Fungicide Control of Phomopsis Cane and Leaf Spot on Grapevine: 2016 Field Trial

Trang T. Nguyen, Nicholas S. Morris and W. Douglas Gubler

Department of Plant Pathology, University of California, Davis, CA 95616.

Department of Plant Pathology,
University of California Cooperative Extension,
University of California, Davis – October 2016

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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 tiny dark spots with yellow halos on the leaf blade and veins (Bettiga *et al.*, 2014). 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 (Bettiga *et al.*, 2014). Spring rains occurring after budbreak stimulate spore release, dispersal and infection (Gubler *et al.*, 2008). Spores released from overwintering pycnidia on canes and spurs are spread by rain to young shoots. 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 in the north 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. 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.

A field trial was conducted at the UC Davis Plant Pathology Farm in northeastern Solano County, CA to evaluate the efficacy of registered fungicides on control of Phomopsis cane and leaf spot. The variety Thompson Seedless was used in this study.

Materials and Methods

The trial was conducted on 4 rows of vines in a 34 year-old Thompson Seedless vineyard (8ft vine x 12 ft row spacing), using a complete randomized design with 4 replicates. Plots consisted of 4 adjacent vines. Fungicides were applied with a handgun sprayer (Nifty-Fifty circulating tank) using 75 gallons/acre on 17 Mar and 100 gallons/acre on 1 Apr. At the time of the first application, shoots were roughly 20 cm in length.

Disease was assessed on 21 Oct by rating disease severity on each vine by counting the number of infected shoots. Trial models were analyzed using the ANOVA Tests for data; P-values for trial was $P<0.05$. Means comparisons were made using Fisher LSD test with $\alpha=0.05$.

Table 1. Experimental Design

Experimental design	Complete randomized design with 4 replicates.		
Experimental unit	4 vines = 1 plot		
Plot area	384 ft^2 (row spacing = 12 ft, vine spacing = 8 ft)		
Area/treatment	1536 ft^2 (4 reps = 1 treatment)	Area/treatment	0.035 acre/treatment
Volume water/acre	75 gallons = 2.63 gal/4 replicates (3/17/16) 100 gallons = 3.5 gal/4 replicates (4/1/2016)		
Application method	Handgun sprayers (attached to Nifty Fifty brand 25 or 50 gallon sprayers).		

Table 2. Treatments examined in the trial. FP = formulated product.

Flag	Product(s)	FP/Acre	FP/4 replicate plots
W	Unsprayed control	none	none
KD	Howler + Capsil	5 g/L + 6 oz/100gal	49.8 g + 4.7 mL at 75 gal or 66.3 g + 6.2 mL at 100 gal
HP	Howler + Sovran + Capsil	5 g/L + 2 oz + 6 oz/100 gal	49.8 g +2.0 g + 4.7 mL at 75 gal or 66.3 g + 2.0 g + 6.2 mL at 100 gal
RC	Serenade Optimum	20 oz	19.8 g
Pu	Fracture	24.4 fl oz	25.3 mL
RKS	Sovran (standard)	4 oz	4.0 g

Figure 1. Map.

Results

Several rain events from the beginning of January to July (Figure 2) provided wetness for Phomopsis infection on emerging green tissue. Overall disease pressure was low, however all treatments significantly decreased disease compared to untreated control.

Figure 2. Daily precipitation data for Davis, California from 1 Jan to 1 Jul 2016. Data from CIMIS station 6 (http://wwwcimis.water.ca.gov/).

