

**Virginia Wine Board Grant
Final Report**

8/2/2021

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Title: Grape disease management projects

Proposal Number: PMXR2D2J

Project Type: ☒ Research ☐ Education ☐ Marketing

Is this a multi-year grant? v Yes ☐ No

If yes, which year does this report address? [E.g. 2nd of a 3-year grant]
2nd of a 2-yr grant.

Original Funding Amount: \$18,000

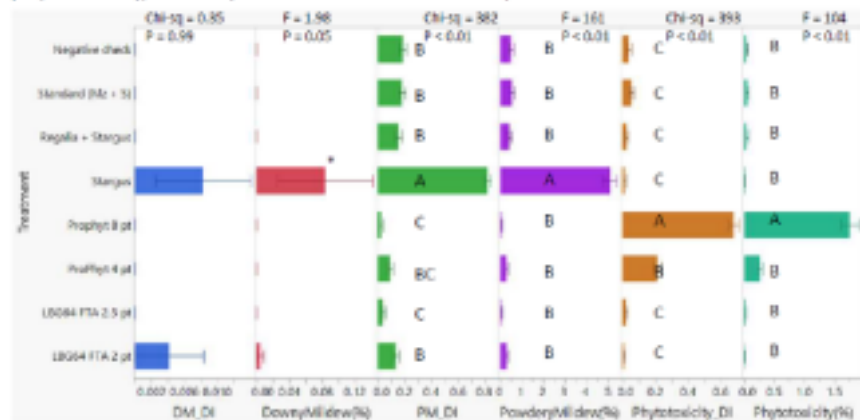
Current Balance: \$134.20

Objectives and Corresponding Achievements:

1) Phytotoxicity

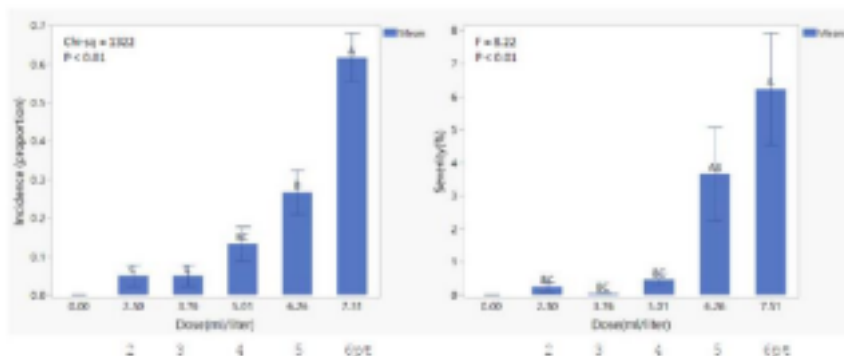
- a) In 2019-20, we tested the effect of Phostrol dose to phytotoxicity, and found out that even the recommended dose can result in phytotoxicity. Also, we tested several combinations of copper products, Prophyt, and water pH to demonstrate that Prophyt can adjust water pH, but extremely high or low pH still result in phytotoxicity and addition of copper, especially, Cueva, resulted in severe phytotoxicity.
- b) In 2020, we tested the effect of Prophyt in the field and greenhouse to find that with Prophyt, we can observe very low level of phytotoxicity as marginal leaf necrosis, but it was not severe (< 1% in severity). When we increase the dose to 8 pt (double the dose of the highest recommended rate), incidence increased to 70%, but severity stayed less than 2%, indicating that although phytotoxicity can be an issue, it may not be severe enough to cause damage on crops.

No significant effect on downy mildew, Stargus resulted in significantly higher powdery mildew (?)
 High (4 pt) and double rate (8 pt) of ProPhyt resulted in significantly higher phytotoxicity, but only 1.8% in mean leaf severity



c)

Dose response on both incidence and severity
 At 4 pt, incidence and severity were similar to that of the field trial



d)

systemic resistance inducer

2) Use of a

a) A plant defense activator Actiguard (ka ASM) showed promising, but a bit confusing result in 2019. In the greenhouse, it resulted in a significant reduction in powdery mildew. On the other hand, in the field, it resulted in a significant reduction in downy mildew, but did not show any efficacy against powdery mildew. However, the results indicate that ASM can trigger some level of plant defense. We will continue our work in 2020. We also tested the dose-response of ASM to find out that even at 200 ppm (2.7 times higher than the recommended dose), ASM did not cause phytotoxicity.

b) In 2020, we found that Actiguard can significantly reduce the number of ripe rot infected berries. Please see objective 4.

