

Cooperative Research Project, Doug Gubler, U.C. Davis Dept. of Plant Pathology

Trial name.....	Grape powdery mildew fungicide Trial 1, 2003
Location.....	Courtland, Sacramento Co. (Herzog Ranch)
Investigators.....	Doug Gubler, 530.752.0304; Ken Dell, Eugene Erickson 752.4982
Cooperators.....	John Baranek, Tom Herzog
Crop.....	Grape 'Chardonnay'
Disease.....	Powdery mildew, <i>Uncinula necator</i>

Trial 1 layout and method

Objective.....	Efficacy of fungicides for control of powdery mildew		
Experimental design ...	Treatments are field applications to 4 vine plots, in a randomized complete block design, with 4 replications.		
Application method	high pressure hand gun sprayer		
Vine spacing	7'	Row spacing.....	12'
Treatment unit.....	4 vines	Treatment unit area	336 ft ²
Area/Treatment, sq ft...	1344	Area/Treatment, acre	0.0308539
Vol. Water/acre, gal.....	138	Vol. water/trt, gal.....	4.25
Apps timing	A=shoot growth, B = pre-bloom; C=bloom, D=berry set, E=preclose, F,G=veraison		
		Evaluation stage.....	1 week after final app.

Treatments protocol, Trial 1

#	Color	Sponsor	Materials	App code	Interval	Tol
1	W	Lab	Untreated			Y
2	B	lab-std	Sulfur 80DF Abound 2.08F	AB C-G	7-10d 14d	Y
3	G	Nufarm	Champ 2F + Micro Sulf Champ 2F	ABC D-G	7-10d 10-14d	Y
4	P	Nufarm	Champ 2F + Micro Sulf Rally 40W	ABC D-G	7-10d 14d	Y
5	BKC	lab	Sulfur 80DF Rally 40W	A1 A2-G	7-10d 14d	Y
6	GBKC	Bayer	Sulfur 80DF Flint 50WG Elite 45WP	A1-4 B alt/ C	7-10d 14d 14d	Y
7	GBKD	Bayer	Sulfur 80DF KWG 4168 300CS Flint 50WG Elite 45WP	A1-4 BD CF E	7-10d 14d 14d 14d	N
8	OBKD	Cerexagri	Microthiol Cuprofix Disperss 20 + Microthiol Disperss Cuprofix Disperss 20	A1 A2-C D-G	7-10d 7-10d 7-10d	Y
9	O / BK	Cerexagri	Microthiol TD-2463 + Microthiol Disperss TD-2463	A1 A2-C D-G	7-10d 7-10d 7-10d	Y
10	BD	Cerexagri	Microthiol TD-2463 + Microthiol Disperss + Silwet L-77 TD-2463 + Silwet L-77	A1 A2-C D-G	7-10d 7-10d 7-10d	Y

11	O	Arvesta	Sulfur 80DF Flint 50WG Elevate 50WG + Flint 50WG Sulfur 80DF	A1-4 B CD E-G	7-10d 14d 14d 7-10d	Y
12	PU	Arvesta	Sulfur 80DF Rally 40W Elevate 50WG + Rally 40W Sulfur 80DF	A1-4 B CD E-G	7-10d 14d 14d 7-10d	Y
13	BKD	BASF	Sulfur 80DF Pristine + Latron B-1956	A-B C-G	7-10d 21d	?
14	W / BK	BASF	Sulfur 80DF Pristine + Latron B-1956	A-B C-G	7-10d 21-28d RI	?
15	GD	JMS	Stylet Oil Stylet Oil	A-B C-G	10-14d RI	Y
16	W / G	JMS	Stylet Oil Stylet Oil + Abound 2.08F	A-B C-G	10-14d RI	Y
17	OC	Uniroyal	Sulfur 80DF Procure 50WS	A-B C-G	7-10d 14d	Y
18	OD	lab	Sulfur 80DF Chilean Sulfur	A-B C-G	7-10d 7-10d	Y
19	W / O	Griffin	Kocide 2000 + Sulfur 80DF Rally 40W Rally 40W	A-C D E-G	7-10d 14d 14d	Y
20	YC	Griffin	Kocide 2000 + Sulfur 80DF Rally 40W Rally 40W	A-C D E-G	7-10d 14d 14d	Y
21	W / Y	Griffin	Kocide 101 + Sulfur 80DF Rally 40W Rally 40W	A-C D E-G	7-10d 14d 14d	Y
22	YBKC	Griffin	GX-569 + Sulfur 80DF Rally 40W Rally 40W	A-C D E-G	7-10d 14d 14d	Y
23	YBKD	lab	Flint 50WG Elite 45WP	A1 A2-G	10d 14d	Y
24	Y / BK	lab	KWG 4168 300CS Flint 50WG KWG 4168 300CS	A1 A2 A3-G	14d 14d 14d	N
25	PC	Rotem	Nutrol + Latron B-1956 Rally 40W	A1 alt/ A2,B	14d 14d	Y
26	BBKD	Rotem	Nutrol + Latron B-1956 Sulfur 80DF	A1-F alt/ A2-G	7-10d RI 7-10d	Y
27	L	Rotem	Nutrol + Latron B-1956 + Sulfur 80DF	A-G	7-10d RI	Y

28	Y	Rotem	Sulfur 80DF Nutrol + Latron B-1956 Rally 40W	A1 A2 alt/ A3	10d 7-14d RI 14d	Y
29	W/B	Lab	Sulfur 80DF Flint 50WG	A1 A2-G	7-10d 14d	Y
30	R	Lab	Water only + Latron B-1956	A-G		Y
31	BC		Untreated			Y

Notes:

1. Tol indicates whether all products in the treatment have an EPA tolerance for grapes, and the crop can be harvested.
2. A slash '/' in a sequence of materials means 'followed by'.

