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 *Eutypa lata* 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).

The trial was conducted in Kern County, near Delano, CA (cv Allison, 4 years old).

Materials and Methods

In this study there was a total of four vines per treatment with 20 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 20 spurs per cordon. 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-biological based treatments were inoculated with a 20 µl solution (roughly 2000 spores) of either *N. parvum* or *E. lata*. Seven days after pruning, canes treated with biological treatments were inoculated with a 20 µl solution (roughly 2000 spores) of either *N. parvum* or *E. lata.*

Treatments

Collection of samples and analysis.

In November 2020, canes were harvested from the field trial. Each spur was split with a knife longitudinally, and six small tissue slices were on acidified potato dextrose agar medium (APDA) (for fungal treated canes) and PDA for bacterial treated canes). After room temperature incubation for 7-14 days, recovery of the fungal pathogen isolates was recorded by their morphological characteristics

Tretament or Trade Name	Active Ingredient	Application rate 100 ga/Ac	Manufacturer
Water Control - Non Inoculat	N/A	N/A	N/A
Water Control - Inoculated	N/A	N/A	N/A
Terramera (Exp B)	Caprylic acid	2.4 % (v/v)	Terramera Inc.
Luna Sensation	Fluopyram/Trifloxystrobin	5.0 fl oz	Bayer CropScience
Topsin M + Rally	Thiophanate-methyl	1.25 lbs + 2.25 oz	DOW AgroSciences LLP
BioTam + Crab Life-Powder	*(Trichoderma asperellum* and Trichoderma gamsii) + crab and lobster shell powder	2 lb + 0.5 lb	Isagro USA + Conchazul de Mexico
Crab Life Powder	A blend of crab and lobster shell powder	0.5 lb	Conchazul de Mexico
Biotam	*Trichoderma asperellum* and *Trichoderma gamsii*	2 lb	Isagro USA
GCM fermented product	*Bacillus velezensis*	2 % (v/v)	GCM (Korean based company)
Vintec	*Trichoderma atroviride*	2.8 oz	Bi-PA
Vintec	*Trichoderma atroviride*	0.7 oz	Bi-PA
Serenade	*Bacillus subtilis* strain 713	2 qt	Bayer CropScience
Botector	*Aureobasidium pullulans* strain DSM14940/14941	100 gal	Westbridge Agricultural Products
UCD 8717	*Trichoderma hamatum*	1x10 5/ml	UCD
UCD 8368	*Trichoderma asperellum*	1x10 5/ml	UCD
UCD 8189 + 8344	*Aureobasidium pullulans*	1x10 5/ml	UCD
UCD 8745	*Bacillus velezensis*	2 % (v/v)	UCD

The efficacy of the treatments controlling the GTDs was calculated as the Mean Percent of Infection (MPI). The following formula was used for the MPI calculation: Number of GTD infected samples (the spurs from which the pathogen could be re-isolated)/number of total samples x 100. The mean percent disease control (MPDC) was calculated on the basis of MPI of the control treatments as (100x(1-(MPI treatment/MPI control))). Means comparisons were made using an LSD test α=0.05. All data analysis was performed using JMP software (SAS Institute, Cary, NC).

Results.

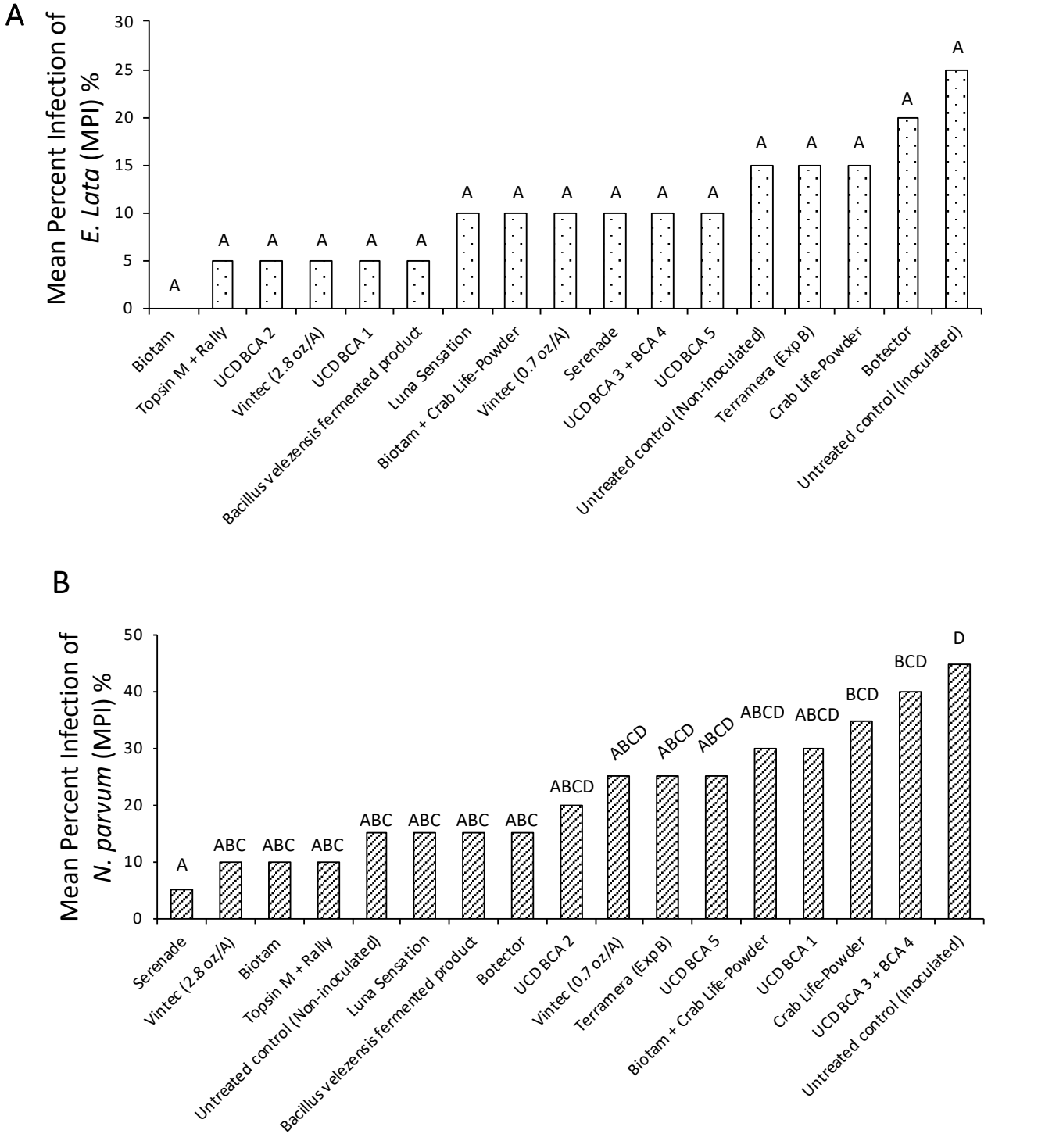

Figure 1. Evaluation of pruning wound infection in Kern County, CA in 2020 with the two pathogenic fungi, (A) *E. lata* and (B) *N. parvum.* Values represent the average of twenty replicates. Bars with a different letter are significantly different according to Fisher's LSD test, P≤ < 0.05).

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