Final Report:
Control of grape powdery mildew with synthetic, biological and organic fungicides: 2015 field trials

W. Douglas Gubler, Trang T. Nguyen, and Nicholas S. Morris

Department of Plant Pathology, University of California, Davis, CA, 95616

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Department of Plant Pathology,
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Report Summary

Powdery mildew is an economically important disease of grapes worldwide. This report details the findings of our annual powdery mildew fungicide trials on grapevine (*Vitis vinifera*, Cultivar Chardonnay). Trials were conducted at Rio Viento Vineyards, near Walnut Grove, California in 2015. Treatments were placed in four adjacent trials in the vineyard in a complete randomized design. Spraying commenced on April 13. Powdery mildew pressure increased slowly, held in check by cool temperatures after disease onset. Spraying was completed at veraison on July 16 and treatments were evaluated for disease incidence and severity on July 20.

The trials consisted of soft chemistry products, experimental, as well as synthetics. Spray frequencies varied from weekly applications to 21 day intervals. Some applications were based on the Gubler-Thomas Risk Index, with application intervals based on the index.

Temperatures were mild and humidity was low during much of the 2015 growing season. Overall disease pressure was moderate to low. By early June, mildew was evident on untreated clusters. By the time of disease evaluation, disease incidence in untreated plots in all trials reached 83-94%.

Materials and Methods

A. Experimental design

Experimental design	Complete randomized design with 5 replicates.		
Experimental unit	2 adjacent vines = 1 plot		
Plot area	154 ft^2 (row spacing = 10 ft, vine spacing = 5 ft)		
Area/treatment	500 ft^2 (5 reps x 2 vines = 1 treatment)	Area/treatment	0.0115 acre/treatment
Volume water/acre	50 gallons (certain programs) = 0.6 gallons/5 replicates 100 gallons (pre-bloom in mid-April) = 1.2 gallons/5 replicates 150 gallons (pre-bloom to pea-sized berries, late April – early June) = 1.8 gallons/5 reps 200 gallons (late season) = 2.4 gallons/5 reps		
Application method	Handgun sprayers (attached to Nifty Fifty brand 25 or 50 gallon sprayers).		

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 144 – 137 West End)

No.	Flag	Treatment	Frequency (days)	Application rate (per acre)	FP/ 5 replicates
1	W	Untreated Control	None	None	None
2	KC	(Vivando then Pristine then Quintec then Switch then Torino then Luna Tranquility) + Syl-Coat	14	(15.4 fl oz then 12.5 oz then 6.6 fl oz then 14 oz then 3.4 fl oz then 16 fl oz) + 8 fl oz/100 gal	(5.2 ml then 4.1 g then 2.2 ml then 4.6 g then 1.2 ml then 5.4 ml) + 2.8 ml at 100 gal or 4.3 ml at 150 gal or 5.7 ml at 200 gal or 6.9 ml at 250 gal
3	GKS	(Vivando alt Pristine) + Syl-Coat	14	(15.4 fl oz alt 12.5 oz) + 8 fl oz/100 gal	(5.2 ml alt 4.1 g) + 2.8 ml at 100 gal or 4.3 ml at 150 gal or 5.7 ml at 200 gal or 6.9 ml at 250 gal
4	GS	(Vivando alt Pristine) + Syl-Coat	14	(15.4 oz alt 23 oz) + 8 fl oz/100 gal	(5.2 ml alt 7.5 g) + 2.8 ml at 100 gal or 4.3 ml at 150 gal or 5.7 ml at 200 gal or 6.9 ml at 250 gal
5	PKS	Microthiol Disperss then (from bloom) Luna Experience + Syl-Coat	7 then 21	5 lb then (from bloom) 8.6 fl oz + 6.4 fl oz/100 gal	26.1 g then (from bloom) 2.9 ml + 2.3 ml at 100 gal or 3.5 ml at 150 gal or 4.6 ml at 200 gal or 5.8 ml at 250 gal
6	OS	Microthiol Disperss then (from bloom) Luna Tranquility + Syl-Coat	7 then 14	5 lb then (from bloom) 12 fl oz + 6.4 fl oz/100 gal	26.1 g then (from bloom) 4.1 ml + 2.3 ml at 100 gal or 3.5 ml at 150 gal or 4.6 ml at 200 gal or 5.8 ml at 250 gal
7	GD	Microthiol Disperss then (from bloom)Luna Tranquility + Syl-Coat	7 then 14	5 lb then (from bloom) 16 fl oz + 6.4 fl oz/100 gal	26.1 g then (from bloom) 5.4 ml + 2.3 ml at 100 gal or 3.5 ml at 150 gal or 4.6 ml at 200 gal or 5.8 ml at 250 gal
8	OKD	Microthiol Disperss then (from bloom) (Luna Experience then Flint then Sonata then Luna Tranquility then Serenade Optimum then Quintec) + Syl-Coat	7 then 14	5 lb then (from bloom) (8.6 fl oz then 3 oz then 3 qt then 16 fl oz then 16 oz then 4 fl oz) + 6.4 fl oz/100 gal	26.1 g then (from bloom) (2.9 ml then 1.0 g then 32.6 ml then 5.4 ml then 5.2 g then 1.4 ml) + 2.3 ml at 100 gal or 3.5 ml at 150 gal or 4.6 ml at 200 gal or 5.8 ml at 250 gal

9	GKD	(Torino alt Quintec) + Syl-Coat	14	(3.4 fl oz alt 4 fl oz) + 8 fl oz/100 gal	(1.2 ml alt 1.4 ml) 2.8 ml at 100 gal or 4.3 ml at 150 gal or 5.7 ml at 200 gal or 6.9 ml at 250 gal
10	OKS	(Inspire Super alt Quintec) + Syl-Coat	14	(20 fl oz alt 4 fl oz) + 8 fl oz/100 gal	(6.8 ml alt 1.4 ml) + 2.8 ml at 100 gal or 4.3 ml at 150 gal or 5.7 ml at 200 gal or 6.9 ml at 250 gal
11	KD	Quintec + Syl-Coat	21	6.6 fl oz + 8 fl oz/100 gal	2.2 ml + 2.8 ml at 100 gal or 4.3 ml at 150 gal or 5.7 ml at 200 gal or 6.9 ml at 250 gal
12	KS	(Luna Experience alt Quintec) + Syl-Coat	21	(8 fl oz alt 6.6 fl oz) + 8 fl oz/100 gal	(2.8 ml alt 2.2 ml) + 2.8 ml at 100 gal or 4.3 ml at 150 gal or 5.7 ml at 200 gal or 6.9 ml at 250 gal
13	YKD	(Pristine alt Quintec) + Syl-Coat	21	(12.5 oz alt 6.6 fl oz) + 8 fl oz/100 gal	(4.1 g alt 2.2 ml) + 2.8 ml at 100 gal or 4.3 ml at 150 gal or 5.7 ml at 200 gal or 6.9 ml at 250 gal
14	YKC	(Viticure alt Quintec) + Vintre	14	(6 fl oz alt 4 fl oz) + 0.25% (v/v)	(2 ml alt 1.4 ml) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal
15	BD	(Viticure alt Quintec) + Vintre	14	(8 fl oz alt 6.6 fl oz) + 0.25% (v/v)	(2.8 ml alt 2.2 ml) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal
16	YS	(Viticure alt Pristine) + Vintre	14	(6 fl oz alt 10.5 oz) + 0.25% (v/v)	(2 ml alt 3.4 g) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal
17	YKS	(Viticure alt Pristine) + Vintre	14	(8 fl oz alt 12.5 oz) + 0.25% (v/v)	(2.8 ml alt 4.1 g) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal
18	YD	(Viticure alt Vivando) + Vintre	14	(6 fl oz alt 10.3 fl oz) + 0.25% (v/v)	(2 ml alt 3.5 ml) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal
19	B	(Viticure alt Vivando) + Vintre	14	(8 fl oz alt 15.4 fl oz) + 0.25% v/v)	(2.8 ml alt 5.2 ml) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal

20	BKS	(Quintec alt Rhyme then Pristine then Quintec alt Rhyme then Pristine then Quintec alt Rhyme then Elevate) + Dyneamic	14	(4 fl oz alt 5 fl oz then 12.5 oz then 4 fl oz alt 5 fl oz then 12.5 oz then 4 fl oz alt 5 fl oz then 16 oz) + 0.25% (v/v)	(1.4 ml alt 1.7 ml then 4.1 g then 1.4 ml alt 1.7 ml then 4.1 g then 1.4 ml alt 1.7 ml then 5.2 g) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal
21	Pu	(Quintec alt Rhyme then Fracture then Quintec alt Rhyme then Fracture then Quintec alt Rhyme then Elevate) + Dyneamic	14	(4 fl oz alt 5 fl oz then 18.3 fl oz then 4 fl oz alt 5 fl oz then 18.3 fl oz then 4 fl oz alt 5 fl oz then 16 oz) + 0.25% (v/v)	(1.4 ml alt 1.7 ml then 6.2 ml then 1.4 ml alt 1.7 ml then 6.2 ml then 1.4 ml alt 1.7 ml then 5.2 g) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal
22	BS	(Quintec alt Rhyme then Fracture then Quintec alt Rhyme then Fracture then Quintec alt Rhyme then Elevate) + Dyneamic	14	(4 fl oz alt 5 fl oz then 20.5 fl oz then 4 fl oz alt 5 fl oz then 20.5 fl oz then 4 fl oz alt 5 fl oz then 16 oz) + 0.25% (v/v)	(1.4 ml alt 1.7 ml then 7.0 ml then 1.4 ml alt 1.7 ml then 7.0 ml then 1.4 ml alt 1.7 ml then 5.2 g) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal
23	RKD	(Rhyme alt Fracture then Fracture then Rhyme alt Quintec then Fracture then Rhyme alt Quintec then Elevate) + Dyneamic	14	(5 fl oz alt 18.3 fl oz then 18.3 fl oz then 5 fl oz alt 4 fl oz then 18.3 fl oz then 5 fl oz alt 4 fl oz then 16 oz) + 0.25% (v/v)	(1.7 ml alt 6.2 ml then 6.2 ml then 1.7 ml alt 1.4 ml then 6.2 ml then 1.7 ml alt 1.4 ml then 5.2 g) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal
24	RD	(Rhyme alt Fracture then Fracture then Rhyme alt Quintec then Fracture then Rhyme alt Quintec then Elevate) + Dyneamic	14	(5 fl oz alt 20.5 fl oz then 20.5 fl oz then 5 fl oz alt 4 fl oz then 20.5 fl oz then 5 fl oz alt 4 fl oz then 16 oz) + 0.25% (v/v)	(1.7 ml alt 7.0 ml then 7.0 ml then 1.7 ml alt 1.4 ml then 7.0 ml then 1.7 ml alt 1.4 ml then 5.2 g) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal

