bunches with some wetting to runoff, but obscured back sides of bunches showing low deposits.

Double pass



Judgement: Excellent coverage on all paper surfaces with visibly increased deposits and deposit evenness on bunches compared with a single pass. Runoff evident on 75% of surfaces.

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Protector^{hml} and HML 32: Fungal Spray Programme 2014/15

This programme has powdery mildew control as the priority and contains both preventative and eradicative elements.

	Woolly bud	First leaf unfolded to inflorescences opening	In to	punch closure eraison
SIGNIFICANT Powdery mildew infection last season:	7% lime sulphur	**HML32** + sulphur + copper at 10 -14 day intervals	If products can be used at this growth stage for enhanced botrytis co	32 + sulphur + copper* at 10 -14 day intervals
LOW or **NO** Powdery mildew infection last season:		Spray with 0.5% **Protector**^{hml} + sulphur at 10 -14 day intervals. Add copper if required for the control of other diseases Final spray with **HML32** + sulphur before inflorescences opening. Copper is optional but recommended as it provides a higher level of powdery mildew control		

HML32 + sulphur+copper at 10-14 day intervals

Spray with 0.5%Protector^{hml}+ sulphur at 10-14 day intervals. Add copper if required for the control of other diseases.

Final spray with HML32 + sulphur before inflorescences opening. Copper is optional but recommended as it provides a higher level of powdery mildew control

Protector^{hml} and HML 32: Fungal Spray Programme 2014/15

This programme has powdery mildew control as the priority and contains both preventative and eradicative elements.

	Woolly bud	First leaf unfolded to inflorescences opening	Inflorescences open to 80% capfall	80% capfall to pre-bunch closure	Pre-bunch closure to veraison
SIGNIFICANT Powdery mildew infection last season:	7% lime sulphur	**HML32** + sulphur + copper at 10 -14 day intervals	If desired other products can be used at this growth stage for enhanced botrytis control	**HML32** + sulphur + copper at 10 -14 day intervals	**HML32** + sulphur + copper* at 10 -14 day intervals
LOW or **NO** Powdery mildew infection last season:		Spray with 0.5% **Protector^{hml}** + sulphur at 10 -14 day intervals. Add copper if required for the control of other diseases Final spray with **HML32** + sulphur before inflorescences opening. Copper is optional but recommended as it provides a higher level of powdery mildew control		First application **HML32** + sulphur + copper Follow up with 0.5% **Protector^{hml}** + sulphur at 10 -14 day intervals. Add copper if required for the control of other diseases	First application HML32 + suphur + copper* If season presents high risk, continue with HML32 + sulphur + copper* at 10-14 day intervals Otherwise, follow-up with 0.5% Protector^{hm} + sulphur at 10-14 day intervals. Add copper* if required for control of other diseases. * check with winery PHIs

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Capfall complete – not 80%

HML32 + sulphur + copper at 10-14 day intervals

Protector[hml] and HML 32: Fungal Spray Programme 2014/15

This programme has powdery mildew control as the priority and contains both preventative and eradi

	Woolly bud	First leaf unfolded to inflorescences opening	Inflorescences open to 80% capfall	80% capfall to pre-bunch closure	to veraison
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First application HML32 + sulphur + copper.
Follow up with 0.5%Protector[hml]+ sulphur at 10-14 day intervals. Add copper if required for the control of other diseases

Post harvest

Protector^{hml} and HML 32: Fungal Spray Pro

This programme has powdery mildew control as the priority and contain ements.

HML32 + sulphur + copper at 10-14 day intervals

	Woolly bud	First leaf unfolded to inflorescences opening	Infl to 8		Pre-bunch closure to veraison
SIGNIFICANT Powdery mildew infection last season:	7% lime sulphur	**HML32** + sulphur + copper at 10 -14 day intervals	If desired other products can be used at this growth stage for enhanced botrytis control	**HML32** + sulphur + copper at 10 -14 day intervals	**HML32** + sulphur + copper* at 10 -14 day intervals
LOW or **NO** Powdery mildew infection last season:		Spray with 0.5% **Protector**^{hml} + sulphur at 10 -14 day intervals. Add copper if required for the		First application **HML32** + sulphur + copper Follow up with 0.5% **Protector**^{hml}	First application HML32 + suphur + copper* If season presents high risk, continue with HML32 + sulphur + copper* at 10-14 day intervals Otherwise, follow-up with 0.5% Protector^{hm} + sulphur at 10-14 day intervals. Add copper* if required for control of other diseases. * check with winery PHIs

First application HML32 + sulphur + copper.

