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

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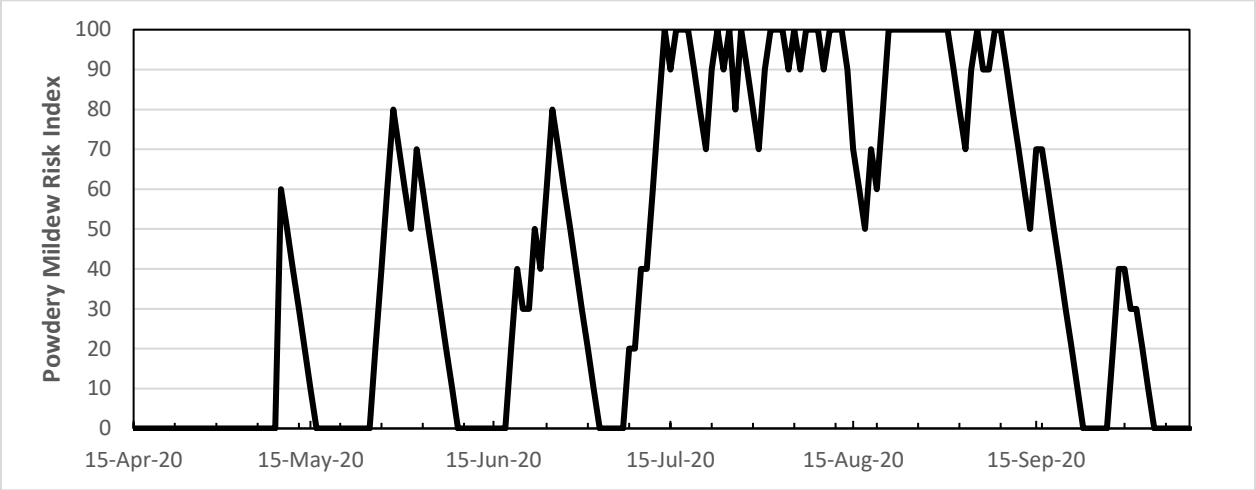
Organic materials for grape powdery mildew management, 2020.

Fungicide treatments were arranged in a randomized complete block design in a block of 'Pinot noir' planted in 1985 on a 8x10 ft spacing. Pinot noir vines were trained to a Guyot (vertical shoot position) system and pruned from 12 to 20 Feb. Shoot thinning by hand occurred on 27 to 28 Apr and again on 4 Jun while sucker removal occurred periodically during the growing season. Canes were cut above the top wire on 20 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 148 gal water/A depending on canopy growth such that 2.6 to 4.8 gal of spray suspension was used per 20 vines. Fungicide treatments were applied on 16 May (BBCH 56), 23 May, 29 May, 5 Jun, 14 Jun (bloom, BBCH 68), 21 Jun, 28 Jun, 8 Jul (BBCH 77), 15 Jul, 22 Jul (BBCH 79), 28 Jul and 4 Aug (just before verasion). Movento (6 fl oz/A) was applied on 23 May for erineum mite management. Makaze (64 fl oz/A) plus GoalTender (40 fl oz/A) plus Mission (2.5 fl oz/A) were tank mixed and applied on 21 Feb for management of weeds. No fertilizer was applied during the trial. According to the Gubler-Thomas powdery mildew forecasting model, there were 18 rain events between bud break and end of bloom that were favorable for ascospore release and infection: 6 severe infection periods (1, 13 (2x) and 16 May, 9 and 13 Jun), 6 moderate infection periods (18 and 22 Apr, 17 and 30 May, 6 and 14 Jun) and 6 low infection periods (24, 25 and 26 Apr, 8, 11 and 16 Jun). The powdery mildew risk index shot up briefly from 0 to past 60 for short periods on 10 May, 28 May and 24 Jun before remaining high (above 60) from 12 July until mid Sep (Figure 1). Incidence and severity of powdery mildew on leaves was evaluated on 10 Aug while incidence and severity of powdery mildew on fruit was evaluated on 11 Aug. Powdery mildew disease data was collected by arbitrarily examining 50 clusters or leaves from the middle 3 vines of each replicate.

After half the normal rainfall during the dormant season, spring weather conditions were considered normal to wet with high powdery mildew pressure. Symptoms of powdery mildew were first found on 4 May as a few individual colonies on scattered vines while flag shoots were confirmed on 8 May. There were no differences in the incidence of powdery mildew on leaves or clusters among any of the treatments including on non-treated vines. Highest leaf severity of powdery mildew was found on non-treated vines. Lowest severity of powdery mildew on leaves was found on vines treated with Rango alternated with TNC, however, leaf severity of powdery mildew on vines treated with TNC alternated with Regalia or Howler plus Microthiol Disperss were not significantly different. Lowest severity of powdery mildew on clusters was found on vines treated with Howler plus Microthiol Disperss and it was significantly different from all other treatments.

Vines treated with (two applications of) TNC showed phytotoxicity on 8 Jun. Marginal leaf yellowing, leaf cupping and deformity, new growth stunted, shorter shoot growth overall, necrotic flecking on canes and underside of leaves, and some fruit marking were observed. Phytotoxicity symptoms were more severe on vines treated with Rango alternate TNC than on vine treated with TNC alternate Regalia. It is also noted that both Rango and Howler clump up when first added to water in the spray tank and occasionally clog screens and/or nozzles during application.

Figure 1. Gubler-Thomas grape powdery mildew risk index for the 2020 growing season.



Treatment & rate/A or /100 gal water as indicated*	Time of application*	% Leaves with powdery mildew**		% Clusters with powdery mildew**	
		Incidence	Severity	Incidence	Severity
Non-treated…….……..	None……	100	89.2 a	100	100 a
Rango at 5 qt	A, C, E, G, I, and K				
alternated					
TNC at 2.4 qt/100 gal or	B, D				
TNC at 3.2 qt/100 gal plus					
Nu-Film-P at 16 fl oz/100 gal	F, H, J and L	99.0	10.9 c	100	98.0 a
TNC at 3.2 qt/100 gal or	A, C				
TNC at 2.4 qt/100 gal plus					
Nu-Film-P at 16 fl oz/100 gal	E, G, I, and K				
Alternated with					
Regalia at 4 qt/A plus					
Nu-Film-P at 16 fl oz/100 gal	B, D, F, H, J and L	98.5	16.3 c	100	99.5 a
Howler at 5 lb then	A and B				
… Howler at 5 lb plus					
Nu-Film-P at 16 fl oz/100 gal...	all other apps	100	47.8 b	100	96.3 a
Howler at 15 lb then	A and B				
Howler at 2.5 lb plus					
Microthiol Disperss at 3 lb …..	all other apps	96.5	11.5 c	99.5	66.9 b

* Fungicides were applied on A = 16 May (BBCH 56), B = 23 May, C = 29 May, D = 5 Jun, E = 14 Jun (bloom, BBCH 68), F = 21 Jun, G = 28 Jun, H = 8 Jul (BBCH 77), I = 15 Jul, J = 22 Jul (BBCH 79), K = 28 Jul and L = 4 Aug (just before verasion). TNC rate was started at 3.2 qt/100 gal but was reduced to 2.4 qt/100 gal for the 14 Jun and subsequent applications due to phytotoxicity. The first application of TNC on 16 May did not have Nu-Film-P added.

** Means followed by the same letter do not differ significantly based on Fisher's protected LSD (*P=0.05*). Means without letters are not significantly different.