Materials list

Sponsor	Product	Active Ingr.	Conc.	Tol.	Mfr
Arvesta	Flint 50WG	Trifloxystrobin	50%	Y	Bayer
	Elevate 50WG	Fenhexamid	50%		Arvesta
	Rally 40W	Myclobutanil	40%	Y	DowAgro
	Sulfur 80DF	Sulfur	80%	Y	Wilbur-Ellis
BASF	Pristine	BAS516	38%	N	BASF
	Latron B-1956	Non-ionic surfactant		Y	DowAgro
	Sulfur 80DF	Sulfur	80%	Y	Wilbur-Ellis
Bayer	KWG 4168 300CS	Spiroxamine	300 g/L	N	Bayer
	Elite 45 WP	Tebuconazole	45%	Y	Bayer
	Flint 50 WG	Trifloxystrobin	50%	Y	Bayer
Cerexagri	Cuprofix Disperss 20	Copper	20%	Y	Cerexagri
	TD-2463	Copper	40%	Y	Cerexagri
	Microthiol	Sulfur			
	Microthiol Disperss	Sulfur	80%	Y	Cerexagri
	Silwet L-77	Sulfur	80%	Y	Cerexagri
		Silicone surfactant		Y	Loveland
Griffin	Kocide 2000 ProTech	Copper hydroxide	50%	N	Griffin
	Kocide 101 ProTech	Copper hydroxide	77%	N	Griffin
	GX-569			N	Griffin
	Rally 40W	Myclobutanil	40%	Y	DowAgro
	Sulfur 80DF	Sulfur	80%	Y	Wilbur-Ellis
JMS	Stylet Oil	Mineral oil	99%	Y	JMS
	Abound 2.08F	Azoxystrobin	300 g/L	Y	Syngenta
Nufarm	Champ 2F	Copper hydroxide	4.6lb/ga	Y	Nufarm
	Micro Sulf	Sulfur	80%	Y	Nufarm
Rotem BKG	Nutrol	MKP		Y	Nutrecology
Syngenta	Vangard 75WG	Cyprodinil	75%	Y	Syngenta
	Sulfur 80DF	Sulfur	80%	Y	Wilbur-Ellis
Uniroyal	Procure 50WS	Triflumizole	50%	Y	Uniroyal
	Sulfur 80DF	Sulfur	80%	Y	Wilbur-Ellis

Application schedule

Date App.# Stage Vol/trt Color	Trt#	4 Apr 03 A1 prebloom 4.25 gal		7 Apr 03 A1 prebloom 4.25 gal		14 Apr 03 A2 Prebloom 4.25 gal		16 Apr 03 A2 Prebloom 4.25 gal	
			FP/trt		FP/trt		FP/trt		FP/trt
W	1	----		----		----			
B	2	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
G	3	Champ 2F Micro Sulf	29.2 mL 70 g			Champ 2F Micro Sulf	29.2 mL 70 g		
P	4	Champ 2F Micro Sulf	29.2 mL 70 g			Champ 2F Micro Sulf	29.2 mL 70 g		
BKC	5	Sulfur 80DF	56 g			Rally 40W	3.5 g		
GBKC	6	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
GBKD	7	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
OBKD	8			Microthiol	56 g	Cuprofix 20 Microthiol	42 g 56 g		
O / BK	9			Microthiol	56 g	TD-2463 Microthiol	42 g 28 g		
BD	10			Microthiol	56 g	TD-2463 Microthiol Silwet L-77	42 g 28 g 5 mL		
O	11			Sulfur 80DF	56 g	Sulfur 80DF	56 g		
PU	12	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
BKD	13	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
W /BK	14	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
GD	15	Stylet Oil	161 mL			Stylet Oil	161 mL		
W / G	16	Stylet Oil	161 mL			Stylet Oil	161 mL		
OC	17	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
OD	18	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
W / O	19	Kocide 2000 Sulfur 80DF	21 g 70 g			Kocide 2000 Sulfur 80DF	21 g 70 g		
YC	20	Kocide 2000 Sulfur 80DF	42 g 70 g			Kocide 2000 Sulfur 80DF	42 g 70 g		
W / Y	21	Kocide 101 Sulfur 80DF	28 g 70 g			Kocide 101 Sulfur 80DF	28 g 70 g		
YBKC	22	GX-569 Sulfur 80DF	11.6 g 70 g			GX-569 Sulfur 80DF	11.6 g 70 g		
YBKD	23	Flint 50WG	1.3 g			Elite 45WP	3.5 g		
Y /BK	24	KWG 4168	16.4 mL			Flint 50WG	1.3 g		
PC	25	Nutrol	140 g			Rally 40W	3.5 g		
BBKD	26	Nutrol	140 g			Sulfur 80DF	56 g		
L	27	Nutrol Sulfur 80DF	98 g 21 g					Nutrol Sulfur 80DF	98 g 21 g
Y	28			Sulfur 80DF	56 g			Nutrol Silwet L-77	140 g 5 mL
W / B	29	Sulfur 80DF	56 g			Flint 50WG	1.75 g		
R	30			Water Latron B-1956	5 MI	Water Latron B-1956	5 mL		
BC	31	-----		-----		-----		-----	

