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Fungicide control of Phomopsis cane and leaf spot on grape: 2009 field trial

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Introduction

Phomopsis cane and leaf spot of grapevine is caused by the fungal pathogen, *Phomopsis viticola*. On leaves, the disease is manifest as small dark spots with yellowish margins on the leaf blade and veins (Flaherty et al. 1992). Similar spotting can occur on petioles or on the basal portion of infected shoots, and heavy infection on shoots may cause a scab-like appearance (Hewitt and Pearson 1988). Spring rains occurring after budbreak stimulate spore dispersal and infection (Gubler et al. 2008). Spores released from overwintering pycnidia on canes and spurs are spread by rain to young shoots, and infection occurs most readily when moisture remains on the green tissue for many hours (Nita et al. 2008).

In California, the disease can be economically important during wet years along the northern coast and in the northern San Joaquin Valley. Economic loss is generally minor, except during years when damage to shoots and fruit reduces the number of fruit clusters. Losses may also be incurred in season following a serious infection due to the necessity of pruning infected wood (Flaherty et al. 1992). In the northern San Joaquin Valley, susceptible grape varieties include Cabernet Sauvignon, Pinot Noir, Chardonnay, Thompson Seedless, and Grenache (Flaherty et al. 1992). Fungicide applications are made during the spring months to protect shoots; manual removal of infected plant material also aids disease management (Nita et al. 2008).

We conducted a field trial at the UC Davis Plant Pathology Farm in northeastern Solano County, CA to evaluate the efficacy of several registered and experimental fungicides on control of Phomopsis cane and leaf spot on Thompson Seedless grapes. Two applications were made during April 2009 prior to precipitation events.

Materials and Methods

The trial was conducted on 3 rows of vines in a Thompson Seedless vineyard (12 ft row spacing), using a complete randomized design with 4 replicates. Plots consisted of 2 adjacent vines, each spaced 8 feet apart. Fungicides were applied with a handgun sprayer connected to a Nifty-Fifty circulating tank using 75 gallons/acre on 3 April and 150 gallons/acre on 30 April. At the time of the first application, shoots were roughly 20 cm in length.

Disease was assessed on 15 May following two rain events by rating disease severity on shoots and leaves on each vine using a 0-10 ranked scale with 0 indicating a disease free leaf or shoot. Ranks on each vine were averaged to represent disease in the entire plot; treatment differences were evaluated with Kruskal-Wallis non-parametric ANOVAs in SAS v. 9.1.3. Between-treatment comparisons for significant differences were calculated using the Wilcoxon-Mann-Whitney test (two-tailed t-test approximation, P = 0.10).

Table 1. Treatments examined in the trial. FP = formulated product.

Flag	Product(s)	FP/Acre	FP/4 replicate plots
YRD	Unsprayed control	none	none
YD	Actinovate + ThermX-70	6 oz 0.03% (v/v)	3.0 g 1.5 ml (at 75 gal/acre); 3.0 ml (at 150 gal/acre)
RS	Actinovate + ThermX-70	12 oz 0.03% (v/v)	6.0 g 1.5 ml (at 75 gal/acre); 3.0 ml (at 150 gal/acre)
RKD	Phyton 016-B	0.3% (v/v)	30 ml
BS	JMS Stylet-oil	2% (v/v)	96 ml (at 75 gal/acre); 192 ml (at 150 gal/acre)
KS	OM-2	2% (v/v)	96 ml (at 75 gal/acre); 192 ml (at 150 gal/acre)
R	Sovran	4.0 oz	2.0 g
KD	Sovran	6.4 oz	3.2 g
GS	Pristine	10.5 oz	5.2 g

Results

Two rain events from April to early May (Figure 1) provided wetnesss for *Phomposis* infection on emergent green tissue (Figure 1). Fungicide treatment significantly affected leaf severity ($\chi^2 = 21.5$; df = 8; P < 0.006; Table 1). Sovran (at 6.4 oz/acre) and Pristine provided the best protection; Sovran (at 4 oz/acre) and the high label rate of Actinovate (12 oz/acre) also reduced leaf severity. Shoot disease severity also differed significantly among treatments ($\chi^2 = 23.9$; df = 8; P < 0.003), with data suggesting that the best disease control was achieved by treatment with Pristine or Sovran (both application rates).

Figure 1. Daily mean temperature and precipitation data for Davis, California during the experimental period. Data are from CIMIS station 6 (http://wwwcimis.water.ca.gov/). Arrows indicate fungicide applications.

