

Grape powdery mildew fungicide Trial 1, 2006

Location	Herzog Ranch, near Courtland, Sacramento Co., California
Principle investigator	Doug Gubler, Ph.D.
Research associates	Ken Asay, Chris Janousek, Ph.D.
Cooperators	John, Cathy, and Randy Baranek, Tom Herzog
Crop	Grape, 'Chardonnay' variety
Disease	Powdery mildew (<i>Uncinula necator</i>)

1a. Trial layout and method

Objective	Efficacy of fungicides for control of powdery mildew		
Experimental design	Treatments consisted of applications to 3 vine plots, in a randomized complete block design, with 4 replicates.		
Application method	High pressure hand gun sprayer, backpack sprayers.		
Vine spacing	7 ft	Row spacing	11 ft
Treatment unit	3 vines	Treatment unit area	252 ft ²
Area/Treatment	924 ft ²	Area/Treatment	0.021 acres
Volume water/Acre	190 gal 240 gal 260 gal	Volume water/Treatment	4.0 gal 5.0 gal 5.5 gal
Application frequency	Variable	Evaluation stage	Veraison

1b. Experimental treatments

Trt no.	Flag	Materials	Applic- ations	Interval (days)	FP/Acre	FP/Treat- ment	Notes
1	W	Untreated control		none			
2	GKD	V-10118 .41EC	AB...	14	0.022 lb ai	5.9 ml	
3	YD	V-10118 .41EC	AB...	14	0.033 lb ai	8.7 ml	
4	P	Pristine 38WG	AB...	14	13.6 oz	8.25 g	
5	GS	Difenoconazole	AB...	14	3.0 fl oz	1.9 ml	
6	BS	Difenoconazole	AB...	14	4.4 fl oz	2.8 ml	
7	OKS	JMS Stylet Oil	AB...	14	0.55 %		
8	RKS	Quintec alt Rally	AC... BD...	14-21 RI	4.4 fl oz alt 4.4 oz	2.7 ml alt 2.6 g	
9	KD	Quintec alt Rally	AC... BD...	21-24 RI	5.5 fl oz alt 7.2 oz	3.4 ml alt 4.33 g	
10	PU	JMS Stylet Oil Foliar Supreme	A BC...	14	5.5 pt	54.7 ml	
11	YC	JMS Stylet Oil Foliar Supreme alt Quintec	A BD... CE...	14 17	5.5 pt alt 4.4 fl oz	54.7 ml alt 2.7ml	
12	KC	KeyPlex 350DP	AB...	10-14	1.1 qt	21.9 ml	
13	LG	KeyPlex 350DP	AB...	10-14	2.2 qt	43.8 ml	
14	RS	BAS 560 00F SC	AB...	14	11.1 fl oz	7.0 ml	

15	YS	BAS 560 00F SC alt (Pristine 38WG + Latron B-1956)	AC... BD...	14	11.1 fl oz alt (9.2 oz + 435 ml)	7.0 ml alt (5.5 g + 9.1ml)	
16	RKC	BAS 560 00F SC alt Sovran 50WG	AC... BD...	14	11.1 fl oz alt 5.2 oz	7.0 ml alt 3.15 g	
17	OD	Pristine 38WG + Latron B-1956	AB...	14	9.2 oz + 435 ml	5.5 g + 9.1 ml	
18	OS	Sulfur dust	AB...	14	5.5 lb	52.5 g	
19	GD	JMS Stylet Oil Bionatrol-M + Latron B-1956	A BC...	10	1.8 l + 435 ml	38 ml + 9.1 ml	
20	RD	JMS Stylet Oil BioNatrol-M + Latron B-1956	A BC...	14	1.8 l + 435 ml	38 ml + 9.1 ml	
21	YKC	JMS Stylet Oil BioNatrol-M + Latron B-1956	A BC...	10	2.4 l + 435 ml	50 ml + 9.1 ml	
22	RC	JMS Stylet Oil BioNatrol-M + Latron B-1956	A BC...	14	2.4 l + 435 l	50 ml + 9.1 ml	
23	GKC	(Elexa 4 + Silwet L-77) alt Flint	AC... BD...	7-14 RI 14-21 RI	(18 l + 215 ml) alt 2.2 oz	(380 ml 4.5 ml) 1.3 g	
24	OKD	(Elexa 4 + Silwet L-77) alt Flint	AC... BD...	7-14 RI 14-21 RI	(18 l + 215 l) alt 2.2 oz	380 ml 4.5 ml 1.3 g	
25	YRD	(Elexa 4 + Silwet L-77) alt Quintec	AC... BD...	7-14 RI 14-21 RI	(18 l + 215 l) alt 2.2 oz	380 ml 4.5 ml 2.7 ml	