Trial II (137 East End – 133 East End)

No.	Flag	Treatment	Frequency (days)	Application rate (per acre)	FP/5 replicates
1	W	Untreated Control	None	None	none
2	KC	Viathon	14-21 (RI)	2 pts	10.9 ml
3	OKS	((Luna Experience then Inspire Super then Quintec) + Syl-Coat) (2x)	14-21 (RI)	((8 fl oz then 20 fl oz then 5 fl oz) + 4 fl oz/100 gal) (2x)	((2.8 ml then 6.8 ml then 1.7 ml) + 1.4 ml at 100 gal or 2.1 ml at 150 gal or 2.8 ml at 200 gal or 3.4 ml at 250 gal) (2x)
4	OKD	((Aprovia then Inspire Super then Quintec) + Syl-Coat) (2x)	14-21 (RI)	((8.5 fl oz then 20 fl oz then 5 fl oz) + 4 fl oz/100 gal) (2x)	((2.9 ml then 6.8 ml then 1.7 ml) + 1.4 ml at 100 gal or 2.1 ml at 150 gal or 2.8 ml at 200 gal or 3.4 ml at 250 gal) (2x)
5	GS	((Aprovia then Inspire Super then Quintec) + Syl-Coat) (2x)	14-21 (RI)	((10.5 fl oz then 20 fl oz then 5 fl oz) + 4 fl oz/100 gal) (2x)	((3.6 ml then 6.8 ml then 1.7 ml) + 1.4 ml at 100 gal or 2.1 ml at 150 gal or 2.8 ml at 200 gal or 3.4 ml at 250 gal) (2x)
6	GD	(Inspire Super alt Quintec) + Syl-Coat	14-21 (RI)	(20 fl oz alt 5 fl oz) + 4 fl oz/100 gal	(6.8 ml alt 1.7 ml) + 1.4 ml at 100 gal or 2.1 ml at 150 gal or 2.8 ml at 200 gal or 3.4 ml at 250 gal
7	OS	Topguard	14	5 fl oz	1.7 ml
8	KS	Topguard	14	6 fl oz	2.0 ml
9	KD	Rhyme	14	5 fl oz	1.7 ml
10	GKS	Rhyme + Dyneamic	14	5 fl oz + 0.25% (v/v)	1.7 ml + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal
11	GKD	Luna Experience + Syl-Coat	14-21 (RI)	8 fl oz + 4 fl oz/100 gal	2.8 ml + 1.4 ml at 100 gal or 2.1 ml at 150 gal or 2.8 ml at 200 gal or 3.4 ml at 250 gal
12	YKC	SA19 + Syl-Coat	14-21 (RI)	5.13 fl oz + 4 fl oz/100 gal	1.7 ml + 1.4 ml at 100 gal or 2.1 ml at 150 gal or 2.8 ml at 200 gal or 3.4 ml at 250 gal
13	YKS	SA29 + Syl-Coat	14-21 (RI)	13.7 fl oz + 4 fl oz/100 gal	4.7 ml + 1.4 ml at 100 gal or 2.1 ml at 150 gal or 2.8 ml at 200 gal or 3.4 ml at 250 gal
14	YS	(Mettle alt Torino) + Dyneamic	14	(5 fl oz alt 3.4 fl oz) + 0.25% (v/v)	(1.7 ml alt 1.2 ml) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal

15	YKD	(Mettle then Pristine (21d) then Torino then Mettle then Quintec then Torino) + Dyneamic	14-21	(5 fl oz then 12.5 oz then 3.4 fl oz then 5 fl oz then 6 fl oz then 3.4 fl oz) + 0.25% (v/v)	(1.7 ml then 4.1 g then 1.2 ml then 1.7 ml then 2 ml then 1.2 ml) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal
16	RD	GWN-10250 + Dyneamic	14	24 fl oz + 0.25% (v/v)	8.2 ml + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal
17	BKS	(Rally alt Quintec) + Dyneamic	14	(5 oz alt 4 fl oz) + 0.25% (v/v)	(1.6 g alt 1.4 ml) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal
18	RKS	(Rally alt Quintec) + Dyneamic (addition of OR-099 at 1st and 4 weeks later)	14	(5 oz alt 4 fl oz) + 0.25% (v/v) + 16 fl oz (1st and 4 weeks after)	(1.6 g alt 1.4 ml) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal + 5.4 ml
19	K	(Rally alt Quintec) + Dyneamic (addition of OR-099 at 1st and 4 weeks later)	14	(5 oz alt 4 fl oz) + 0.25% (v/v) + 32 fl oz (1st and 4 weeks after)	(1.6 g alt 1.4 ml) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal + 10.9 ml
20	KS/Pu	PSG alt Taegro + PSG	7-10 alt 7-14 (RI)	1% (v/v) alt 5.2 oz + 0.5% (v/v)	45.6 ml at 100 gal or 68.8 ml at 150 gal or 91.2 ml at 200 gal or 114.4 ml at 250 gal alt 1.7 g + 22.8 ml at 100 gal or 34.4 ml at 150 gal or 45.6 ml at 200 gal or 57.2 ml at 250 gal
21	BS	PSG (2x) then ((Rhyme then Quintec then Sovran) + PSG)(2x)	10 14	1% (v/v) (2x) then ((5 fl oz then 4 fl oz then 4 oz) + 0.5% (v/v)) (2x)	45.6 ml at 100 gal or 68.8 ml at 150 gal or 91.2 ml at 200 gal or 114.4 ml at 250 gal (2x) then ((1.7 ml then 1.4 ml then 1.3 g) + 22.8 ml at 100 gal or 34.4 ml at 150 gal or 45.6 ml at 200 gal or 57.2 ml at 250 gal) (2x)
22	BD	((Rhyme then Quintec then Sovran) + PSG) (2x) then Rhyme + PSG	14	((5 fl oz then 4 fl oz then 4 oz) + 1% (v/v) (2x) then 5 fl oz +1% (v/v)	((1.7 ml then 1.4 ml then 1.3 g) + 45.6 ml at 100 gal or 68.8 ml at 150 gal or 91.2 ml at 200 gal or 114.4 ml at 250 gal (2x) then 1.7 ml + 45.6 ml at 100 gal or 68.8 ml at 150 gal or 91.2 ml at 200 gal or 114.4 ml at 250 gal (2x)

23	RKD	(Rhyme then Quintec then Sovran) + Syl-Coat) (2x) then Rhyme + Syl-Coat	14	((5 fl oz then 4 fl oz then 4 oz) + 4 fl oz/100 gal) (2x) then 5 fl oz + 4 fl oz/100 gal	(1.7 ml then 1.4 ml then 1.3 g) + 1.4 ml at 100 gal or 2.1 ml at 150 gal or 2.8 ml at 200 gal or 3.5 ml at 250 gal) (2x) then 1.7ml + 1.4 ml at 100 gal or 2.1 ml at 150 gal or 2.8 ml at 200 gal or 3.5 ml at 250 gal
24	Pu	(Rhyme then Quintec then Sovran) + PSG then (Rhyme then Quintec) + PSG	21	(5 fl oz then 4 fl oz then 4 oz) + 1% (v/v) then (5 fl oz then 4 fl oz) + 1% (v/v)	(1.7 ml then 1.4 ml then 1.3 g) + 45.6 ml at 100 gal or 68.8 ml at 150 gal or 91.2 ml at 200 gal or 114.4 ml at 250 gal then (1.7 ml then 1.4 ml) + 45.6 ml at 100 gal or 68.8 ml at 150 gal or 91.2 ml at 200 gal or 114.4 ml at 250 gal
25	B	Pyriofenone	14	5 fl oz	1.7 ml
26	YD	Pyriofenone	21	5 fl oz	1.7 ml

Trial III (133 West End – 130 West End)

No.	Flag.	Treatment	Frequency (days)	Application rate (per acre)	FP/5 replicates
1	W	Untreated Control	None	None	None
2	BD	Vigor Cal	14	2 qt	21.8 ml
3	BS	Vigor Cal + Vigor SeaCal	14	2 qt + 2 qt	21.8 ml + 21.8 ml
4	RKD	Sysstem Cal	14	2 qt	21.8 ml
5	RD/YC	Sysstem Cal + Dyneamic	14	2 qt + 1% (v/v)	21.8 ml + 45.6 ml at 100 gal or 68.8 ml at 150 gal or 91.2 ml at 200 gal or 114.4 ml at 250 gal
6	BKS	Sysstem SeaCal	14	2 qt	21.8 ml
7	RD	Vigor SeaCal	14	4 qt	43.6 ml
8	RKS	GOP-1 Bran + GOP-1 Oil	7	7 oz/25 gal + 32 fl oz/25 gal	9.5 g + 45.4 ml at 100 gal or 14.3 g + 68.1 ml at 150 gal or 19.1 g + 90.8 ml at 200 gal or 23.0 g + 109.8 ml at 250 gal
9	YKS	WXF-15001	7	1.75% (v/v)	79.5 ml at 100 gal or 119.3 ml at 150 gal or 159.0 ml at 200 gal or 198.8 ml at 250 gal
10	YC	WXF-15002	7	0.5% (v/v)	22.8 ml at 100 gal or 34.4 ml at 150 gal or 45.6 ml at 200 gal or 57.2 ml at 250 gal
11	OKS	(K-PHITE 7LP (2x) then K-PHITE 7LP + Luna Experience then K-PHITE 7LP then K-PHITE 7LP + Quintec then K-PHITE 7LP (2x)) + Tactic	14	(3 qt (2x) then 3 qt + 8 fl oz then 3 qt then 3 qt + 6.6 fl oz then 3 qt (2x)) + 6 fl oz/100 gal	(32.6 ml (2x) then 32.6 ml + 2.7 ml then 32.6 ml then 32.6 ml + 2.2 ml then 32.6 ml (2x)) + 1.1 ml at 50 gal or 2.2 ml at 100 gal or 3.3 ml at 150 gal
12	GS	(K-PHITE 7LP then K-PHITE 7LP + Pristine then K-PHITE 7LP then K-PHITE + Quintec then K-PHITE 7LP then K-PHITE 7LP + Pristine then K-PHITE 7LP) + Latron	14	(3 qt then 3 qt + 12.5 oz then 3 qt then 3 qt + 6.6 fl oz then 3 qt then 3 qt + 12.5 oz then 3 qt) + 10 fl oz/100 gal	(32.6 ml then 32.6 ml + 4.1 g then 32.6 ml then 32.6 ml + 2.2 ml then 32.6 ml then 32.6 ml + 4.1 g then 32.6 ml) + 1.8 ml at 50 gal or 3.6 ml at 100 gal or 5.4 ml at 150 gal
13	KC	REX (rescue app after leaf removal 2 gal)	14 (or 4-6in growth)	1 gal	43.5 ml
14	GKS	LSU (rescue app after leaf removal 2 gal)	14 (or 4-6in growth)	0.5 gal	21.8 ml
15	GD	LSU (rescue app after leaf removal 2 gal)	14 (or 4-6in growth)	1 gal	43.5 ml

