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DEPARTMENT OF PLANT PATHOLOGY

Evaluation of Pruning Wound Protectants Against Grapevine Trunk Diseases: 2024 Field Trials

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Report Summary

Grapevine trunk diseases (GTDs) represent one of the most important diseases affecting the viticulture industry worldwide. Over 100 different fungal pathogens are responsible for the development of GTDs [1]. Following precipitation events, fungal spores are disseminated from fruiting bodies (i.e. pycnidia or perithecia) through water droplets, which require susceptible plant tissue, such as pruning wounds, to germinate and cause infection [2-3]. Therefore, disease management strategies are focused on fungicide sprays during the winter, when grapevines are pruned and susceptible for infections [4]. In this study, we applied and evaluated registered and experimental fungicides for the protection of pruning wounds of mature grapevines against *Neofusicoccum parvum* and *Diplodia seriata,* two major pathogens responsible for Botryosphaeria dieback in California. Results are shown in Figures 1-3.

Materials and Methods

Field site

The trials were conducted in an experimental vineyard located in the research field of the Department of Plant Pathology at UC Davis (38.522591, -121.760719) between March and November of 2024. Vines of the cultivar Cabernet Franc (12 years old) were trained to bilateral cordons, with 5 spurs per cordon. Vines were drip irrigated throughout the season.

Experimental design

Two experiments were set up for each pathogen, i.e. *Neofusicoccum parvum* and *Diplodia seriata*. Both trials were arranged in a completely randomized block design, with five blocks, each containing all the treatments (Table 1). The experimental unit was a single vine with 5 pruned spurs. Vines were spur pruned (3 buds) with disinfected pruning shears in early March, and immediately treated by spraying the treatments using mist blower backpack sprayers (Stihl SR 430) on the pruning wound until runoff. After 5 days, the treated canes were inoculated with a 20 µL spore suspension (~10,000 spores) of each pathogen, respectively

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Table 1. Treatments utilized in grapevine pruning wound protection trial, year 2024.

Treatment	Active ingredient	Rate (50 ga/a)	Application time	Manufacturer
2. Inoculated control	*Neofusicoccum parvum / Diplodia seriata*	10,000 con	5 days after treatment	n/a
3. UC-70	Proprietary	4.7 fl. Oz.	After pruning	BASF
4. UC-70	Proprietary	9.1 fl. oz.	After pruning	BASF
5. Rhyme	Flutriafol	5.0 fl. oz.	After pruning	FMC
6. Prune Master	Proprietary	100% *v/v*	After pruning	Bruce Thomas
7. Topsin M	Thiophanate-methyl	1.25 lb	After pruning	Dow AgriSciences
8. PerCarb	Sodium carbonate peroxyhydrate	1,350 g	After inoculation	BioSafe Systems
9. *Clonostachys rosea* (experimental)	Clonostachys rosea isolates B62 + C81	10^5 cfu/mL	After pruning	Eskalen Lab
10. CrabLife Powder	Chitin	0.83 lb	After pruning	Conchazul de Mexico
11. Bio-Tam 2.0	*Trichoderma asperellum* strain ICC012 + *T. gamsii* strain ICC080	2 lb	After pruning	Isagro USA
12. *Aureobasidium pullulans* (experimental)	*Aureobasidium pullulans* isolates UCD8189 + UCD8344	10^5 cfu/mL	After pruning	Eskalen Lab
13. Esendo	Azoxystrobin + *Pseudomonas chlororaphis* strain AFS009	2.8 lb	After pruning	AgBiome
14. Parade + Dyne-Amic	Pyraziflumid	235 fl. oz. + 0.25% *v/v*	After pruning	Nichino America
15. Guarda	Thyme oil	1.0% *v/v*	After inoculation	BioSafe Systems
16. OxiDate 5.0	Hydrogen peroxide + peroxyacetic acid	1.0% *v/v*	After inoculation	BioSafe Systems
17. G49	Proprietary	4.0 fl. oz.	After pruning	Lalleman
18. *Bacillus velezensis* (experimental)	*Bacillus velezensis* isolate UCD10631	10^5 cfu/mL	After pruning	Eskalen Lab
19. *Pseudomonas chlororaphis* (experimental)	*Pseudomonas chlororaphis* isolate UCD10763	10^5 cfu/mL	After pruning	Eskalen Lab
20. *Trichoderma hamatum* (experimental)	*Trichoderma hamatum* isolate UCD8717	10^5 cfu/mL	After pruning	Eskalen Lab

Experimental treatments

The treatments described in this report were conducted for experimental purposes only and crops treated in a similar manner may not be suitable for commercial or other use.

