Control of grape powdery mildew with synthetic, biological, and organic fungicides: 2021 field trials

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Report Summary

Powdery mildew is caused by the biotrophic fungus *Erysiphe necator*[1]; this polycyclic disease of grape causes losses to crop quality and yield and is considered one of the most economically important disease of grapes worldwide. This report details the findings of our annual powdery mildew fungicide trials on grapevine (*Vitis vinifera*, Cultivar Chenin Blanc – 10- yrs-old). Along with Chardonnay, Muscat blanc, Roussanne and Carignane, Chenin blanc is one of the highly susceptible wine varieties [2]. This trial was conducted at the University of California Davis Plant Pathology Fieldhouse Facility (38.522591, -121.760719) from April to July 2021. Treatments were placed in a complete randomized block design. Spraying was completed on July 9th based on the berry brix level and treatments were evaluated for disease incidence and severity on July 20th 2021.
The trials consisted of soft chemistry products and synthetic fungicides. Spray frequencies varied from 7 day to 21-day intervals.

Materials and Methods

A. Experimental design

Table 1. Experimental design

Experimental design	Randomized complete block design with 4 replicates		
Experimental unit	2 adjacent vines = 1 plot		
Row and tree spacing	11 ft (row) and 7 ft (vine)	Plot unit area	154 ft2
Area/treatment	616 ft_2 or 0.0141 acre/treatment (4 replicates = 1 treatment)		
Volume water/**A**cre	50 gallons =0.71 gal/4 reps 100 gallons (late April,) = 1.41 gal/4 reps 150 gallons (late May) = 2.12 gal/4 reps		
Equipment	Stihl SR 430 mist blower backpack sprayers		

Acknowledgements

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[1] Wilcox, Wayne Frank, et al. Compendium of Grape Diseases, Disorders, and Pests. Second Edition. APS Press, The American Phytopathological Society, 2015.

[2] Vasquez, Stephen. n.d. Grape Cultivar Susceptibility to Grapevine Powdery Mildew. UC Cooperative Extension.

B. Experimental treatments

The treatments described in this report were conducted for experimental purposes only and crops treated in a similar manner may not be suitable for commercial or other use.

Trial I (Row 5 to Row 22)

Treatment No	Flag	Treatment	Rate	FP/4 reps	Interval (days)
1	W	Untreated Control	none	none	none
2	K	Luna Experience	8.6 fl oz/acre	3.6 ml	14
3	KD	Rally 5/	5 oz/acre	2.0 gr	14
		Quintec /	5 fl oz/acre	2.1 ml	
		Mettle /	4 fl oz/acre	1.7 ml	
		Pristine /	18.5 oz/acre	7.4 gr	
		Inspire Super /	20 fl oz/acre	8.4 ml	
		Luna Experience /	8.6 fl oz/acre	3.6 ml	
		Vivando 15 fl oz /	15 fl oz/acre	6.3 ml	
4	KS	Serenade ASO	4 qt/acre	53.5 ml	14
5	KC	Boost Biomes BC18	5*10^13CFU/acre	11.9 ml	14
6	O	MinerALL	4.3 lb/100 gal	13.8 gr at 50 gal or 27.6 gr at 100 gal or 41.4 gr at 150 gal	14
7	OS+O	MinerALL	8.5 lb/100 gal	27.3 gr at 50 gal or 54.5 gr at 100 gal or 81.8 gr at 150 gal	14
8	OC+O	Magna-Bon CS 2005	20 oz/100 gal	4.0 gr at 50 gal or 8.0 gr at 100 gal or 12.0 gr at 150 gal	14
9	OKD	Cevya +	5 fl oz/acre	2.1 ml	14
		Dyne-Amic	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
10	OKS	Prolivo +	5 fl oz/acre	2.1 ml	14
		Syl-Coat	4 fl oz/100 gal	0.8 ml at 50 gal or 1.7 ml at 100 gal or 2.5 ml at 150 gal	
11	ONS	Vivando	10.3 fl oz/acre	4.3 ml	14
12	Y	Gatten +	6.4 fl oz/acre	2.7 ml	14
		Dyne-Amic	0.25 % (v/v)	6.7 ml at 50 gal or 13.4 ml at 100 gal or 20.1 ml at 150 gal	
13	YD	Parade +	3.1 oz/acre	1.2 gr	14
		Dyne-Amic	0.25 % (v/v)	6.7 ml at 50 gal or 13.4 ml at 100 gal or 20.1 ml at 150 gal	
14	YS	Nanospada	3.3 L/100 L	88.3 ml at 50 gal or 176.6 ml at 100 gal or 265 ml at 150 gal	7
15	YC	Flint Extra +	3.5 fl oz/acre	1.5 ml	14
		Syl-Coat/	4 fl oz/100 gal	0.8 ml at 50 gal or 1.7 ml at 100 gal or 2.5 ml at 150 gal	
		Prolivo +	5 fl oz/acre	2.1 ml	

		Syl-Coat /	4 fl oz/100 gal	0.8 ml at 50 gal or 1.7 ml at 100 gal or 2.5 ml at 150 gal	
		Luna experience +	6.4 fl oz/acre	2.7 ml	
		Syl-Coat /	4 fl oz/100 gal	0.8 ml at 50 gal or 1.7 ml at 100 gal or 2.5 ml at 150 gal	
		Quintec +	4 fl oz/acre	1.7 ml	
		Syl-Coat /	4 fl oz/100 gal	0.8 ml at 50 gal or 1.7 ml at 100 gal or 2.5 ml at 150 gal	
		Torino +	3.4 oz/acre	1.4 gr	
		Syl-Coat /	4 fl oz/100 gal	0.8 ml at 50 gal or 1.7 ml at 100 gal or 2.5 ml at 150 gal	
		Luna Sensation +	6.4 fl oz/acre	2.7 ml	
		Syl-Coat/	4 fl oz/100 gal	0.8 ml at 50 gal or 1.7 ml at 100 gal or 2.5 ml at 150 gal	
		Vivando +	15.4 fl oz/acre	6.4 ml	
		Syl-Coat /	4 fl oz/100 gal	0.8 ml at 50 gal or 1.7 ml at 100 gal or 2.5 ml at 150 gal	
16	YKD	Regalia	2 qt/acre	26.8 ml	7
17	YKS	ReyZox	11.8 fl oz/acre	4.9 ml	14
18	YKC	ReyZox	15.1 fl oz/acre	6.3 ml	14
19	YRD	ReyZox	18.4 fl oz/acre	7.7 ml	14
20	YRS	NSTKI-014	3 lb/acre	19.2 gr	7
21	R	NSTKI-014	5 lb/acre	32.1 gr	7
22	RD	NSA +	1% (v/v)	80 ml	Curative
		HML Potum +	600 gr/100L	48 gr	
		Nordox	60 gr/100L	4.8 gr	
23	RS+R	Microthiol Disperss +	3 lb/acre	19.2 gr	14
		Trionic /	8 fl oz/acre	3.3 ml	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Quintec /	4 fl oz/acre	1.7 ml	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Trionic /	8 fl oz/acre	3.3 ml	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Inspire Super /	20 fl oz/acre	8.4 ml	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Torino /	3.4 oz/acre	1.4 gr	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Torino +	3.4 oz/acre	1.4 gr	
		PHD /	6.2 oz/acre	2.5 gr	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Luna Experience /	8.6 fl oz/acre	3.6 ml	
24	RC+R	Microthiol Disperss +	3 lb/acre	19.2 gr	14
		Trionic /	8 fl oz/acre	3.3 ml	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Quintec /	4 fl oz/acre	1.7 ml	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Rhyme /	5 fl oz/acre	2.1 ml	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Inspire Super /	20 fl oz/acre	8.4 ml	
		Microthiol Disperss +	3 lb/acre	19.2 gr	