16	OS	Microthiol Disperss (2x) then AG Copp 75 + Microthiol Disperss + HML32	10-14 (RI)	5 lb (2x) then 60 g/100 L + 5 lb + 1.25 L/100 L	26.1 g (2x) then 2.7 g at 100 gal or 4.1 g at 150 gal or 5.5 g at 200 gal or 6.6 g at 250 gal + 26.1 g + 56.8 ml at 100 gal or 85.2 ml at 150 gal or 113.6 ml at 200 gal or 142.0 ml at 250 gal
17	KS	Inspire Super + JMS Stylet Oil then (Luna Experience then Flint) + Dyneamic	14-21 (RI)	10.5 fl oz + 0.5% (v/v) then 6 fl oz then 2 oz then 10.5 fl oz + 0.5% (v/v) then (6 fl then 2 oz) + 0.25% (v/v)	3.6 ml ml + 22.8 ml at 100 gal or 34.4 ml at 150 gal or 45.6 ml at 200 gal or 57.2 ml at 250 gal then (2.0 ml then 0.7 g) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal
18	GKD	Regalia	7-10 (RI)	2 qt	21.8 ml
19	OKD	Regalia + JMS Stylet Oil	7-10 (RI)	2 qt + 0.5% (v/v)	21.8 ml + 22.8 ml at 100 gal or 34.4 ml at 150 gal or 45.6 ml at 200 gal or 57.2 ml at 250 gal
20	Pu	Regalia + JMS Stylet Oil then (Luna Experience then Flint) + Dyneamic	7-10 (RI) 14-21 (RI)	2 qt + 0.5% (v/v) then (6 fl oz then 2 oz) + 0.25% (v/v)	21.8 ml + 22.8 ml at 100 gal or 34.4 ml at 150 gal or 45.6 ml at 200 gal or 57.2 ml at 250 gal then (2.0 ml then 0.7 g) + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal
21	YKD	Regalia then Inspire Super + JMS Stylet Oil then Luna Experience + Dyneamic then Inspire Super + JMS Stylet Oil then Luna Experience + Dyneamic then Regalia	7-10 (RI) 14-21 (RI)	2 qt then 10.5 fl oz + 0.5% (v/v) then 6 fl oz + 0.25% (v/v) then 10.5 fl oz + 0.5% (v/v) then 6 fl oz + 0.25% (v/v) then 2 qt	21.8 ml then 3.6 ml + 22.8 ml at 100 gal or 34.4 ml at 150 gal or 45.6 ml at 200 gal or 57.2 ml at 250 gal then 2.0 ml + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal then 3.6 ml + 22.8 ml at 100 gal or 34.4 ml at 150 gal or 45.6 ml at 200 gal or 57.2 ml at 250 gal then 2.0 ml + 11.4 ml at 100 gal or 17.2 ml at 150 gal or 22.8 ml at 200 gal or 28.6 ml at 250 gal then 21.8 ml

C. Maps

Trial I

Row:	144	143	142	141	140	139	138	137
	W	B	BKS	KD	OS	GD	KS	W
	KC	YD	BS	KC	W	YKC	OKD	KC
	GKS	YKS	Pu	OKD	BS	GS	RKD	OKS
	GS	YS	RD	BS	BKS	OS	B	OKD
	PKS	BD	RKD	PKS	YKC	GKD	KC	GS
	OS	YKC	GS	Pu	KC	BS	YKS	GD
	GD	YKD	BD	BKS	YKS	PKS	YS	OS
	OKD	KS	GD	W	BD	GKS	KD	KS/Pu
		KD	B	RKD	B	YD	BKS	KD
		OKS	YKC	YKS	RD	RD	Pu	GKS
← N		GKD	YKD	YS	OKD	BD	KD	GKD
			OKS	GKD	RKD	OKS	OKD	YKC
			YD	RD	GD	W	BD	YKS
				KS	YKD	YKD	RD	YS
				GKS	PKS	YD	B	YKD
					GS	OS	Pu	
					Pu	GKS	BKS	
					YS	KD	RKD	PKS
						OKS	KS	YS
						KS	GKD	YKD
						GKD	GKS	GD
							YKS	BS
							W	KC
							OS	YKC
								GS
								YD
								OKS

Color:		Pattern:	
B	Blue	C	Checker
G	Green	D	Dot
K	Black	S	Stripe
O	Orange		
P	Pink		
Pu	Purple		
R	Red		
Y	Yellow		
W	White		

Trial II

Color:			Pattern:	
B	Blue		C	Checker
G	Green		D	Dot
K	Black		S	Stripe
O	Orange			
P	Pink			
Pu	Purple			
R	Red			
Y	Yellow			
W	White			

← N

Row:	137	136	135	134	133
	W	GKS	BKS	K	GD
	KC	GS	YKS	Pu	KS/Pu
	OKS	BD	YKC	BD	W
	OKD	YD	RKS	RD	YKD
	GS	OKD	OKS	GKS	OKD
	GD	B	RKD	W	YKS
	OS	YS	BS	YKD	B
	KS/Pu	YKD	KC	GKD	GKD
	KD	W	KS	BKS	GS
	GKS	RD	OKD	KS	KS
	GKD	Pu	KS/Pu	YKC	YD
	YKC	KD	RD	GS	RKS
	YKS	KS/Pu	YS	YD	YS
	YS	K	RKS	RD	OKS
	YKD	OS	RKD	BD	BS
		GKD	YD	RKS	KD
		GD	GKS	YKS	YKC
	PKS	YD	GD	BS	OS
	YS	B	YKC	OS	KC
	YKD	K	K	RKD	BKS
	GD	Pu	GS	GD	RKD
	BS	RKD	B	B	
	KC	BD	BKS	K	
	YKC	BS	YKD	OKS	W
	GS	KS	OS	KC	BD
	YD	RKS	YKS	OKD	RKD
	OKS	BKS	Pu	KD	BKS
		RD	BD	GKS	RD
			KC	KS	RD/YC
			W	Pu	BS
			KS/Pu	YS	RKS
			GKD	OKS	YKS
				KD	YC
				BS	OKS
					GS
					KC

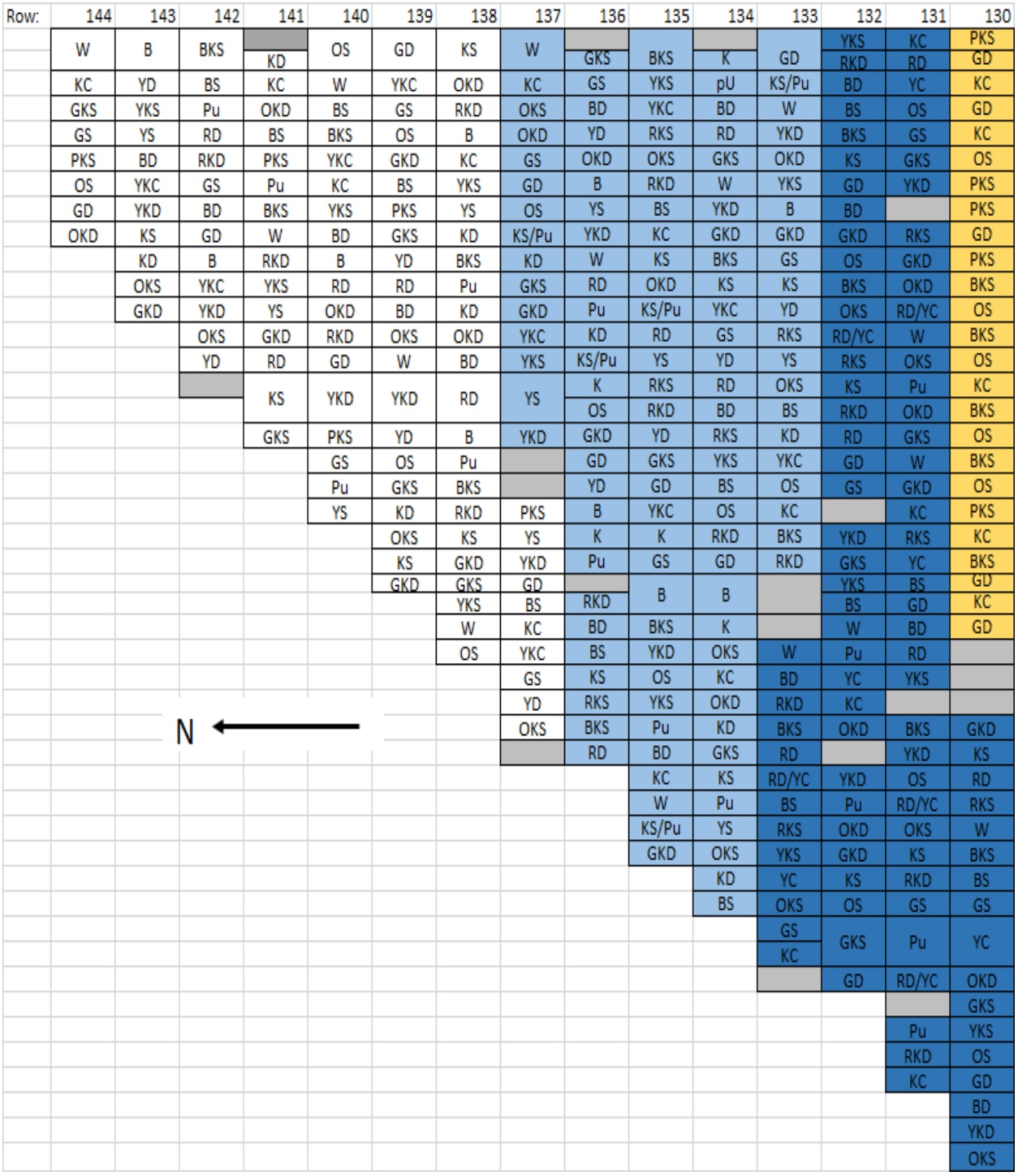
Trial III

Color:			Pattern:	
B	Blue		C	Checker
G	Green		D	Dot
K	Black		S	Stripe
O	Orange			
P	Pink			
Pu	Purple			
R	Red			
Y	Yellow			
W	White			

