Final Report: Evaluation of Biological and Chemical Pruning Wound Protectants Against Selected Fungi Associated with Grapevine Trunk Diseases

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Report Summary

Grapevine trunk diseases (GTDs) represent a major threat to the future economic sustainability of table grapes and wine grapes. Several taxonomically unrelated groups of Ascomycete fungi cause trunk diseases in grapevines including *Phaeoacremonium minimum* and *Neofusicoccum parvum.* (1). Following precipitation events, fungal spores (sexual and asexual) become airborne and colonize exposed wood vessels caused by pruning. Total disease control is virtually unattainable because of the huge number of wounds made on an individual grapevine and extended period of wound susceptibility but one mitigation practice is to apply a protectant to exposed pruning wounds (2, 3, 4, 5).

This trial was conducted at the UC Davis Plant Pathology Fieldhouse Facility (38°31'25.4"N 121°45'39.5"W) from February to December 2020. Treatments were a randomized block design. The trial was performed in an 8 year old Sauvignon Blanc vineyard.

Materials and Methods

A. Experimental design

In this study a total of four vines were used per treatment with 10 spurs used per vine, organized in a completely randomized block design across four rows. Grapevines were trained to bilateral cordons on a horizontally divided trellis with typically 10 spurs per cordon. A total of 10 spurs were used per vine with 5 spurs used for each GTD pathogen per vine. The experimental unit for this trial was 1 vine or 5 spurs. Vines were spur pruned (1 foot-long) in February, and within 24 hours of pruning, the liquid treatments were sprayed with a 1-liter hand-held spray bottle on the pruning wound until runoff.

The following day, canes treated with non-biologically based treatments were inoculated with a 20 µl solution (roughly 2000 spores) of either *N. parvum* or *P. minimum*. Seven days after pruning, canes treated with biological treatments were inoculated with a 20 µl solution (roughly 2000 spores) of either *N. parvum* or *P. minimum.*

B. 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.

Tretament or Trade Name	Application rate 100 ga/Ac	Interval
Untreated Control	N/A	After Pruning
Luna sensation (7.6 oz/AC)	7.6 fl oz	After pruning
Luna Experience (8.6 oz/AC)	7.6 fl oz	After pruning
Terramera Biological (Ter-1291)	2.4 % (v/v)	After pruning
Terramera Biological (Ter-1291)	0.8% (v/v)	After pruning
Terramera Biological (Ter-1291) + Spur Shield	0.8 % (v/v) + 1.5 qt	After pruning
Rhyme 1 (Spur and Drip)	5 fl oz	Dormant after pruning (pruning wound spray), Budbreak (Foliar), 6-10 inc grove (drip), June 15 (drip), after harvest (drip)
Rhyme 2 (Spur and Drip)	5 fl oz	Dormant after pruning (pruning wound spray), Budbreak (Foliar), 6-10 inc grove (drip)
Rhyme 3 (Drip)	5 fl oz	6-10 inc grove (drip), June 15 (drip), after harvest (drip)
EMP	1% (v/v)	
EMP+ Biotam (*Trichoderma asperellum* and *Trichoderma gamsii*)	1 % (v/v) + 2lbs	Inoculate 7 days after pruning
Biotam (*Trichoderma asperellum* and *Trichoderma gamsii*)	2 lb	Inoculate 7 days after pruning
Biotam + Crab Life Powder	2 lb + 0.5 lb	Inoculate 7 days after pruning
Crab Life Powder	0.5 lb	Inoculate 7 days after pruning
Vintec (*Trichoderma atroviride*)	0.18 oz	Inoculate 7 days after pruning
Biosafety 1 (PerCarb)	3 lbs	Apply after pathogen
Topsin M + Rally	1.5 lb + 5 oz	After pruning

C. Trial Map

19	YKS	RKD	RS	B	YD	OC	OS	GKS	BC	P	W	GKD	KD	YKD	KS	Y	GS
18	B	OS	RS	P	YKD	YD	RKD	BC	YKS	GKD	Y	GKS	W	GS	KS	OC	KD
17	OS	W	GS	GKD	RKD	P	BC	RS	Y	KD	B	KS	GKS	OC	YKS	YD	YKD
16	YD	P	GKD	W	YKS	BC	OS	B	OC	KS	RKD	GKS	GS	KD	Y	RS	YKD
15																	

D. Vine Management

During the application period, vines were irrigated by drip irrigation. Sucker shoot removal and leafing were done during the duration of trial.

E. Data Collection and Statistics

The efficacy of the treatments controlling the GTDs were recorded as the Mean Percentage of Infection (MPI). This was calculated by: (Number of GTD infected samples/Number of total samples) x 100. There were a total of 4 repetitions (4 vines) with 5 spurs per GTD per treatment. Treatments were compared against the untreated control and a standard control. Means comparisons were made using Fisher's least significant difference test ($p<0.05$).