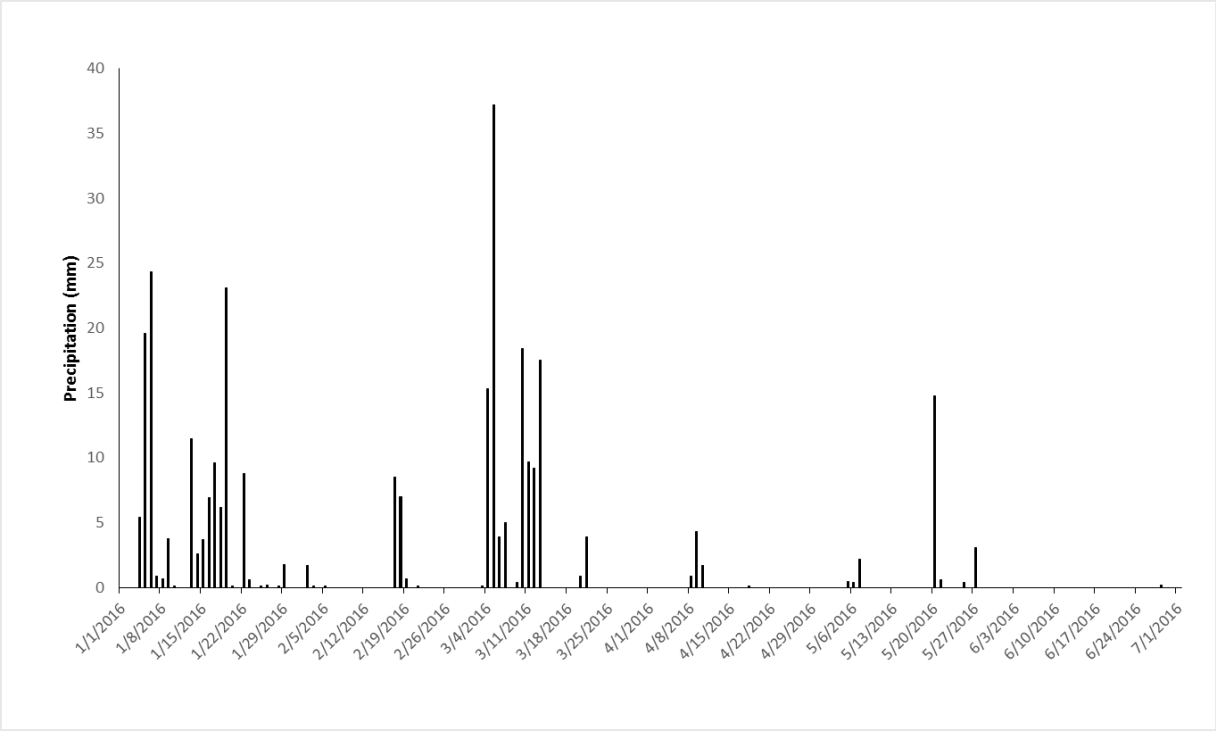

Figure 3. Daily temperature data for Davis, California from 1 Jan to 1 Jul 2016. Data from CIMIS station 6 (http://wwwcimis.water.ca.gov/).