Date App.# Stage Vol/trt Color	Trt#	25 Apr 03 A3 Pre-bloom 4.25 gal	FP/trt	29 Apr 03 A3 Pre-bloom 4.25 gal	FP/trt	5 May 03 A4 BBCH 57 4.25 gal	FP/trt	13 May 03 B BBCH 57 4.25 gal	FP/trt
W	1	-----		-----		-----			
B	2	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
G	3	Champ 2F Micro Sulf	29.2 mL 70 g			Champ 2F Micro Sulf	29.2 mL 70 g		
P	4	Champ 2F Micro Sulf	29.2 mL 70 g			Champ 2F Micro Sulf	29.2 mL 70 g		
BKC	5			Rally 40W	3.5 g			Rally 40W	3.5 g
GBKC	6	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
GBKD	7	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
OBKD	8	Cuprofix 20 Microthiol	56 g 42 g			Cuprofix 20 Microthiol	56 g 42 g		
O / BK	9	TD -2463 Microthiol	28 g 42 g			TD -2463 Microthiol	28 g 42 g		
BD	10	TD-2463 Microthiol Silwet L-77	28 g 42 g 5 mL			TD-2463 Microthiol Silwet L-77	28 g 42 g 5 mL		
O	11	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
PU	12	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
BKD	13	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
W /BK	14	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
GD	15			Stylet Oil	161 mL			Stylet Oil	161 mL
W / G	16			Stylet Oil	161 mL			Stylet Oil	161 mL
OC	17	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
OD	18	Sulfur 80DF	56 g			Sulfur 80DF	56 g		
W / O	19	Kocide 2000 Sulfur 80DF	21 g 70 g			Kocide 2000 Sulfur 80DF	21 g 70 g		
YC	20	Kocide 2000 Sulfur 80DF	42 g 70 g			Kocide 2000 Sulfur 80DF	42 g 70 g		
W / Y	21	Kocide 101 Sulfur 80DF	28 g 70 g			Kocide 101 Sulfur 80DF	28 g 70 g		
YBKC	22	GX-569 Sulfur 80DF	11.6 g 70 g			GX-569 Sulfur 80DF	11.6 g 70 g		
YBKD	23			Elite 45WP	3.5 g			Elite 45WP	3.5 g
Y /BK	24			KWG 4168	16.4 mL			KWG 4168	16.4 mL
PC	25			Nutrol	140 g			Rally 40W	3.5 g
BBKD	26	Nutrol	140 g			Sulfur 80DF	70 g		
L	27	Nutrol Sulfur 80DF	98 g 21 g			Nutrol Sulfur 80DF	98 g 21 g		
Y	28			Rally 40W	3.5 g			Nutrol Latron B1956	140 g 5 mL
W / B	29			Flint 50WG	1.3 g			Flint 50WG	1.3 g
R	30	Water Latron B-1956	5 mL			Water Latron B-1956	5 mL		
BC	31	-----		-----		-----		-----	

Date App.# Stage Vol/trt Color	Trt#	16 May 03 B BBCH 57-61 4.25 gal	FP/trt	20 May 03 B BBCH 61 4.25 gal	FP/trt	23 May 03 C BBCH 66 4.25 gal	FP/trt	27 May 03 C BBCH 69-71 4.25 gal	FP/trt
W	1	-----							
B	2	Sulfur 80DF	56 g			Abound 2.08F	14.1 mL		
G	3	Champ 2F Micro Sulf	29.2 mL 70 g			Champ 2F Micro Sulf	29.2 mL 70 g		
P	4	Champ 2F Micro Sulf	29.2 mL 70 g			Champ 2F Micro Sulf	29.2 mL 70 g		
BKC	5							Rally 40W	3.5 g
GBKC	6	Flint 50WG	1.3 g						
GBKD	7	KWG 4168	16.4 mL						
OBKD	8	Cuprofix 20 Microthiol	56 g 42 g			Cuprofix 20 Microthiol	56 g 42 g		
O / BK	9	TD -2463 Microthiol	28 g 42 g			TD -2463 Microthiol	28 g 42 g		
BD	10	TD-2463 Microthiol Silwet L-77	28 g 42 g 5 mL			TD-2463 Microthiol Silwet L-77	28 g 42 g 5 mL		
O	11	Flint 50WG	1.8 g						
PU	12	Rally 40W	3.5 g						
BKD	13	Sulfur 80DF	56 g			Pristine Latron B-1956	9.2 g 3.7 mL		
W /BK	14	Sulfur 80DF	56 g			Pristine Latron B-1956	9.2 g 3.7 mL		
GD	15					Stylet Oil	242 mL		
W / G	16					Stylet Oil Abound 2.08F	161 mL 11 mL		
OC	17	Sulfur 80DF	56 g			Procure 50WS	5.25 g		
OD	18	Sulfur 80DF	56 g			Chile Sulfur	56 g		
W / O	19	Kocide 2000 Sulfur 80DF	21 g 70 g			Kocide 2000 Sulfur 80DF	21 g 70 g		
YC	20	Kocide 2000 Sulfur 80DF	42 g 70 g			Kocide 2000 Sulfur 80DF	42 g 70 g		
W / Y	21	Kocide 101 Sulfur 80DF	28 g 70 g			Kocide 101 Sulfur 80DF	28 g 70 g		
YBKC	22	GX-569 Sulfur 80DF	11.6 g 70 g			GX-569 Sulfur 80DF	11.6 g 70 g		
YBKD	23							Elite 45WP	3.5 g
Y /BK	24							KWG 4168	16.4 mL
PC	25							Nutrol Latron B-1956	140 g 5.0 mL
BBKD	26	Nutrol Latron B-1956	140 g 5 mL			Sulfur 80DF	70 g		
L	27	Nutrol Sulfur 80DF Latron B-1956	98 g 21 g 5 mL			Nutrol Sulfur 80DF Latron B-1956	98 g 21 g 5 mL		
Y	28			Rally 40W	3.5 g				
W / B	29							Flint 50WG	1.3 g
R	30	Water Latron B-1956	5 mL			Water Latron B-1956	5 mL		
BC	31	-----				-----			