If season presents high risk, continue with HML32 + sulphur + copper at 10-14 day intervals.

Otherwise, follow up with 0.5%Protector^{hml}+ sulphur at 10-14 day intervals. Add copper if required for the control of other diseases

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Protector[hml] and HML 32

Powdery Mildew Control

and the control of other diseases

Optimum Results

on your vineyard

The science and field trial data behind the 'armour plate for grapes'

Pro-Forma Integrated Chemistry and HML 32 / Protector Spray Programme - 2014-15

Objectives: To provide a seamless and compatible integration of HML 32 and Protector into a conventional spray programme, which:

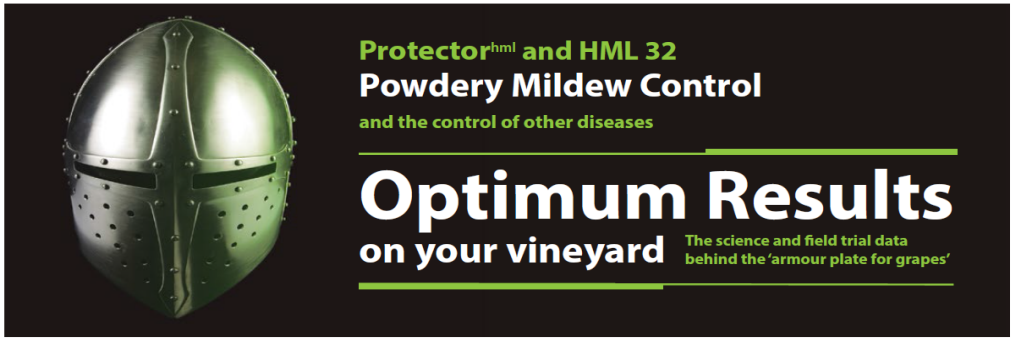
- makes powdery mildew control a priority.
- allows full use of sulphur all season.
- provides control of botrytis directly, and control of other diseases such as downy mildew, phomopsis and black spot as a consequence of using copper.
- allows use of insecticides and trace elements and, where necessary, HML 32 replaces Protector to achieve a lower spray solution pH, or is excluded altogether.

Rates:
HML32 - always use at the prescribed rate
Sulphur - 3 Kg/ha all season
Potassium bicarbonate - 300gm/100 litres
Copper - 45g metallic copper / 100 litres
Our preference is red copper (cuprous oxide) as it presented no spray tank issues in the field trials. For both sulphur and copper, take into account local use rates and manufacturer's recommendations. All other named products at their prescribed label rates.

Pro-forma HML 32 / Protector / conventional chemistry **where there has been a powdery mildew infection the previous season**

Round	Stage	Approx. Hawke's Bay Dates	Approx. Marlborough Dates	Spray products	Water rate for 2.4m	Fert (etc) additions	Insect, PM and Botrytis fungicides	Cultural (approx)
1	Budburst	25-Sep	9-Oct	Lime sulphur 7%	250			
1B			15-Oct		200		Karate nightspray	
2	1 leaf	6-Oct	20-Oct	Lime sulphur 3.5%	250			
3		16-Oct	30-Oct	Sulphur + HML32 + Nordox	250	Seaweed		
4	3 leaf	26-Oct	9-Nov	Sulphur + Protector or Sulphur + HML32	250	Seaweed	IGR or other insecticides - use HML32	
4B		1-Nov	15-Nov		200	TE (trace element)	Karate nightspray	
5	5-7 leaf	6-Nov	20-Nov	Sulphur + Protector	350	Seaweed + TE		Collard
6	Pre-flower	16-Nov	30-Nov	Sulphur + HML32 + Nordox	400	Seaweed	IGR or other insecticides – use HML32	Trim
7	Flowering	26-Nov	10-Dec	du wett	400	Seaweed + TE	PM or Bot chemistry	
8	Post flower	8-Dec	22-Dec	Sulphur + HML32 + Nordox	450	Seaweed		
9	Pbc	22-Dec	5-Jan	Sulphur + du wett	500	Seaweed + TE	PM or Bot chemistry	Trim
10		1-Jan	15-Jan	Sulphur + HML32 + Nordox + pot bicarb	500	Seaweed		
11	Early veraison	14-Jan	28-Jan	Sulphur	500	Seaweed + TE	PM or Bot chemistry	Trim
12	Late veraison	26-Jan	9-Feb	Sulphur + HML32 + Nordox + pot bicarb	500	Seaweed		
13	Post veraison	Early Feb	Late Feb	HML32 + pot bicarb	500			