← N

Row:	133	132	131	130
	GD	YKS	KC	PKS
	KS/Pu	RKD	RD	GD
	W	BD	YC	KC
	YKD	BS	OS	GD
	OKD	BKS	GS	KC
	YKS	KS	GKS	OS
	B	GD	YKD	PKS
	GKD	BD	YKC	PKS
	GS	GKD	RKS	GD
	KS	OS	GKD	PKS
	YD	BKS	OKD	BKS
	RKS	OKS	RD/YC	OS
	YS	RD/YC	W	BKS
	OKS	RKS	OKS	OS
	BS	KS	Pu	KC
	KD	RKD	OKD	BKS
	YKC	RD	GKS	OS
	OS	GD	W	BKS
	KC	GS	GKD	OS
	BKS	YKC	KC	PKS
	RKD	YKD	RKS	KC
		GKS	YC	BKS
		YKS	BS	GD
	W	BS	GD	KC
	BD	W	BD	GD
	RKD	Pu	RD	
	BKS	YC	YKS	
	RD	KC	YKC	
	RD/YC	OKD	BKS	GKD
	BS	YKC	YKD	KS
	RKS	YKD	OS	RD
	YKS	Pu	RD/YC	RKS
	YC	OKD	OKS	W
	OKS	GKD	KS	BKS
	GS	KS	RKD	BS
	KC	OS	GS	GS
		GKS	Pu	YC
		GD	RD/YC	OKD
			YKC	GKS
			Pu	YKS
			RKD	OS
			KC	GD
				BD
				YKD
				OKS

Overview map



Row:	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130
	W	B	BKS	KD	OS	GD	KS	W	GKS	BKS	K	GD	YKS RKD	KC RD	PKS GD
	KC	YD	BS	KC	W	YKC	OKD	KC	GS	YKS	pU	KS/Pu	BD	YC	KC
	GKS	YKS	Pu	OKD	BS	GS	RKD	OKS	BD	YKC	BD	W	BS	OS	GD
	GS	YS	RD	BS	BKS	OS	B	OKD	YD	RKS	RD	YKD	BKS	GS	KC
	PKS	BD	RKD	PKS	YKC	GKD	KC	GS	OKD	OKS	GKS	OKD	KS	GKS	OS
	OS	YKC	GS	Pu	KC	BS	YKS	GD	B	RKD	W	YKS	GD	YKD	PKS
	GD	YKD	BD	BKS	YKS	PKS	YS	OS	YS	BS	YKD	B	BD		PKS
	OKD	KS	GD	W	BD	GKS	KD	KS/Pu	YKD	KC	GKD	GKD	GKD	RKS	GD
		KD	B	RKD	B	YD	BKS	KD	W	KS	BKS	GS	OS	GKD	PKS
		OKS	YKC	YKS	RD	RD	Pu	GKS	RD	OKD	KS	KS	BKS	OKD	BKS
		GKD	YKD	YS	OKD	BD	KD	GKD	Pu	KS/Pu	YKC	YD	OKS	RD/YC	OS
			OKS	GKD	RKD	OKS	OKD	YKC	KD	RD	GS	RKS	RD/YC	W	BKS
			YD	RD	GD	W	BD	YKS	KS/Pu	YS	YD	YS	RKS	OKS	OS
				KS	YKD	YKD	RD	YS	K	RKS	RD	OKS	KS	Pu	KC
									OS	RKD	BD	BS	RKD	OKD	BKS
				GKS	PKS	YD	B	YKD	GKD	YD	RKS	KD	RD	GKS	OS
					GS	OS	Pu		GD	GKS	YKS	YKC	GD	W	BKS
					Pu	GKS	BKS		YD	GD	BS	OS	GS	GKD	OS
					YS	KD	RKD	PKS	B	YKC	OS	KC		KC	PKS
						OKS	KS	YS	K	K	RKD	BKS	YKD	RKS	KC
						KS	GKD	YKD	Pu	GS	GD	RKD	GKS	YC	BKS
						GKD	GKS	GD		B	B		YKS	BS	GD
							YKS	BS	RKD				BS	GD	KC
							W	KC	BD	BKS	K		W	BD	GD
							OS	YKC	BS	YKD	OKS	W	Pu	RD	
								GS	KS	OS	KC	BD	YC	YKS	
								YD	RKS	YKS	OKD	RKD	KC		
			N	←				OKS	BKS	Pu	KD	BKS	OKD	BKS	GKD
									RD	BD	GKS	RD		YKD	KS
										KC	KS	RD/YC	YKD	OS	RD
										W	Pu	BS	Pu	RD/YC	RKS
										KS/Pu	YS	RKS	OKD	OKS	W
										GKD	OKS	YKS	GKD	KS	BKS
											KD	YC	KS	RKD	BS
											BS	OKS	OS	GS	GS
												GS KC	GKS	Pu	YC
													GD	RD/YC	OKD
															GKS
														Pu	YKS
														RKD	OS
														KC	GD
															BD
															YKD
															OKS

D. Application history

Trial I

Trial I (Row 144-137)

Trt no.	Treatment	Dates product applied: March / April / May / June / July
1	Unsprayed control	
2	Vivando, 15.4 fl oz	x x x x x
	Pristine, 12.5 oz	x
	Quintec, 6.6 fl oz	x
	Switch, 14 oz	x
	Torino, 3.4 fl oz	x
	Luna Tranquility, 16 fl oz	x
	Syl-Coat, 8 fl oz/100 gal	x x x x x x x
3	Vivando, 15.4 fl oz	x x x x x
	Pristine, 12.5 oz	x x x
	Syl-Coat, 8 fl oz/100 gal	x x x x x x x
4	Vivando, 15.4 fl oz	x x x x x
	Pristine, 23.0 oz	x x x
	Syl-Coat, 8 fl oz/100 gal	x x x x x x x
5	Microthiol Disperss, 5lb	x x
	Luna Exp, 8.6 fl oz	x x x x
	Syl-Coat, 6.4 fl oz/100 gal	x x x x
6	Microthiol Disperss, 5lb	x x
	Luna Tranquility, 12 fl oz	x x x x x x x
	Syl-Coat, 6.4 fl oz/100 gal	x x x x x x x
7	Microthiol Disperss, 5lb	x x
	Luna Tranquility, 16 fl oz	x x x x x x x
	Syl-Coat, 6.4 fl oz/100 gal	x x x x x x x
8	Microthiol Disperss, 5lb	x x
	Luna Exp, 8.6 fl oz	x
	Flint, 3 oz	x
	Sonata, 3 qt	x
	Luna Tranquility, 16 fl oz	x
	Serenade Optimum, 16 oz	x
	Quintec, 4 fl oz	x
	Syl-Coat, 6.4 fl oz/100 gal	x x x x x x
9	Torino, 3.4 fl oz	x x x x
	Quintec, 4 fl oz	x x x x
	Syl-Coat, 8 fl oz/100 gal	x x x x x x
10	Inspire Super, 20 fl oz	x x x x
	Quintec, 4 fl oz	x x x x
	Syl-Coat 8 fl oz/100 gal	x x x x x x
11	Quintec, 6.6 fl oz	x x x x x
	Syl-Coat, 8 fl oz/100 gal	x x x x x
12	Luna Exp, 8 fl oz	x x x
	Quintec, 6.6 fl oz	x x x
	Syl-Coat, 8 fl oz/100 gal	x x x x x
13	Pristine, 12.5 oz	x x x
	Quintec, 6.6 fl oz	x x
	Syl-Coat, 8 fl oz/100 gal	x x x x
14	Viticure, 6 fl oz	x x x x
	Quintec, 4 fl oz	x x x
	Vintre, 0.25% (v/v)	x x x x x x
15	Viticure, 8 fl oz	x x x x
	Quintec, 6.6 fl oz	x x x
	Vintre, 0.25% (v/v)	x x x x x x
16	Viticure, 6 fl oz	x x x x
	Pristine, 10.5 oz	x x x
	Vintre, 0.25% (v/v)	x x x x x x
17	Viticure, 8 fl oz	x x x x
	Pristine, 12.5 oz	x x x
	Vintre, 0.25% (v/v)	x x x x x x
18	Viticure, 6 fl oz	x x x x
	Vivando, 10.3 fl oz	x x x
	Vintre, 0.25% (v/v)	x x x x x x
19	Viticure, 8 fl oz	x x x x
	Vivando, 15.4 fl oz	x x x
	Vintre, 0.25% (v/v)	x x x x x x
20	Quintec, 4 fl oz	x x
	Rhyme, 5 fl oz	x x
	Pristine, 12.5 oz	x x
	Elevate, 16 oz	x
	Dyneamic, 0.25% (v/v)	x x x x x x x
21	Quintec, 4 fl oz	x x
	Rhyme, 5 fl oz	x x
	Fracture, 18.3 fl oz	x x
	Elevate, 16 oz	x
	Dyneamic, 0.25% (v/v)	x x x x x x x
22	Quintec, 4 fl oz	x x
	Rhyme, 5 fl oz	x x
	Fracture, 20.5 fl oz	x x
	Elevate, 16 oz	x
	Dyneamic, 0.25% (v/v)	x x x x x x x
23	Rhyme, 5 fl oz	x x
	Fracture, 18.3 fl oz	x x
	Quintec, 4 fl oz	x x
	Elevate, 16 oz	x
	Dyneamic, 0.25% (v/v)	x x x x x x x
24	Rhyme, 5 fl oz	x x
	Fracture, 20.5 fl oz	x x
	Quintec, 4 fl oz	x x
	Elevate, 16 oz	x
	Dyneamic, 0.25% (v/v)	x x x x x x x