Date App.# Stage Vol/trt Color	Trt#	30 May 03 C BBCH 69 4.25 gal	FP/trt	3 Jun 03 D BBCH 71 4.25 gal	FP/trt	5 Jun 03 D BBCH 71 4.25 gal	FP/trt	10 Jun 03 D BBCH 71-73 4.25 gal	FP/trt
W	1	-----		-----		-----		-----	
B	2					Abound 2.08F	14.1 mL		
G	3	Champ 2F Micro Sulf	29.2 mL 70 g			Champ 2F	29.2 mL		
P	4	Champ 2F Micro Sulf	29.2 mL 70 g			Rally 40W	3.5 g		
BKC	5							Rally 40W	3.5 g
GBKC	6	Elite 45WP	3.5 g						
GBKD	7	Flint 50WG	1.3 g						
OBKD	8	Cuprofix 20 Microthiol	56 g 42 g			Cuprofix 20	56 g		
O / BK	9	TD -2463 Microthiol	28 g 42 g			TD -2463	28 g		
BD	10	TD-2463 Microthiol Silwet L-77	28 g 42 g 5 mL			TD-2463 Silwet L-77	28 g 5 mL		
O	11	Elevate 50WG Flint 50WG	14 g 1.3 g						
PU	12	Elevate 50WG Rally 40W	14 g 2.6 g						
BKD	13								
W /BK	14								
GD	15			Stylet Oil	323 mL				
W / G	16			Stylet Oil Abound 2.08F	161 mL 11 mL				
OC	17					Procure 50WS	5.5 mL		
OD	18	Chile Sulfur	56 g			Chile Sulfur	56 g		
W / O	19	Kocide 2000 Sulfur 80DF	21 g 70 g			Rally 40W	3.5 g		
YC	20	Kocide 2000 Sulfur 80DF	42 g 70 g			Rally 40W	3.5 g		
W / Y	21	Kocide 101 Sulfur 80DF	28 g 70 g			Rally 40W	3.5 g		
YBKC	22	GX-569 Sulfur 80DF	11.6 g 70 g			Rally 40W	3.5 g		
YBKD	23							Elite 45WP	3.5 g
Y /BK	24							KWG 4168	16.4 mL
PC	25							Rally 40W	3.5 g
BBKD	26	Nutrol Latron B-1956	140 g 5 mL			Sulfur 80DF	70 g		
L	27	Nutrol Sulfur 80DF Latron B-1956	98 g 21 g 5 mL			Nutrol Sulfur 80DF Latron B-1956	98 g 21 g 5 mL		
Y	28			Nutrol Latron B-1956	140 g 5 mL			Rally 40W	3.5 g
W / B	29							Flint 50WG	1.3 g
R	30	Water Latron B-1956	5 mL			Water Latron B-1956	5 mL		
BC	31								

Date App.# Stage Vol/trt Color	Trt#	12 Jun D BBCH 71-73 4.25 gal	FP/trt	13 Jun BBCH 73 4.25 gal	FP/trt	16 Jun 4.25 gal	FP/trt	19 Jun E BBCH 77 4.25 gal	FP/trt
W	1	-----		-----		-----		-----	
B	2							About 2.08F	14.1 mL
G	3					Champ 2F	29.2 mL		
P	4							Rally 40W	3.5 g
BKC	5								
GBKC	6			Flint 50WG	1.3 g				
GBKD	7			KWG 4168	16.4 mL				
OBKD	8	Cuprofix 20	56 g					Cuprofix 20	56 g
O / BK	9	TD -2463	28 g					TD -2463	28 g
BD	10	TD-2463 Silwet L-77	28 g 5 mL					TD-2463 Silwet L-77	28 g 5 mL
O	11			Elevate 50WG Flint 50WG	14 g 1.3 g				
PU	12			Elevate 50WG Rally 40W	14 g 2.6 g				
BKD	13			Pristine Latron B-1956	9.2 g 3.7 mL				
W /BK	14			Pristine Latron B-1956	9.2 g 3.7 mL				
GD	15			Stylet Oil	323 mL				
W / G	16			Stylet Oil About 2.08F	161 mL 11 mL				
OC	17							Procure 50WS	5.5 mL
OD	18	Chile Sulfur	56 g					Chile Sulfur	56 g
W / O	19							Rally	5.4 g
YC	20							Rally	5.4 g
W / Y	21							Rally	5.4 g
YBKC	22							Rally	5.4 g
YBKD	23								
Y /BK	24								
PC	25								
BBKD	26	Nutrol Latron B-1956	140 g 5 mL					Sulfur 80DF	70 g
L	27	Nutrol Sulfur 80DF Latron B-1956	98 g 21 g 5 mL					Nutrol Sulfur 80DF Latron B-1956	98 g 21 g 5 mL
Y	28								
W / B	29								
R	30	Water Latron B-1956	5 mL					Water Latron B-1956	5 mL
BC	31								