Notes: 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. FP = formulated product; ai = active ingredient; alt= alternated with; RI= "risk index" (denotes that spray intervals may vary according to the Gubler-Thomas powdery mildew risk index).

1c. Fungicide information

Institution	Product	Active Ingredient(s)	Concentration(s)	Contact
Valent USA	V-10118 .41EC	unknown	5 %	Tom De Witt tom.dewitt@valent.com
	Pristine 38 WG	pyraclostrobin boscalid	12.8 % 25.2 %	
Syngenta	Difenoconazole	difenoconazole	25 %	David Vitolo david.vitolo@syngenta.com
	JMS Stylet Oil	mineral oil	99 %	
DowAgro	Quintec	quinoxifen	300 g/L	Jim Mueller jpmueller@dow.com
	Rally	myclobutanil	40 %	
WFS	Foliar Supreme	phosphoric acid soluble potash sulfur	16 % 10 % 30 %	Jerome Pier jpier@agriumretail.com
Morse Enterprises	KeyPlex 350DP	magnesium sulfur boron iron manganese molybdenum zinc	1.5 % 4 % 0.16 % 3.5 % 0.75 % 0.003 % 0.75 %	Hamed Doostdar Doostdar9@aol.com
BASF	BAS 560 00F SC	unknown	300 g ai/l	John Helm helmj@basf.com
NTS Research Inc.	Thiolux (Sulfur DF)	sulfur	80 %	Phil Grau philgrau@aol.com
	BioNatrol-M + Latron B-1956	soybean oil non-ionic surfactant	42 % 77 %	
Steve Whitesides	Elexa 4 + Silwet L-77 sticker	chitosan silicone surfactant	4 % 100 %	Steve Whitesides elexa4@msn.com

1d. Fungicide applications

Date	3 May 2006	4 May 2006	5 May 2006	11 May 2006	16 May 2006
Volume	190 gal/acre	190 gal/acre	190 gal/acre	190 gal/acre	190 gal/acre
1					
2			X		
3			X		
4			X		X
5			X		X
6			X		X
7			X		X
8			X		
9			X		
10			X		
11			X		
12			X		X
13			X		X
14			X		
15		X			
16		X			
17		X			
18			X		
19			X	X	
20			X		X
21			X	X	
22			X		X
23			X	X	
24			X	X	
25			X	X	

Date	18 May 2006	19 May 2006	24 May 2006	25 May 2006	26 May 2006
Volume	190 gal/acre	190 gal/acre	190 gal/acre	190 gal/acre	190 gal/acre
1					
2	X				
3					
4					
5					
6					
7					
8					X
9					X
10	X				
11	X				
12					
13					
14	X				
15		X			
16		X			
17		X			
18		X			
19			X		
20					
21					
22		X	X		
23				X	X
24				X	X
25				X	X