		Torino /	3.4 oz/acre	1.4 gr	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Torino +	3.4 oz/acre	1.4 gr	
		PHD /	6.2 oz/acre	2.5 gr	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Luna Experience /	8.6 fl oz/acre	3.6 ml	
25	RKD	Microthiol Disperss +	3 lb/acre	19.2 gr	14
		Trionic +	8 fl oz/acre	3.3 ml	
		Vacciplant /	16 fl oz/acre	6.7 ml	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Quintec /	4 fl oz/acre	1.7 ml	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Trionic +	8 fl oz/acre	3.3 ml	
		Vacciplant /	16 fl oz/acre	6.7 ml	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Inspire Super /	20 fl oz/acre	8.4 ml	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Torino +	3.4 oz/acre	1.4 gr	
		PHD /	6.2 oz/acre	2.5 gr	
		Microthiol Disperss +	3 lb/acre	19.2 gr	
		Vacciplant +	16 fl oz/acre	6.7 ml	
		Luna Experience /	8.6 fl oz/acre	3.6 ml	
		Vivando 15 fl oz /	15 fl oz/acre		
26	RKS	microSURE™	4.4 gal/acre	235.5 ml	7
27	RKC	EXP2 +	128 fl oz/100 gal	26.8 ml at 50 gal or 53.5 ml at 100 gal or 80.3 ml at 150 gal	7
		Dyne-Amic	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
28	G	EXP1 +	256 fl oz/100 gal	53.5 ml at 50 gal or 107.1 ml at 100 gal or 160.6 ml at 150 gal	7
		Dyne-Amic	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
29	GD	PureSpray Green (pre bloom) /	1 gal/acre	53.5 ml	7
		Sulfur Dry-Flowable (after bloom)	5 lb/acre	32.1 gr	
30	GS	Pure Spray Green	1 gal/acre	53.5 ml	7
31	GKD	PureSpray Foliar 22 E	0.5 gal/acre	26.8 ml	7
32	GKS	PureSpray Foliar 22 E (pre bloom) /	0.5 gal/acre	26.8 ml	7
		Sulfur Dry-Flowable (after bloom)	5 lb/acre	32.1 gr	
33	GKC	PureSpray Foliar 22 E (7d) (pre bloom) /	0.5 gal/acre	26.8 ml	7
		Pristine (14d) /	18.5 oz/acre	7.4 gr	14
		Inspire Super (14d) /	20 fl oz/acre	8.4 ml	
		Luna Experience (14d) /	8.6 fl oz/acre	3.6 ml	
		Vivando (14d) /	15 fl oz/acre	6.3 ml	
		Merivon (14d)	4 fl oz/acre	1.7 ml	
34	B	PureSpray Green (7d) (pre bloom)/	1 gal/acre	53.5 ml	7

		Pristine (14d) /	18.5 oz/acre	7.4 gr	14
		Inspire Super (14d) /	20 fl oz/acre	8.4 ml	
		Luna Experience (14d) /	8.6 fl oz/acre	3.6 ml	
		Vivando (14d) /	15 fl oz/acre	6.3 ml	
		Merivon (14d)	4 fl oz/acre	1.7 ml	
35	BD	BC1320	5.5 pt/acre	36.8 ml	7
36	BS	BC1320	4.4 pt/acre	29.4 ml	7
37	BC	BC1320	3.3 pt/acre	22.1 ml	7
38	BKD	Microthiol Disperss	5 lb/acre	32.1 gr	7
39	BKS	Microthiol Disperss	4 lb/acre	25.7 gr	7
40	BKC	Microthiol Disperss	3 lb/acre	19.2 gr	7
41	Pu	NSA	1.4 % (v/v)	37.5 ml at 50 gal or 74.9 ml at 100 gal or 112.4 ml at 150 gal	7
42	Pu+R	NSA +	1 % (v/v)	26.8 ml at 50 gal or 53.5 ml at 100 gal or 80.3 ml at 150 gal	7
		Nordox +	30 gr/100 L	0.8 gr at 50 gal or 1.6 gr at 100 gal or 2.4 gr at 150 gal	
		HML Silco (pre-bloom)/	250 ml/100 L	6.7 ml	
		NSA +	1 % (v/v)	26.8 ml at 50 gal or 53.5 ml at 100 gal or 80.3 ml at 150 gal	
		Sulfur Dry-Flowable +	5 lb/acre	32.1 gr	
		HML Silco (pre-bloom)/	250 ml/100 L	6.7 ml at 50 gal or 13.4 ml at 100 gal or 20.1 ml at 150 gal	
		NSA +	1 % (v/v)	26.8 ml at 50 gal or 53.5 ml at 100 gal or 80.3 ml at 150 gal	7
		Nordox +	30 gr/100 L	0.8 gr at 50 gal or 1.6 gr at 100 gal or 2.4 gr at 150 gal	
		HML Potum (after bloom) /	300 gr/100 L	8.0 gr at 50 gal or 16.1 gr at 100 gal or 24.1 gr at 150 gal	
		NSA +	1 % (v/v)	26.8 ml at 50 gal or 53.5 ml at 100 gal or 80.3 ml at 150 gal	
		HML Potum+	300 gr/100 L	8.0 gr at 50 gal or 16.1 gr at 100 gal or 24.1 gr at 150 gal	
		HML Silco (after bloom)	250 ml/100 L	6.7 ml	
43	PWD	NSA +	1 % (v/v)	26.8 ml at 50 gal or 53.5 ml at 100 gal or 80.3 ml at 150 gal	14
		Nordox +	30 gr/100 L	0.8 gr at 50 gal or 1.6 gr at 100 gal or 2.4 gr at 150 gal	
		HML Silco (pre bloom)/	250 ml/100 L	6.7 ml	

		NSA + HML Potum+ HML Silco (pre bloom) /	1 % (v/v) 300 gr/100 L 250 ml/100 L	26.8 ml at 50 gal or 53.5 ml at 100 gal or 80.3 ml at 150 gal 8.0 gr at 50 gal or 16.1 gr at 100 gal or 24.1 gr at 150 gal 6.7 ml	
		NSA + Nordox + HML Potum (after bloom) /	1 % (v/v) 30 gr/100 L 300 gr/100 L	26.8 ml at 50 gal or 53.5 ml at 100 gal or 80.3 ml at 150 gal 0.8 gr at 50 gal or 1.6 gr at 100 gal or 2.4 gr at 150 gal 8.0 gr at 50 gal or 16.1 gr at 100 gal or 24.1 gr at 150 gal	7
		NSA + HML Potum+ HML Silco – (after bloom)	1 % (v/v) 300 gr/100 L 250 ml/100 L	26.8 ml at 50 gal or 53.5 ml at 100 gal or 80.3 ml at 150 gal 8.0 gr at 50 gal or 16.1 gr at 100 gal or 24.1 gr at 150 gal 6.7 ml	
44	PWS	OR 009-A	50 fl oz/100 gal	10.5 ml at 50 gal or 20.9 ml at 100 gal or 31.4 ml at 150 gal	14
45	PWC	Quintec / Quintec + Howler + Syl-Coat / Pristine / Inspire Super / Quintec + Howler + Syl-Coat /	5 fl oz/acre 2 fl oz/acre 2.5 lb/acre 0.125 % (v/v) 18.5 fl oz/acre 20 fl oz/acre 2 fl oz/acre 2.5 lb/acre 0.125 %/acre	2.1 ml 0.8 ml 16 gr 3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal 7.7 ml 8.4 ml 0.8 ml 16 gr 3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	14
46	PKD	OR-009-E + Same as treatment 3 KD	32 fl oz/100 gal	6.7 ml at 50 gal or 13.4 ml at 100 gal or 20.1 ml at 150 gal	14
47	PKS	OR-295-E + Same as treatment 3 KD	32 fl oz/100 gal	6.7 ml at 50 gal or 13.4 ml at 100 gal or 20.1 ml at 150 gal	14
48	PKC	OR-278-F + Same as treatment 3 KD	32 fl oz/100 gal	6.7 ml at 50 gal or 13.4 ml at 100 gal or 20.1 ml at 150 gal	14