Date App.# Stage Vol/trt Color	Trt#	23 Jun F BBCH 78 4.25 gal	FP/trt	24 Jun F BBCH 77-79 4.25 gal	FP/trt	26 Jun F BBCH 79 4.25 gal	FP/trt	27 Jun F BBCH 79 4.25 gal	FP/trt
W	1	-----		-----		-----		-----	
B	2								
G	3					Champ 2F	29.2 mL		
P	4								
BKC	5			Rally 40W	3.5 g				
GBKC	6							Elite 45WP	3.5 g
GBKD	7							Elite 45WP	3.5 g
OBKD	8					Cuprofix 20	56 g		
O / BK	9					TD -2463	28 g		
BD	10					TD-2463 Silwet L-77	28 g 5 mL		
O	11							Sulfur 80DF	56 g
PU	12							Sulfur 80DF	56 g
BKD	13								
W /BK	14								
GD	15	Stylet Oil	323 mL						
W / G	16	Stylet Oil Abound 2.08F	161 mL 11 mL						
OC	17								
OD	18					Chile Sulfur	56 g		
W / O	19								
YC	20								
W / Y	21								
YBKC	22								
YBKD	23			Elite 45WP	3.5 g				
Y /BK	24			KWG 4168	16.4 mL				
PC	25			Nutrol Latron B-1956	140 g 5.0 mL				
BBKD	26					Nutrol Latron B-1956	140 g 5 mL		
L	27					Nutrol Sulfur 80DF Latron B-1956	98 g 21 g 5 mL		
Y	28			Nutrol Latron B-1956	140 g 5.0 mL				
W / B	29			Flint 50WG	1.3 g				
R	30							Water Latron B-1956	5 mL
BC	31								

Date App.# Stage Vol/trt Color	Trt#	1 Jul F BBCH 79 4.25 gal	FP/trt	3 Jul F BBCH 79 4.25 gal	FP/trt	8 Jul F BBCH 79 4.25 gal	FP/trt	10 Jul F BBCH 79 4.25 gal	FP/trt
W	1	-----		-----		-----		-----	
B	2			Abound 2.08F	14.1 mL				
G	3							Champ 2F	29.2 mL
P	4			Rally 40W	3.5 g				
BKC	5					Rally 40W	3.5 g		
GBKC	6								
GBKD	7								
OBKD	8			Cuprofix 20	56 g				
O / BK	9			TD -2463	28 g				
BD	10			TD-2463 Silwet L-77	28 g 5 mL				
O	11			Sulfur 80DF	56 g				
PU	12			Sulfur 80DF	56 g				
BKD	13			Pristine Latron B-1956	9.2 g 3.7 mL				
W /BK	14								
GD	15			Stylet Oil	323 mL				
W / G	16			Stylet Oil Abound 2.08F	161 mL 11 mL				
OC	17			Procure 50WS	5.5 mL				
OD	18			Chile Sulfur	56 g				
W / O	19			Rally	5.4 g				
YC	20			Rally	5.4 g				
W / Y	21			Rally	5.4 g				
YBKC	22			Rally	5.4 g				
YBKD	23					Elite 45WP	3.5 g		
Y /BK	24					KWG 4168	16.4 mL		
PC	25					Rally 40W	3.5 g		
BBKD	26			Sulfur 80DF	70 g				
L	27			Nutrol Sulfur 80DF Latron B-1956	98 g 21 g 5 mL				
Y	28	Rally 40W	3.5 g						
W / B	29					Flint 50WG	1.3 g		
R	30			Water Latron B-1956	5 mL				
BC	31								

Date App.# Stage Vol/trt Color	Trt#	11 Jul F BBCH 79 4.25 gal	FP/trt	14 Jul F BBCH 79 4.25 gal	FP/trt	15 Jul F BBCH 79 4.25 gal	FP/trt	17 Jul F BBCH 79 4.25 gal	FP/trt
W	1	-----		-----		-----		-----	
B	2							About 2.08F	14.1 mL
G	3								
P	4							Rally 40W	3.5 g
BKC	5								
GBKC	6	Flint 50WG	1.3 g						
GBKD	7	Flint 50WG	1.3 g						
OBKD	8			Cuprofix 20	56 g				
O / BK	9			TD -2463	28 g				
BD	10			TD-2463 Silwet L-77	28 g 5 mL				
O	11			Sulfur 80DF	56 g				
PU	12			Sulfur 80DF	56 g				
BKD	13								
W /BK	14	Pristine Latron B-1956	9.2 g 3.7 mL						
GD	15							Stylet Oil	323 mL
W / G	16							Stylet Oil About 2.08F	161 mL 11 mL
OC	17							Procure 50WS	5.5 mL
OD	18			Chile Sulfur	56 g				
W / O	19							Rally	5.4 g
YC	20							Rally	5.4 g
W / Y	21							Rally	5.4 g
YBKC	22							Rally	5.4 g
YBKD	23								
Y /BK	24								
PC	25								
BBKD	26			Nutrol Latron B-1956	140 g 5 mL				
L	27			Nutrol Sulfur 80DF Latron B-1956	98 g 21 g 5 mL				
Y	28					Nutrol Latron B-1956	140 g 5.0 mL		
W / B	29								
R	30			Water Latron B-1956	5 mL				
BC	31								

