

GRAPE (*Vitis vinifera* 'Chardonnay')  
Powdery Mildew; *Erysiphe necator*

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### Organic materials for grape powdery mildew management on Chardonnay, 2023.

Fungicide treatments were arranged in a randomized complete block design in a block of 'Chardonnay' planted in 1985 on a 7x11 ft spacing. Chardonnay vines were trained to a Guyot (vertical shoot position) system and pruned from 11 to 12 Feb 2023. Shoot thinning and sucker removal by hand occurred on 17 May 2023. Suckers were also sprayed with Rely 280 at 1 fl oz/gal on 23 May and subsequent regrowth was removed periodically during the growing season. Canes were cut above the top wire on 17 Jul and maintained at this height throughout the growing season. Each treatment was replicated on four sets of five vines. Treatments were applied using a hooded boom sprayer at 150 psi at a rate of 42 to 63 gal water/A depending on canopy growth such that 1.49 to 2.23 gal of spray suspension was used per 20 vines. Fungicide treatments were applied on 22 May (BBCH 55), 8 Jun (BBCH 63), 15 Jun (BBCH 68), 23 Jun (BBCH 72), 29 Jun (BBCH 73), 6 Jul (BBCH 75), 13 Jul (BBCH 79), 20 Jul (BBCH 80), 27 Jul (BBCH 80), 3 Aug (just before veraison, BBCH 80), 10 Aug (BBCH 81), and 17 Aug (veraison beginning, BBCH 82). Leaves were not removed from the fruiting zone this year. A 2% solution of Mad Dog (55 fl oz/A) was applied to all rows on 18 Mar for weed control. No fertilizer was applied to vines this year. According to the Gubler-Thomas powdery mildew forecasting model, there was 1 rain event favorable for ascospore release and infection between bud break and end of bloom that resulted in a low risk infection period (8 May). The powdery mildew risk index rose to high infection risk (0 to 60) on 21 May, dipped back to medium risk but back up to high risk on 27 May and remained high (above 60) all summer except for brief, one day periods down to medium risk. Incidence and severity of powdery mildew on leaves was evaluated on 10 and 24 Jul, 7 and 21 Aug while incidence and severity of powdery mildew on fruit was evaluated on 25 Jul and 14 Aug. (Only the last rating date is presented in Tables 1 and 2.) Powdery mildew disease data was collected by arbitrarily examining 50 clusters or leaves from the middle 3 vines of each replicate. Treatments were also evaluated by calculating the area under disease progress curve (AUDPC) which was calculated by multiplying the mean incidence or 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 incidence or severity of mildew in percent 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.

Spring weather conditions were normal to dry in April and first week of May but then became very dry with little rainfall for the remainder of the season. Symptoms of powdery mildew were first found on 22 May as a few individual colonies on scattered vines. Flag shoots were not observed in this block. Highest incidence and severity of powdery mildew on leaves or clusters and highest AUDPC was found on non-treated vines and was significantly higher than the powdery mildew found on fungicide treated vines (Tables 1 and 2). Lowest incidence of powdery mildew on leaves and lowest AUDPC was found on vines treated with Serenade plus Sulfur but it was not significantly different than the incidence or AUDPC found on vines treated with Stargus plus Sulfur (Table 1). Lowest severity of powdery mildew on leaves and lowest AUDPC was found vines treated with Stargus plus Sulfur but it was not significantly different than the powdery mildew found on vines treated with Cinnerate or Serenade. Lowest incidence of powdery mildew on cluster was found vines treated with Cinnerate plus Sulfur and was significantly different than powdery mildew found on other fungicide treated vines (Table 2). Lowest severity of powdery mildew on clusters was also found vines treated with Cinnerate plus Sulfur but it was not significantly different than the powdery mildew found on vines treated with Serenade or Stargus. All tank mixes of biologicals with sulfur resulted in powdery mildew on leaves that resulted in incidence and AUDPC values that were significantly lower than on vines treated with just sulfur alone. Vines treated with Cinnerate plus sulfur or Serenade plus sulfur resulted in an incidence of powdery mildew on clusters significantly lower than on vines treated with just sulfur alone. Only vines treated with Cinnerate plus sulfur resulted in a severity of powdery mildew on clusters significantly lower than on vines treated with just sulfur alone. No phytotoxicity was observed on vines treated with any fungicide.

Table 1. Incidence and severity of grape powdery mildew on Chardonnay leaves.

Treatment & Rate/A or /100 gal water as indicated	Time of Application*	Leaves with Powdery Mildew**			
		Incidence (21 Aug)	Incidence AUDPC	Severity (21 Aug)	Severity AUDPC
Non-treated.....	None.....	99.5 a	2122 a	73.8 a	2045 a
Microthiol Disperss at 2 lb .....	All.....	78.5 b	1193 b	28.2 b	314 b
Cinnerate at 30 fl oz plus					
Microthiol Disperss at 2 lb ...	All.....	44.5 c	662 c	13.4 c	155 c
Serenade ASO at 4 qt plus					
Microthiol Disperss at 2 lb ...	All.....	39.5 d	557 d	14.5 c	160 c
Stargus at 2 qt plus					
Microthiol Disperss at 2 lb ...	All.....	41.0 cd	613 cd	11.4 c	155 c

\* Pesticides were applied on 22 May (BBCH 55), 8 Jun (BBCH 63), 15 Jun (BBCH 68), 23 Jun (BBCH 72), 29 Jun (BBCH 73), 6 Jul (BBCH 75), 13 Jul (BBCH 79), 20 Jul (BBCH 80), 27 Jul (BBCH 80), 3 Aug (just before veraison, BBCH 80), 10 Aug (BBCH 81), and 17 Aug (veraison beginning, BBCH 82).

\*\* Means followed by the same letter do not differ significantly based on Fisher's protected LSD ( $P \leq 0.05$ ) using Agricultural Research Manager (GDM Solutions, Inc.).

Table 2. Incidence and severity of grape powdery mildew on Chardonnay clusters.

Treatment & Rate/A or /100 gal water as indicated	Time of Application*	Clusters with Powdery Mildew**	
		Incidence (14 Aug)	Severity (14 Aug)
Non-treated.....	None.....	100 a	70.0 a
Microthiol Disperss at 2 lb .....	All.....	64.5 b	20.9 b
Cinnerate at 30 fl oz plus			
Microthiol Disperss at 2 lb ...	All.....	20.5 d	4.2 c
Serenade ASO at 4 qt plus			
Microthiol Disperss at 2 lb ...	All.....	34.5 c	9.6 bc
Stargus at 2 qt plus			
Microthiol Disperss at 2 lb ...	All.....	57.0 b	15.3 bc

\* Pesticides were applied on 22 May (BBCH 55), 8 Jun (BBCH 63), 15 Jun (BBCH 68), 23 Jun (BBCH 72), 29 Jun (BBCH 73), 6 Jul (BBCH 75), 13 Jul (BBCH 79), 20 Jul (BBCH 80), 27 Jul (BBCH 80), 3 Aug (just before veraison, BBCH 80), 10 Aug (BBCH 81), and 17 Aug (veraison beginning, BBCH 82).

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