49	W+K	Embrace EA + Same as treatment 3 KD	16 fl oz/100 gal	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	14
50	W+Y	Syl-Tac EA + Same as treatment 3 KD	16 fl oz/100 gal	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	14
51	W+G	Ninja/SP2700 SP 2% + Capsil	8 oz/acre 12 fl oz/100 gal	3.2 gr 2.5 ml at 50 gal or 5.0 ml at 100 gal or 7.5 ml at 150 gal	14
52	W+B	Microthiol Disperss / EXP14 + Embrece-EA	5 lb/acre 3 lb/acre 16 fl oz/acre	32.1 gr 19.2 gr 6.7 ml	7
53	W+Pu	Microthiol Disperss / EXP14 + Syl-Coat	5 lb/acre 3 lb/acre 4 fl oz/100 gal	32.1 gr 19.2 gr 0.8 ml at 50 gal or 1.7 ml at 100 gal or 2.5 ml at 150 gal	7
54	W+P	Microthiol Disperss / EXP14 + Glacier EA	5 lb/100 gal 3 lb/acre 16 fl oz/100 gal	32.1 gr 19.2 gr 3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	7
55	P+K	Sulfur Dry-Flowable (pre bloom) / BTS-EXP-100 27.4 fl oz (after bloom)	5 lb/acre 27.4 fl oz/acre	32.1 gr 11.5 ml	7
56	P+Y	Sulfur Dry-Flowable (pre bloom) / BTS-EXP-100+ Kinetic	5 lb/acre 27.4 fl oz/acre 0.125 % (v/v)	32.1 gr 11.5 ml 3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	7
57	P+G	Sulfur Dry flowable BTS-EXP-100 / Quintec / Mettle / BTS-EXP-100 / Inspire Super / Luna Experience /	5 lb/acre 27.4 fl oz/acre 4 fl oz/acre 4 fl oz/acre 27.4 fl oz/acre 20 fl oz/acre 8.6 fl oz/acre	32.1 gr 11.5 ml 1.7 ml 1.7 ml 11.5 ml 8.4 ml 3.6 ml	14
58	P+Pu	Quintec / Howler + Syl-Coat / Pristine / Inspire Super / Howler + Syl-Coat /	5 fl oz/acre 5 lb/acre 0.125 % (v/v) 18.5 fl oz/acre 20 fl oz/acre 5 lb/acre 0.125 % (v/v)	2.1 ml 32.1 gr 3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal 7.7 ml 8.4 ml 32.1 gr 3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	14
59	P+B	Quintec /	5 fl oz/acre	2.1 ml	14

		Theira +	3 lb/acre	19.2 gr	
		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
		Pristine /	18.5 fl oz/acre	7.7 ml	
		Inspire Super /	20 fl oz/acre	8.4 ml	
		Theira +	3 lb/acre	19.2 gr	
		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
60	P+R	Quintec /	5 fl oz/acre	2.1 ml	14
		Esendo +	2.8 lb/acre	18 gr	
		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
		Pristine /	18.5 fl oz/acre	7.7 ml	
		Inspire Super /	20 fl oz/acre	8.4 ml	
		Esendo +	2.8 lb/acre	18 gr	
		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	

Trial II (Row 22 to Row 24)

Treatment No	Flag	Treatment	Rate	FP/4 reps	Interval (days)
61	B+R	Inspire Super +	20 fl oz/acre	8.4 ml	14
		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
		Aprovia Top +	13.3 fl oz/acre	5.6 ml	
		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
		Quintec +	6.6 fl oz/acre	2.8 ml	
		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
		Inspire Super +	20 fl oz/acre	8.4 ml	
		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
		Aprovia Top +	13.3 fl oz/acre	5.6 ml	
		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
62	B+Y	Aprovia Top +	13.3 fl oz/acre	5.6 ml	14
		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
		Quintec +	6.6 fl oz/acre	2.8 ml	
		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
		Inspire Super +	20 fl oz/acre	8.4 ml	
		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
		Miravis Prime +	13.4 fl oz/acre	5.6 ml	
		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
		Inspire Super +	20 fl oz/acre	8.4 ml	

		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
63	B+O	Sulfur Dry flowable /	5 lb/acre	32.1 gr	14
		Sulfur Dry flowable /	5 lb/acre	32.1 gr	
		Howler +	5 lb/acre	32.1 gr	
		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
		Howler +	5 lb/acre	32.1 gr	
		Syl-Coat /	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
		Howler +	5 lb/acre	32.1 gr	
		Syl-Coat	0.125 % (v/v)	3.3 ml at 50 gal or 6.7 ml at 100 gal or 10.0 ml at 150 gal	
64	B+Pu	NSA +	10% (v/v)	800 ml	Curative
		HML Potum +	600gr/100L	48 gr	
		Sulfur Dry flowable +	5 lb/acre	32.1 gr	
		HML Silco	500ml/100L	40 ml	
65	W	Untreated Control	none	none	none

C. Map

Trial II	Trial I

ROW / VINE	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	ROW / VINE
			BLOCK 4					BLOCK 3					BLOCK 2				BLOCK 1				
-31		x	62-B+Y	1-W	x	x	x	x	11-ONS	50-W+Y	x	x	55-P+K	7-OS+O	59-P+Pu	23-RS+R	57-P+G	15-YC	32-GKS	x	-31
-30		x			40-BKC	x	3-KD	53-W+Pu			24-RC+R	48-PKC								18-YKC	-30
-29		x	63-B+O	28-G		54-W+P	x		19-YRD	12-Y			4-KS	43-PWD	1-W	54-W+P	5-KC	45-PWC	35-BD		-29
-28		65-W			60-P+R			57-P+G			8-OC+O	33-GKC								38-BKD	-28
-27			65-W	x		16-YKD	44-PWS		27-RKC	32-GKS			27-RKC	20-YRS	21-R	33-GKC	4-KS	10-OKS	25-RKD		-27
-26		64-B+Pu		17-YKS	33-GKC			6-O			31-GKD	59-P+Pu								37-BC	-26
-25			65-W			x	24-RC+R		58-P+B	53-W+Pu				50-W+Y	31-GKD	24-RC+R	39-BKS	52-W+B	53-W+Pu		-25
-24		63-B+O		20-YRS		x		34-B			52-W+B	14-YS	10-OKS	16-YKD	26-RKS	8-OC+O	14-YS	23-RS+R	12-Y	x	-24
-23			61-B+R	x	x	8-OC+O	37-BC		4-KS	39-BKS			29-GD							x	-23
-22		62-B+Y		10-OKS				43-PWD			29-GD	30-GS		30-GS	41-Pu	44-PWS	50-W+Y	56-P+Y	21-R	16-YKD	-22
-21			63-B+O	55-P+K			25-RKD	31-GKD	25-RKD	3-KD			18-YKC			x					-21
-20		61-B+R			47-PKS	45-PWC			42-Pu+R	7-OS+O	28-G	17-YKS		37-BC	35-BD	9-OKD	55-P+K	28-G	30-GS	9-OKD	-20
-19			64-B+Pu	26-RKS			x				9-OKD	26-RKS	60-P+R								-19
-18		64-B+Pu			36-BS	x	4-KS	21-R	35-BD	x				34-B	49-W+K	9-OKD	1-W	36-BS	8-OC+O	24-RC+R	-18
-17	65-W		61-B+R			2-K					18-YKC	13-YD	22-RD	x		52-W+B					-17
-16		x		7-OS+O	x		46-PKD	43-PWD	x	56-P+Y				x	57-P+G		17-YKS	27-RKC	22-RD	26-RKS	-16
-15	64-B+Pu	x	59-P+Pu	x		22-RD			1-W	x	60-P+R	53-W+Pu	48-PKC	x		51-W+G				40-BKC	-15
-14		65-W			51-W+G		52-W+B	22-RD		x				46-PKD	17-YKS		54-W+P	13-YD	58-P+B		-14
-13	61-B+R		23-RS+R	50-W+Y		35-BD		21-R	46-PKD	16-YKD	15-YC	19-YRD	42-Pu+R	40-BKC	14-YS	2-K	3-KD	31-GKD	x	49-W+K	-13
-12		62-B+Y			x							x	3-KD			25-RKD			51-W+G	43-PWD	-12
-11	62-B+Y		18-YKC	27-RKC	29-GD	30-GS	12-Y	49-W+K	55-P+K	57-P+G	54-W+P	x		45-PWC	6-O		44-PWS	59-P+Pu	34-B		-11
-10		64-B+Pu											x			42-Pu+R				46-PKD	-10
-9	x		42-Pu+R	13-YD		56-P+Y	14-YS	41-Pu	47-PKS	5-KC	51-W+G	5-KC	39-BKS	32-GKS	28-G	33-GKC	29-GD	20-YRS	7-OS+O	x	-9
-8	x	62-B+Y			41-Pu								36-BS	12-Y	56-P+Y	47-PKS	60-P+R	41-Pu	6-O	x	-8
-7	63-B+O		x	x		x	19-YRD	34-B	2-K	44-PWS	23-RS+R	15-YC	38-BKD	11-ONS	13-YD	48-PKC	11-ONS			x	-7
-6		x	x	32-GKS		48-PKC	15-YC	10-OKS	40-BKC	20-YRS	37-BC	58-P+B	x	x	x		x	2-K	19-YRD	x	-6
-5		63-B+O	39-BKS	11-ONS	9-OKD	5-KC	58-P+B	38-BKD	45-PWC	36-BS	6-O	47-PKS									-5
-4			38-BKD	x	49-W+K	x															-4
-3																					-3
-2																					-2
-1		61-B+R																			-1
VINE / ROW	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	VINE / ROW
			BLOCK 4					BLOCK 3					BLOCK 2				BLOCK 1				

