

GRAPE (*Vitis labrusca* 'Niagara')
 Black rot; *Guignardia bidwellii*
 Downy mildew; *Plasmopara viticola*
 Powdery mildew; *Uncinula necator*

B. Hed, Lake Erie Regional Grape Research
 and Extension Center, North East, PA 16428
 J. W. Travis, Penn State Fruit Research and
 Extension Center, 290 University Drive,
 Biglerville, PA 17307

Evaluation of alternative fungicides for control of black rot, powdery mildew, and downy mildew of grapes, 2008.

This trial was conducted in a mature vineyard at the Lake Erie Regional Grape Research and Extension Center in North East, PA. Vines were trained to a single-curtain, high-wire cordon system. Treatments were applied to 8-12 vine plots in a randomized complete block design with four replications. Applications were made with a Friend covered-boom plot sprayer at 100 psi. The Cuprofix treatment was applied to dormant vines with a backpack sprayer at 30 psi. Pre-bloom treatments (applications 1-5) were applied at 50 gal/A. Applications 6-11 were applied at 100 gal/A. In the upwind half of each plot, all black rot infected fruit mummies were removed from the trellis. In the downwind half of each plot, black rot fruit mummies were hung from the trellis wire at five locations (5 mummies per location) to establish a second, higher inoculum pressure there (with the exception of the Cuprofix treatment). Plots and plot rows were separated by a buffer plot and a buffer row, respectively. Black rot incidence (percent clusters infected) and severity (percent area clusters infected) were determined on 20-21 Aug from 50 clusters selected randomly from directly below mummies in the downwind half of each plot, and on 27-28 Aug from 50 randomly selected clusters from the upwind half of each plot. Powdery and downy mildew incidence and severity were determined on 27-28 Aug from 50 randomly selected clusters from the upwind half of each plot.

Below average pre-bloom rainfall left shoot and rachis tissue nearly free of black rot. Post-bloom weather conditions were more conducive to black rot development and most control of black rot fruit infection was likely derived from applications 5-11. Rainfall for May, Jun, Jul, Aug, and Sep was 4.09, 5.35, 8.46, 4.21, and 4.8 in., respectively. Under high inoculum pressure (cane inoculum plus mummies), Topaz significantly reduced the incidence of black rot on fruit in comparison to the water-treated check. Cueva and Topaz significantly reduced black rot severity compared to the check, but Topaz was significantly more effective than Cueva. Under low inoculum pressure (cane inoculum only), Topaz significantly reduced black rot incidence when compared to the check, but none of the treatments reduced severity despite high levels of control by Topaz and lime sulfur. Downy mildew disease pressure was light early but became moderate toward the end of the fruit susceptibility period. Lime sulfur, Cueva, and Topaz provided good to excellent control of downy mildew, significantly reducing incidence and severity on fruit in comparison to the check. Powdery mildew pressure was very light and none of the treatments significantly reduced this disease on fruit.

Treatment and rate/A	Application timing ^z	Black rot on fruit					
		Cane inoculum plus mummies			Wood inoculum only		
		% Infected	% Area ^y infected	% ^x Control	% ^w Infected	% Area ^{wy} infected	% ^x Control
Topaz 0.32%	5, 6, 7, 8, 9, 10, 11	77.0 a ^v	11.2 a ^v	83	2.0 a ^v	0.1 a ^v	90
Cueva 1%	5, 6, 7, 8, 9, 10, 11	98.0 b	49.8 b	23	13.0 bc	1.0 abc	0
Lime Sulfur 1% + NuFilm P 0.12%	2, 3, 4, 5, 6, 7, 8, 9, 10, 11	98.0 b	59.8 bc	8	7.0 ab	0.2 ab	80
Serenade AS 1% + NuFilm P 0.12%	2, 3, 4, 5, 6, 7, 8, 9, 10, 11	98.0 b	65.2 c	0	27.3 c	1.8 bc	0
Cuprofix Ultra 40 DF 2 lb	1				22.0 c	3.3 c	0
Taegro 1.75 oz	2, 3, 4, 5,						
Taegro 3.5 oz	6, 7, 8, 9, 10, 11	100.0 b	64.6 c	0	17.0 bc	1.2 abc	0
Water-treated check	2, 3, 4, 5, 6, 7, 8, 9, 10, 11	98.0 b	64.9 c		19.5 bc	1.0 abc	

^zTiming: 1 = 21 Apr; 2 = 13 May; 3 = 21 May; 4 = 28 May; 5 = 4 Jun (immediate pre-bloom); 6 = 11 Jun (full bloom); 7 = 19 Jun (1st post-bloom); 8 = 25 Jun; 9 = 2 Jul; 10 = 10 Jul; 11 = 16 Jul.

^ySeverity was rated using the Barratt-Horsfall scale and was converted to % area infected using Elanco conversion tables.

^xPercent control = control of disease severity over that of the water-treated check.

^wActual data are shown. Data were subjected to square root transformation before statistical analysis.

^vMeans within columns followed by the same letter are not significantly different according to Fisher's Protected LSD (P < 0.05).

Treatment and rate/A	Application timing ^z	Downy mildew on fruit			Powdery mildew on fruit		
		% Infected	% Area ^{yw} infected	% Control	% ^x Infected	% Area ^{yw} infected	% ^x Control
		Topaz 0.32%	5, 6, 7, 8, 9, 10, 11	0.5 a ^v	0.01 a ^v	100	1.0 ab ^v
Cueva 1%	5, 6, 7, 8, 9, 10, 11	14.5 b	0.38 ab	93	2.0 bc	0.05 bc	0
Lime Sulfur 1% + NuFilm P 0.12%	2, 3, 4, 5, 6, 7, 8, 9, 10, 11	22.5 b	0.87 b	85	0.0 a	0.00 a	100
Serenade 1% + NuFilm P 0.12%	2, 3, 4, 5, 6, 7, 8, 9, 10, 11	58.8 c	3.30 c	42	0.5 ab	0.01 ab	75
Cuprofix 2 lb	1	66.3 c	3.59 c	37	5.5 c	0.14 c	0
Taegro 1.75 oz	2, 3, 4, 5,						
Taegro 3.5 oz	6, 7, 8, 9, 10, 11	50.5 c	3.47 c	39	4.5 c	0.12 c	0
Water-treated check	2, 3, 4, 5, 6, 7, 8, 9, 10, 11	50.5 c	5.66 c		1.5 ab	0.04 ab	

^zTiming: 1 = 21 Apr; 2 = 13 May; 3 = 21 May; 4 = 28 May; 5 = 4 Jun (immediate pre-bloom); 6 = 11 Jun (full bloom); 7 = 19 Jun (1st post-bloom); 8 = 25 Jun; 9 = 2 Jul; 10 = 10 Jul; 11 = 16 Jul.

^ySeverity was rated using the Barratt-Horsfall scale and was converted to % area infected using Elanco conversion tables.

^xPercent control = control of disease severity over that of the water-treated check.

^wActual data are shown. Data were subjected to square root transformation before statistical analysis.

^vMeans within columns followed by the same letter are not significantly different according to Fisher's Protected LSD ($P < 0.05$).