Date	31 May 2006	1 June 2006	2 June 2006	5 June 2006	9 June 2006
Volume	190 gal/acre	190 gal/acre	190 gal/acre	190 gal/acre	190 gal/acre
1					
2			X		
3			X		
4	X				
5	X				
6	X				
7		X			
8					X
9					
10			X		
11				X	
12				X	at 9 days
13				X	at 9 days
14			X		
15			X		
16			X		
17	X				
18			X		
19			X		
20	X				
21					
22	X		X		
23			X	41 ml Silwet L-77 sticker	X
24			X	41 ml, as above	X
25			X	41 ml, as above	X

Date	12 June 2006	14 June 2006	15 June 2006	21 June 2006	23 June 06
Stage	pea-sized fruits			pea-sized +	
Volume	240 gal/acre	190 gal/acre	190 gal/acre	190 gal/acre	190 gal/acre
1					
2		X			
3		X			
4		X			
5		X			
6		X			
7		X			
8					X
9			X		
10		X			
11	X				
12					
13					
14			X		
15		X			
16		X			
17		X			
18		X			
19	X			X	
20		X			
21		X		X	
22	X				X
23	X				X Elexa application
24	X				X Elexa application
25					X Elexa application

Date	28 June 2006	29 June 2006	30 June 2006	6 July 2006	11 July 2006
Stage	Small marble sized				
Volume	190 gal/acre	260 gal/acre	260 gal/acre	260 gal/acre	260 gal/acre
1					
2	X				
3	X				
4	X				
5	X				
6	X				
7	X				
8					X
9				X	
10		X	190 gal/acre		
11		X	190 gal/acre		
12		X			X
13		X			X
14	X				
15	X				
16	X				
17	X				
18		X	190 gal/acre		
19				X	X
20	X				
21				X	X
22					
23				X	
24				X	
25				X	

Date	12 July 2006	13 July 2006	14 July 2006	21 July 2006
Volume	260 gal/acre	260 gal/acre	260 gal/acre	260 gal/acre
1				
2	X			
3	X			
4	X			
5	X			
6	X			
7	X			
8				
9				
10	X			
11			X	
12				
13				
14	X			
15	X			
16		X		
17	X			
18		X		
19				
20	X			
21				
22	X			
23				X
24				X
25				X

Additional notes on fungicide applications:

Treatments 23-25 were sprayed with 45.4 ml of Silwet L-77 sticker until May 26th.

24-26 May: Most products applied at 88% of acreage rate.

June 28: Began manual thinning of vines. Completed thinning in about 1 week.

June 29: Water was increased from 190 gal/acre to 260 gal/acre.

June 29: Treatments 10, 11, and 18 were sprayed using 190 gal/acre to match the amount used on the 28th.

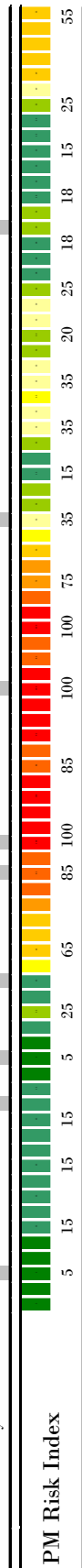
July 13: Treatment 8: 1 replicate in row 66 was accidentally sprayed with Sovran.