N

Color			
B	Blue	**Pu**	Purple
G	Green	**R**	Red
K	Black	**Y**	Yellow
O	Orange	**W**	White
P	Pink	**N**	Gray

Pattern	
C	Checker
D	Dot
S	Stripe

D. Application History

Trial I

| Treatment No | Flag | Treatment | Rate | Interval (days) | APRIL | | | | | | | | | | | | | | | | | | | | | | MAY | | | | | | | | | | | | | | | | | | | | | | JUNE | | | | | | | | | | | | | | | | | | | | | | JULY | | | | | | | | | | | | | | | | | | | | | |
|---|---|---

| Treatment No | Flag | Treatment | Rate | Interval (days) | APRIL | | | | | | | | | | | | | | | | | | | | | | | | | | | | MAY | | | | | | | | | | | | | | | | | | |

| Treatment No | Flag | Treatment | Rate | Interval (days) | APRIL | | | | | | | | | | | | | | | | | | | | | | MAY | | | | | | | | | | | | | | | | | | | | | | JUNE | | | | | | | | | | | | | | | | | | | | | | JULY | | | | | | | | | | | | | | | | | | | | | |
|---|---|---

Treatment No	Flag	Treatment	Rate	Interval (days)
55	P+K	Sulfur Dry-Flowable (pre bloom) /	5 lb/acre	7
		BS-200 27.4 fl oz (after bloom)	27.4 fl oz/acre	
56	P+Y	Sulfur Dry-Flowable (pre bloom) /	5 lb/acre	7
		BS-200 + Kinetic	27.4 fl oz/acre + 0.125 % (v/v)	
57	P+G	Sulfur Dry flowable	5 lb/acre	14
		BS-200 /	27.4 fl oz/acre	
		Quintec /	4 fl oz/acre	
		Mettle /	4 fl oz/acre	
		BS-200 /	27.4 fl oz/acre	
		Inspire Super /	20 fl oz/acre	
		Luna Experience /	8.6 fl oz/acre	
58	P+Pu	Quintec /	5 fl oz/acre	14
		Howler + Syl-Coat /	5 lb/acre + 0.125 % (v/v)	
		Pristine /	18.5 fl oz/acre	
		Inspire Super /	20 fl oz/acre	
		Howler + Syl-Coat /	5 lb/acre + 0.125 % (v/v)	
59	P+B	Quintec /	5 fl oz/acre	14
		Theira + Syl-Coat /	3 lb/acre + 0.125 % (v/v)	
		Pristine /	18.5 fl oz/acre	
		Inspire Super /	20 fl oz/acre	
		Theira + Syl-Coat /	3 lb/acre + 0.125 % (v/v)	
60	P+R	Quintec /	5 fl oz/acre	14
		Esendo + Syl-Coat /	2.8 lb/acre + 0.125 % (v/v)	
		Pristine /	18.5 fl oz/acre	
		Inspire Super /	20 fl oz/acre	
		Esendo + Syl-Coat /	2.8 lb/acre 0.125 % (v/v)	

Trial II

Treatment No	Flag	Treatment	Rate	Interval (days)
61	B+R	Inspire Super + Syl-Coat /	20 fl oz/acre + 0.125 % (v/v)	14
		Aprovia Top + Syl-Coat /	13.3 fl oz/acre + 0.125 % (v/v)	
		Quintec + Syl-Coat /	6.6 fl oz/acre + 0.125 % (v/v)	
		Inspire Super + Syl-Coat /	20 fl oz/acre + 0.125 % (v/v)	
		Aprovia Top + Syl-Coat /	13.3 fl oz/acre + 0.125 % (v/v)	
		Miravis Prime + Syl-Coat /	13.4 fl oz/acre + 0.125 % (v/v)	
62	B+Y	Aprovia Top + Syl-Coat	13.3 fl oz/acre + 0.125 % (v/v)	14
		Quintec + Syl-Coat	6.6 fl oz/acre + 0.125 % (v/v)	
		Inspire Super + Syl-Coat	20 fl oz/acre + 0.125 % (v/v)	
		Miravis Prime + Syl-Coat	13.4 fl oz/acre + 0.125 % (v/v)	
		Inspire Super + Syl-Coat	20 fl oz/acre + 0.125 % (v/v)	
		Miravis Prime + Syl-Coat	13.4 fl oz/acre + 0.125 % (v/v)	
63	B+O	Sulfur Dry flowable /	5 lb/acre	14
		Sulfur Dry flowable /	5 lb/acre	
		Howler + Syl-Coat	5 lb/acre + 0.125 % (v/v)	
		Howler + Syl-Coat	5 lb/acre	
		Howler + Syl-Coat	5 lb/acre+ 0.125 % (v/v)	
64	B+Pu	NSA + HML Potum + Sulfur Dry flowable + HML Silco	10% (v/v) + 600gr/100L + 5 lb/acre + 500ml/100L	14
65	W	Untreated Control	none	

E. Vine Management

During the application period, vines were irrigated by drip irrigation. Sucker shoot removal and leafing were done on June 19th.

F. Data Collection and Statistics

Daily temperature and precipitation were obtained from a CIMIS weather station in west Davis (CI006). The temperature data is shown in Figure 1. Thomas-Gubler Risk Index data was obtained from IPM.UCANR (Figure 2).

Signs of powdery mildew were observed in middle May on leaves and in middle June on berries.

Powdery mildew incidence and severity were assessed in each treatment by evaluating twenty-five random clusters. Incidence was defined as the proportion of clusters in a plot having some symptoms and/or signs of powdery mildew. Severity was determined by estimating the percentage of area of a cluster that was infected; the severity value of all clusters was then averaged to give a plot-wide estimate of disease severity. Mean incidence and severity values for each treatment were computed. Trial models were analyzed using the ANOVA Tests for data. Data percentages were arcsine$\sqrt{(x/100)}$ transformed but non transformed data are presented. Means comparisons were made using Fisher's LSD with α=0.05.

