

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

Activity #7: Precision management of grapevine stress and development under the challenges of climate change

Principal Investigator(s): Dr. Ben-Min Chang (AAFC Summerland)

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

The frequency and magnitude of extreme weather events will increase due to climate change. In the Okanagan valley, drought and heatwaves are highly concerned weather events that could challenge the production of wine grapes. Better grapevine stress monitoring and mitigation strategies will be needed for stabilizing production and improving fruit quality. This research activity will integrate plant stress sensing technologies, geographic information systems, existing cultural practices, and automatic control technologies for drought and heat stress management.

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

Backlogged vineyard information for the GIS database had been updated to 2025. Integration of data in Access and ArcGIS database is under progress.

Two additional weather stations are ready to be deployed in Okanagan or Similkameen valley. The weather stations will cover the areas where the BC provincial weather station network might be missing.

Wireless technologies for stress monitoring network were evaluated. De-centralized Meshtastic could be a potential platform for real-time environment or stress monitoring. However, the technology has limited supports for popular environmental sensors, like most of soil moisture sensors. Alternatively, LoRa WAN is a relatively mature platform to transmit data wirelessly. There are commercial sensor adapters available on the shelf.

Soil moisture probes measuring multiple depths not only measure soil water distribution but also give some hints of vine growth. The roots of newly planted vines can reach to 90 cm depth in the soil in the second year. Also, the soil moisture distribution can demonstrate whether excessive water was irrigated in each cycle by analysing the change of water distribution in soil profiles.

Grafted and self-rooted vines were planted in 2024. In 2025, shoots of grafted vines on rootstocks (3309C, SO4, and 110R) were 50% longer than the self-rooted vines in the sandy soil while no difference between grafted vines. The total length of mature brown cane in grafted vines were also longer. Since these mature buds have better cold hardiness than those immature green buds, the grafted vines might seem having superior cold hardiness than the self-rooted vines. The results also suggest that the grafted vines might fill the trellis faster than the self-rooted vines.

Aerial NDVI images were used to assist experimental design at new vineyard blocks in Summerland Research & Development Centre. These new blocks are designated for multiple purpose and feature full-season dual water supply lines in each zone. Complex sprinkler, evaporative cooling, or irrigation trials can be conducted in these blocks. The irrigation experiment zoning was based on the growing conditions of cover crops planted in late 2024. This activity demonstrates the potential of using NDVI images for vineyard planning.

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?

Frequencies and intensity of heat events are expecting to increase and challenge wine grape growing in Canada. On top of that, drought conditions are expected to be the other challenge. How to use limited water resources to mitigate the heat stress is the key to make the industry becoming resilient to such challenges.

This research activity will offer growers a new tool set for managing drought and heat stress. Growers can use the tool or knowledge for reasonable and optimum resource inputs to respond to the stresses.

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.