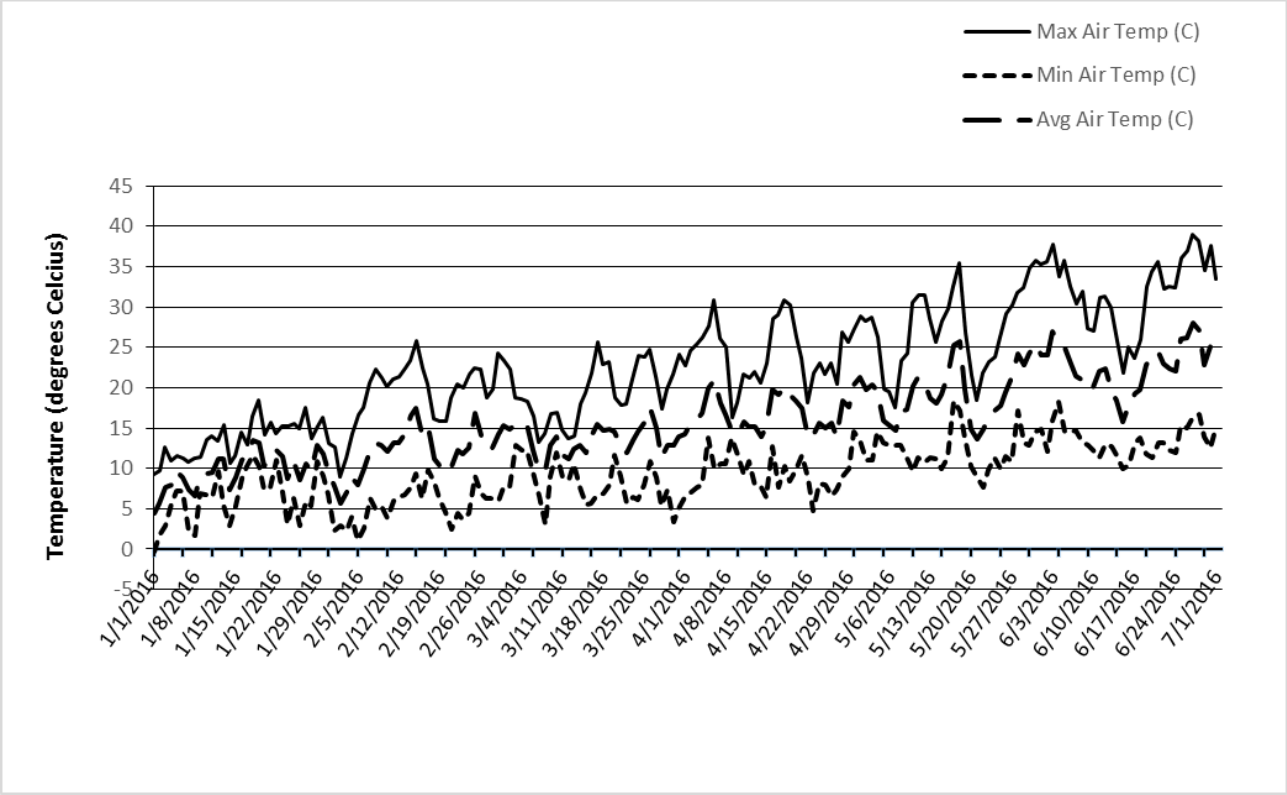

Table 3. Treatment effects on shoot disease symptoms. Treatment means with different letters are significantly different according to Fisher LSD test ($\alpha = 0.05$). '*' Treatment followed by rate per acre.

Treatment	Mean # of infected shoots	
Sovran 4 oz (standard)	1.25	c
Fracture 24.4 fl oz	2.13	bc
Howler 5 g/L + Sovran 2 oz + Capsil 6 oz/100 gal	2.19	bc
Howler 5 g/L + Capsil 6 oz/100 gal	2.19	bc
Serenade Opti 20 oz	2.5	b
Unsprayed control	4.19	a

References

Grape Pest Management. UC DANR Publication 3343, 3nd edition. Regents of the University of California. Bettiga *et al*., 2014

Gubler WD, Smith RJ, Varela LJ, Vasquez S, Stapleton JJ, and Purcell AH. (2008) UC IPM Management Guidelines: Grape, UCANR Publication 3448, Diseases.

Nita M, Ellis MA, and Madden LV (2008) Variations in disease incidence of Phomopsis cane and leaf spot of grape in commercial vineyards in Ohio. Plant Disease 92:1053-1061.

Appendix: Materials

Product	Active ingredient(s) and concentration	Class	Manufacturer
Capsil	Polyether-polymethylsiloxane-copolymer and nonionic surfactant (100%)	adjuvant	Aquatrols
Fracture	BLAD (20%)	plant extract	FMC Corporation
Howler	proprietary	N/A	proprietary
Serenade Opti	QST 713 strain of *Bacillus subtilis* (26.2%)	biological	Bayer CropScience
Sovran	kresoxim-methyl (50%)	QoI (11)	Cheminova

Appendix references: (1) Adaskaveg, et al. 2012. Efficacy and timing of fungicides, bactericides and biologicals for deciduous tree fruit, nut, strawberry, and vine crops 2012, available at http://www.ipm.ucdavis.edu/PDF/PMG/fungicideefficacytiming.pdf , (2) 2014 Fungicide trials, available at http://plantpathology.ucdavis.edu/Cooperative_Extension/, (3) various sources including product labels and/or MSDS.