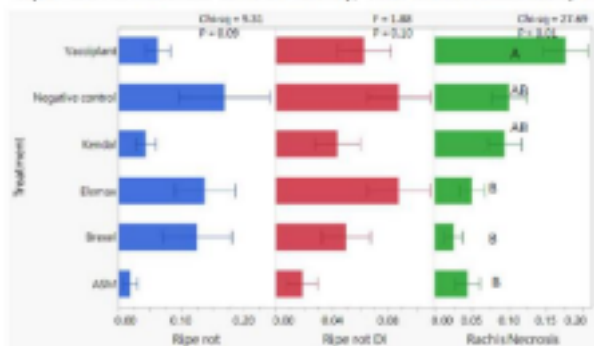
3) Chemical products to keep berries dry

a) We tested the efficacy of RG1960 with or without Stylet oil to keep the berries dry at our AREC and at Zephaniah Farm Vineyard in 2020. Preliminary results shows that the berries were hydrated again after the rain.

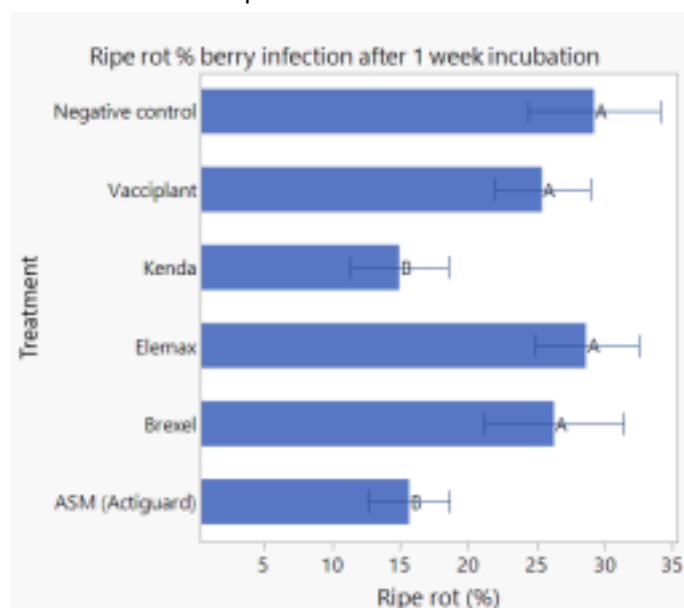
4) Use of alternative spray materials to control ripe rot in the field

- a) We are testing two different formulations of calcium, and two plant defense activators at AHS AREC and Ingleside Vineyards. Unfortunately, none of the treatments resulted in a significant reduction in ripe rot.

Both Kendal and ASM (Actiguard) resulted in numerically lower ripe rot incidence and severity, but not statistically significant



- b)
- c) Once berries are incubated for one week, both Kendal and ASM resulted in significantly lower numbers of ripe rot infected berries than other treatments.



Summary:

- d) Both Kendal (registered as nitrogen, but some suggest its potential activity as a plant defense activator) and ASM resulted in significantly lower ripe rot in 2020. ASM was tested in 2019 and showed its efficacy on grape downy mildew.
- i) ASM is not registered for grape, but it may help. I communicated with Syngenta, and they showed interest in expanding the ASM label to grapes.
- e) Kendal may suppress sour rot to some extent, but we need more research (very little development of sour rot in 2020)

f) We did not find better ripe rot control with two different formulations of calcium (Brexil and Elemax), and Vacciplant (Laminarin, sold as a plant defense activator) when they are applied on top of a standard fungicide regimen over the course of two seasons.

i) Ca was tested due to positive effects reported on apple bitter rot

ii) Vacciplant resulted in higher powdery mildew in 2019 and more rachis necrosis in 2020

5) Effect of pH on fungicide application

a) Water pH matters when it comes to insecticide application, but we have limited knowledge on many fungicides. I would like to test the effect of pH in field and lab conditions.

b) I created a table of known pH reactions of pesticides in 2019. I circulated the table to chemical companies to update in 2020.