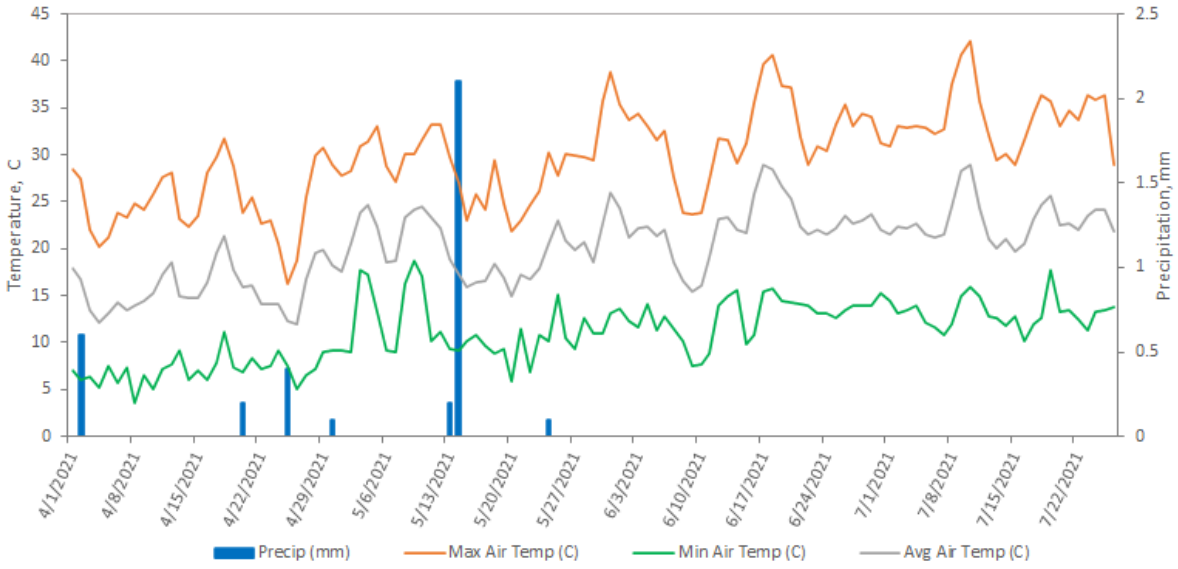

Figure 1. Average daily temperature (°C) and precipitation (mm) from Apr 1 to July 26, 2021 from CIMIS station Davis, CA.

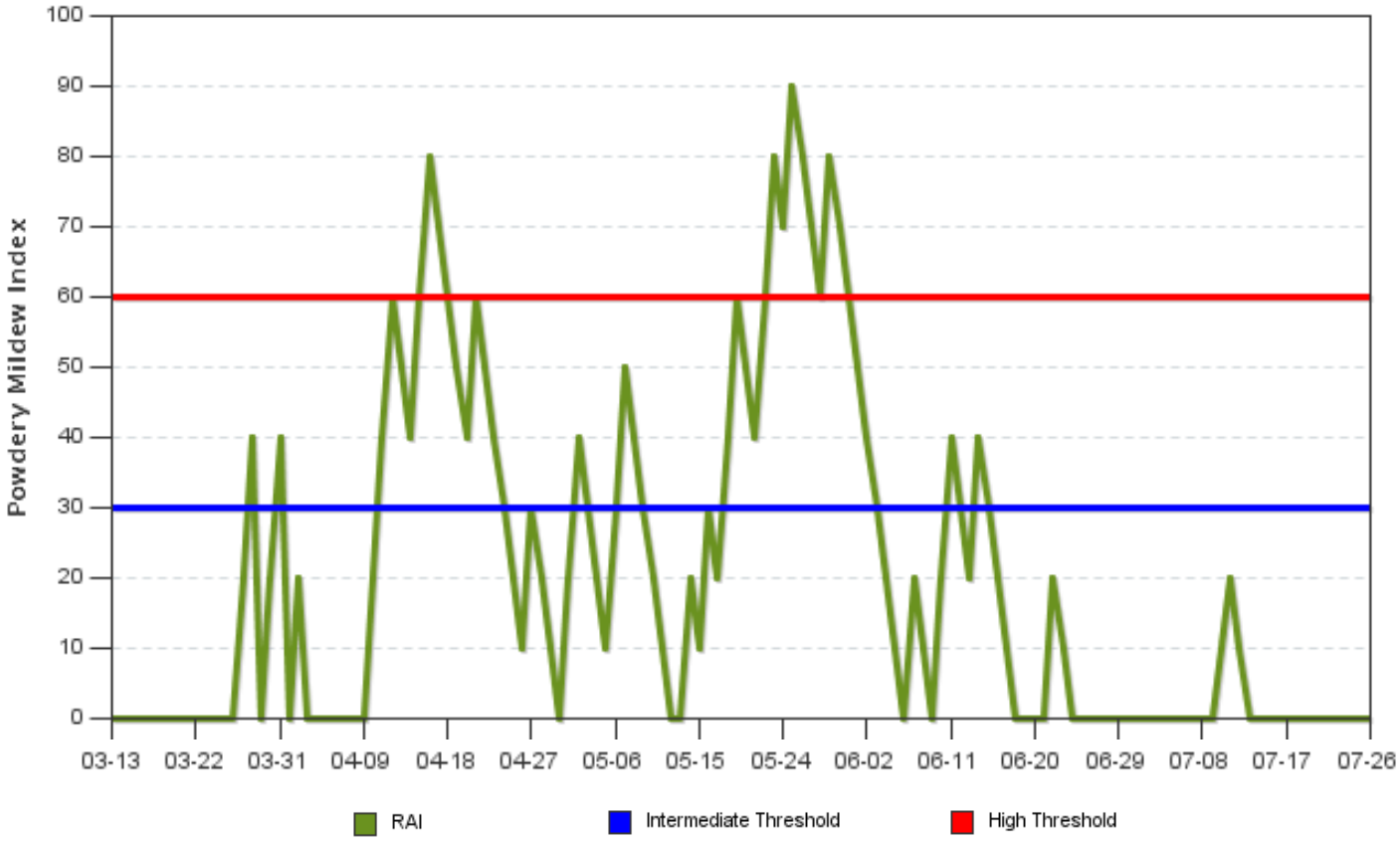

Figure 2. Thomas-Gubler Risk Index data from March to July. The Red line data points indicate risk index > 60, between blue and red data points indicate risk index data between 30 and 60 and blue data points are values below 30.

Results

Trial I

Table 1. Disease incidence and severity. Product names are followed by rate (per acre) and the frequency of application. Treatment means followed by the same letter are not significantly different according to Fisher's LSD at α=0.05; Data percentages were arcsine√(x/100) transformed but non transformed data are presented. /= followed by.

Pictures	Treatment	Flag[1]	Prevalence %		Severity %	
https://photos.app.goo.gl/w1GF92QrdVv9znNa6	Luna Experience 8.6 fl oz, (14 d)	K	0.0	a	0.000	a
https://photos.app.goo.gl/FKoBjBbadoXAfcy28	Rally 5 fl oz / Quintec 5 fl oz / Mettle 4 fl oz / Pristine 18.5 fl oz / Inspire Super 20 fl oz / Luna Experience 8.6 fl oz / Vivando 15 fl oz (14 d)	KD	0.0	a	0.000	a
https://photos.app.goo.gl/zPGbXRp9Ey5N1rBZA	Cevya 5 oz + Dyne-Amic + 0.125%, (14 d)	OKD	0.0	a	0.000	a
https://photos.app.goo.gl/yXeLsfyBHXSHbbLb8	Vivando 10.3 oz, (14 d)	ONS	0.0	a	0.000	a
https://photos.app.goo.gl/MTFngrs6o7yLkheZ7	Gatten 6.4 fl oz + Dyne-Amic 0.25% (v/v), (14 d)	Y	0.0	a	0.000	a
https://photos.app.goo.gl/r2M8zn8Z3hccwcDL9	Parade (pyraziflumid) 3.1 fl oz + Dyne-Amic 0.25% (v/v) (14 d)	YD	0.0	a	0.000	a
https://photos.app.goo.gl/Hy7NcLev1Doo2c1z6	Flint Extra 3.5 oz / Provilo 5 oz / Luna experience 6.4 oz / Quintec 4 oz / Torino 3.4 oz / Luna Sensation 6.4 oz / Vivando 15.4 oz / Serenade ASO 4 qts (+ Syl-Coat 0.125 % (v/v) to all treatments), (14 d)	YC	0.0	a	0.000	a
https://photos.app.goo.gl/rTAL4JYL5g6N9zEX8	NSTKI-014 (3 lb), (7 d)	YRS	0.0	a	0.000	a
https://photos.app.goo.gl/qFZhNXpQwe2NMjzU8	NSTKI-014 (5 lb), (7 d)	R	0.0	a	0.000	a
	Microthiol Disperss 3lb + Trionic 8 oz / Microthiol Disperss 3 lb + Quintec 4 oz / Microthiol Disperss 3lb + Rhyme 5 oz / Microthiol Disperss 3lb + Inspire Super 20 oz / Microthiol Disperss 3lb +Torino 3.4 oz / Microthiol Disperss 3lb +Torino 3.4 oz + PHD 6.2 oz / Microthiol Disperss 3lb + Luna Experience 8.6 oz, (14 d)	RC+R	0.0	a	0.000	a
https://photos.app.goo.gl/X5kAZ2jqdDdYkFQc8	Microthiol Disperss 3lb + Trionic 8 oz + Vacciplant 16 oz/ Microthiol Disperss 3 lb + Quintec 4 oz / Microthiol Disperss 3lb + Trionic 8 oz + Vacciplant 16 oz / Microthiol Disperss 3lb + Inspire Super 20 oz / Microthiol Disperss 3lb +Torino 3.4 oz + PHD 6.2 oz / Microthiol Disperss 3lb + Vacciplant 16 oz +Luna Experience 8.6, (14 d)	RKD	0.0	a	0.000	a
https://photos.app.goo.gl/8TBZhZNC8E2c7wKN9	microSURE™. 4.36 gal, (7 d)	RKS	0.0	a	0.000	a