Results

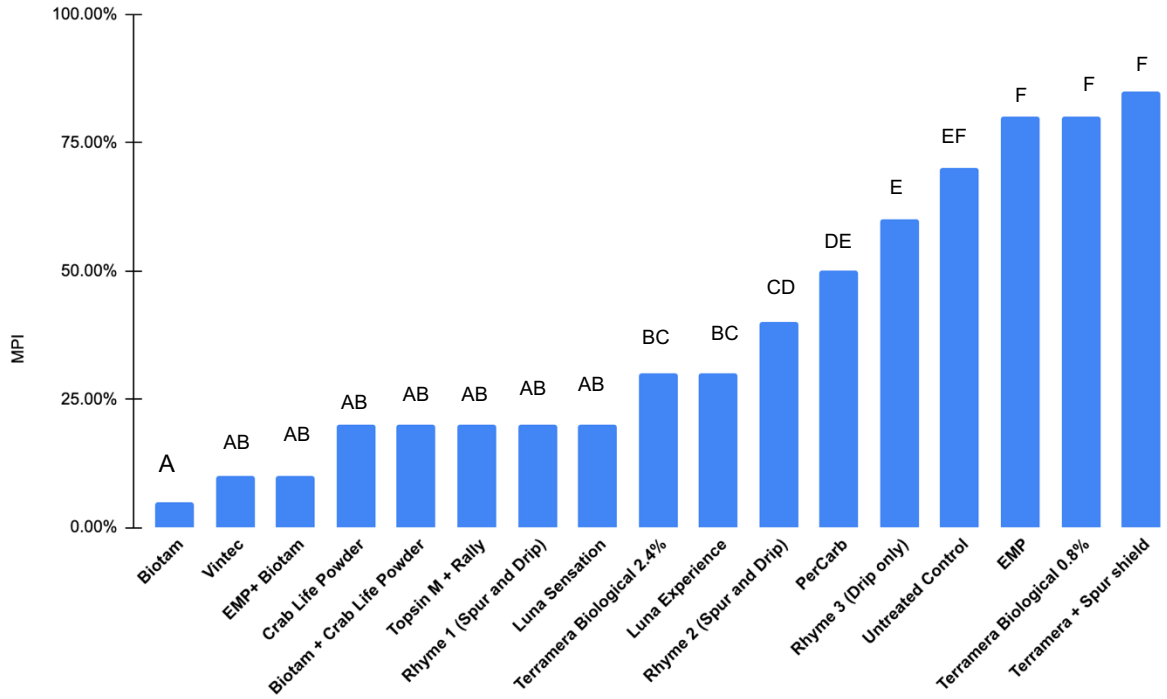

Figure 1. Evaluation of pruning wound treatments mean percent infection (MPI) rates with ***Phaeoacremonium minimum*** located at UC Davis Plant Pathology Field House, 2020. Bars represent the least mean square of percent infection. Bars with a different letter are significantly different according to Fisher's least significant difference test ($p = 0.05$).

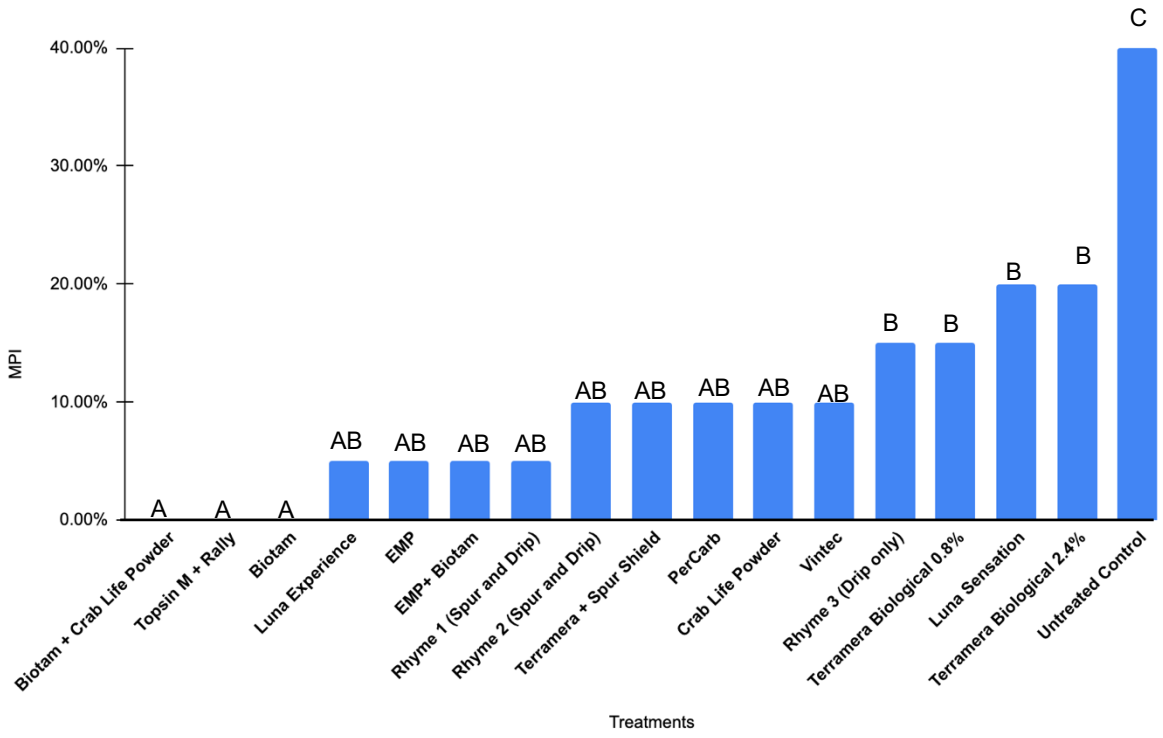

Figure 2. Evaluation of pruning wound treatments mean percent infection (MPI) rates with ***Neofusicoccum parvum*** located at UC Davis Plant Pathology Field House, 2020. Bars represent the least mean square of percent infection. Bars with a different letter are different according to Fisher's least significant difference test ($p = 0.05$).

Acknowledgements

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