

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

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Organic fungicides for grape powdery mildew management on Pinot noir, 2022.

Fungicide treatments were arranged in a randomized complete block design in a block of 'Pinot noir' planted in 1985 on a 7x11 ft spacing. Pinot noir vines were trained to a Guyot (vertical shoot position) system and pruned from 14 to 17 Feb. Sucker removal occurred periodically during the growing season. Canes were cut above the top wire on 15 Jul and maintained at this height throughout the growing season. Each treatment was replicated on 4 sets of 5 vines. Treatments were applied using a hooded boom sprayer at 150 psi at a rate of 80 to 128 gal water/A depending on canopy growth such that 2.8 to 4.5 gal of spray suspension was used per 20 vines. Fungicide treatments were applied on 1 Jun (BBCH 15), 8 Jun (BBCH 17), 14 Jun (BBCH 19), 21 Jun (BBCH 55), 28 Jun (bloom, BBCH 65), 5 Jul (BBCH 68), 12 Jul (BBCH 71), 20 Jul (BBCH 75), 27 Jul (BBCH 77), 3 Aug (BBCH 79), 10 Aug (BBCH 79), and 17 Aug (just before veraison, BBCH 81). Leaves were removed from the fruiting zone on the east side of all vines on 13 Jul. Movento (12 fl oz/A) was applied on 26 May for erineum mite management. Makaze (32 fl oz/A) plus GoalTender (32 fl oz/A) were tank mixed and applied to all rows on 21 Jan for weed control, while Forfeit 280 (3 fl oz/gal) was applied on 29 Jun for spot management of weeds. Fertilizer (16-16-16 at 30 lb/A) was applied 25 Apr. According to the Gubler-Thomas powdery mildew forecasting model, there were 15 rain events between bud break and end of bloom that were favorable for ascospore release and infection: 7 severe infection periods (21 and 27 Apr, 5 and 13 May, 3, 9 and 10 Jun), 7 moderate infection periods (20 Apr, 7, 12 and 28 May, 6, 14 and 17 Jun) and 1 low infection periods (2 May). The powdery mildew risk index shot up to high (0 to past 60) on 24 Jun and remained high (above 60) all summer except between 30 Jul to 8 Aug and 26 Aug to 8 Sep when it fluctuated between low, medium and high risk. Incidence and severity of powdery mildew on leaves was evaluated on 19 and 26 July, 2, 15 and 23 Aug while incidence and severity of powdery mildew on fruit was evaluated on 1, 8 and 19 Aug. 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 very wet resulting in the second wettest spring on record. Symptoms of powdery mildew were first found on 23 May as a few individual colonies on scattered vines in a nearby grape planting and in this block on 31 May. Flag shoots were also observed in this block on 31 May. Almost all clusters had some powdery mildew by 8 Aug except on Sulfur/Instill treated vines (Table 1). All fungicide treated vines had a lower AUDPC incidence or severity on clusters than non-treated vines. Lowest AUDPC incidence or severity on clusters was found on vines treated with Sulfur/Instill which was significantly lower than all other treatments. Highest incidence or severity of powdery mildew on leaves was found on non-treated vines which was significantly higher than all other treatments. All fungicide treated vines had a lower AUDPC incidence or severity on leaves than non-treated vines. Lowest AUDPC incidence or severity on leaves was found on vines treated with Sulfur/Instill which was significantly lower than all other treatments. No phytotoxicity was observed on vines treated with any fungicide.

Figure 1. Gubler-Thomas grape powdery mildew risk index for the 2022 growing season.