DISEASE EVALUATION

Trial II

Trial II (Row 137-133)

Trt No.	Treatment	March	April	May	June	July
		Dates product applied				
1	Unsprayed control					
2	Viathon, 2 pt		x	x x	x x	x
3	Luna Exp, 8 fl oz		x		x	
	Inspire Super, 20 fl oz			x	x	
	Quintec, 5.0 fl oz			x		x
	Syl-Coat, 4 fl oz/100 gal		x	x x	x x	x
4	Aprovia, 8.5 fl oz		x		x	
	Inspire Super, 20 fl oz			x	x	
	Quintec, 5.0 fl oz			x		x
	Syl-Coat, 4 fl oz/100 gal		x	x x	x x	x
5	Aprovia, 10.5 fl oz		x		x	
	Inspire Super, 20 fl oz			x	x	
	Quintec, 5.0 fl oz			x		x
	Syl-Coat, 4 fl oz/100 gal		x	x x	x x	x
6	Inspire Super, 20 fl oz		x	x	x	
	Quintec, 5 fl oz			x	x	x
	Syl-Coat, 4 fl oz/100 gal		x	x x	x x	x
7	Topguard EQ, 5 fl oz		x x	x x	x x	x
8	Topguard EQ, 6 fl oz		x x	x x	x x	x
9	Rhyme, 5 fl oz		x x	x x	x x	x
10	Rhyme, 5 fl oz		x x	x x	x x	x
	Dyneamic, 0.25% (v/v)		x x	x x	x x	x
11	Luna Exp, 8 fl oz		x	x x	x x	x
	Syl-Coat, 4 fl oz/100 gal		x	x x	x x	x
12	SA19, 5.13 fl oz		x	x x	x x	x
	Syl-Coat, 4 fl oz/100 gal		x	x x	x x	x
13	SA29, 13.7 fl oz		x	x x	x x	x
	Syl-Coat, 4 fl oz/100 gal		x	x x	x x	x
14	Mettle, 5 fl oz		x	x	x	x
	Torino SC, 3.4 fl oz		x	x	x	
	Dyneamic, 0.25% (v/v)		x x	x x	x x	x
15	Mettle, 5 fl oz		x		x	
	Pristine, 12.5 oz		x			
	Torino, 3.4 fl oz			x		x
	Quintec, 6 fl oz				x	
	Dyneamic, 0.25% (v/v)		x x	x	x x	x
16	GWN-10250, 24 fl oz		x x	x x	x x	
	Dyneamic, 0.25% (v/v)		x x	x x	x x	
17	Rally, 5 oz		x	x	x	x
	Quintec, 4 fl oz		x	x	x	
	Dyneamic, 0.25% (v/v)		x x	x x	x x	x
18	Rally, 5 oz		x	x	x	x
	Quintec, 4 fl oz		x	x	x	
	OR-099, 16 fl oz		x	x		
	Dyneamic, 0.25% (v/v)		x x	x x	x x	x
19	Rally, 5 oz		x	x	x	x
	Quintec, 4 fl oz		x	x	x	
	OR-099, 32 fl oz		x	x		
	Dyneamic, 0.25% (v/v)		x x	x x	x x	x
20	PSG, 1% (v/v)		x	x x	x x	x
	Taegro, 5.2 oz		x	x	x x x	x
	PSG, 0.5% (v/v)		x	x	x x x	x
21	PSG, 1% (v/v)		x x			
	Rhyme, 5 fl oz			x	x	
	Quintec, 4 fl oz			x	x	
	Sovran, 4 oz				x	x
	PSG, 0.5% (v/v)			x x	x x x	x
22	Rhyme, 5 fl oz		x	x		x
	Quintec, 4 fl oz		x		x	
	Sovran, 4 oz			x	x	
	PSG, 1% (v/v)		x x	x x	x x	x
23	Rhyme, 5 fl oz		x	x		x
	Quintec, 4 fl oz		x		x	
	Sovran, 4 oz			x	x	
	Syl-Coat, 4 fl oz/100 gal		x x	x x	x x	x
24	Rhyme, 5 fl oz		x		x	
	Quintec, 4 fl oz			x		x
	Sovran, 4 oz			x		
	PSG, 1% (v/v)		x	x x	x	x
25	Pyriofenone, 5 fl oz		x x	x x	x x	x
26	Pyriofenone, 5 fl oz		x	x x	x	x

DISEASE EVALUATION

Trial III (133-130)

Trt No.	Treatment	March	April				May				June				July			
		7-Mar	28-Mar	4-Apr	11-Apr	18-Apr	25-Apr	2-May	9-May	16-May	23-May	30-May	6-Jun	13-Jun	20-Jun	27-Jun	4-Jul	11-Jul	18-Jul
1	Unsprayed control																		
2	Vigor Cal, 2 qt		x		x		x		x		x		x		x		x		
3	Vigor Cal, 2 qt		x		x		x		x		x		x		x		x		
	Vigor Sea Cal, 2 qt		x		x		x		x		x		x		x		x		
4	Sysstem Cal, 2 qt		x		x		x		x		x		x		x		x		
5	Sysstem Cal, 2 qt		x		x		x		x		x		x		x		x		
	Dyneamic, 1% (v/v)		x		x		x		x		x		x		x		x		
6	Sysstem Sea Cal, 2 qt		x		x		x		x		x		x		x		x		
7	Vigor Sea Cal, 4 qt		x		x		x		x		x		x		x		x		
8	GOP-1 Bran, 7oz/25 gal		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	GOP-1 Oil, 32 oz/25 gal		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
9	WXF-15001, 1.75% (v/v)		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
10	WXF-15002, 0.5% (v/v)		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
11	K-PHITE 7LP, 3 qt		x		x		x		x		x		x		x		x		
	Luna Experience, 3 qt						x												
	Quintec, 6.6 fl oz												x						
	Tactic, 6 oz/100 gal		x		x		x		x		x		x		x		x		
12	K-PHITE 7LP, 3 qt		x		x		x		x		x		x		x		x		
	Pristine, 12.5 oz				x										x				
	Quintec, 6.6 fl oz								x										
	Latron, 10 oz/100 gal		x		x		x		x		x		x		x		x		
13	REX, 1 gal		x		x		x						x		x		x		
	REX, 2 gal (1 rescue app)								x										
14	LSU, 0.5 gal		x		x		x						x		x		x		
	LSU, 2 gal (1 rescue app)								x										
15	LSU, 1 gal		x		x		x						x		x		x		
	LSU, 2 gal (1 rescue app)								x										
16	AG Copp 75, 60 g/100 L				x		x		x		x		x		x				
	Microthiol Disperss, 5 lb		x	x	x		x		x		x		x		x				
	HML32, 1.25 L/100 L				x		x		x		x		x		x				
17	Inspire Super, 10.5 fl oz		x									x							
	JMS Stylet Oil, 0.5% (v/v)		x									x							
	Luna Experience, 6 fl oz						x								x				
	Flint, 2 oz								x								x		
	Dyneamic, 0.25% (v/v)						x		x						x		x		
18	Regalia, 2 qt		x	x		x	x		x		x	x	x	x	x		x		x
19	Regalia, 2 qt		x	x		x	x		x		x	x	x	x	x		x		x
	JMS Stylet Oil, 0.5% (v/v)		x	x		x	x		x		x	x	x	x	x		x		x
20	Regalia, 2 qt		x						x										
	JMS Stylet Oil, 0.5% (v/v)		x						x										
	Luna Experience, 6 fl oz			x							x						x		
	Flint, 2 oz						x							x					
	Dyneamic, 0.25% (v/v)			x			x				x			x			x		
21	Regalia, 2 qt		x												x				
	Inspire Super, 10.5 fl oz			x					x								x		
	JMS Stylet Oil, 0.5% (v/v)			x					x								x		
	Luna Experience, 6 fl oz						x					x							
	Dyneamic, 0.25% (v/v)						x					x							

DISEASE EVALUATION

E. Vine Management

During the application period, vines were irrigated by drip irrigation. Sucker shoots were removed the first week of May 2015. Leaf removal around the clusters was conducted on the last week of May until second week of Jun.

F. Data Collection and Statistics

Daily temperature, precipitation and Gubler-Thomas Risk Index values were computed and obtained from an Adcon weather station in the trial site. Overall temperature were mild throughout the season (Figure 1), four precipitation events were recorded on Apr 24, 25, May 18 and Jun 10 as 0.6, 3.8, 0.4 and 2 respectively (Figure 2). Powdery mildew incidence and severity were assessed in each plot by evaluating twenty five random clusters. Incidence was defined as the proportion of clusters in a plot having some living powdery mildew. Severity was determined by estimating the percentage of area of a cluster that were 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. Means comparisons were made using Student's t-test with α=0.05.

Phytotoxicity data were collected for all treatments (data not shown).

Figure 1. Daily temperature data from Apr 21 to Jul 21 2015.