V-10118 .4l EC and Difenoconazole applications

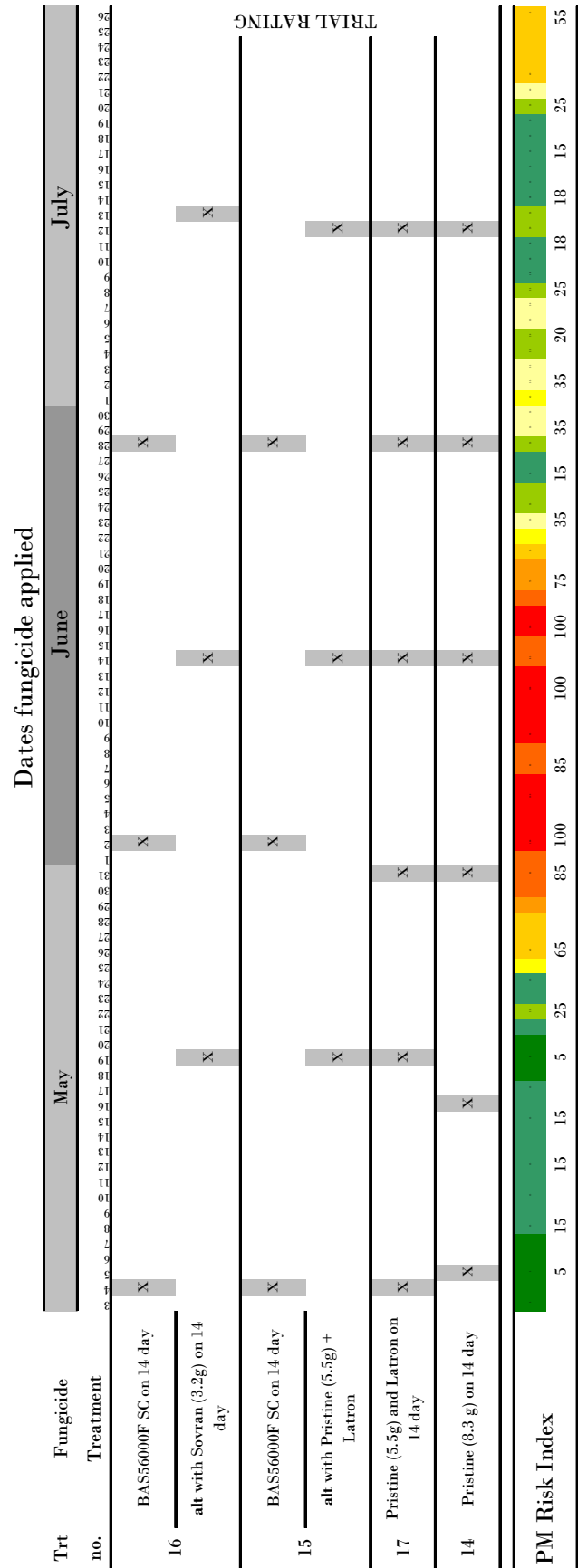
Trt no.	Fungicide Treatment	Dates fungicide applied						RATING
		May		June		July		
2	V-10118 at 0.022 lb ai/acre at 14 days	X		X	X		X	
3	V-10118 at 0.033 lb ai/acre at 14 days	X		X	X		X	
5	Difenoconazole, 3.0 fl oz/acre on 14 day	X		X	X		X	
6	Difenoconazole, 4.4 fl oz/acre on 14 day	X		X	X		X	