Date App.# Stage Vol/trt Color	Trt#	22 Jul F BBCH 81 4.25 gal	FP/trt	24 Jul F BBCH 81 4.25 gal	FP/trt	25 Jul F BBCH 83 4.25 gal	FP/trt
W	1	-----		-----		-----	
B	2						
G	3			Champ 2F	29.2 mL		
P	4						
BKC	5	Rally 40W	3.5 g				
GBKC	6					Elite 45WP	3.5 g
GBKD	7						
OBKD	8			Cuprofix 20	56 g		
O / BK	9			TD -2463	28 g		
BD	10			TD-2463 Silwet L-77	28 g 5 mL		
O	11			Sulfur 80DF	56 g		
PU	12			Sulfur 80DF	56 g		
BKD	13			Pristine Latron B-1956	9.2 g 3.7 mL		
W /BK	14						
GD	15						
W / G	16						
OC	17						
OD	18			Chile Sulfur	56 g		
W / O	19						
YC	20						
W / Y	21						
YBKC	22						
YBKD	23	Elite 45WP	3.5 g				
Y /BK	24	KWG 4168	16.4 mL				
PC	25	Nutrol Latron B-1956	140 g 5.0 mL				
BBKD	26			Sulfur 80DF	70 g		
L	27			Nutrol Sulfur 80DF Latron B-1956	98 g 21 g 5 mL		
Y	28						
W / B	29	Flint 50WG	1.3 g				
R	30			Water Latron B-1956	5 mL		
BC	31						

Calendar of events

Date	Activity
27 Mar	Deflag old plots; BBCH-13 stage.
3 Apr 03	KD, EE; Flag rows; BBCH-15 stage
4 Apr	“A1”;KD, EE; most treatments. 10:30AM-3:30PM, partly cloudy, 60F, westerly wind 5-20 mph, 4.25 gal/trt at 200 psi with #5 ceramic nozzle. Shoots 6”-8”
7 Apr	KD, EE; Finished “A1” spray (trtmts 8-10, 28-31), 4:00PM-5:30PM, clear, 65F, calm, shoots 6”-10”
14 Apr	‘A2’; KD, EE; 10:00AM-3:00PM, 62-65F, 5-10 mph west breeze, PC-overcast, BBCH 1-5, 8”-14” shoots
16 Apr	Finish ‘A2’; EE; 8:00AM-8:30AM, 58F, calm, overcast, BBCH 1-5, 8”-14” shoots
23 Apr	Grower-applied sulfur dust to new guard rows 26, 27; flagged Trial 2
24 Apr	Rain; postpone spraying
25 Apr	‘A3’ (most trtmts); KD, EE; 7:30AM-11-30AM, 55-60F, 0-15mph south wind, overcast, 10”-14” shoots; Sulfur 80DF on guard rows 14, 15
28 Apr	Rain; postponed spraying
29 Apr	‘A3’ finish; KD, EE; 10:15-11:00AM; 60F, 0-10 mph SSE breeze; partly overcast, shoots 10”-14”, sprinkles began at 11:40AM
5 May	‘A4’; KD, EE; 9:45-1:45PM; 55-64F, calm to 8 mph west breeze; overcast to clear; BBCH 57; incl. rows 14-15, finish row 27
13 May	‘B’; KD, EE; 8:30-10:00AM; 64-70F; clear, calm; BBCH 57
16 May	‘B’; KD, EE; 7:00-10:00AM; 62-74F; clear, calm to slight N breeze; BBCH 57-61
20 May	‘B’; EE; 7:00-7:30AM; 62F; clear; calm ;BBCH 61
23 May	‘C’; KD, EE; 7:15-10:45AM; 64-84F; clear, calm; BBCH 61-69 (avg 66)
27 May	‘C’; KD, EE; 10:00-11:15AM; 80-86F; clear, 3-8mph N breeze; BBCH 69-71
30 May	‘C’; KD, EE; 7:00-10:00AM; 60-72F; overcast, 5mph W breeze to calm; BBCH 69
3 Jun	‘D’; KD, EE; 12:15-1:00PM; 80-84F; clear, 8 mph W breeze; BBCH 71
5 Jun	‘D’; KD, EE; 6:30AM-12:30PM; 60-76F; clear 5-10 mph W wind; BBCH 71
10 Jun	‘D’; EE; 11:30AM-1:45PM; 72-75F; clear, 5-10 mph W wind; BBCH 71-73
12 Jun	‘D’; EE, BE; 1:15-2:15PM; 75F; clear, 5-10 mph SW breeze; BBCH 71-73
13 Jun	KD, EE; 9:15-11:15AM; 68-74F; clear, 5-10 mph SW breeze; BBCH 73-77 (mostly 73)
16 Jun	KD;
19 Jun	‘E’; KD, EE; 7:45-11:15AM; 60-66F; clear, 10-15 mph W wind; BBCH 75-79 (mostly 77)
23 Jun	‘F’; KD, EE; 10:30-11:30AM; 70F; clear, 5-10 mph NW breeze; BBCH 77-79; sprayed all skipped vines w/ 2% Stylet Oil + Flint (1.5 oz/A)
24 Jun	‘F’; KD, EE; 8:30-9:45AM; 70-72F; clear, 5-10 mph N wind; BBCH 77-79
26 Jun	‘F’; EE, PO; 8:30-11:00AM; 75-80F; clear, calm; BBCH 79
27 Jun	‘F’; KD, EE; 8:15-10:00AM; 72-76F; clear, calm; BBCH 79
1 Jul	‘F’; EE; 6:45-7:00AM; 58F; clear, 5 mph S breeze; BBCH 79
3 Jul	‘F’; EE, PO; 7:15AM-12:15PM; 65-80F; clear, calm to 10mph breeze; BBCH 79
8 Jul	‘F’; EE, PO; 6:45-7:30AM; 64-66F; clear, 5-10 mph W wind; BBCH 79
10 Jul	‘F’; EE, PO; 7:30-7:45AM; 62F; clear, calm; BBCH 79
11 Jul	‘F’; EE, KD; 7:45-8:15AM; 64F; clear, calm; BBCH 79
14 Jul	‘F’; EE, PO; 7:30-9:30AM; 65-74F; clear, calm; BBCH 79
15 Jul	‘F’; EE; 8:30-8:45AM; 68F; clear, 5-10 mph W breeze; BBCH 79
17 Jul	‘F’; EE, PO; 10:00AM-1:45PM; 72-90F; clear, calm-5mph W breeze; BBCH 79
22 Jul	‘F’; EE; 7:15-8:15AM; 68F; partial high clouds, calm-slight W breeze; BBCH 81-83
24 Jul	‘F’; EE, PO; 7:45-10:15AM; 68-74F; overcast-high clouds; calm-5 mph W breeze; BBCH 81-83
25 Jul	‘F’; EE, PO; 7:15-7:30AM; 65F; clear 5 mph W breeze; BBCH 83
29 Jul	Lab rate all plots; 7.5 brix
28-29 Aug	EE; crop drop: Y/BK, GBKD (KWG 4168, Spiroxamine)
9 Sep	EE; map bad vines for next season; remove flagging tape

