

# Better disease contro with fewer sprays?

## Validating the applicability of a Decision Support System in Ontario vineyards

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### Objective

To determine whether the number of sprays per season can be reduced, and /or downy mildew and powdery mildew can be better controlled in Ontario vineyards by using the Vite.net Decision Support System

### Introduction

Downy mildew and powdery mildew are two common fungal diseases that can cause damage on grapevines and /or wine produced. In Ontario, fungicides are usually sprayed by following calendar-based schedule to control disease development. In order to reduce the risk of using excessive fungicides and better control the disease, disease models have been adapted to create decision support systems (DSS). Vite.net is an expert system which was designed for vineyard management. The disease models in Vite.net simulate the development of the pathogens and process involved in infection cycles using information about the biology of the pathogens and forecast weather. Growers can make spray decisions by checking the disease risk forecast, and residual protection from the latest spray based on “dashboards” of forecast infection risk and fungicide protection and forecast suitability of weather for spray applications created by Vite.net. We evaluated this expert system in 2020 and 2021 at the same sites.

### Materials and methods

Five sites in Niagara were selected based on the presence weather stations from the eGrape weather network. At each site, treatments included 1) areas sprayed by backpack sprayer according to Vite.net outputs, 2) areas sprayed by the grower according to their standard program, and 3)unsprayed vines. The fungicides used for Vite.net plots were the same as those used by growers whenever possible. Vines were monitored twice a week for growth stage and disease development. Only disease incidence was evaluated in Vite.net and Grower plots in 2020 and severity was monitored in all 3 plots in 2021. The Total Treatment Frequency Index (TFI): TFI=sum of all pesticide used at full dose, which was calculated each year at each site for Vite.net and grower plots.



### Discussion

The disease and weather forecast in Vite.net update hourly so the spray decision could also be changed hourly. However, it is not practical for growers to change their spray plans that frequently. If a grower plans a spray for downy mildew, they will usually apply a tank mix to control powdery mildew as well to minimize the number of passes. The disease risk forecast by Vite.net was sometimes high for only one disease. There would be situations that two diseases have to be sprayed separately on different days.

Vite.net was designed by considering the efficacy of the spray mixtures so the residual protection on Vite.net showed only the minimal protection when multiple fungicides are sprayed. Vite.net was more conservative with respect to fungicide activity and crop susceptibility to infection than is normally practiced by Ontario growers.

### Results

Over the 2 years and 5 sites, in 4 instances, the TFI for Vite.net plots was less than for Grower; in 3 it was equal to Grower and in 3 it was greater than Grower. In 2020, the higher disease in Vite.net plots was a function of spray coverage rather than spray timing. This was resolved in 2021 with a different sprayer. Disease incidence and severity was comparable in Vite.net and Grower plots in 2021.

### Vite.net Dashboards for Downy Mildew and Powdery Mildew and Spray Applicability Forecast



Number of Sprays for Downy (DM) and Powdery mildew (PM) and Total Treatment Frequency Index for Plots sprayed according to Vite.net output or Grower Program, 2020 and 2021											
Site	Year	# Downy Mildew Sprays		# Powdery Mildew Sprays		Total TFI (Treatment Frequency Index)		Disease incidence/50 (2020) Disease Severity (% area infected) (2021)			
		Vite.net	Grower	Vite.net	Grower	Vite.net	Grower	Disease	Vite.net	Grower	Unsprayed
1	2020	12	12	11	12	23	24	DM	0	0	N/A
								PM	0	0	
	2021	11	11	11	11	22	22	DM	0	0	1.3
2	2020	10	12	13	12	23	24	DM	0	0	N/A
								PM	22.7	9.8	
	2021	14	14	14	14	28	28	DM	0	<0.1	0.2
3	2020	10	11	9	10	19	21	DM	4.8	21	N/A
								PM	0	0	
	2021	10	12	11	12	21	24	DM	0.2	<0.1	0.5
4	2020	9	10	10	9	19	19	DM	1.4	1	N/A
								PM	20.2	9.2	
	2021	10	10	12	10	22	20	DM	<0.1	0	0.2
5	2020	10	11	12	10	22	21	DM	0	0	N/A
								PM	7.25	0	
	2021	11	11	13	11	24	22	DM	0	0	0.1
5	2021	11	11	13	11	24	22	PM	0	0	<0.1

### Conclusions

Vite.net allowed for a reduced number of fungicide sprays while providing comparable control of powdery and downy mildew. With increased familiarity with the system, the efficiency of applications could be improved even more.

### Acknowledgements

Thanks to Michael MacGillivray, Matthew Summerville, Rachel Hamm, Nadia Skorupski, Kristen Vlahiotis, Karlie Haining, Raquel Schoenberg and Lexi Kozel for their help and to the growers who allowed this work in their vineyards. The project received funding through the Ontario Ministry of Agriculture Food and Rural Affairs.