BioNatroI-M applications

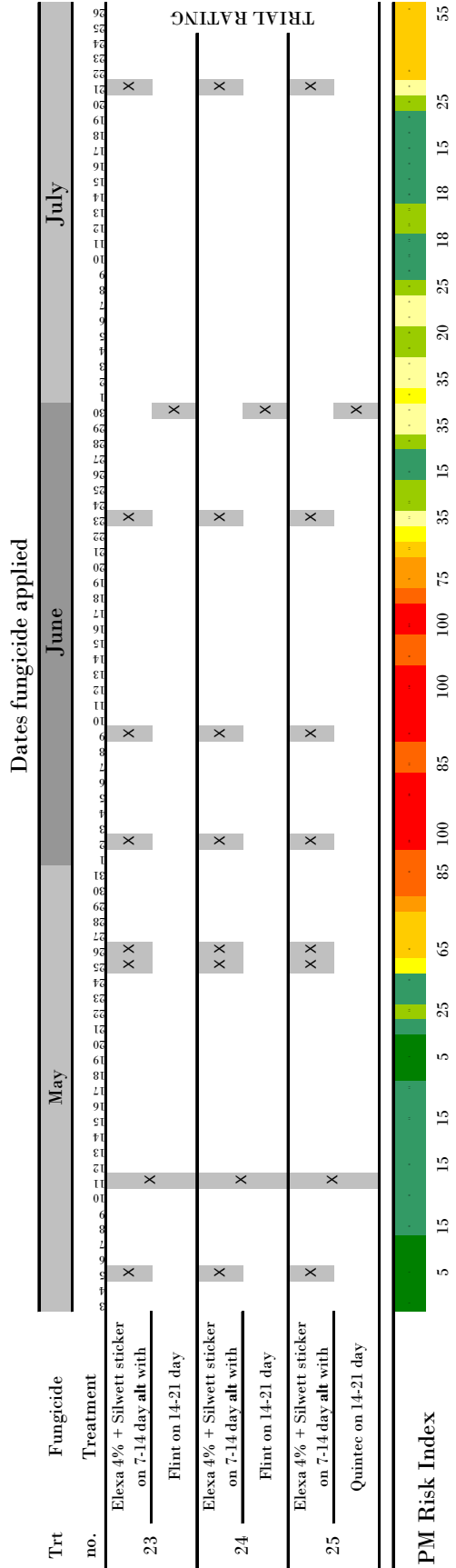
Trt no.	Fungicide Treatment	Dates fungicide applied						RATING
		May		June		July		
19	1.8 liters/acre on 10 day cycle	X	X	X	X		X	
20	1.8 liters/acre on 14 day cycle	X	X	X	X		X	
21	2.4 liters/acre on 10 day cycle	X	X	X	X		X	
22	2.4 liters/acre on 14 day cycle	X	X	X	X		X	