Comments: This programme assumes no compatibility of either Protector or HML 32 with chemical products. Calcium should be regarded as not compatible. All other trace elements require jar test before spraying. Where insecticides are used, consider HML 32 or HML 32 at adjuvant rate which delivers lower pH than Protector.



Suggested Organic Spray Programme: Verdelho - Auckland 2014-15

Continuous history of high powdery mildew infections. At times risks of black spot, phomopsis and downy mildew. Very low risk of botrytis. The objective is to bring through another disease-free season before softening the programme.

Date	Plant Growth Stage	Plant Growth Number	Spray Treatments					
			HML32	Sulphur	Copper	Lime Sulphur	Natrakelp	Other
2-Sep-13	Bud swell	EL-02				7%		
18-Sep	Bud swell	EL-02				3.50%		
3-Oct-13	Flower buds just visible	EL-12	1.25l/100l	3kg/ha	300gm/ha		2kg/ha	
18-Oct-13	Flower buds tight	EL-15	1.25l/100l	3kg/ha				1.5kg/ha BioMin Booster V
30-Oct-13	Flower buds separating	EL-17		3kg/ha				4l/ha Wuxal Amino
12-Nov-13	5% capfall	EL-19	1.25l/100l	3kg/ha	300gm/ha		2kg/ha	
27-Nov-13	80% capfall	EL-25	0.5/100l Protector	3kg/ha				4kg/ha Botryzen
3-Dec-13	100% capfall	EL-26	1.25l/100l	3kg/ha	300gm/ha			
10-Dec-13	3-4mm hanging berries	EL-29	1.25l/100l	3kg/ha	300gm/ha		2kg/ha	
23-Dec-13	3-4mm hanging berries	EL-29	1.25l/100l	3kg/ha	300gm/ha		2kg/ha	
7-Jan-14	Berries mature green	EL-34	1.25l/100l	3kg/ha	300gm/ha		2kg/ha	
24-Jan-14	Berries mature green	EL-34	1.25l/100l	3kg/ha	300gm/ha		2kg/ha	

Water rate range through season 250 - 500l/ha
Lower Sulphur rate from 4kg to 3kg
Change copper to Nordox - reduce from 75gm/100l to 45gm metallic copper/100 litre

Comments: If clear result for powdery mildew and other diseases this season, soften program from HML 32 to adjuvant rates of HML 32 and/or Protector in parts, Botryzen perhaps not necessary for Verdelho, but at this stage retain for Chardonnay, etc. Leaf analysis at the beginning of the season and the next.

Henry Manufacturing Ltd
Visit **www.henrymanufacturing.co.nz** • Call Chris Henry on **027 294 1490**
email **chris@henrymanufacturing.co.nz** or contact your local Farmlands representative.

Farmlands Horticulture

Fungal Spray Programme

- Prevention better than cure
- Start early and target critical period
- Ensure good coverage
- Spray according to risk

Contact Chris Henry or your Farmlands Technical Advisor

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027 294 1490

Protector^{hml} and HML 32

Armour plate for grapes

Post harvest applications on developing Powdery Mildew Cleistothecia 2015

Presented by:
Chris Herries,

Farmlands
Horticulture

Applications made with Silvan G2

Farmlands
Horticulture

1000lt/Ha water rate

Farmlands
Horticulture

Treatments

Plot	Product	Rate	Rate	Rate
A – White	Wettable Sulpur (Thivot)	8kg/Ha		
B - Orange	GroChem Lime Sulphur	3.5%		
C - Yellow	Nordox	90gm/100lt		
D - Pink	HML32 – Nordox – Pot Bi	1.25lt/100lt	90gm/100lt	300gm/100lt
E - Blue	Excel Oil	2%		
F – Green	Excel Oil + Nordox	2%	90gm/100lt	
G- Red	Untreated Control	-		

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