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

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Fungicides for grape powdery mildew management on Riesling, 2023.

Fungicide treatments were arranged in a randomized complete block design in a block of 'White Riesling' planted in 1995 on 7x11 ft spacing. White Riesling vines were trained to a Guyot (vertical shoot position) system and pruned from 11 to 12 Feb 2023. Suckers were 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 14 Jul and maintained at this height throughout the growing season. Each treatment was replicated on 4 sets of 10 to 15 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 40 to 50 vines. Fungicide treatments were applied on 22 May (BBCH 54), 13 Jun (bloom, BBCH 65), 27 Jun (BBCH 73), 11 Jul (BBCH 77), 25 Jul (BBCH 78), 8 Aug (BBCH 79), and 22 Aug (veraison, BBCH 83). 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 29 Jun and 14 and 28 Jul, 10 and 24 Aug while incidence and severity of powdery mildew on fruit was evaluated on 31 Jul and 15 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 ($\Sigma[Y_{i+1} + Y_i)/2][X_{i+1}-X_i]$ 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, severity or AUDPC of powdery mildew on leaves was found on non-treated vines which was significantly higher than all other treatments (Table 1). Lowest incidence of powdery mildew on leaves was found on vines treated with SA-0650004, which was not significantly different from vines treated with Endura plus Trojan or Aprovia Top. Lowest incidence AUDPC of powdery mildew on leaves was also found on vines treated with SA-0650004, which was not significantly different from vines treated with the lowest rates of Endura plus Trojan. Lowest severity and severity AUDPC of powdery mildew on leaves was found on vines treated with the highest rates of Endura plus Trojan but this was not significantly different from all other fungicide treated vines. Highest incidence or severity of powdery mildew on clusters was found on non-treated vines which was significantly higher than all fungicide treated vines (Table 2). Powdery mildew was not found on clusters from vines treated with SA-0650004 or the highest rates of Endura plus Trojan, however, this was not significantly different from the incidence or severity of powdery mildew found on vines treated with lower rates of Endura plus Trojan or Aprovia Top. No phytotoxicity was observed on vines treated with any fungicide.

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

Treatment & Rate/A or /100 gal water as indicated	Time of Application*	Leaves with Powdery Mildew**			
		Incidence (24 Aug)	Incidence AUDPC	Severity (24 Aug)	Severity AUDPC
Non-treated…….……	None……	99.5 a	2083 a	53.7 a	1148 a
Prolivo 300 SC at 5 fl oz then	A				
Mevalone at 55 fl oz plus	B				
Dyne-amic at 16 fl oz then	B				
Quintec at 6 fl oz then	C				
Gatten at 6.4 fl oz then	D				
Vivando at 15.4 fl oz then	E				
Torino at 3.4 fl oz then	F				
Mevalone at 55 fl oz plus	G				
Dyne-amic at 16 fl oz …….	G…….	60.0 b	1069 b	12.5 b	186 b
Prolivo 300 SC at 5 fl oz then	A				
SA-0650004 at 28 fl oz plus	B				
Quintec at 6 fl oz then	C				
Gatten at 6.4 fl oz then	D				
Vivando at 15.4 fl oz then	E				
Torino at 3.4 fl oz then	F				
SA-0650004 at 28 fl oz …….	G…….	26.0 c	334 d	5.4 b	53 b
Prolivo 300 SC at 5 fl oz then	A				
Endura at 1.6 oz plus	B				
Trojan at 2.3 fl oz then	B				
Quintec at 6 fl oz then	C				
Gatten at 6.4 fl oz then	D				
Vivando at 15.4 fl oz then	E				
Torino at 3.4 fl oz then	F				
Endura at 1.6 oz plus	G				
Trojan at 2.3 fl oz ……..…	G…….	27.5 c	352 d	4.5 b	55 b
Prolivo 300 SC at 5 fl oz then	A				
Endura at 2 oz plus	B				
Trojan at 2.8 fl oz then	B				
Quintec at 6 fl oz then	C				
Gatten at 6.4 fl oz then	D				
Vivando at 15.4 fl oz then	E				
Torino at 3.4 fl oz then	F				
Endura at 2 oz plus	G				
Trojan at 2.8 fl oz ……..…	G…….	31.5 c	569 c	4.0 b	48 b

Table 1 continued on next page!

* Pesticides were applied on A = 22 May (BBCH 54), B = 13 Jun (bloom, BBCH 65), C = 27 Jun (BBCH 73), D = 11 Jul (BBCH 77), E = 25 Jul (BBCH 78), F = 8 Aug (BBCH 79), and G = 22 Aug (veraison, BBCH 83).

** 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 1 (**continued from previous page**). Incidence and severity of grape powdery mildew on White Riesling leaves.