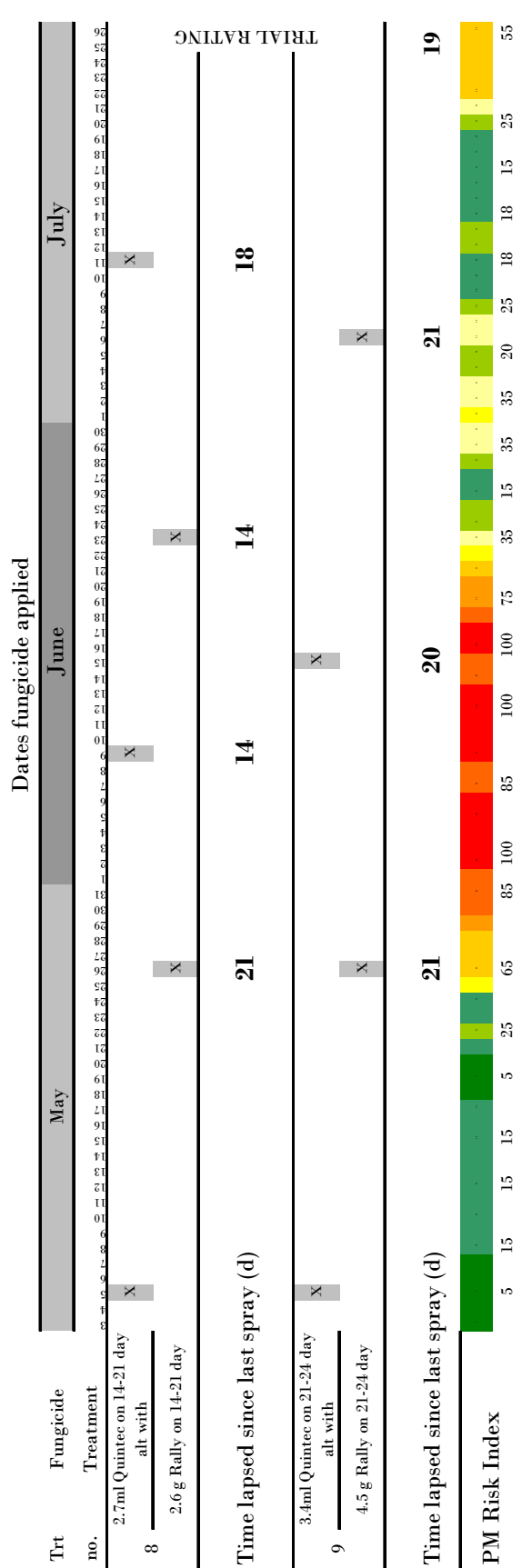
BAS56000 and Pristine applications



Elexa 4% applications



Rally and Quintec applications



1e. Plot map

Trial IV then Dirt Road

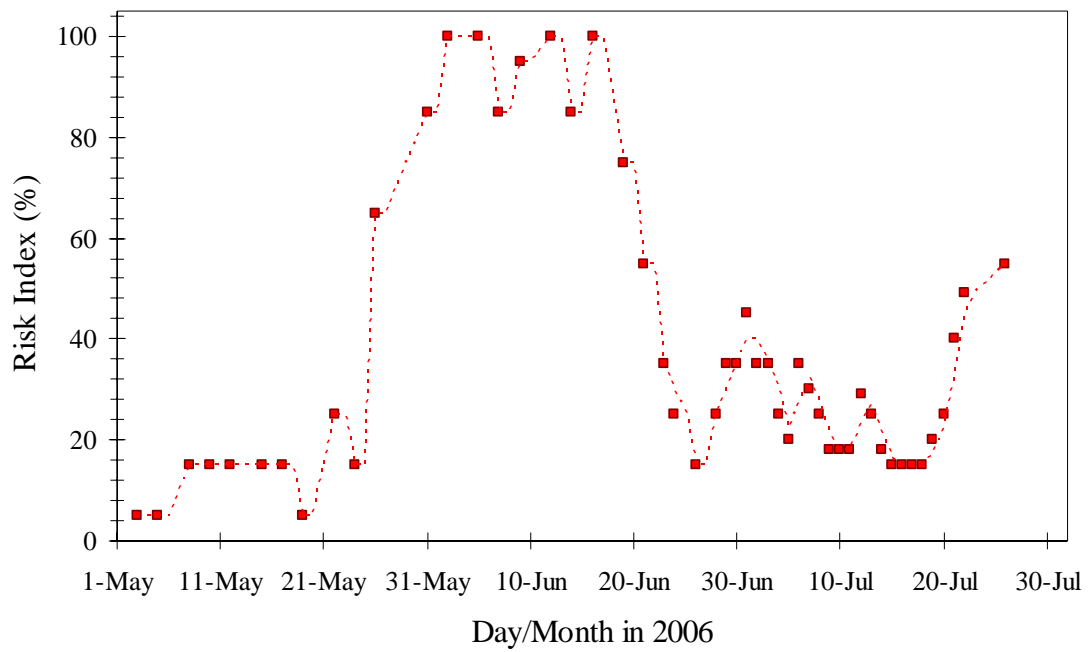
Row 73	Row 72	Row 71	Row 70	Row 69	Row 68	Row 67	Row 66
X	X	X	X	RS	X	GD	X
RS	X	X	YD	RKS	YS	P	GS
YS	LG	RC	OKD	RD	KS	GKD	RKC
RKC	KC	Pu	P	GKD	GS	YKC	YS
OD	YC	YRD	LG	RKC	YKC	KS	RKS
OS	Pu	YKC	RS	OD	P	YRD	RC
GD	KD	RD	RKC	GKC	YKS	OD	LG
RD	RKS	GKC	W	KD	OKD	YD	GKC
YKC	OKS	KD	KC	OKS	YD	W	OKD
RC	BS	GKD	YC	GD	BS	KD	Pu
GKC	GS	RKS	GD	KC	YC	KC	OKS
W	P	BS	OD	LG	W	RS	OS
OKD	YD	OKS	OS	RC	OS	YKS	YC
YRD	GKD	YS	GS	YRD	Pu	BS	RD
X	X	X	X	X	X	X	X
Block 4		Block 3		Block 2		Block 1	

Grass
Dirt Road
Waterway

X: vines not utilized in the experiment.

