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

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

Activity #18: Growing more resilient and hardy wine grapes in the face of climate change in an Eastern Canadian environment

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

The overall focus of this activity is to grow hardier and more resilient vines for the Canadian wine grape industry in the face of climate change. The four objectives associated with this activity primarily do this by expanding our understanding of hybrid vines: i.e., crosses between European (*Vitis vinifera*) and more resilient North American (*Vitis spp*) species. While understudied, hybrids make up less than 5% of the BC industry, but roughly 50%, 70% and 90% of the ON, NS and QC industries, respectively. The goal of the four objectives is to model bud hardiness (objective 1) and to determine the impact of common viruses (objective 2), vine balance (objective 3) and rootstock (objective 4) on hybrid vine performance and fruit composition.

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

Progress updates/milestones associated with Activity #18 will be broken down according to the four associated project objectives:

Objective 1 (validation and additional training for a machine-learning bud hardiness model) – Bud hardiness values were tracked in four cultivars (Chardonnay, L'Acadie, Marquette and New York Muscat), across twenty sites, five per cultivar, throughout the 2024-2025 dormant season. While the proposed work plan promised hardiness values would be tracked over four time points, five were delivered. Manual hardiness values were typically within 1 °C of modelled values. The datasets will be amended with the 2024-2025 values and the individual cultivar models adjusted. These models are now available to growers online.

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Objective 2 (hybrid virus studies) – several insights into the impact of viruses on hybrid wine grape production were found over the course of the 2024-2025 reporting period. For example, while the impact of viruses on winter hardiness in grapevines is poorly studied, grapevine red blotch virus (GRBV) was found to significantly decrease bud hardiness in Marquette vines (≈ 3 °C), at least in the early winter. Several hybrid virus impact findings were novel and differed from well studied virus impacts in European vines. Such novel findings, which cannot be generalized, but were dependent on the cultivar and virus-type combination, included: i) virus increased yield, ii) virus had no impact on overall acidity, but changed acid composition, iii) virus decreased the vine's sensitivity to chemical burn.

Objective 3 (hybrid vine balance studies) – the focus of this objective was two common hybrids grown in Nova Scotia: L'Acadie and Marquette. Either two or four canes were retained and canes were either thinned to one basal cluster or left as a control treatment for a total of four different vine balance treatments: 1. Two canes (thinned), 2. Two canes (control), 3. Four canes (thinned), 4. Four canes (control). While vine yield varied greatly across treatments and cultivar (L'Acadie: 2.2 to 6.9 kg/vine; Marquette: 1.5 to 3.1 kg/vine), the impacts on fruit composition and on the vine were nuanced and often minimal. The biggest differences were observed in sugar levels, which were higher in the fruit on thinned vines, but lower in the canes of thinned vines. Some vine nutrients were impacted vine balance treatments, with the biggest differences being observed in potassium, of which the fruit are a major sink. No treatment difference was observed in bud hardiness to date.

Objective 4 (hybrid rootstock trial) – Marquette vines were planted on nine different root types for this objective. Several differences were observed in the vine nutrient status and on account of root type in year two; however, the biggest differences were observed between grafted and own rooted vines. Of particular note, own rooted vines appeared to be superior to the majority of rootstocks tested in regards to the uptake of potassium. This finding, if verified in future years, could help account for magnesium deficiency issues, which can be outcompeted by potassium, and the associated late bunch stem necrosis disorder, commonly reported in Marquette.

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?**

Answers in response to these questions will again be broken down by the individual four activity objectives associated with Activity #18.

Objective 1 (validation, and additional training, for machine-learning bud hardiness model) – The development, additional training and validation of individual wine grape cultivar models will allow growers, regardless of region, to track the hardiness of their vines in real time. A network, using data from Environment and Climate Change Canada (ECCC), and supported by Cornell University (Geneva, NY, USA), was made available online in 2024 and is currently freely accessible by Canadian growers. Access to such information could help growers determine the proper temperature setpoint for their wind machines as well alert growers when they may have endured winter injury and the need for pruning adjustments.

Objective 2 (hybrid virus studies) – many hybrid vines do not react to viruses in the same way as European vines (i.e., *vinifera*); however, the issue has received very little study. More information on how viruses impact hybrids will give growers information on how viruses are impacting hybrid winter hardiness, fruit composition, winemaking and possibly roguing decisions.

Objective 3 (hybrid vine balance studies) – most vine balance studies are based on European vines in an arid climate; however, many vines grown in Canada are vigorous hybrids grown in regions with ample water. More information on how the balance between vegetation and yield in hybrid vines impacts factors such as winter hardiness, fruit composition and nutrition will be used to create better guidelines for growing hybrids in a Canadian cool climate.

Objective 4 (hybrid rootstock trial) – many European grapes are grafted onto rootstocks, primarily for phylloxera resistance reasons, while few hybrids are grafted. The benefits of using rootstocks on hybrids as a means of addressing nutrient deficiencies or excesses has not been well studied in hybrids. Preliminary results suggest at least one physiological issue found in Marquette (e.g., stem necrosis), may be exacerbated on account of the level of potassium, and limited magnesium, taken up by the plant. Using the right rootstock may help address this and other physiological issues common in own-rooted hybrid grape production; however, additional study is needed.

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.**

Five bud hardiness reports generated in 2024-2025 have already been shared with the CGCN. In addition, three wine grape presentations associated with a conference organized by Michigan State University in January 2025 were recorded. Links to these recordings, once available, will be passed along to the CGCN.