

GRAPE (*Vitis vinifera* 'Chardonnay')
Powdery Mildew; *Uncinula necator*
Botrytis Bunch Rot; *Botrytis cinerea*

J. W. Pscheidt and Gordon Kenyon
Dept. of Botany and Plant Pathology
Oregon State University
Corvallis, OR 97331-2903

EFFICACY OF VARIOUS FUNGICIDES FOR CONTROL OF GRAPE POWDERY MILDEW ON CHARDONNAY, 2002: Treatments were arranged in a randomized complete block design in a block of 'Chardonnay' planted in 1985 and 1995 on a 7x10 ft spacing. Vines were trained to a bilateral cordon with spur pruning. The number of buds was adjusted based on pruning weights at the rate of 30 buds/kg canes. Shoot thinning occurred 14 to 15 May. Each treatment was replicated on 4 sets of 5 vines. Treatments were applied using a hooded boom sprayer. Rates of water used were 93 gal/A (3 and 17 Jun), 149 gal/A (2 Jul), and 204 gal/A on all subsequent applications. Pressure used was 100 psi for the first 2 applications, 150 psi on 2 Jul, and 200 psi thereafter. Approximately 3 to 7 gal of spray suspension was used per 20 vines depending on time of year and growth of vines. Fungicides were applied on 3 Jun (EL 13), 17 Jun (EL 17), 2 Jul (60% bloom), 15 Jul (EL 29), 30 Jul, 13 and 27 Aug (early veraison). All fungicide treated vines had an additional application of Thiloux 80 DF (4 lb/A) on 24 May. Leaves were not removed from the east side of the fruiting zone. According to the Gubler-Thomas powdery mildew forecasting model, there were 8 rain events between budbreak (18 Apr) and end of bloom that were favorable for ascospore release and infection: 4 severe infection periods (19 and 27 May, 17 and 27 Jun), 2 moderate infection periods (26 Apr and 8 Jun), and 2 low infection periods (13 and 16 May). The risk index climbed above 60 on 24 Jun and remained high through mid Sep (Fig 1). Urea fertilizer was spread within vine rows on 11 Apr at 53 lb/A. Cassaron 4G (150 lb/A) was initially applied to control weeds in the vine row on 1 Feb and completed on 18 Feb. Glyphos xtra (4 qt/A) was applied 10 May to manage weeds which had already emerged. Incidence of powdery mildew on leaves was evaluated on 9 Jul, 24 Jul, 2 Aug, 21 Aug, 6 Sep and 13 Sep by randomly examining 100 leaves from the middle 3 vines of each replicate. Severity of powdery mildew on leaves was evaluated on 2 Aug, 21 Aug, 6 Sep and 13 Sep by randomly examining 100 leaves from the middle 3 vines of each replicate. Incidence and severity of powdery mildew on clusters was evaluated on 29 Jul, 12 Aug, and 26 Aug, respectively, by randomly examining 50 clusters from the middle 3 vines of each replicate. Comparisons among treatments for severity of powdery mildew on leaves and clusters were evaluated by calculating the area under disease progress curves (AUDPC). AUDPC was calculated by multiplying the mean 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 severity of mildew 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. Nets were placed around vines on 26 Sep to protect fruit from possible bird damage. Although vines were not treated specifically for bunch rot, incidence of Botrytis bunch rot was determined on 27 Sep (19.6° Brix) by examining 50 clusters from the center vines of each set of five vines. Incidence and severity of Botrytis bunch rot was determined on 9 Oct (19.8° Brix) by harvesting and examining 50 clusters from the center vines of each set of five vines. Nontreated vines were not evaluated for bunch rot since all clusters were severely diseased with powdery mildew. Soluble solids, Brix, were determined using a hand held refractometer.

Light frost conditions occurred on 4 and 8 May with light to moderate damage to grape blocks. Powdery mildew was first found widely scattered on 19 Jun on nontreated vines just before the risk index increased to over 60. All fungicide treated vines had significantly less powdery mildew than nontreated vines except for the incidence on clusters treated with Rally alone or Sovran alternated with Rally (Table 1). The lowest incidence of powdery mildew on leaves on 21 Aug was on vines treated with BAS 516 alone, however, the incidence on vines treated with BAS 516 alternated with Rally or Sovran alternated with Rally was not significantly different. There was no significant difference among fungicide treatments when leaf severity on 21 Aug or AUDPC for leaf severity were compared. Incidence of powdery mildew on clusters was very high in all plots. Only the incidence on 26 Aug on clusters from vines treated with BAS 516 alone was significantly lower than all other treatments. Cluster severity on 26 Aug was significantly lower for vines treated with BAS 516 alone than on vines with any other treatment. The AUDPC was lowest for vines treated BAS 516 alone but vines treated with BAS 516 alternated with Rally or Sovran alternated with Rally was not significantly different. The high level of powdery mildew on vines treated with Rally alone suggests that our powdery mildew at the Botany and Plant Pathology Farm has become less sensitive (resistant) to this fungicide. Although vines were not treated specifically for bunch rot, it is interesting to note that the incidence of bunch rot on 9 Oct was significantly lower for vines treated with BAS 516 than other fungicide treated vines (Table 2). The incidence of bunch rot on 27 Sep or the severity on 9 Oct was not significantly different among the various fungicide treated vines. No phytotoxicity was observed on any vines treated with any fungicide.

Table 1. Powdery mildew incidence and severity on Chardonnay vines.

Treatment and Rate/A	% Leaves with Powdery Mildew (21 Aug)*		AUDPC* (Leaves)**	% Clusters with Powdery Mildew (26 Aug)*		AUDPC* (Clusters)
	Incidence	Severity**		Incidence	Severity	
Nontreated	100 a	45.6 a	16.3 a	100 a	100 a	27.7 a
Rally 40 W 5 oz	21.5 b	0.6 b	0.3 b	100 a	36.2 b	7.6 b
Sovran 50 WG 4 oz alternate with						
Rally 40 W 5 oz	13.8 bc	0.2 b	0.1 b	99.5 a	20.7 c	3.7 c
BAS 516 (38 WG) at 0.658 lb	0.3 c	0.0 b	0.0 b	92.0 b	3.8 d	0.6 c
BAS 516 (38 WG) at 0.658 lb alternate with						
Rally 40 W 5 oz	1.8 c	0.0 b	0.0 b	100 a	22.7 bc	4.1 bc

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

** Although the two BAS 516 treatments had a little disease they are listed at 0.0 due to rounding off error.

Table 2. Bunch rot incidence and severity on Chardonnay vines.

Treatment and Rate/A**	% Incidence of Bunch Rot*		% Severity of Bunch Rot*
	27 Sep	9 Oct	
Nontreated	--	--	--
Rally 40 W 5 oz	30.0	91.5 a	13.9
Sovran 50 WG 4 oz alternate with			
Rally 40 W 5 oz	27.0	73.0 a	11.1
BAS 516 (38 WG) 0.658 lb	18.0	45.5 b	8.5
BAS 516 (38 WG) 0.658 lb alternate with			
Rally 40 W 5 oz	33.5	76.5 a	15.8

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

** Vines were not treated specifically for bunch rot.

-- Nontreated vines were not evaluated since all clusters were severely diseased with powdery mildew.