1f. Herzog Ranch 2006 PM risk index

All risk index data from: www.precisionagrilab.com/Diseasemaps



1g. Results

Table 1. Mean powdery mildew severity (\pm 1 S.E.) in trial 1 treatments. Non-significant groups of means are represented by the same letter at right (Tukey-Kramer test).

Treatment description	Disease severity	Significance groups (at $p < 0.05$)
Untreated control	98.5 (\pm 1.2)	a
Keyplex 350 DP, 10-14 days, 1.1 qt/acre	95.5 (\pm 3.4)	ab
Keyplex 350 DP, 10-14 days, 2.2 qt/acre	93.3 (\pm 4.3)	ab
Foliar Supreme, 14 days, 5.5 pt/acre	91.3 (\pm 4.3)	abc
Sulfur Dust (tank mixed), 14 days, 5.5 lbs/acre	90.2 (\pm 5.8)	abc
Quintec alt Rally, 21-24 days, 5.5 fl oz/acre	83.2 (\pm 4.6)	abc
BioNatrol-M + Latron B-1956, 10 days, 1.8 l/acre	81.2 (\pm 4.5)	abc
JMS Stylet Oil, 14 days, 3.6 l/acre	75.0 (\pm 4.1)	bcde
BioNatrol-M + Latron B-1956, 2.4 l/acre (trt no. 21)	73.8 (\pm 12.2)	bc
BioNatrol-M + Latron B-1956, 14 days, 1.8 l/acre	66.8 (\pm 7.9)	cdf
BioNatrol-M + Latron B-1956, 2.4 l/acre (trt no. 22)	39.6 (\pm 2.8)	efg
Elexa 4% + Silwet L-77 alt Flint, 7-14 alt 14-21	13.0 (\pm 6.1)	gh
BAS 56000F alt Sovran, 14 days	11.5 (\pm 4.3)	gh
Quintec alt Rally, 14-21 days, 4.4 fl oz/acre	10.4 (\pm 1.4)	gh
Elexa 4% + Silwet L-77 alt Flint, 7-14 alt 14-21	7.6 (\pm 2.4)	h
BAS 56000F, 14 days, 11.1 fl oz/acre	6.7 (\pm 1.2)	h
Foliar Supreme alt Quintec, 14 alt 17 days	6.7 (\pm 2.9)	h
Elexa 4% + Silwet L-77 alt Quintec, 7-14 alt 14-21 days	5.3 (\pm 2.3)	h
Pristine + Latron B-1956, 14 days, 9.2 oz/acre	3.3 (\pm 2.6)	h
V-10118, 14 days, 0.033 lb ai/acre	2.3 (\pm 1.4)	h
Difenoconazole, 14 days, 4.4 fl oz/acre	1.0 (\pm 0.7)	h
Difenoconazole, 14 days, 3.0 fl oz/acre	0.8 (\pm 0.3)	h
BAS 56000F alt Pristine + Latron B-1956, 14 days	0.8 (\pm 0.4)	h
Pristine, 14 days, 13.6 oz/acre	0.5 (\pm 0.3)	h
V-10118, 14 days, 0.022 ai/acre	0.1 (\pm 0.1)	h

1h. Conclusions

Most treatments in this trial had significantly lower powdery mildew severity compared with untreated control plots. However, the two Keyplex treatments, tank-mixed sulfur dust, Foliar Supreme, Quintec alternated with Rally at 21-24 days, and one of the BioNatrol-M treatments showed disease cover that was not statistically different from the control. V-10118, Difenoconazole, Pristine, Pristine with Latron B-1956 sticker, and BAS56000F alternated with Pristine were among the top performing products in the trial, with powdery mildew severity at <4%.