Canadian Grapevine Certification Network
CGCN • RCCV
Réseau Canadien de Certification de la Vigne

Plain Language Research Summary - AgriScience Grape & Wine Cluster - *2024-25*

Activity #10: Grapevine trunk disease: an under-rated threat to the Ontario grape industry?

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1. What is the overall focus of this research activity?

Grapevine trunk diseases caused by fungi have been largely ignored in Ontario vineyards with assumptions that vine decline and death are due to cold injury rather than pathogenesis. The goal of this project is to determine a baseline of incidence of grapevine trunk diseases, the pathogens responsible for them, the timing of inoculum presence (when infection could occur) relative to weather and vine development, and to identify possible cultural, chemical and biological management options.

Baseline incidence will be determined by observing symptoms and collecting trunk samples in the early and late summer from Ontario vineyards of different ages. Pathogens will be isolated and identified using molecular techniques. The presence of inoculum (fungal spores) will be monitored using volumetric spore traps. Spores will be sucked into tubes that will be collected weekly and analyzed using molecular techniques to identify which pathogens are present and the weather conditions that are associated with spore release. Diagnostic tools will be developed to facilitate identification of infected vines by growers and consultants.

This project aims to shed light on a hidden problem in Ontario vineyards: the role of fungal trunk infections in the decline and death of grapevines, a problem previously attributed mainly to cold weather. Fungal trunk diseases can weaken grapevines, leading to reduced vigor, lower fruit yield, and poorer fruit quality, while also shortening the lifespan of the vines. Researchers are setting out to understand how widespread these fungal diseases are, identify the specific fungi responsible, and pinpoint the times these fungi are most likely to infect the vines. This includes exploring various ways to protect the vines, ranging from traditional farming practices to chemical treatments and biological controls.

To gather the necessary information, the team will examine grapevines at key growth stages during the growing season, collecting samples to identify the fungi using advanced lab techniques. They will also deploy spore traps to capture and identify fungal spores in the air, linking their presence to specific weather conditions that might trigger outbreaks. The ultimate goal is to develop easy-to-use tools for vineyard owners and consultants, enabling them to quickly detect infected plants. This research not only aims to protect Ontario's grapevines from these hidden threats but also to ensure the sustainability and productivity of the vineyards.

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2. **What are the main progress updates/milestones in terms of work that was done on this research activity <u>this year</u>?**

Until recently, grapevine trunk diseases (GTDs) have not been considered a major issue in the cool climate growing region of Ontario, the largest grape production area in Canada. To determine the prevalence of GTDs and their causal agents, randomly selected vineyards each of Chardonnay and Cabernet franc were surveyed in early and late summer during the 2024 growing season. The age of vines ranged from 2 to 30 years. From each selected vineyard, trunks were collected from 5 symptomatic vines, including poor vigor, dieback, lack of spring growth, and/or characteristic Eutypa dieback symptoms. Young vine decline symptoms were not observed. Fungal pathogens were first identified based on morphological characteristics and subsequently by multi-gene DNA analyses. Species within the Botryosphaeriaceae family were the most prevalent, specifically *Diplodia seriata* and *Neofusicoccum* spp., followed in number by *Phaeoacremonium minimum*, *Phaeomoniella chlamydospora* and *Eutypa* spp. We are now testing how harmful these pathogens are to grapevines, how effective various fungicides are against them, and whether beneficial fungi we've isolated, such as nine types of *Trichoderma* and *Clonostachys rosea*, can help control the diseases. We set up two modified spore samplers in Niagara vineyards to collect and monitor fungal spores in the air that could spread disease. This study represents the first attempt to demystify the status of GTD in ON, a grape-growing region with unique climatic conditions. identifying the main GTDs pathogens in ON will assist to better understand their epidemiology and develop proper management strategies.

3. **What is this research activity's intended impact on the Canadian grape and wine industry? What benefits could/will the growers, wineries, consumers, etc. see as a result of this research?**

For the Ontario grape industry to remain viable, vineyards must remain at their optimum productivity for many years. Grapevine trunk diseases (GTDs) reduce fruit yield and quality and impact the viability of vines and thus the sustainability of vineyard plantings. GTDs occur in every grape growing region of the world and have recently come to the attention of Ontario grape growers, mainly through presentations by Dr. Úrbez-Torres. Historically, grapevine trunks have been routinely renewed due to what was thought to be cold injury. While this may be the case, trunk diseases are very likely unrecognized but implicated as well. Because they are not as obvious as diseases that directly impact the fruit, like downy or powdery mildew, they are often ignored. Several of these pathogens have an extended incubation period, producing years after infection has occurred. GTDs may also be latent and express only when vines are under stress. The extensive adoption of wind machines to mitigate cold injury has resulted in the retention of older trunks where infections may sporulate and disease spread. As the frequency of extreme weather events, particularly drought, increases with climate change, trunk diseases will be

expressed in vines that were previously considered healthy. It is critical that growers recognize trunk diseases and have means to manage them.

4. **Do you have any communications materials, publications, or other content related to this research activity that you would like CGCN-RCCV to share?**

Not at this time.