https://photos.app.goo.gl/DTWRAcUCAmi3Bupi7	PureSpray Green 1 gal (pre bloom) / Sulfur Dry-Flowable 5 lb (after bloom), (7 d)	GD	0.0	a	0.000	a
https://photos.app.goo.gl/MHH6XJyAGrRKNTzHA	PureSpray Green 1 gal, (7 d)	GS	0.0	a	0.000	a
https://photos.app.goo.gl/NSn9sQDqqWKK33Qf8	PureSpray Foliar 22 E 0.5 gal, (7 d)	GKD	0.0	a	0.000	a
https://photos.app.goo.gl/1WNoRAzjUP3ayv9S6	PureSpray Foliar 22 E 0.5 gal (pre bloom) (7d) / Pristine 18.5 fl oz (14d) / Inspire Super 20 fl oz (14d) / Luna Experience 8.6 fl oz (14d) / Vivando 15 fl oz (14d) / Merivon 4 fl oz (14d)	GKC	0.0	a	0.000	a
https://photos.app.goo.gl/pcUFkdsApkvR7dmB7	PureSpray Green 1 gal (7d) (pre bloom)/ Pristine 18.5 fl oz (14d) / Inspire Super 20 fl oz (14d) / Luna Experience 8.6 fl oz (14d) / Vivando 15 fl oz (14d) / Merivon 4 fl oz (14d)	B	0.0	a	0.000	a
https://photos.app.goo.gl/YjYQHTD7ejVWURqC9	CeraSulfur (BC1320) (5.5 pt) (Sulfur 1st spray), (7 d)	BD	0.0	a	0.000	a
https://photos.app.goo.gl/1WvoYCoFtNjqGsfo6	CeraSulfur (BC1320) (4.38 pt) (Sulfur 1st spray), (7 d)	BS	0.0	a	0.000	a
https://photos.app.goo.gl/WPpzFYv4Ss2dBVB97	CeraSulfur (BC1320) (3.3 pt) (Sulfur 1st spray), (7 d)	BC	0.0	a	0.000	a
https://photos.app.goo.gl/o9JeRLAmejb2ogiD7	Microthiol disperss (5 lb), (7 d)	BKD	0.0	a	0.000	a
https://photos.app.goo.gl/91bLp1D67zdu3GTU9	Microthiol disperss (4 lb), (7 d)	BKS	0.0	a	0.000	a
https://photos.app.goo.gl/XkxqNh94CzFrzzuH8	Microthiol disperss (3 lb), (7 d)	BKC	0.0	a	0.000	a
https://photos.app.goo.gl/4SUp1ZEBf27hLvX58	NSA 1% + Nordox (30 gr/100 L)+ HML Silco (250 ml /100L) / NSA 1%+ Sulphur 5lb + HML Silco (250 ml /100L) (Pre-flowering) , NSA 1% + Nordox (30 gr/100 L) + HML Potum (300 gr/100L) / NSA 1% + HML Potum (300 gr/100L)+ HML Silco (250 ml /100L) (after bloom), (7 d)	Pu+R	0.0	a	0.000	a
https://photos.app.goo.gl/k4hYVpFcMgs8P9EQA	NSA 1% + Nordox (30 gr/100 L)+ HML Silco (250 ml /100L) / NSA 1% + HML Potum (300 gr/100L)+ HML Silco (250 ml /100L)(pre bloom), NSA 1% + Nordox (30 gr/100 L) + HML Potum (300 gr/100L) / NSA 1% + HML Potum (300 gr/100L)+ HML Silco (250 ml /100L) (after bloom) , (7 d)	PWD	0.0	a	0.000	a
https://photos.app.goo.gl/Vg3sHAMGD1k7ERLd9	Quintec 5 fl oz / Quintec 2 fl oz + Howler 2.5 lb + Syl-Coat 0.125%/ Pristine 18.5 fl oz / Inspire Super 20 fl oz / Quintec 2 fl oz + Howler 2.5 lb + Syl-Coat 0.125%, (14 d)	PWC	0.0	a	0.000	a
https://photos.app.goo.gl/EqS3uXv6kRBrTKGE8	OR-009-E (32 fl oz) + Same as treatment 3 KD, (14 d)	PKD	0.0	a	0.000	a
	OR-295-E (32 fl oz) + Same as treatment 3 KD, (14 d)	PKS	0.0	a	0.000	a
https://photos.app.goo.gl/6QBPbzcqhoRqodBg7	OR-278-F (32 fl oz) + Same as treatment 3 KD, (14 d)	PKC	0.0	a	0.000	a