6) Revisiting sprayer calibration

a) As we addressed in a 2018 workshop, we need more information on sprayer preparation, maintenance, and calibration. This is more of an extension project where I will collect extension and demonstration materials to help my program.

b) I created a new handout in 2019, presented in two extension meetings.

i) The handout is now published as an extension publication (SPES314-NP)

Overall Benefit for Virginia Wine Industry:

1. We determined the effects of dose, water pH, and copper on the risks of phytotoxicity caused by a phosphorous acid. This information has been discussed anecdotally among growers, but never shown as data to support their field observations.
2. We also showed potential positive effects of two products for ripe rot. Since none of the fungicides we have tested controlled ripe rot very well, this information helps us to improve our fungicide spray plan.
3. Vineyard spray calibration was reviewed and resulted in one workshop, extension talks, and one publication
4. Overall, these findings and activities will benefit wine grape growers to improve their production by reducing the loss due to phytotoxicity, ripe rot, and mis-calibration of their sprayers. Each component will contribute to the overall sustainability of their operation.
5. Findings from this project have been incorporated into my extension meetings and materials.

Publications and Activities Associated with Project:

Nita (2021) Vineyard canopy sprayer calibration worksheet, VCE, SPES314-NP,

<https://resources.ext.vt.edu/contentdetail?contentid=3002&contentname=Vineyard%20canopy%20sprayer%20calibration%20worksheet>

Nita, M., Brannen, P., Villani, S., Hansen, Z., Burrack, H., Pfeiffer, D., . . . Menjak, M. T. (2020). *2020 Southeast Regional Bunch Grape Integrated Management Guide*. Southern Region Small Fruit Consortium Bull. 46.

Pfeiffer, D., Baudoin, A., Bergh, J. C., & Nita, M. (2020). *Grapes: Diseases and Insects in Vineyards*. p. 3-1 – 3- 14. In: *2020 Pest Management Guide for Horticultural and Forest Crops*. Va. Coop. Ext. Pub. 456-017.

Pfeiffer, D., Bergh, J. C., Nita, M., & Yoder, K. S. (2020). *Home Fruit: Diseases and Insects*. p. 3-1 – 3-24. In: *2020 Pest Management Guide for Home Grounds and Animals*. Va. Coop. Ext. Pub. 456-018.

Nita, M., & Nahiyan, A. (2020). Fungicide and Nutrient Field Tests Against Grape Diseases, Winchester, 2020. In Cumberland-Shenandoah Fruit Workers Conference.

Nita, M (2020) Pathogen management in vineyards, VCE Viticulture Virtual IPM workshop, Online, 03/25/2020, Workshop

Nita, M (2020) Interactive Grape Disease Management Planning, VCE Grape Pathology meeting, Online, 03/24/2020, Workshop

Nita, M (2020) Introduction to GrapeIPM.org, VA Vineyard Association Winter Technical Meeting, Charlottesville, VA, 02/21/2020, Oral

Nita, M (2020) Fundamental of grape disease management, VA Vineyard Association Winter Technical Meeting, Charlottesville, VA, 02/19/2020, Workshop

Future Work:

I have submitted another 2-yr study based on the results we obtained from this one and has been approved. We will focus more on ripe rot and sour rot management. A graduate student is expected to join my lab in Spring 2022.

Final Budget and Justification:

Item Type	Original Awarded Amount	Final Amount Spent
Personnel	\$13,000	\$15,058
Fringe	\$1,035	\$1,215
Travel	\$965	\$1,025

Supplies & Materials	\$3,000	\$1,347
Contractual	[\$0.00]	[\$0.00]

Other	[\$0.00]	[\$0.00]
Total	\$18,000	\$17,865

We obtained some donations of chemicals we used in the project and due to the current situation, I was not able to travel as much as I planned. We used the funds for these to cover wage workers who helped in the field and lab.

References: [List all references.]