Data collection and analysis

Treated spurs were allowed to stand for 8 months before their removal from the field for evaluations. Collected spurs were transported to the laboratory, disinfected with 70% ethanol and split longitudinally using a sterile knife. Six wood pieces (approximately 2 × 2 mm), three from the pith and three from the margin of the discoloration area on acidified potato dextrose agar (APDA). After an incubation of 7 to 14 days at room temperature, recovery of each pathogen was recorded and identified by their morphological characteristics. The efficacy of the treatments was recorded as percentage of infection, which was calculated using the formula: [(number of infected samples/total samples) × 100]. Each block yielded one percentage of infection value per treatment, resulting in five repetitions for each treatment. Infection percentages were subjected to analysis of variance, and means were separated using Fisher's least significant difference test (α = 5%). Additionally, weather data such as daily temperature and precipitation were obtained from the CI006 weather station belonging to the California Irrigation Management Information System (CIMIS) and are shown in Figure 1.

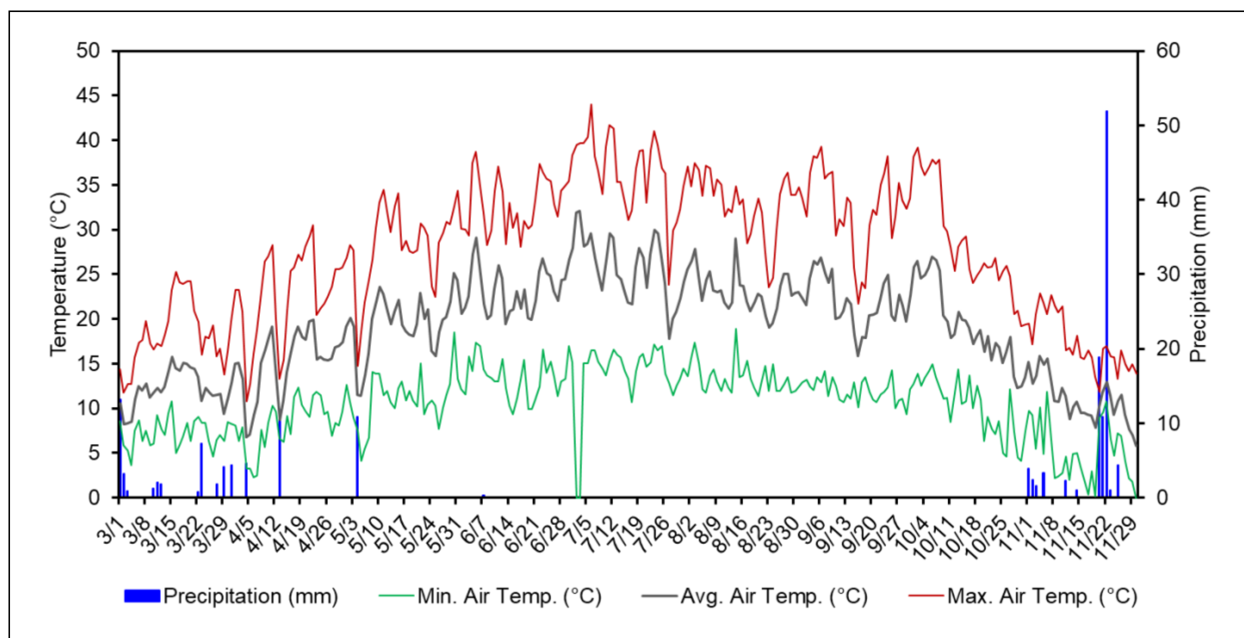

Figure 1. Average daily temperature (°C) and precipitation (mm) from March 1 to November 30 of 2024 obtained from the CIMIS weather station located in Davis, CA.

Results

Percentages of infection by each pathogen are shown in Figures 2 and 3.