https://photos.app.goo.gl/J4tq8TkZjMDkTqjh7	Embrace EA (16 fl oz) + Same as treatment 3 KD, (14 d)	W+K	0.0	a	0.000	a
https://photos.app.goo.gl/LGLms6TCuzwyL7kG6	Syl-Tac EA (16 fl oz) + Same as treatment 3 KD, (14 d)	W+Y	0.0	a	0.000	a
https://photos.app.goo.gl/zQTFu4NSuv9Jj7LF8	Ninja/SP2700 SP 2% 8 oz + Capsil 12 fl oz, (14 d)	W+G	0.0	a	0.000	a
https://photos.app.goo.gl/rh9hheVTTuH52pUu7	Microthiol Disperss (5 lb) / EXP14 (3 lb) + Embrace-EA 16 fl oz, (7 d)	W+B	0.0	a	0.000	a
https://photos.app.goo.gl/BEz1k4QUvj9KAfUc6	Microthiol Disperss (5 lb) / EXP14 (3 lb) + Syl-Coat (4 fl oz), (7 d)	W+Pu	0.0	a	0.000	a
https://photos.app.goo.gl/odZByJUV8PQX983j8	Microthiol Disperss (5 lb) / EXP14 (3 lb)+ Glacier EA (16 fl oz), (7 d)	W+P	0.0	a	0.000	a
https://photos.app.goo.gl/Tu8Hc8hSP1xesTZw8	Sulfur DF / BTS-EXP-100 27.4 fl oz / Quintec 4 oz / Mettle 4 fl oz / BTS-EXP-100 27.4 fl oz / Inspire Super 20 fl oz / Luna Experience 8.6 fl oz, (14 d)	P+G	0.0	a	0.000	a
https://photos.app.goo.gl/83d8q7kt2fYE84Ya9	Quintec 5 fl oz / Theira 3 lb + Syl-Coat 0.125%/Pristine 18.5 fl oz / Inspire Super 20 fl oz /Theira 3 lb+ Syl-Coat 0.125%, (14 d)	P+B	0.0	a	0.000	a
https://photos.app.goo.gl/98tWJGQmYyhrhwoR6	Quintec 5 fl oz / Esendo 2.8 lb+ Syl-Coat 0.125%/Pristine 18.5 fl oz / Inspire Super 20 fl oz / Esendo 2.8 lb+ Syl-Coat 0.125%, (14 d)	P+R	0.0	a	0.000	a
https://photos.app.goo.gl/YGAexX22wjRSsnx86	Provilo 5 oz + Syl-Coat 4 fl oz/100 gal	OKS	1.0	a	0.010	a
https://photos.app.goo.gl/Hv3B7NZ3wNMvSCSA8	Regalia 2 qt, (7 d)	YKD	1.0	a	0.020	a
https://photos.app.goo.gl/18sPCZR4kpcPppXM8	ReyZox 11.8 fl oz, (14 d)	YKS	1.0	a	0.100	a
https://photos.app.goo.gl/pWoPc3aXcRv6Zrgg8	Microthiol Disperss 3lb + Trionic 8 oz / Microthiol Disperss 3 lb + Quintec 4 oz / Microthiol Disperss 3lb + Trionic 8 oz / Microthiol Disperss 3lb + Inspire Super 20 oz /Microthiol Disperss 3lb +Torino 3.4 oz / Microthiol Disperss 3lb +Torino 3.4 oz + PHD 6.2 oz / Microthiol Disperss 3lb + Luna Experience 8.6 oz, (14 d)	RS+R	1.0	a	0.010	a
https://photos.app.goo.gl/UzxbxmThdceaT3H18	Sulfur Dry flowable (pre bloom) / BTS-EXP-100 27.4 fl oz + Kinetic Adj 0.125 (%v/v) (after bloom), (7 d)	P+Y	1.0	a	0.050	a
https://photos.app.goo.gl/yusYpgd4x4WnWrvs7	NSA 1.4% (v/v), (7 d)	Pu	1.0	a	0.010	a
https://photos.app.goo.gl/MEg3swetnmgzdsNK9	Sulfur Dry flowable (pre bloom) / BTS-EXP-100 27.4 fl oz (after bloom), (7 d)	P+K	2.0	ab	0.040	a
https://photos.app.goo.gl/cS4ybnCZWycPn21BA	PureSpray Foliar 22 E 0.5 gal (pre bloom) / Sulfur Dry-Flowable 5 lb (after bloom), (7 d)	GKS*	2.0	ab	0.060	a
https://photos.app.goo.gl/vYyhRdebCb15S8YYA	EXP1 256 fl oz + Dyne-Amic 0.125 % v/v, (7 d)	G*	3.0	ab	0.600	ab
https://photos.app.goo.gl/hKAkmVRQujo4p9oc7	MinerALL (8.5 lb/100 gal), (14 d)	OS+O	4.0	abc	0.990	ab
https://photos.app.goo.gl/dfTi7TAegj5Nt78q7	Quintec 5 fl oz / Howler 5 lb + Syl-Coat 0.125%/ Pristine 18.5 fl oz / Inspire Super 20 fl oz / Howler 5 lb+ Syl-Coat 0.125%, (14 d)	P+Pu	4.0	abc	0.650	ab

https://photos.app.goo.gl/tJ1HrSJZZhSUgzKD9	EXP2 128 fl oz + Dyne-Amic 0.125 % v/v, (7 d)	RKC	6.0	abc	0.550	ab
https://photos.app.goo.gl/qrWcdCijAZrS2DWY6	ReyZox 18.4 fl oz, (14 d)	YRD	8.0	abcd	0.890	ab
https://photos.app.goo.gl/RLsqhVFq8Fapcr8Q6	OR 009-A (50 fl oz), (14 d)	PWS	12.0	bcde	1.300	abcd
https://photos.app.goo.gl/WBfZTTYoXDKyoShX9	Nanospada 3.3 L/100 L, (7 d)	YS	13.0	cde	1.030	abc
https://photos.app.goo.gl/qfDXRrHJ7vKfZ3ks6	ReyZox 15.1 fl oz, (14 d)	YKC	14.0	cde	1.500	abcd
https://photos.app.goo.gl/A3AfcoqhibBy1qDV7	Magna-Bon CS 2005 (20 oz/100 ga), (14 d)	OC+O	17.0	de	5.520	de
https://photos.app.goo.gl/6WrcqnXdYcJucBmEA	Boost Biomes BC18 (1X label rate), (14 d)	KC	22.0	e	2.650	cde
https://photos.app.goo.gl/pBAXpwYhExEiJrDF6	Serenade ASO 4 qt, (14 d)	KS	24.0	e	5.190	bcd
https://photos.app.goo.gl/onZXLfZMot61gWYE6	MinerALL (4.25 lb/100 gal), (14 d)	O	26.0	e	12.020	e
https://photos.app.goo.gl/PyvfLMmF715FoLhb7	Untreated Control	W	71.0	f	46.130	f

[1] * Phytotoxicity was observed on berries.

Trial II

Table 2. Disease incidence and severity. Product names are followed by rate (per acre) and the frequency of application. Treatment means followed by the same letter are not significantly different according to Fisher's LSD at α=0.05; Data percentages were arcsine√(x/100) transformed but nontransformed data are presented. /= followed by.

Pictures	Treatment	Flag	Prevalence, %		Severity, %	
https://photos.app.goo.gl/QjY4RfzW8tSPiBEH8	Inspire Super 20.0 fl oz/A / Aprovia Top 13.3 fl oz/A / Quintec 6.6 fl oz/A / Inspire Super 20.0 fl oz/A / Aprovia Top 13.3 fl oz/A / (+ Syl-Coat 0.125 % (v/v) to all treatments), (14 d)	B+R	0	a	0	a
https://photos.app.goo.gl/yXeLsfyBHXSHbbLb8	Aprovia Top 13.3 fl oz/A / Quintec 6.6 fl oz/A / Inspire Super 20.0 fl oz/A / Miravis Prime 13.4 fl oz/A / Inspire Super 20.0 fl oz/A / (+ Syl-Coat 0.125 % (v/v) to all treatments), (14 d)	B+Y	0	a	0	a
https://photos.app.goo.gl/f1XpXKp3V8aXJEdY9	Sulfur DF 5 lb/ Sulfur DF 5 lb/ Howler 5fl oz + Syl-Coat 0.125%/ Howler 5fl oz + Syl-Coat 0.125% / Howler 5fl oz + Syl-Coat 0.125%, (14 d)	B+O	26.4	a	5.66	a
https://photos.app.goo.gl/BsEfQ2ksUqWjwFBW8	Untreated Control	W	84.8	b	55.45	b