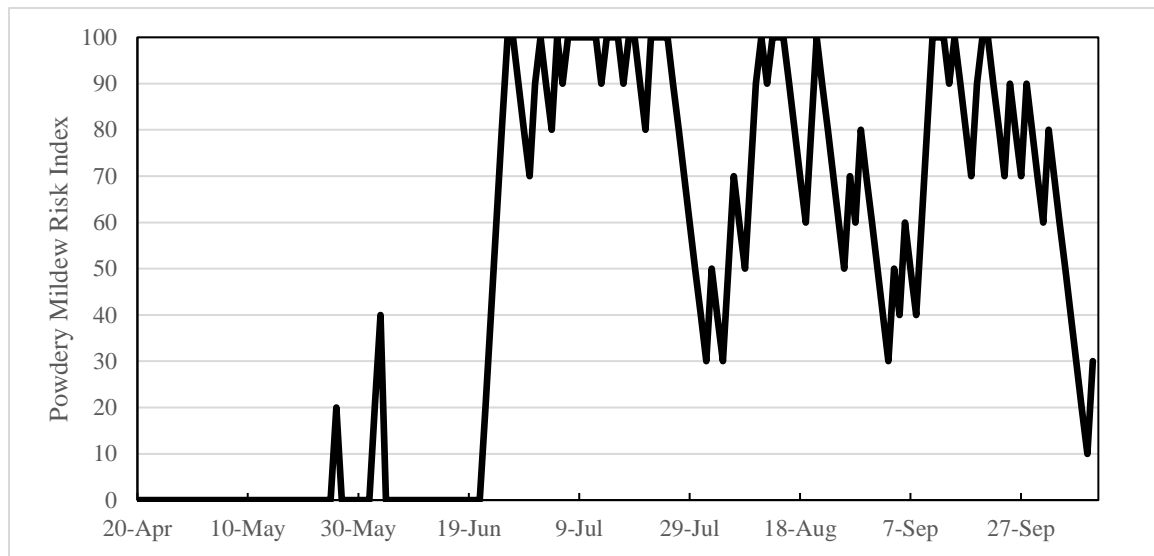


Table 1. Incidence and severity of grape powdery mildew on Pinot noir clusters.

Treatment & Rate/A or /100 gal water as indicated	Time of Application*	Clusters with Powdery Mildew**			
		Incidence (8 Aug)	Incidence AUDPC	Severity (19 Aug)	Severity AUDPC
Non-treated.....	None.....	100 a	1800 a	99.7 a	1334 a
Microthiol Dispers at 5 lb then Instill at 25 fl oz then Instill at 15 fl oz	A, B, C, D E F through L	85.0 b	1592 c	48.5 c	387 c
Theia DF at 1.5 lb plus Kinetic at 16 fl oz/100 gal	All.....	99.5 a	1761 b	70.1 b	671 b
Theia DF at 3 lb plus Kinetic at 16 fl oz/100 gal	All.....	100 a	1760 b	72.8 b	703 b
Theia DF at 1.5 lb plus Howler at 2.5 lb plus Kinetic at 16 fl oz/100 gal	All.....	100 a	1770 b	72.0 b	727 b

* Pesticides were applied on A = 1 Jun (BBCH 15), B = 8 Jun (BBCH 17), C = 14 Jun (BBCH 19), D = 21 Jun (BBCH 55), E = 28 Jun (bloom, BBCH 65), F = 5 Jul (BBCH 68), G = 12 Jul (BBCH 71), H = 20 Jul (BBCH 75), I = 27 Jul (BBCH 77), J = 3 Aug (BBCH 79), K = 10 Aug (BBCH 79), and L = 17 Aug (just before veraison, BBCH 81).

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

Table 2. Incidence and severity of grape powdery mildew on Pinot noir leaves.

Treatment & Rate/A or /100 gal water as indicated	Time of Application*	Leaves with Powdery Mildew**			
		Incidence (2 Aug)	Incidence AUDPC	Severity (23 Aug)	Severity AUDPC
Non-treated.....	None.....	100 a	3476 a	100 a	2407 a
Microthiol Disperss at 5 lb then Instill at 25 fl oz then Instill at 15 fl oz	A, B, C, D E F through L	88.0 c	3133 c	71.0 c	1047 c
Theia DF at 1.5 lb plus Kinetic at 16 fl oz/100 gal	All.....	94.5 b	3282 b	80.7 b	1223 b
Theia DF at 3 lb plus Kinetic at 16 fl oz/100 gal	All.....	95.5 b	3312 b	79.5 b	1247 b
Theia DF at 1.5 lb plus Howler at 2.5 lb plus Kinetic at 16 fl oz/100 gal	All.....	96.0 b	3346 b	82.0 b	1329 b

* Pesticides were applied on A = 1 Jun (BBCH 15), B = 8 Jun (BBCH 17), C = 14 Jun (BBCH 19), D = 21 Jun (BBCH 55), E = 28 Jun (bloom, BBCH 65), F = 5 Jul (BBCH 68), G = 12 Jul (BBCH 71), H = 20 Jul (BBCH 75), I = 27 Jul (BBCH 77), J = 3 Aug (BBCH 79), K = 10 Aug (BBCH 79), and L = 17 Aug (just before veraison, BBCH 81).

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