

Plain Language Research Summary - AgriScience Grape & Wine Cluster 2023-2024

Activity 12: Selection of superior grapevine material using traditional field evaluations and genomic/metabolic signatures for cold resilience

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

Climate change is a threat to the Canadian grape and wine industry and adaptation strategies are urgently needed. The main objective of this research is to support the Canadian Grapevine Certification's domestic clean plant program through accelerated selection of superior grapevine material for improved performance, cold resilience, and quality using traditional evaluations and genomic and metabolic signatures.

The goal is to improve the sustainability of grape production by greater cold tolerance resilience through identification of superior vine material and their genomic and metabolic signatures and mitigation strategies such as the use plant growth regulators such as Abscisic acid analogs.

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

In 2023-24, different *Vitis* genotypes of varying cultivars, clone and rootstock combinations were evaluated for their cold tolerance and dormancy responses. A number of different cultivars such as Chardonnay, Cabernet franc, Cabernet Sauvignon, Merlot and Sauvignon blanc were used for these studies as well as different clones of each grafted to different rootstocks.

We also performed experiments using plant growth regulators including a cold hardiness promoter called Tetralone which is an abscisic acid analog. We examined the impacts of different types and rates of plant growth regulators on cold hardiness responses in *V. vinifera* cultivars Merlot and Riesling as well as the hybrid cv. Marquette. We were able to gain a further understanding of how these plant growth regulators impact hardiness and dormancy responses in different grapevine genotypes over the course of the 2023-24 dormant period. Samples were also collected throughout dormancy for gene

expression and metabolite analyses so that we can further understand the mechanisms of how these plant growth regulators help to maintain dormancy and hardiness as well as well as underlying hardiness physiology and changes occurring with different Vitis genotypes during winter months. The 2023-24 winter was highly variable with respect to temperatures and was one of the warmest on record so we feel that the results moving forward will help us understand how climate change may impact overwintering of grapevines and how we can mitigate these effects for more sustainable grape production in Canada.

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?

Research, innovation, and technology are critical components to ensure the industry's economic growth. Like all agriculture, the grape and wine industry is threatened by extreme weather, variability associated with climate change. Freeze injury is a continuous threat to the sustainability of the Canadian grape and wine industry even as other threats may exist, such as virus infection, freeze injury can result in significant fruit shortages and economic losses across the entire value chain from one single cold event. Innovation is required to mitigate climate change effects.

One of the most important strategies are adaptation using more resilient plant material to weather variability and extremes. This is also critical to the Canadian Grapevine Certification Network's goal of providing the Canadian grape and wine industry with the highest performing grapevine material possible. Aside from plant material through cultivar, clone and rootstock selection, the use of plant growth regulators is also a potential mitigation strategy to abiotic stress like freezing stress. Abscisic acid analogs have been shown to act as a cold hardiness promoter and maintain hardiness in grapevine. Therefore, the goal is to improve the sustainability of grape production by greater cold tolerance resilience through identification of superior vine and develop new mitigation strategies such as the use plant growth regulators such as Abscisic acid analogs.

4. Do you have any communications materials, publications, or other content related to this research activity that you would like CGCN-RCCV to share? If so, please provide a brief description here and either link it here or send the file as an attachment along with this summary.

None for year 1 of the study.