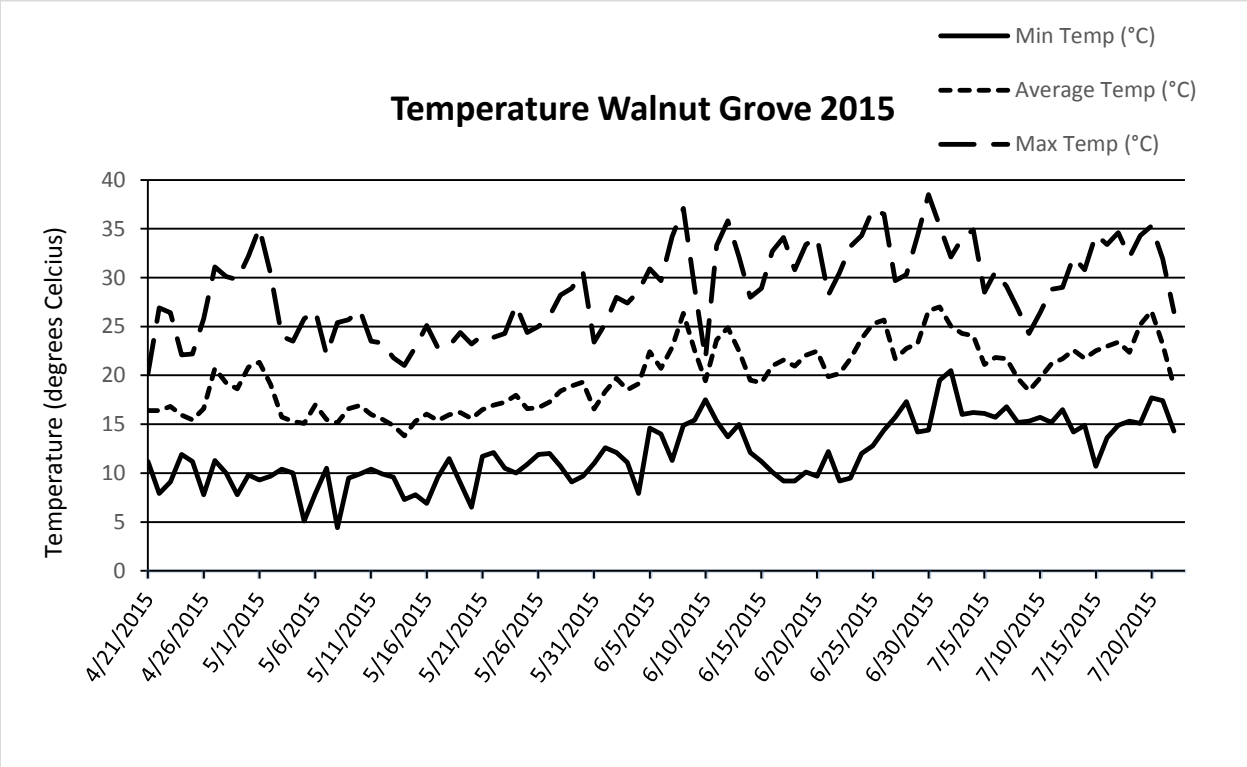


Figure 2. Daily precipitation data from Apr 21 to Jul 21 2015

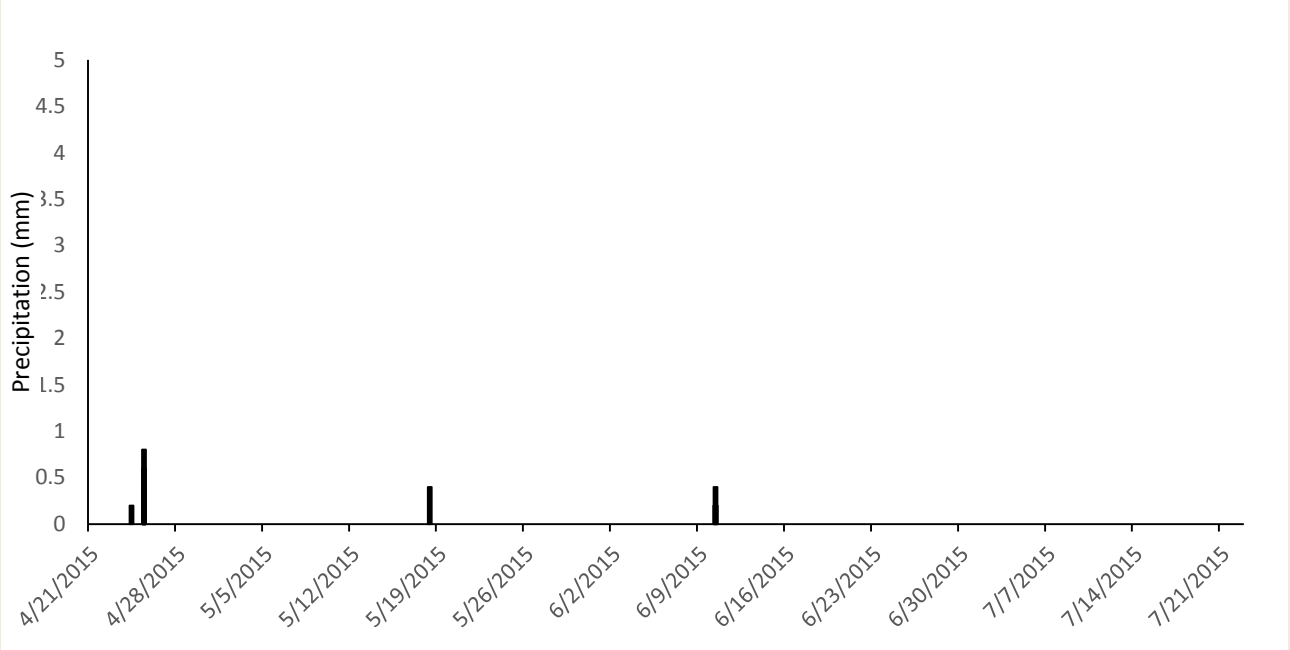


Figure 3. Thomas-Gubler Risk Index data from 21 Apr to 21 Jul. Red data points indicate risk index > 60 (high risk), yellow data points indicate risk index data between 30 and 60 (moderate risk) and green data points are values below 30 (no risk).

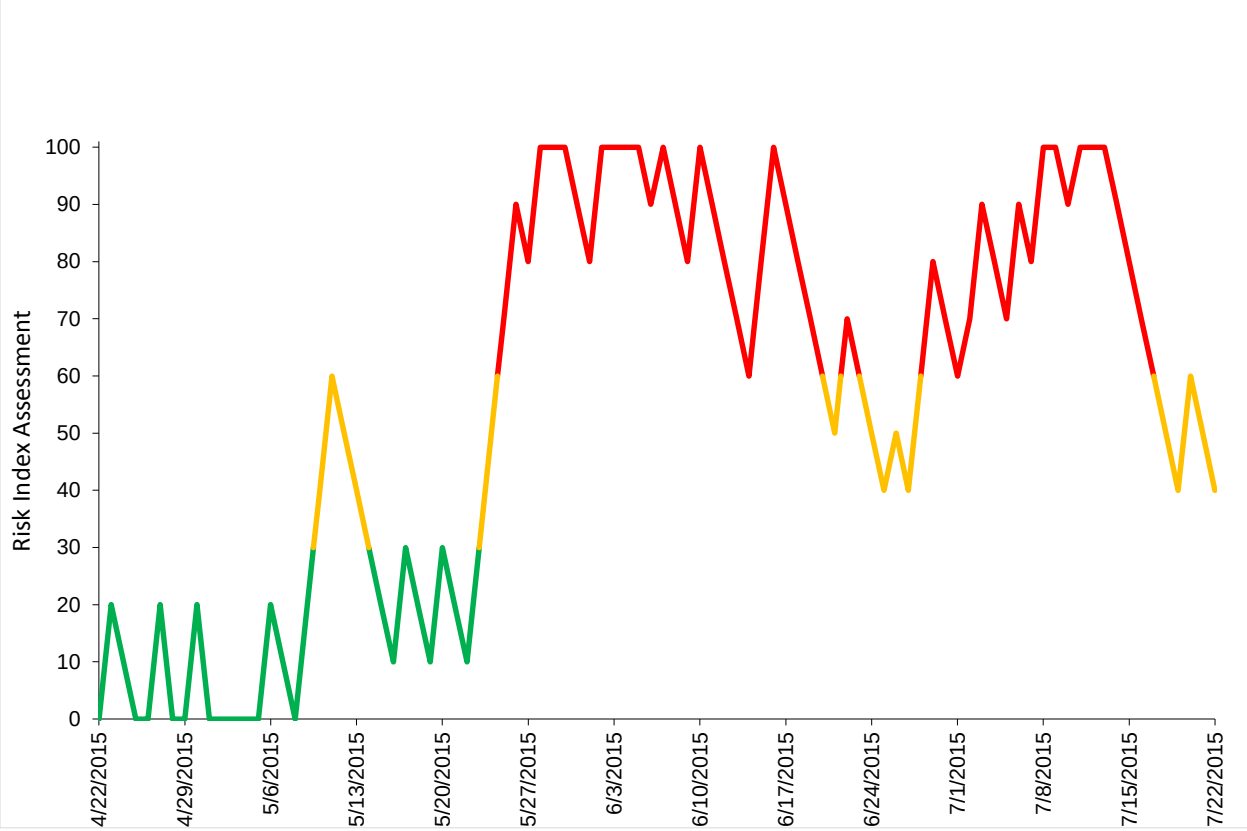
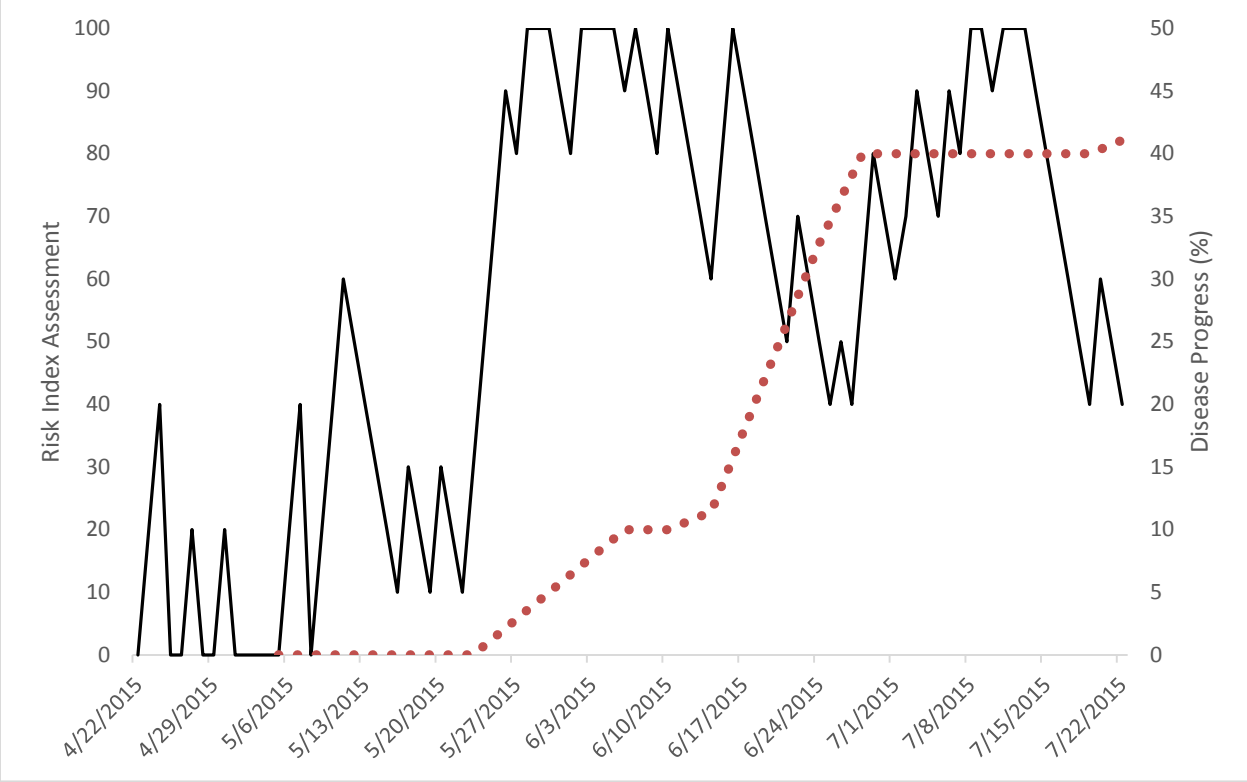