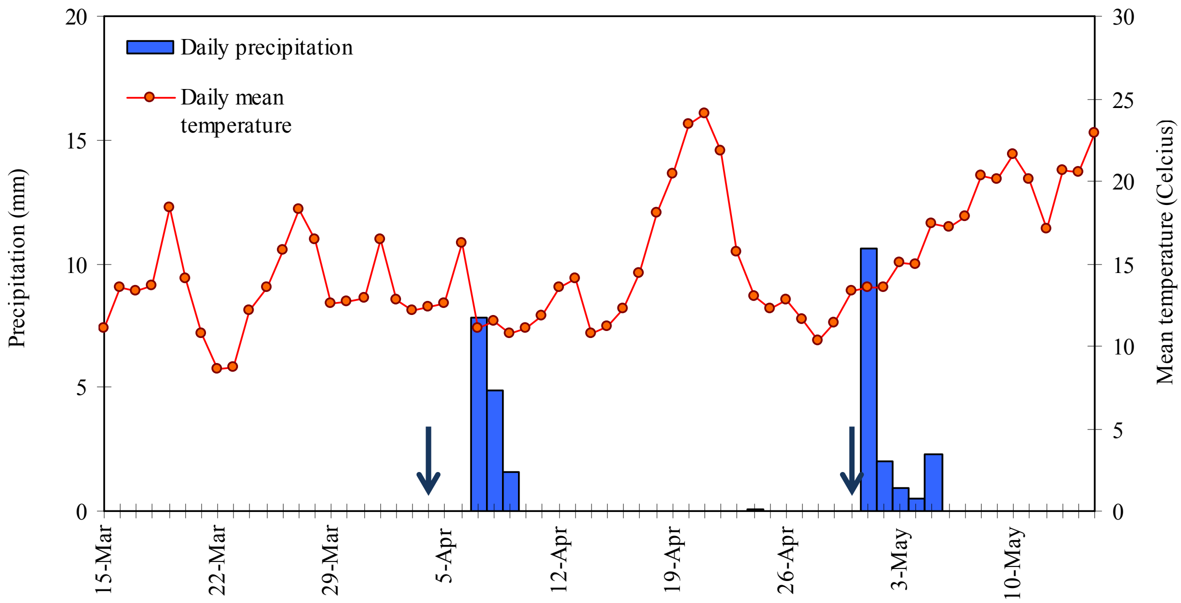

Table 1. Treatment effects on leaf and shoot disease symptoms. Values represent the mean severity rating on a 0-10 ranked scale. Treatment means with different letters are significantly different according to the Wilcoxon-Mann-Whitney test (two-tailed t-test approximation, P < 0.10).

Treatment	Active ingredient(s)	Leaf Severity		Shoot Severity	
JMS Stylet-oil, 2% (v/v)	Parafinnic oil	5.8	a	5.5	a
Unsprayed control	None	4.5	a	4.0	a
Actinovate, 6 oz + ThermX-70, 0.03% (v/v)	*Streptomyces lydicus* WYEC108	4.3	ab	4.0	a
Phyton 016-B, 0.3% (v/v)	Copper sulfate pentahydrate	4.0	a	2.5	ab
OM2, 2% (v/v)	Parafinnic oil	3.5	ac	3.0	a
Actinovate, 12 oz + ThermX-70, 0.03% (v/v)	*Streptomyces lydicus* WYEC108	2.4	abd	2.4	a
Sovran, 4 oz	Kresoxim-methyl	2.0	bce	0.4	b
Pristine, 10.5 oz	Pyraclostrobin + boscalid	1.1	de	0.0	b
Sovran, 6.4 oz	Kresoxim-methyl	0.9	de	0.1	b

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Acknowledgements

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Appendix: Materials

Product	Active ingredient(s) and concentration	Class	Manufacturer
Actinovate AG	*Streptomyces lydicus* WYEC108 (0.0371%)	biological-microbial	Natural Industries, Inc.
JMS Stylet-oil	paraffinic oil (97.1%)	oil	JMS Flower Farms
OM-2	paraffinic oil + OE444 (an oil-based adjuvant-2%)	oil	OE 444 DuGassa/Goldschmidt
Phyton 016-B	copper sulfate pentahydrate (21.4%)	other	Phyton Corporation
Pristine	pyraclostrobin (12.8%) + boscalid (25.2%)	QoI (strobilurin) and carboximide	BASF
Sovran	kresoxim methyl (50%)	QoI	BASF
ThermX-70	saponin extracted from *Yucca schidigera* (20%)	plant extract	American Extracts

Appendix references: (1) Adaskaveg, et al. 2008. Efficacy and timing of fungicides, bactericides and biologicals for deciduous tree fruit, nut, strawberry, and vine crops 2008, available at http://plantpathology.ucdavis.edu/ext/gubler/fungtrials2008/file/IPMFungicidetables2-14-08.pdf, (2) http://www.omri.org/index.html, (3) Janousek et al. 2008. Grape powdery mildew trials, available at http://plantpathology.ucdavis.edu/ext/gubler/fungtrials2008/file/Grape_PM_2008_web_report.pdf, (3) various sources including product labels and/or MSDS.