Treatment & Rate/A or /100 gal water as indicated	Time of Application*	Leaves with Powdery Mildew**			
		Incidence (24 Aug)	Incidence AUDPC	Severity (24 Aug)	Severity AUDPC
Non-treated…….……	None……	99.5 a	2083 a	53.7 a	1148 a
Prolivo 300 SC at 5 fl oz then	A				
Endura at 2.8 oz plus	B				
Trojan at 4 fl oz then	B				
Quintec at 6 fl oz then	C				
Gatten at 6.4 fl oz then	D				
Vivando at 15.4 fl oz then	E				
Torino at 3.4 fl oz then	F				
Endura at 2.8 oz plus	G				
Trojan at 4 fl oz ……..…	G…….	32.0 c	527 c	3.4 b	46 b
Prolivo 300 SC at 5 fl oz then	A				
Aprovia Top at 13.3 fl oz plus	B				
Quintec at 6 fl oz then	C				
Gatten at 6.4 fl oz then	D				
Vivando at 15.4 fl oz then	E				
Torino at 3.4 fl oz then	F				
Aprovia Top at 13.3 fl oz ….	G…….	32.5 c	499 c	5.1 b	52 b

* Pesticides were applied on A = 22 May (BBCH 54), B = 13 Jun (bloom, BBCH 65), C = 27 Jun (BBCH 73), D = 11 Jul (BBCH 77), E = 25 Jul (BBCH 78), F = 8 Aug (BBCH 79), and G = 22 Aug (veraison, BBCH 83).

** 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 White Riesling clusters.

Treatment & Rate/A or /100 gal water as indicated	Time of Application*	Clusters with Powdery Mildew**	
		Incidence (15 Aug)	Severity (15 Aug)
Non-treated…….……..	None……	81.0 a	23.2 a
Prolivo 300 SC at 5 fl oz then	A		
Mevalone at 55 fl oz plus	B		
Dyne-amic at 16 fl oz then	B		
Quintec at 6 fl oz then	C		
Gatten at 6.4 fl oz then	D		
Vivando at 15.4 fl oz then	E		
Torino at 3.4 fl oz then	F		
Mevalone at 55 fl oz plus	G		
Dyne-amic at 16 fl oz …….	G…….	24.0 b	1.5 b
Prolivo 300 SC at 5 fl oz then	A		
SA-0650004 at 28 fl oz plus	B		
Quintec at 6 fl oz then	C		
Gatten at 6.4 fl oz then	D		
Vivando at 15.4 fl oz then	E		
Torino at 3.4 fl oz then	F		
SA-0650004 at 28 fl oz …….	G…….	0.0 c	0.0 b
Prolivo 300 SC at 5 fl oz then	A		
Endura at 1.6 oz plus	B		
Trojan at 2.3 fl oz then	B		
Quintec at 6 fl oz then	C		
Gatten at 6.4 fl oz then	D		
Vivando at 15.4 fl oz then	E		
Torino at 3.4 fl oz then	F		
Endura at 1.6 oz plus	G		
Trojan at 2.3 fl oz ……..…	G…….	1.5 c	0.0+ b
Prolivo 300 SC at 5 fl oz then	A		
Endura at 2 oz plus	B		
Trojan at 2.8 fl oz then	B		
Quintec at 6 fl oz then	C		
Gatten at 6.4 fl oz then	D		
Vivando at 15.4 fl oz then	E		
Torino at 3.4 fl oz then	F		
Endura at 2 oz plus	G		
Trojan at 2.8 fl oz ……..…	G…….	2.5 c	0.0+ b

Table 2 continued on next page!

* Pesticides were applied on A = 22 May (BBCH 54), B = 13 Jun (bloom, BBCH 65), C = 27 Jun (BBCH 73), D = 11 Jul (BBCH 77), E = 25 Jul (BBCH 78), F = 8 Aug (BBCH 79), and G = 22 Aug (veraison, BBCH 83).

** 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.).

+ = The data points with 0.0+ indicates the value was very low but not equal to zero.

Table 2 (**continued from previous page**). Incidence and severity of grape powdery mildew on White Riesling clusters.

Treatment & Rate/A or /100 gal water as indicated	Time of Application*	Clusters with Powdery Mildew**	
		Incidence (15 Aug)	Severity (15 Aug)
Non-treated…….……..	None……	81.0 a	23.2 a
Prolivo 300 SC at 5 fl oz then	A		
Endura at 2.8 oz plus	B		
Trojan at 4 fl oz then	B		
Quintec at 6 fl oz then	C		
Gatten at 6.4 fl oz then	D		
Vivando at 15.4 fl oz then	E		
Torino at 3.4 fl oz then	F		
Endura at 2.8 oz plus	G		
Trojan at 4 fl oz ……..…	G…….	0.0 c	0.0 b
Prolivo 300 SC at 5 fl oz then	A		
Aprovia Top at 13.3 fl oz plus	B		
Quintec at 6 fl oz then	C		
Gatten at 6.4 fl oz then	D		
Vivando at 15.4 fl oz then	E		
Torino at 3.4 fl oz then	F		
Aprovia Top at 13.3 fl oz ….	G…….	3.0 c	0.1 b

* Pesticides were applied on A = 22 May (BBCH 54), B = 13 Jun (bloom, BBCH 65), C = 27 Jun (BBCH 73), D = 11 Jul (BBCH 77), E = 25 Jul (BBCH 78), F = 8 Aug (BBCH 79), and G = 22 Aug (veraison, BBCH 83).

** 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.).

+ = The data points with 0.0+ indicates the value was very low but not equal to zero.