Plain Language Research Summary - AgriScience Grape & Wine Cluster - *2025-2026*

Activity #14: Increasing climate change resilience by a better understanding of cold hardiness and with novel frost protection methods

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

Recent events across Canada have clearly shown that cold damage is the biggest abiotic threat to grape production. Extreme winter temperatures and unpredictable spring frosts can cause significant damage to grapevines, leading to lower yields and increased uncertainty for growers. As climate variability increases, vineyards are being exposed to conditions that are more difficult to anticipate and manage. To address this challenge, this research focuses on understanding how grapevine cold hardiness changes throughout the different phases of dormancy. We are first working to better understand the fundamental relationship between cold hardiness and dormancy in both hybrid and Vitis vinifera grape varieties. This knowledge is then applied to improve existing protection practices, such as the use of geotextiles, so that growers can make better decisions to maximize protection. In parallel, we are evaluating new frost protection technologies to provide additional tools that can help reduce damage and improve vineyard resilience.

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

This year, the research team continued collecting extensive data on grapevine cold hardiness and dormancy across multiple vineyard sites and grape varieties in Quebec. Bud samples were regularly collected throughout the winter and analyzed to track how cold tolerance evolves over time. This work builds on previous years and will help improve our understanding of how vines respond to cold conditions under different environments. A portion of the data was also integrated into the VineAlert platform, although some delays in data processing were encountered and will be addressed in the coming year. Experiments on geotextile coverings were continued this year using the same experimental design as before. Early observations suggest that geotextiles successfully protect vines without significantly impacting cold hardiness or the transition between dormancy phases. We are also documenting the effect of geotextile on vine development, particularly the timing of bud break. Growers may have slightly more

flexibility than previously thought in the timing of geotextile removal without significantly affecting bud break, although additional data is needed to confirm these results. Finally, ABA treatments were applied, and we are documenting their impact on cold hardiness and dormancy. However, it is still too early to draw conclusions from these results.

In parallel, new frost protection technologies continued to be evaluated. Heated wire systems were installed in the vineyard and tested under non-critical conditions to confirm proper functioning and system setup. Laboratory trials of a cellulose-based product showed promising results, with significantly higher bud survival compared to untreated controls under controlled freezing conditions when sufficient product was applied. However, translating these results to field conditions remains a challenge, and further work is needed to adapt this technology for practical use in vineyards.

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?**

This research aims to provide grape growers with better tools and knowledge to manage the risks associated with cold temperatures and frost events. By improving our understanding of how grapevines develop cold hardiness and how this changes throughout dormancy, growers will be better equipped to anticipate potential damage and adapt their vineyard practices accordingly. In addition, the data generated through this project will support the development of more physiologically accurate prediction models, which will help improve decision-making around cold risk management. In practical terms, this work will help growers make more informed decisions based on a risk-benefit approach. For example, our results will support better planning of geotextile installation and removal, using scientific data to balance cold protection, timing of operations, labour constraints, and the risk of impacting vine development. Rather than relying on fixed recommendations, growers will be able to adapt their practices to their specific conditions. In parallel, our work on new frost protection technologies helps evaluate both the effectiveness and the practical complexity of these methods under Canadian conditions. This will support decision-making around their use, as well as their potential commercialization and adoption by the industry. Ultimately, these technologies aim to directly reduce the impact of frost events on vines, contributing to more resilient vineyards and more stable production.

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.