Figure 4. Risk index (solid line) and disease progress (%) (dotted curve).



Results

Table 1. Disease incidence and severity in trial I. 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 Student's t-test at α=0.05; alt = alternated with.

Treatment	Incidence (%)		Severity (%)	
(Quintec, 4 fl oz then Pristine, 12.5 oz then Rhyme, 5 fl oz then Pristine, 12.5 oz then Quintec, 4 fl oz then Rhyme, 5 fl oz then Elevate, 16 oz) + Dyneamic, 0.25% (v/v), 14d	0.00	e	0.000	c
Microthiol Disperss, 5 lbs, 7d (2x) thenLuna Tranquility, 12 fl oz + Syl-Coat, 6.4 fl oz/100 gal, 14d	1.60	e	0.016	c
(Vivando, 15.4 fl oz alt Pristine, 12.5 oz) + Syl-Coat, 8 fl oz/100 gal, 14d	2.40	e	0.024	c
Microthiol Disperss, 5 lbs, 7d (2x) then Luna Experience, 8.6 fl oz + Syl-Coat, 6.4 fl oz/100 gal, 21d	2.40	e	0.024	c
Microthiol Disperss, 5 lbs, 7d (2x) then Luna Tranquility, 16 fl oz + Syl-Coat, 6.4 fl oz/100 gal, 14d	3.20	e	0.032	c
(Vivando, 15.4 fl oz alt Pristine, 23 oz) + Syl-Coat, 8 fl oz/100 gal, 14d	3.20	e	0.032	c
Microthiol Disperss, 5 lbs, 7d (2x) then (Luna Experience, 8.6 fl oz then Flint, 3 oz then Sonata, 3 qt then Luna Tranquility, 16 fl oz then Serenade Optimum, 16 oz then Quintec, 4 fl oz) + Syl-Coat, 6.4 fl oz/100 gal, 14d	4.00	e	0.040	c
(Quintec, 4 fl oz then Fracture, 20.5 fl oz then Rhyme, 5 fl oz then Fracture, 20.5 fl oz then Quintec, 4 fl oz then Rhyme, 5 fl oz then Elevate, 16 oz) + Dyneamic, 0.25% (v/v), 14d	7.00	de	0.080	c
(Rhyme, 5 fl oz then Fracture, 18.3 fl oz then Quintec, 4 fl oz then Fracture, 18.3 fl oz then Rhyme, 5 fl oz then Quintec, 4 fl oz then Elevate, 16 oz) + Dyneamic, 0.25% (v/v), 14d	8.00	de	0.140	bc
(Vivando, 15.4 fl oz then Pristine, 12.5 oz then Quintec, 6.6 fl oz then Switch, 14 oz then Torino, 3.4 fl oz then Luna Tranquility, 16 fl oz) + Syl-Coat, 8 fl oz/100 gal, 14d	8.00	de	0.150	bc
(Viticure, 6 fl oz alt Vivando, 10.3 fl oz) + Vintre. 0.25% (v/v), 14d	11.20	de	0.152	c
(Viticure, 8 fl oz alt Pristine, 12.5 oz) + Vintre. 0.25% (v/v), 14d	9.60	de	0.160	c
(Viticure, 8 fl oz alt Vivando, 15.4 fl oz) + Vintre. 0.25% (v/v), 14d	11.20	de	0.224	c
(Luna Experience, 8 fl oz alt Quintec, 6.6 fl oz) + Syl-Coat, 8 fl oz/100 gal, 21d	6.00	e	0.240	bc
(Pristine, 12.5 oz alt Quintec, 6.6 fl oz) + Syl-Coat, 8 fl oz/100 gal, 21d	12.80	de	0.264	bc
(Inspire Super, 20 fl oz alt Quintec, 4 fl oz) + Syl-Coat, 8 fl oz/100 gal, 14d	12.80	de	0.296	bc
(Quintec, 4 fl oz then Fracture, 18.3 fl oz then Rhyme, 5 fl oz then Fracture, 18.3 fl oz then Quintec, 4 fl oz then Rhyme, 5 fl oz then Elevate, 16 oz) + Dyneamic, 0.25% (v/v), 14d	12.00	de	0.336	bc
(Torino, 3.4 fl oz alt Quintec, 4 fl oz) + Syl-Coat, 8 fl oz/100 gal, 14d	14.40	de	0.424	bc
(Viticure, 6 fl oz alt Quintec, 4 fl oz) + Vintre. 0.25% (v/v), 14d	21.60	cd	0.432	bc
(Viticure, 8 fl oz alt Quintec, 6.6 fl oz) + Vintre. 0.25% (v/v), 14d	30.40	c	0.512	bc
(Viticure, 6 fl oz alt Pristine, 10.5 oz) + Vintre. 0.25% (v/v), 14d	15.20	de	0.568	bc
(Rhyme, 5 fl oz then Fracture, 20.5 fl oz then Quintec, 4 fl oz then Fracture, 20.5 fl oz then Rhyme, 5 fl oz then Quintec, 4 fl oz then Elevate, 16 oz) + Dyneamic, 0.25% (v/v), 14d	30.40	c	0.720	bc
Quintec, 6.6 fl oz + Syl-Coat, 8 fl oz/100 gal, 21d	69.60	b	2.568	b
Untreated Control	94.00	a	32.670	a

Table 2. Disease incidence and severity in trial II. 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 Student's t-test at α=0.05; alt = alternated with.

Treatment	Incidence (%)		Severity (%)	
Luna Experience, 8 fl oz + Syl-Coat, 4 fl oz/100 gal, 14-21d (RI)	2.00	g	0.03	c
Rhyme, 5 fl oz, 14d	1.60	g	0.032	c
(Aprovia, 8.5 fl oz then Inspire Super, 20 fl oz then Quintec, 5 fl oz) +Syl-Coat 4 fl/100 gal) (2x), 14-21d (RI)	5.00	fg	0.050	c
(Aprovia, 10.5 fl oz then Inspire Super, 20 fl oz then Quintec, 5 fl oz) + Syl-Coat, 4 fl oz/100 gal) (2x), 14-21d (RI)	4.80	fg	0.112	c
Rhyme, 5 fl oz + Dyneamic, 0.25% (v/v), 14d	5.60	fg	0.136	c
Topguard, 5 fl oz, 14d	11.20	efg	0.192	c
(Mettle, 5 fl oz then Pristine, 12.5 oz then Torino, 3.4 fl oz then Mettle, 5 fl oz then Quintec, 6 fl oz then Torino, 3.4 fl oz) + Dyneamic, 0.25% (v/v), 14-21d	6.40	fg	0.192	c
SA19, 5.13 fl oz + Syl-Coat, 4 fl oz/100 gal, 14-21d (RI)	8.00	fg	0.200	c
(Rally, 5 oz alt Quintec, 4 fl oz) + Dyneamic, 0.25% (v/v), 14d	8.00	fg	0.210	c
(Luna Experience, 8 fl oz then Inspire Super, 20 fl oz then Quintec, 5 fl oz) + Syl-Coat, 4 fl oz/100 gal) (2x), 14-21d (RI)	7.00	fg	0.220	c
Pyriofenone, 5 fl oz, 14d	5.60	fg	0.232	c
SA29, 13.7 fl oz + Syl-Coat, 4 fl oz/100 gal, 14-21d (RI)	12.80	efg	0.256	c
GWN-10250, 24 fl oz + Dyneamic, 0.25% (v/v), 14d	10.40	efg	0.272	c
(Rhyme, 5 fl oz then Quintec, 4 fl oz then Sovran, 4 oz) + Syl-Coat, 4 fl oz/100 gal) (2x) then Rhyme, 5 fl oz + Syl-Coat, 4 fl oz/100 gal, 14d	8.80	fg	0.296	c
Pyriofenone, 5 fl oz, 21d	12.00	efg	0.304	c
(Mettle, 5 fl oz alt Torino, 3.4 fl oz) +Dyneamic, 0.25% (v/v), 14d	8.80	ef	0.328	c
Topguard, 6 fl oz, 14d	12.00	efg	0.360	c
PSG (2x), 1% (v/v), 10d then ((Rhyme, 5 fl oz then Quintec, 4 fl oz then Sovran, 4 oz) + PSG, 0.5% (v/v)) (2x), 14d	12.00	efg	0.460	c
(Inspire Super, 20 fl oz alt Quintec, 5 fl oz) + Syl-Coat, 4 fl/100 gal, 14-21 (RI)	14.40	efg	0.472	c
(Rally, 5 oz alt Quintec, 4 fl oz) + Dyneamic, 0.25% (v/v), 14d, OR-099, 16 fl oz (1st and 4th week)	20.80	def	0.816	c
(Rhyme 5 fl oz then Quintec 4 fl oz then Sovran 4 oz) + PSG, 1% (v/v)) (2x) then Rhyme, 5 fl oz + PSG, 1% (v/v), 14d	26.40	cde	1.688	bc
(Rhyme, 5 fl oz then Quintec, 4 fl oz then Sovran, 4 oz) + PSG, 1% (v/v) then (Rhyme, 5 fl oz then Quintec, 4 fl oz) + PSG, 1% (v/v), 21d	36.00	cd	1.768	bc
PSG, 1% (v/v), 7-10d (RI) alt Taegro, 5.2 oz + PSG, 0.5% (v/v), 7-14d (RI)	32.80	cd	2.096	bc
(Rally, 5 oz alt Quintec, 4 fl oz) + Dyneamic, 0.25% (v/v), 14d, OR-099, 32 fl oz (1st and 4th week)	39.20	bc	2.264	bc
Viathon, 2 pts, 14-21 (RI)	53.60	b	4.816	b
Untreated Control	89.60	a	20.408	a

Table 3. Disease incidence and severity in trial III. 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 Student's t-test at α=0.05; alt = alternated with.