Results and discussion

The trial was conducted in a 26 year old commercial Chardonnay vineyard, planted on 7' x 12' spacing and trained to a 2-wire T-trellis. Plots were 4 adjacent vines, arranged in a randomized complete block with 4 replications. Treatments were applied in 150 gallons water per acre by high pressure hand gun (Rears Nifty Fifty) at 200 p.s.i. Deposition was mainly on the cluster zone. Treatments started at 6 inch shoot growth on 4 Apr, and continued to veraison on 25 Jul. Applications were made on 10 to 28 day intervals as listed in the table. Plots were evaluated for disease on 29 Jul, at 7.5 brix fruit soluble sugars. Disease evaluation was made by estimating powdery mildew severity on 40 fruit clusters per replication. Results were analyzed by ANOVA at $p \leq 0.05$ and treatments separated with Fisher's LSD t test at $p \leq 0.05$ (SAS Institute).

Powdery mildew on basal leaves (most severely infected) from untreated plots rose consistently from 4% surface coverage on 25 Apr to 83% on 3 Jun. Fruit clusters from untreated plots had 98% of berries infected by 19 Jun. The powdery mildew risk index (0-100 scale) increased consistently beginning 14 May and was near 100 from 19 May to 26 Jun. Disease pressure was considered very high for the season. Pristine (BAS516), a strobilurin containing compound, applied on 21 to 28 day intervals (the higher interval was used at the end of the season during a period of low risk index) resulted in less than ½% infected berries, significantly lower fruit disease than treatments with other strobilurin (Flint, Abound) or DMI (Rally, Procure) fungicides on 14 day intervals. California registration of Pristine is expected by BASF Corp. sometime in 2004.

Trial 1 treatment results- Systemic fungicides

#	Color	Materials, rate/A	Applications	Severity, %	Incidence,%
14	W/BK	Sulfur 80DF, 4 lb, 7-10d.....	ABCDE		
		Pristine 38WG, 10.5 oz + Latron, 4.1 foz, 21-28d ...	FGH.....	0.3 f	12.5 f
13	BKD	Sulfur 80DF, 4 lb, 7-10d.....	ABCDE		
		Pristine 38WG, 10.5 oz + Latron, 4.1 foz, 21d	FGHI.....	0.4 f	16.3 f
29	W/B	Sulfur 80DF, 4 lb, 7-10d.....	A		
		Flint 50WG, 1.5 oz, 14d	BCDEFGHI.....	1.8 e	51.9 e
24	Y/BK	KWG 4168 300SC, 18.0 foz, 14d	ACDEFGHI		
		Flint 50WG, 1.5 oz, 14d	B.....	4.4 d	69.4 cde
11	O	Sulfur 80DF, 4 lb, 7-10d.....	ABCDHIJK		
		Flint 50WG, 2 oz, 14d	E		
		Elevate 50WG, 1lb + Flint 50WG, 1.5 oz, 14d.....	FG.....	4.8 d	67.5 de
23	YBKD	Flint 50WG, 1.5 oz, 10d	A		
		Elite 45DF, 4 oz, 14d	BCDEFGHI.....	5.2 cd	77.5 bcd
6	GBK C	Sulfur 80DF, 4 lb, 7-10d.....	ABCD		
		Flint 50WG, 1.5 oz, 14d	EGI		
		Elite 45DF, 4 oz, 14d	FHJ.....	5.8 cd	86.3 abcd
17	OC	Sulfur 80DF, 4 lb, 7-10d.....	ABCDE		
		Procure 50WS, 6.0 oz, 14d.....	FGHIJ.....	6.5 cd	77.5 bcd
7	GBK D	Sulfur 80DF, 4 lb, 7-10d.....	ABCD		
		KWG 4168 300SC, 18.0 foz, 14d	EG		
		Flint 50WG, 1.5 oz, 14d	FI		
		Elite 45DF, 4 oz, 14d	H.....	8.5 bcd	89.4 abc
2	B	Sulfur 80DF, 4 lb, 7-10d.....	ABCDE		
		Abound 2.08F, 15.4 foz, 14d	FGHIJ.....	11.2 bc	88.8 abc
5	BKC	Sulfur 80DF, 4 lb, 7-10d.....	A		
		Rally 40W, 4 oz, 14d	BCDEFGHI.....	15.5 b	93.8 ab
12	PU	Sulfur 80DF, 4 lb7-10d.....	ABCDHIJK		
		Rally 40W, 4 oz, 14d.....	E		
		Elevate 50WG, 1 lb + Rally 40W, 3.0 oz, 14d	FG.....	18.8 b	91.3 ab
1	W	Untreated		98.9 a	100.0 a

Note: Applications are listed in alphabetical sequence, and each letter corresponds to one application. Severity values were arcsin transformed prior to statistical analysis due to heterogeneity of variance; values shown are back-transformed. Values in a column followed by the same letter are not significantly different according to Fisher's LSD t test, P=0.05.

