

# Characterization of the presence and distribution of grapevine trunk diseases in the vineyards of Quebec, Canada.



C.AROLINE PROVOST<sup>1</sup>, PHILIPPE CONSTANT<sup>2</sup>, and AUDREY-ANNE DURAND<sup>2</sup>.  
<sup>1</sup>CENTRE DE RECHERCHE AGROALIMENTAIRE DE MIRABEL, 9850 Belle-Rivière, Mirabel, Québec, Canada, J7N2X8.  
<sup>2</sup>INRS-ARMAND-FRAPPIER SANTÉ BIOTECHNOLOGIE, 531 Boul des Prairies, Laval, Québec, Canada, H7V 1B7.  
[cprovost@cram-mirabel.com](mailto:cprovost@cram-mirabel.com)



## Introduction

Grapevine trunk diseases (GTD) are very damaging for the sustainability of the vineyard heritage in all major wine regions of the world. GTD can affect young plantations as well as aging vineyards. In both cases, the risk of contamination by these diseases is increasing in Quebec vineyards, as many of them are more than 20 years old, and many producers plan to expand. However, the presence and distribution of GTD is unknown in Quebec. Knowledge of the etiology and epidemiology of MBV is necessary to develop control methods against these diseases. Knowledge of infection times in combination with the development of management strategies using appropriate cultural practices, such as 'replacement surgery', and the application of fungicides or biological control agents to pruning wounds (when registered) are needed to control MBV in vineyards (Bertsch et al. 2013; Gramaje et al. 2018).

**The objective was to characterize the distribution of GTD in Quebec vineyards according to different criteria, such as region, grape varieties and age of the vineyards.**

## Results and discussion

- Results showed the presence of these diseases in Quebec vineyards, mainly *Botryosphaeria dieback* (Tab. 1).
- Black dead arm was present in the samples received in the summer of 2021 since at least one of the pathogens causing this disease was found in 28% of the samples analyzed. The fungus *D. seriata* was dominant, as only one vineyard tested positive for *B. dothidae*.
- On the other hand, eutypiosis was found in 10% of the samples analyzed.
- It is interesting to note that the fungus *E. lata* was mostly detected in vineyards located on the north shore of the St. Lawrence River while *D. seriata* was mostly found in vineyards on the south coast (Figure 1).
- In the case of the two diseases examined, neither the grape variety nor the tissue explained their distribution pattern in the different vineyards that participated in the study (Kruskal-Wallis,  $p > 0.48$ ).
- The knowledge gained from this project will allow us to establish a portrait of GTDs in Quebec vineyards, allowing us to study the epidemiology of these diseases and evaluate cultural practices to limit their spread.

## Acknowledgement

The authors wish to thank Stefano Campagnaro and Pascale Boulay for the technical support, and Louis Thomas, Conseil des vins du Québec. This project is funded through the Innov'Action Agroalimentaire program, under the Canadian Partnership for Agriculture, an agreement between the governments of Canada and Quebec.



## Method

Five GTD were targeted: Esca (Petri disease) (*Phaeomoniella chlamydospora*, *Phaeoacremonium aleophilum*), Eutypa dieback (*Eutypa lata*, *Eutypa armeniacae*), Botryosphaeria dieback (*Botryosphaeriaceae* spp.), Excoriosis (*Diaporthe ampelina*), Black foot (*Cylindrocarpon*-like asexual morphs.).

In 2021, 40 samples (108 samples) from 24 different vineyards were received and qPCR analysis were performed to detect GTD (analysis in progress for some fungi). For each grapevine sampled, three sections were sent: the trunk, the spur and the canker.

The age distribution of the plots concerned is 26 fields older than 9 years (older plots) and 14 plots younger than 8 years (younger plots). This distribution aligns with the initial target proportion of 40% young vineyards and 60% older vineyards. In addition, 75% of the vineyards are under conventional management and 25% under organic control, which is also reported by the Quebec industry. Twenty-two grape varieties were sampled, including 11 of the 12 main grape varieties in Quebec, mainly cold-hardy hybrids such as Frontenac, Marquette, and Seyval

Table 1: Number of positive samples for two of the five diseases tested.

Diseases	Species	Threshold of detection	Number of positive samples	# Young vineyard	# Old vineyard
Eutypiose	<i>Eutypa lata</i>	10 <sup>3</sup>	11 (10%)	2	9
	<i>Eutypa armeniacae</i>				
Black dead arm	<i>Diplodia seriata</i>	10 <sup>1</sup>	29 (27%)	11	18
	<i>Diplodia corticola</i>				
	<i>Botryosphaeria dothidae</i>	10 <sup>2</sup>	1 (0,1%)	1	0

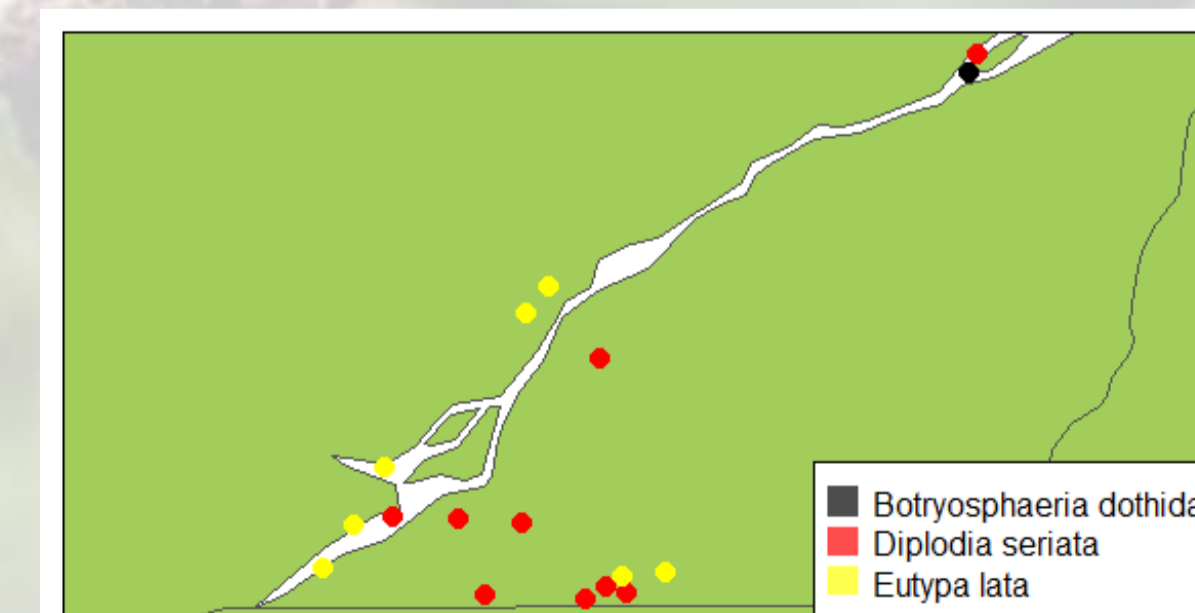


Figure 1: Geographical map showing the distribution of positive samples for two of the five diseases tested.

## References

- Bertsch, C., Ramirez-Suero, M., Magnin-Robert et al. (2013). Grapevine trunk diseases: complex and still poorly understood. *Plant Pathology*, 62(2), 243-265.
- Gramaje, D., Urbez-Torres, J. R., & Sosnowski, M. R. (2018). Managing grapevine trunk diseases with respect to etiology and epidemiology: current strategies and future prospects. *Plant disease*, 102(1), 12-39.