

GRAPE (*Vitis vinifera* 'White Riesling')
Powdery Mildew; *Uncinula necator*

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Efficacy of various fungicides for control of grape powdery mildew on White Riesling, 2005.

Treatments were arranged in a randomized complete block design in a block of 'White Riesling' planted in 1995 on a 7x10 ft spacing. Vines were trained to a bilateral cordon with spur pruning. Vines were pruned from 3 Mar to 14 Mar. Shoot thinning and sucker removal occurred 19 May by hand. Vines were pruned to approximately 60 spur/vine and thinned to approximately 40 shoots/vine. Each treatment was replicated on 4 sets of 5 vines. Treatments were applied using a hooded boom sprayer. Rates of water used were 77 gal/A (1st three applications), 85 gal/A (17 Jun), and 170 gal/A on all subsequent applications. Pressure used was 150 psi for the first four applications and 200 psi thereafter. Approximately 2.5 to 5.4 gal of spray suspension was used per 20 vines depending on time of year and growth of vines. Fungicides were applied on 3 Jun (EL 15), 10 Jun (EL 17), 20 Jun (EL 19), 24 Jun (EL 23), 30 Jun (EL 24), 8 Jul (EL 27), 14 Jul (EL 28), 22 Jul (bunch close), 28 Jul, 5 Aug, 12 Aug (EL 33), 19 Aug, and 25 Aug. All vines received an application of Thiolux (5 lb/A, 140 GPA) on 27 May (EL 12 or 6-10 in shoots) soon after flag shoots were discovered in an adjacent block of grapes. Veraison (25%) occurred on 29 Aug. Canes were cut above the top wire on 21 Jul. Buccaneer (2 qt/A) plus Goal 2XL (2 qt/A) was applied in the vine row on 18 Mar and Rely (4 qt/A) was applied on 12 Jul to manage weeds. According to the Gubler-Thomas powdery mildew forecasting model, there were 12 rain events between budbreak and end of bloom that were favorable for ascospore release and infection: 3 severe infection periods (23 Apr, 8 and 17 May), 5 moderate infection periods (1, 3, 5 and 18 May and 6 Jun), and 4 low infection periods (13, 16, and 28 May and 5 Jun). The risk index climbed above 60 in early July and remained high through late Sep (Fig 1). During this period the index briefly dropped below 60 in early Aug due to hot weather. Incidence and severity of powdery mildew on leaves was evaluated on 26 Jul and 9 Aug by examining 50 leaves arbitrarily selected (25 from each side) from the middle 3 vines of each replicate. Severity and incidence of powdery mildew on clusters was evaluated on 27 Jul, 10 Aug, and 31 Aug by examining 50 (25 from each side) clusters arbitrarily selected from the middle 3 vines of each replicate. Comparisons among treatments for severity of powdery mildew on clusters were evaluated by calculating the area under disease progress curves (AUDPC). AUDPC was calculated by multiplying the mean severity from two observation dates by the number of days between observations ($\sum[Y_{i+1} + Y_i]/2][X_{i+1}-X_i]$ where Y_i is severity of mildew at i th observation and X_i is the day of the i th observations). Values calculated between each pair of observations are added together to obtain a total AUDPC.

Symptoms of powdery mildew were first found in an adjacent block of Pinot Noir as flag shoots on 23 May. Flag shoot have never before been observed in managed vines. Flag shoots were common and found on every third or fourth vine. Some secondary spread had occurred around flag shoots on this date but new colonies had not yet begun to sporulate. Disease pressure was considered extremely high. Symptoms of powdery mildew were first found in this block of Riesling on widely scattered leaves on nontreated vines on 6 Jun. All treated vines had significantly less leaf incidence and severity when compared to nontreated vines. Pristine treated vines had the lowest leaf incidence but vines treated with weekly applications of Elite or the 20 EC formulation of Mana-TBZ were not significantly different. Vines treated every other week with the 45 DF formulation of Mana-TBZ had significantly more leaf severity than all other fungicide treated vines. Pristine treated vines had significantly lower cluster incidence or severity than all other treated vines. Powdery mildew on clusters from vines treated every other week with Elite or Mana-TBZ 45 DF were not significantly different than nontreated vines. There was no difference in powdery mildew measurements between block or regular alternations of Quintec with Rally. Applications of the 20 EC formulation of Mana-TBZ resulted in significantly less powdery mildew severity on leaves and clusters than applications of the 45 DF formulation except for leaf severity on vines treated every week. The low efficacy of DMI materials may be due to resistant strains of powdery mildew. No phytotoxicity was observed on any vines treated with any fungicide.

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Treatment and Rate/100 gal***	Time of Application**	% Leaves with Powdery Mildew (9 Aug)*		AUDPC* (cluster)	% Clusters with Powdery Mildew (31 Aug)*	
		Incidence	Severity		Incidence	Severity
Nontreated	None...	100 a	79.9 a	34.7 a	100 a	100 a
Pristine 38 EG at 5.25 oz + Sylgard 309 at 4 oz then...	B, F, J					
Pristine 38 EG at 11.5 oz + Sylgard 309 at 4 oz.....	D, H, L...	9.5 f	0.1 c	0.3 e	44 b	1.4 e
Rally 40 at 2.5 oz alternate Quintec 250 at 2 fl oz.....	D, H, L B, F, J	47.5 bc	0.8 c	15.2 d	100 a	55.4 d
Rally 40 at 2.5 oz block alt Quintec 250 at 2 fl oz.....	F, H B, D, J, L	49.5 b	0.9 c	12.5 d	100 a	45.6 d
Elite 45DF at 2 oz.....	B, D, F, H, J, L	39.5 bcd	1.0 c	29.3 abc	100 a	86.9 abc
Mana-TBZ 45DF at 2 oz.....	B, D, F, H, J, L	53.5 b	3.7 b	33.1 ab	100 a	95.4 ab
Mana-TBZ 20EC at 4.3 fl oz....	B, D, F, H, J, L	40.5 bcd	0.8 c	25.2 c	100 a	75.7 c
Elite 45DF at 2 oz.....	All	22.5 def	0.5 c	25.4 c	100 a	79.7 bc
Mana-TBZ 45DF at 2 oz.....	All	30.0 cde	0.9 c	27.9 bc	100 a	89.3 abc
Mana-TBZ 20EC at 4.3 fl oz....	All	17.5 ef	0.4 c	17.6 d	99.5 a	57.7 d

* Means followed by the same letter do not differ significantly based on Fisher's protected LSD (P=0.05).

** Fungicides were applied on A = 3 Jun (EL 15), B = 10 Jun (EL 17), C = 20 Jun (EL 19), D = 24 Jun (EL 23), E = 30 Jun (Bloom), F = 8 Jul (EL 27), G = 14 Jul (EL 28), H = 22 Jul (bunch close), I = 28 Jul, J = 5 Aug, K = 12 Aug (EL 33), L = 19 Aug, and M = 25 Aug.

*** Original target application rate was to be 200 gal water solution/A for all treatments. Lower per gal rates resulted in lower per A rates than target for all chemical applications. Rates of water used were 77 gal/A (1st three applications), 85 gal/A (17 Jun), and 170 gal/A on all subsequent applications.