Trial 1 treatment results- Contact fungicides

#	Color	Treatment materials, rate/A	Application	Severity,%	Incidence,%
16	W/G	Stylet Oil, 1%, 10-14d	ABCD	0.6 f	21.4 e
		Stylet Oil, 1% + Abound 2.08F, 12foz,10-14d.....	EFGHIJ		
27	L	Nutrol, 7lb + Sulfur 80DF, 1.5lb, 7-10d	ABCD	2.9 e	57.5 d
		Nutrol, 7lb + Latron, 4foz + Sulfur 80DF, 1.5lb, 7-10d	E-N.....		
10	BD	Microthiol Special, 2lb, 7-10d	A	4.0 de	65.6 cd
		TD-2463, 2lb + Microthiol Disperss, 3lb + Silwet, 4foz, 7-10d	BCDEFG HIJKLMN		
		TD-2463, 2lb + Silwet L-77, 4foz, 7-10d			
3	G	Champ 2F, 2pt + Micro Sulf, 5lb, 7-10d	ABCDEFGF	6.5 cde	74.4 bcd
		Champ 2F, 2pt, 10-14d	HIJKL		
15	GD	Stylet Oil, 1%, 10-14d	ABCD	6.6 cde	75.0 bcd
		Stylet Oil, 2%, 10-14d	EFGHIJ		
26	BBKD	Nutrol, 10lb, 7-10d.....	AC	9.0 bcd	81.9 abc
		Nutrol, 10lb + Latron B-1956, 4foz, 7-10d.....	EGIKM		
		Sulfur 80DF, 5lb, 7-10d.....	BDFHJLN		
21	W/Y	Kocide 101. 2lb + Sulfur 80DF, 5lb, 7-10d	ABCDEFGF	10.4 bcd	88.8 ab
		Rally 40W, 4oz, 14d	H		
		Rally 40W, 6oz, 14d	IJK.....		
20	YC	Kocide 2000, 3lb + Sulfur 80DF, 5lb, 7-10d	ABCDEFGF	10.8 bc	84.4 abc
		Rally 40W, 4lb, 14d	H		
		Rally 40W, 6oz, 14d	IJK.....		
2	B	Sulfur 80DF, 4 lb, 7-10d	ABCDE	11.2 bc	88.8 ab
		Abound 2.08F, 15.4 foz, 14d.....	FHIJ		
9	O/BK	Microthiol Special, 2lb, 7-10d	A	11.8 bc	95.6 a
		TD-2463, 2lb + Microthiol Disperss, 3lb, 7-10d.....	BCDEFG		
		TD-2463, 2lb, 7-10d	HIJKLMN		
25	PC	Nutrol, 10lb, 14d.....	AC	11.8 bc	86.9 ab
		Nutrol, 10lb + Latron, 4foz, 14d.....	EGI		
		Rally 40W, 4oz, 14d	BDFH		
19	W/O	Kocide 2000, 1.5lb + Sulfur 80DF, 5lb, 7-10d.....	ABCDEFGF	12.0 bc	85.0 abc
		Rally 40W, 4oz, 14d	H		
		Rally 40W, 6oz, 14d	IJK.....		
28	Y	Sulfur 80DF, 4lb, 10d	A	12.1 bc	86.3 ab
		Nutrol, 10lb + Latron, 4foz, 7-14d	BDFHJ		
		Rally 40W, 4oz, 14d	CEGI		
4	P	Champ 2F, 2pt + Micro Sulf, 5lb, 7-10d	ABCDEFGF	12.3 bc	93.1 ab
		Rally 40W, 4oz, 14d	HIJK.....		
18	OD	Sulfur 80DF, 4lb, 7-10d.....	ABCDE	13.6 bc	91.3 ab
		Chilean Sulfur, 4lb, 7-10d.....	FHIJKLMN ..		
8	OBKD	Microthiol Special, 4lb, 7-10d.....	A	15.0 bc	92.5 ab
		Cuprofix Disperss 20, 4lb + Microthiol Disperss, 3lb, 7-10d	BCDEFG HIJKLMN		
		Cuprofix Disperss 20, 4lb, 7-10d.....			
30	R	Latron B-1956, 4foz, 14d.....	A-N.....	16.5 bc	91.3 ab
22	YBKC	GX-569, .83lb + Sulfur 80DF, 5lb, 7-10d.....	ABCDEFGF	18.5 b	95.0 a
		Rally 40W, 4oz, 14d	H		
		Rally 40W, 6oz, 14d	IJK.....		
1	W	Untreated.....		98.9 a	100.0 a

Note: Applications are listed in alphabetical sequence, and each letter corresponds to one application. Severity values were arcsin transformed prior to statistical analysis due to heterogeneity of variance; values shown are back-transformed. Values in a column followed by the same letter are not significantly different according to Fisher's LSD t test, P=0.05.