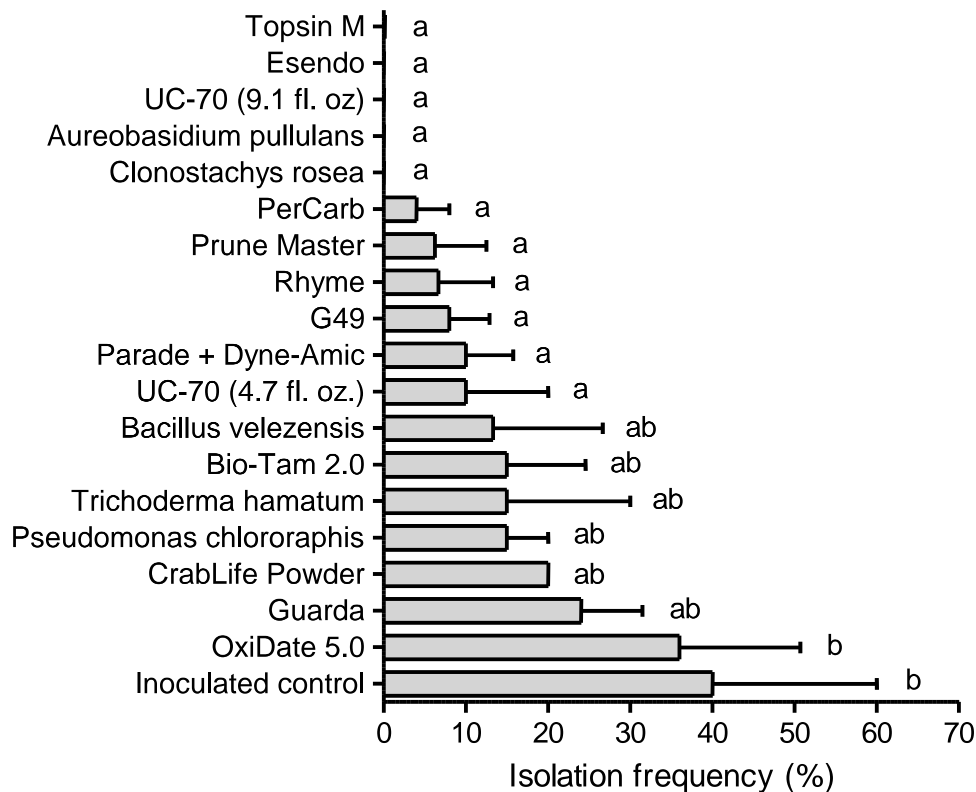

Figure 2. Mean percentage of infection by *Neofusicoccum parvum* eight months post-treatments. Columns with different letters vertically indicate significant differences between treatments according to Fisher's LSD test ($p = 0.0307$).

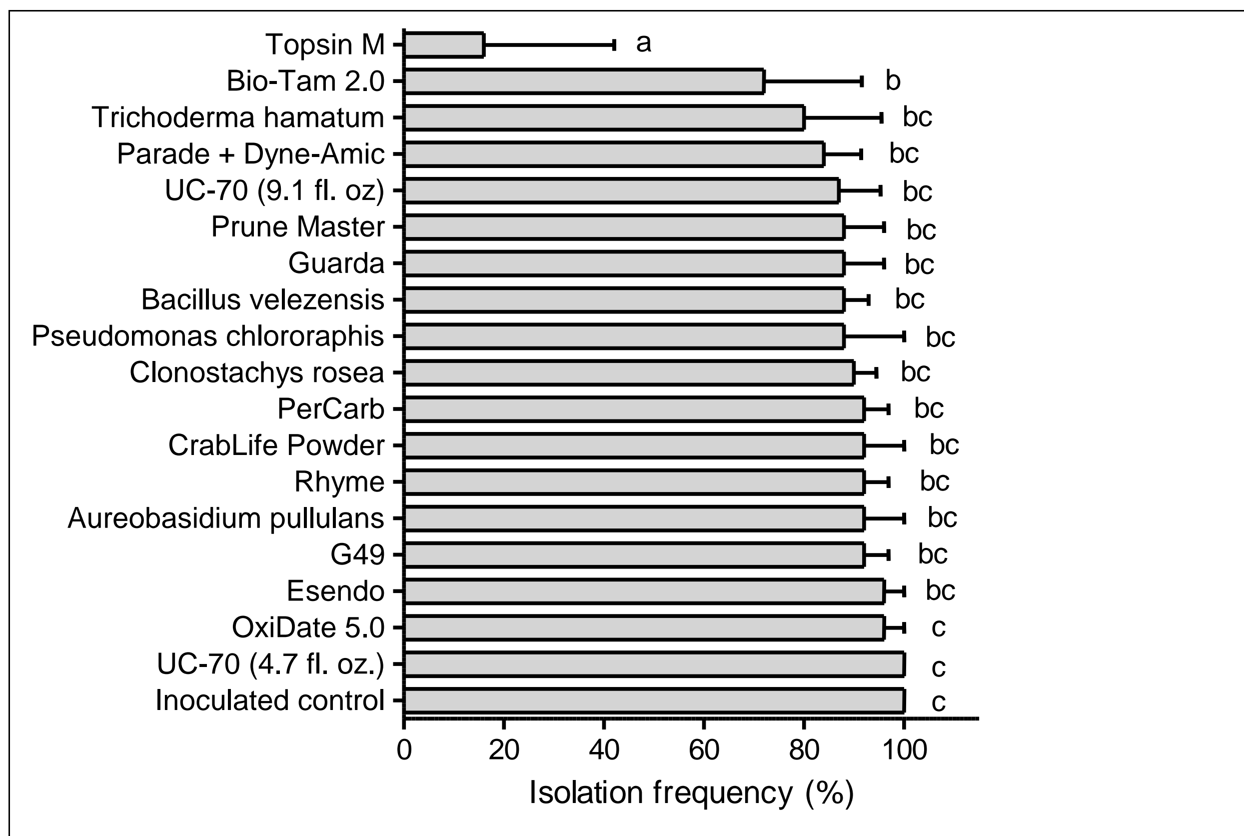

Figure 3. Mean percentage of infection by *Diplodia seriata* eight months post-treatments. Columns with different letters vertically indicate significant differences between treatments according to Fisher's LSD test ($p < 0.001$).

Acknowledgements

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