Appendix: Materials

Product	Active ingredient(s) and concentration	Manufacturer or distributor	Chemical class (Frac Code)
Aprovia Top	Difenoconazole (10.95%), Benzovindiflupyr (7.30%)	Syngenta	DMI (3) / SDHI (7)
BC1320	proprietary	Belchim	N/A
Boost Biomes BC18	proprietary	Boost Biomes	N/A
BTS-EXP-100	proprietary	Botanical Solution Inc (BSI_	N/A
Capsil	Polyether-polymethylsiloxane-copolyme 100%	Acuatrols	adjuvant
Cevya	mefentrifluconazole	BASF	DMI
Dyne-Amic	polyalkyleneoxide modified polydimethylsiloxane, nonionic emulsifiers, methyl ester of c16-c18 fatty acids (99%)	Helena Chemical Co.	adjuvant
Embrece-EA	Polyoxyalkylen polyol fatty acid ester, Alcohol ethoxylate (78.92%)	Wilbur-Ellis	adjuvant
Esendo	proprietary	AgBiome Innovations	N/A
EXP1	proprietary	Agrospheres	N/A
EXP14	proprietary	Biotalys	N/A
EXP2	proprietary	Agrospheres	N/A
Flint Extra	trifloxystrobin (50%)	Bayer CropScience	QoI (11)
Gatten	flutianil	Nichino America	thiazolidine (U13)
Glacier EA	Methylated seed oil (96%)	Wilbur-Ellis	adjuvant
HML Potum	proprietary	Henry Manufacturing Limited	N/A
HML Silco	proprietary	Henry Manufacturing Limited	N/A
Howler	Pseudomonas chlororaphis strain AFS009 (50%)	AgBiome Innovations	biological
Inspire Super	difenoconazole (8.4%), cyprodinil (24.1%)	Syngenta Crop Protection, Inc.	DMI-triazole (3)/AP(9)
Kinetic	Polyoxyethylene-polyoxypropylene copolymer, Polyether modified (99%) heptamethyltrisiloxane	Helena Agri-Enterprises, LLC	adjuvant
Luna Experience	fluopyram (17.54%), tebuconazole (17.54%)	Bayer CropScience	SDHI (7)/DMI-triazole (3)
Luna Sensation	Trifloxystrobin (21.4%), Fluopyram (21.4%)	Bayer CropScience	QoI (11)/SDHI (7)
Magna-Bon CS 2005	proprietary	Magna-Bon	N/A
Merivon	pyraclostrobin (21.26%), fluxapyroxad (21.26%)	BASF	QoI (11)/SDHI (7)
Mettle	tetraconazole (11.6%)	Gowan Co.	DMI-triazole (3)
Microthiol Disperss	sulfur (80%)	United Phosphorus, Inc.	Inorganic (M2)
MinerALL	proprietary	MinerALL Clay INC	N/A

Miravis Prime	Fludioxonil (21.4%), Pydiflumetofen (12.8%)	Syngenta	phenylpyrroles (12)/SDHI (7)
Nanospada	proprietary	Katana Ag.	N/A
Ninja/SP2700 SP 2%	proprietary	Sepro	N/A
Nordox	proprietary	Brandt, Inc	N/A
NSA	proprietary	Henry Manufacturing Limited	N/A
NSTKI-014	proprietary	Tkinet	N/A
OR 009-A	proprietary	Oro-Agri	N/A
OR-009-E	proprietary	Oro-Agri	N/A
OR-278-F	proprietary	Oro-Agri	N/A
OR-295-E	proprietary	Oro-Agri	N/A
Parade	pyraziflumid	Nichino America	SDHI(7)
PHD	Polyoxin D zinc salt (11.3%)	Arysta LifeScience	polyoxins (19)
Pristine	pyraclostrobin (12.8%), boscalid (25.2%)	BASF	QoI(11)/SDHI (7)
Prolivo	pyriofenone	Summit Agro USA	benzoylpyridine (50)
PureSpray Green	mineral oil (98%)	Petro-Canada	oil
PureSpray Foliar 22 E	mineral oil (98%)	Intelligro	oil
Quintec	quinoxyfen (22.6%)	Dow AgroSciences LLC	aryloxyquinoline (13)
Rally	myclobutanil (40%)	Dow AgroSciences LLC	DMI-triazole (3)
Regalia	extract of *Reynoutria sachalinensis* (5%)	Marrone Bio Innovations	Plant extract
ReyZox	Azoxystrobin, Reynoutria spp. extract	Marrone Bio Innovations	N/A
Rhyme	flutriafol (22.7 %)	Cheminova Inc	DMI-triazole (3)
microSURE™	proprietary	microSURE™ Agricultural Solutions LLC	N/A
Serenade ASO	*Bacillus subtilis* qst 713 (26%)	Bayer CropScience	biological
Sulfur Dry flowable	sulfur (80%)	Wilbur-Ellis	Inorganic (M2)
Syl-Coat	polyether-polymethylsiloxane-copolymer and polyether-100%	Wilbur-Ellis	adjuvant
Syl-Tac EA	ethylated seed oil	Wilbur-Ellis	adjuvant
Theira	proprietary	Agbiome	N/A
Torino	cyflufenamid (10%)	Gowan Co.	phenyl-acetamide (U06)
Trionic	Triflumizole (42.1%)	United Phosphorus, Inc.	DMI-triazole (3)
Vacciplant	proprietary	Arysta LifeScience	natural compound (P04)
Vivando	metrafenone (25.2%)	BASF	benzophenone (50)

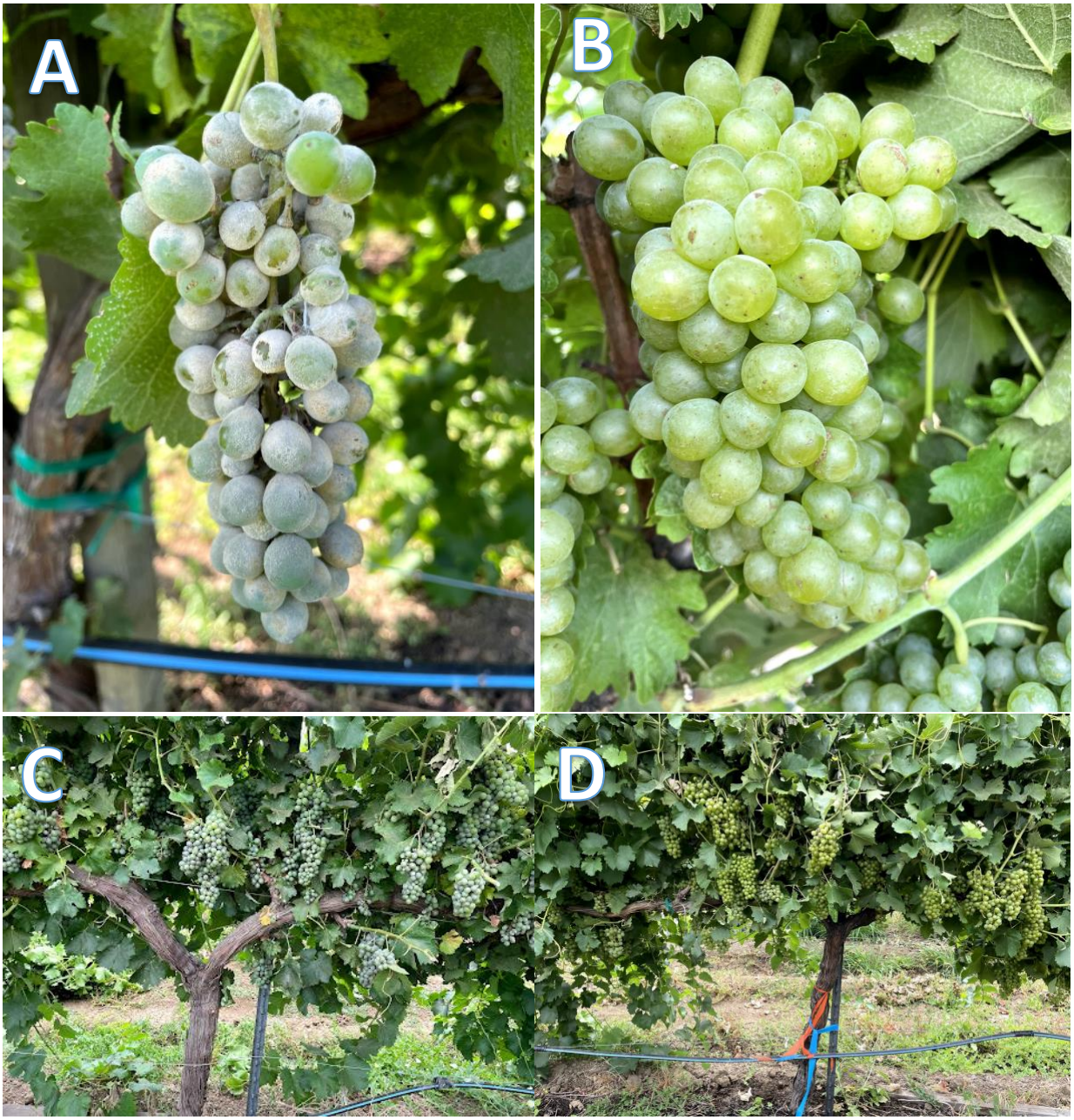

Fig 3. Powdery Mildew infested berries from Untreated Control (A, C). Berries treated with fungicide (B, D).