



Saving wine: managing red blotch disease and its viral vector through symptom analysis

Alyssa R. Ward

Abstract

Red Blotch Disease: What is it?

- The wine industry adds roughly over \$219 billion to the American economy annually, and the industry supplies about one million jobs [1].
- A relatively new threat, grapevine red blotch disease (GRBD), is caused by Grapevine red blotch virus (GRBV) (*Geminiviridae*).
 - Symptoms include leafroll, leaf reddening, & delayed fruit ripening [2].

Background

Transmission: How does the disease spread?

- Disease symptoms first appeared in Cabernet Sauvignon vines in Oakville, CA in 2008.
- It has been identified in all major grape-growing states in the U.S.
- Infected rootstocks are believed to be the main source of inoculum.
- The three-cornered alfalfa hopper, *Spissistilus festinus* (Hemiptera: Membracidae) was identified as the only known insect vector of the disease [3].

Management: How do we control the problem?

- Management of is best implemented by recognizing symptoms early and removing infected vines.
- *Recognizing changes in juice/wine chemistry of infected vines could assist growers in managing the vector and the disease.*

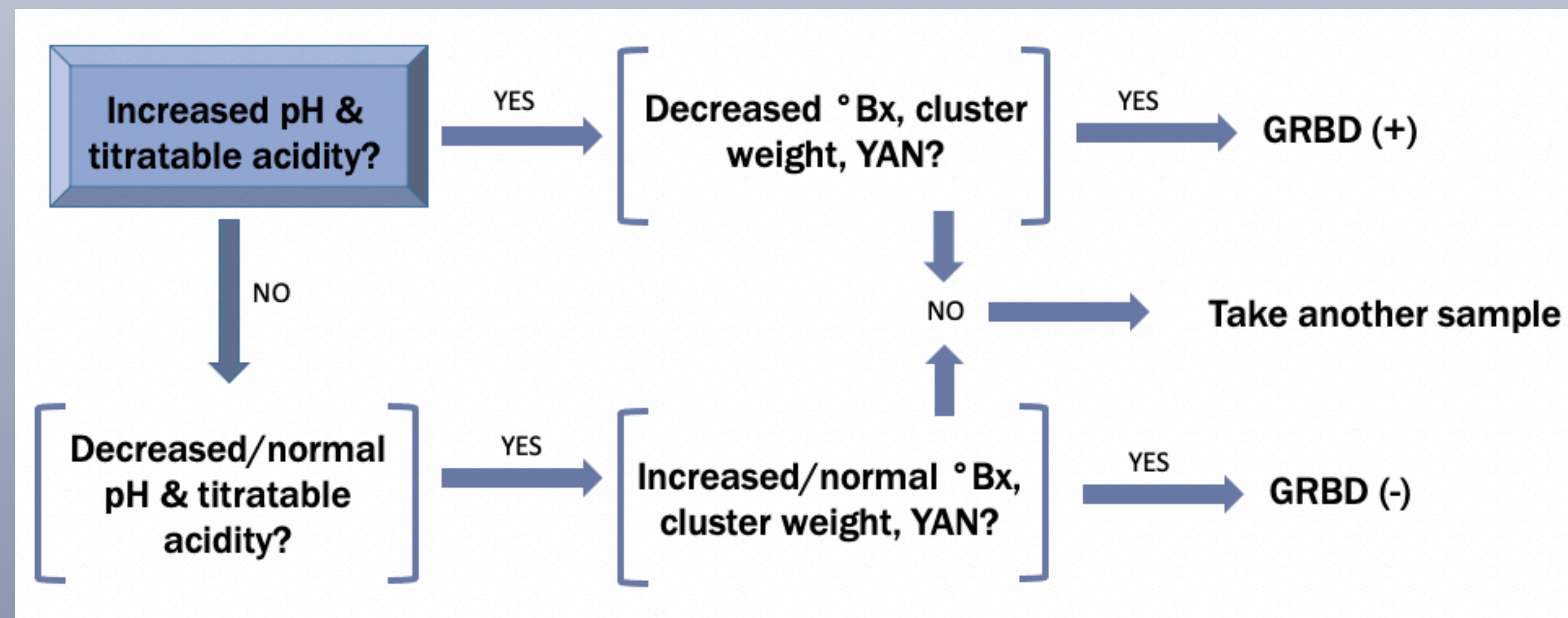
Methodology

Can pH, °Bx, titratable acidity, cluster weight, and yeast assimilable nitrogen (YAN) dictate the probability of a vineyard being infected with GRBV?

- Analyses of pinot noir crop qualities are tracked with a software known as Vintrace.
- The use of a logistic regression model created with R can help answer this question.
- Binary response variable: Disease (yes vs. no, + vs. -)
- Predictor variables: pH, Brix (°Bx, dissolved sugar), titratable acidity, cluster weight (g), yeast assimilable nitrogen YAN (mg/L)

Expected Results

Data for this research is actively being collected



Conclusion

- The unfamiliarity of GRBD, GRBV, and *S. festinus* as a vector manifests difficulty in optimizing control.
- Purchasing clean, certified vines is the best way to prevent the spread; removing infected vines is second [2].
- There is the possibility for those in the wine industry to understand the epidemiology of grapevine red blotch disease better by monitoring chemical parameters and utilizing disease forecasting.

REFERENCES

- [1] WineAmerica. (2017, September 27). WineAmerica study SHOWS \$219.9 billion economic impact of U.S. wine industry in 2017. Retrieved April 14, 2021, from <https://wineindustryadvisor.com/2017/09/27/219-billion-economic-impact-us-wine-industry#:~:text=%E2%80%9CThe%20American%20wine%20industry%20is,of%20the%20United%20States%20economy.%E2%80%9D>
- [2] Skinkis, P., Litwin, J., (2019). Red Blotch Disease. Oregon State University Extension Service. <https://extension.oregonstate.edu/crop-production/wine-grapes/red-blotch-disease>
- [3] Bahder, B. W., Zalom, F. G., Jayanth, M., & Sudarshana, M. R. (2016). Phylogeny of geminivirus coat protein sequences and digital PCR aid in identifying *Spissistilus festinus* as a vector of grapevine red blotch-associated virus. *Phytopathology*, 106(10), 1223-1230