Treatment	Incidence (%)		Severity (%)	
Inspire Super, 10.5 fl oz + JMS Stylet Oil, 0.5% (v/v) then (Luna Experience, 6 fl oz then Flint, 2 oz) + Dyneamic, 0.25% (v/v), 14-21d (RI)	0.00	f	0.000	de
Regalia, 2 qts + JMS Stylet Oil, 0.5% (v/v) then (Luna Experience, 6 fl oz then Flint, 2 oz) + Dyneamic, 0.25% (v/v), 7-10d (RI) or 14-21d (RI)	0.80	f	0.008	e
(K-PHITE 7LP (2x), 3qts then K-PHITE 7LP, 3 qts + Luna Experience, 8 fl oz then K-PHITE 7LP, 3 qts then K-PHITE 7LP, 3 qts + Quintec, 6.6 fl oz then K-PHITE 7LP (2x), 3 qts)) + Tactic, 6 fl oz/100 gal, 14d	4.80	ef	0.120	e
Regalia, 2 qts then Inspire Super, 10.5 fl oz + JMS Stylet Oil, 0.5% (v/v) then Luna Experience, 6 fl oz + Dyneamic, 0.25% (v/v) then Inspire Super, 10.5 fl oz + JMS Stylet Oil, 0.5% (v/v) then Luna Experience, 6 fl oz + Dyneamic, 0.25% (v/v) then Regalia, 2 qts, 7-10d or 14-21d (RI)	5.60	ef	0.152	e
(K-PHITE 7LP, 3qts then K-PHITE 7LP, 3 qts + Pristine, 12.5 oz then K-PHITE 7LP, 3 qts then K-PHITE 7LP, 3 qts + Quintec, 6.6 fl oz then K-PHITE 7LP, 3 qts then K-PHITE 7LP, 3 qts + Pristine, 12.5 oz then K-PHITE 7LP, 3 qts) + Latron, 10 fl oz/100 gal, 14d	9.60	ef	0.296	e
LSU, 0.5 gal, 14d or 4-6in growth	18.40	ef	0.448	de
WXF-15001, 1.75% (v/v), 7d	10.40	ef	0.536	de
Microthiol Disperss (2x), 5 lb then (AG Copp 75, 60 g/100 L + Microthiol Disperss, 5 lb + HML32, 1.25 L/100 L) (7x), 10-14d (RI)	12.80	ef	0.560	de
WXF-15002, 0.5% (v/v), 7d	11.20	ef	0.600	de
Regalia, 2 qts + JMS Stylet Oil, 0.5% (v/v), 7-10d (RI)	16.00	ef	0.696	de
LSU, 1 gal, 14d or 4-6in shoot growth	19.20	ef	0.872	de
REX, 1 gal, 14d or 4-6in shoot growth	30.00	de	1.270	cde
Regalia, 2 qts, 7-10d (RI)	22.40	ef	1.280	de
Sysstem Cal, 2 qts + Dyneamic, 1% (v/v), 14d	47.20	cd	2.736	cde
Sysstem SeaCal, 2 qts, 14d	57.00	bc	3.560	bcde
Vigor SeaCal, 4 qts, 14d	52.00	cd	4.488	bcde
Vigor Cal, 2 qts, 14d	65.60	abc	4.704	bcde
GOP-1 Bran, 7 oz/25 gal + GOP-1 Oil, 32 fl oz/25 gal, 7d	56.00	bc	7.616	bcd
Vigor Cal, 2 qts + Vigor SeaCal, 2 qts, 14d	76.80	ab	8.528	bc
Sysstem Cal, 2 qts, 14d	77.60	ab	11.152	b
Untreated Control	83.20	a	21.640	a

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Appendix: Materials

Product	Active ingredient(s) and concentration	Manufacturer or distributor	Chemical class (after Adaskaveg et al. 2008)
AG Copp 75	cuprous oxide (75% copper)	American Chemet Corporation	inorganic (M1)
Aprovia	proprietary	N/A	proprietary
Dyne-Amic	polyalkyleneoxide modified polydimethylsiloxane, nonionic emulsifiers, methyl ester of C16-C18 fatty acids (99%)	Helena Chemical Co.	adjuvant
Elevate 50 WDG	fenhexamid (50%)	hydroxyanilide (17)	Arysta LifeScience
Flint	trifloxystrobin (50%)	Bayer CropScience	QoI (11)
Fracture	BLAD (20%)	FMC Corporation	plant extract
Fulvic Acid	proprietary	N/A	proprietary
GOP-1 Bran	proprietary	N/A	proprietary
GOP-1 Oil	proprietary	N/A	proprietary
GWN-10250	proprietary	N/A	proprietary
HML32	proprietary	N/A	proprietary
Inspire Super	difenoconazole (8.4%), cyprodinil (24.1%)	Syngenta Crop Protection, Inc.	DMI (3)/anilinopyrimidine (9)
JMS Stylet-Oil	paraffinic oil (97.1%)	JMS Flower Farms, Inc.	oil
K-PHITE 7LP	potassium phosphite (56%)	Plant Food Systems, Inc.	phosphonates
Latron B-1956	modified phthalic glycerol alkyd resin (77.0%)	Dow AgroSciences LLP	adjuvant
LSU (Lime Sulfur Ultra)	calcium polysulfide (28%)	Or-Cal, Inc.	mineral (M2)
Luna Experience	fluopyram (17.54%), tebuconazole (17.54%)	Bayer CropScience	SDHI (7)/DMI-triazole (3)
Luna Tranquility	fluopyram (11.3%) pyrimethanil (33.8%)	Bayer CropScience	SDHI (7)/AP (9)
Mettle 125 ME	tetraconazole (11.6%)	Gowan Co.	DMI-triazole (3)
Microthiol Disperss	sulfur (80%)	United Phosphorus Inc.	mineral (M2)
OR-099	proprietary	N/A	proprietary
Pristine	pyraclostrobin (12.8%) boscalid (25.2%)	BASF	SDHI (7)/QoI(11)
Purespray Green	low range oil	Petro-Canada	oil
Pyriofenone	proprietary	N/A	proprietary

Quintec	quinoxyfen (22.6%)	Dow AgroSciences LLC	quinoline (13)
Rally 40 WSP	myclobutanil (40%)	Dow AgroSciences LLC	DMI-triazole (3)
Regalia	extract of *Reynoutria sachalinensis* (5%)	Marrone Bio Innovations	plant extract
REX	calcium polysulfide (28%)	Or-Cal, Inc.	mineral (M2)
Rhyme	flutriafol (22.7%)	Cheminova	DMI-triazole (3)
SA19	proprietary	N/A	proprietary
SA29	proprietary	N/A	proprietary
Serenade Optimum	*Bacillus subtilis* QST 713 (26%)	Bayer CropScience	biological
Sonata	*Bacillus pumilus* QST 2808 (1.38%)	Bayer CropScience	biological
Sovran	kresoxim-methyl (50%)	Cheminova	QoI (11)
Switch	cyprodinil (37.5%), fludioxonil (25%)	Syngenta Crop Protection	anilinopyrimidine (9)/phenylpyrrole (12)
Syl-Coat	polyether-polymethylsiloxane-copolymer and Polyether (100%)	Wilbur-Ellis	adjuvant
Sysstem Cal	phosphoric acid (14%) calcium (4%) copper (0.25%)	Agro-K	inorganic salt
Sysstem SeaCal	phosphoric acid (14%) calcium (4%)	Agro-K	inorganic salt
Tactic	synthetic latex, 1,2-propanediol, Alcohol ethoxylate, silicone polyether copolymer (63.4%)	Loveland	adjuvant
Taegro 13 WP	*Bacillus subtilis* Strain FZB24 (13.0%)	Syngenta	biological
Topguard	flutriafol (11.8%)	Cheminova	DMI-triazole (3)
Torino SC	cyflufenamid (10%)	Gowan Co.	phenyl-acetamide (U6)
Viathon	potassium phosphite (49%), tebuconazole (3.3%)	Helena Chemical Co.	Phosphonates (33)/DMI-triazole (3)
Vigor Cal	calcium (5%)	Agro-K	inorganic salt
Vigor SeaCal	soluble potash (0.5%), calcium (5%)	Agro-K	inorganic salt
Vintre	alcohol ethoxylate (8.15%)	ORO Agri, Inc.	adjuvant
Viticure	triflumizole (42.14%)	Chemtura	DMI-imidazole (3)
Vivando	metrafenone (25.2%)	BASF	benzophenone (U6)
WXF-15001	proprietary	N/A	proprietary
WXF-15002	proprietary	N/A	proprietary

Appendix sources: (1) Adaskaveg, et al. 2012. Efficacy and timing of fungicides, bactericides and biologicals for deciduous tree fruit, nut, strawberry, and vine crops 2012, available at http://ucanr.edu/sites/plp/files/146650.pdf. (2) Gubler Lab field trials, available at http://plantpathology.ucdavis.edu/Cooperative_Extension/ (3) product-specific MSDS and/or labels.