

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

Activity #17: Enhancing the resilience of Nova Scotia vineyards to climate change through improvements to ecosystem services

Principal Investigator(s): Dr. Vicky Lévesque and Dr. Rachel Rix (AAFC Kentville); Dr. Gordon Price (Dalhousie University)

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

The overall focus of this activity is to develop innovative best management practices that will include enhancing ground and soil through the use of organic amendments like biochar, green compost and wildflowers in conventional and organic production systems. Research objectives will include: (1) below-ground assessment of impact of ground management and organic amendments over time in conventional and organic systems on soil health and fertility; soil biological diversity and function; and soil organic carbon. (2) Above-ground assessments of ground/soil management and organic amendments over time in conventional and organic systems on: nutrient composition and yield measurements; soil and canopy temperature and soil moisture content as it relates to frost injury and grapevine phenological development; evaluation of under-vine establishment of host plants and the impact on natural enemy abundance and biocontrol of grape phylloxera; and seasonal dynamics of emerging and invasive pests (soil-borne and leaf/cluster feeding).

The organic amendments are intended to give growers sustainable agricultural practices that build carbon levels in the soil, improve soil health and fertility, support the biodiversity of beneficial microorganisms and insects below and above ground, and enhance vine performance. The proposed research will use a multi-disciplinary strategy to introduce and evaluate how soil amendments can enhance various ecosystem services to improve vineyard resilience in eastern Canada.

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

This project is working with vineyards to find practical, environmentally friendly ways to improve soil health, grapevine resilience, and vineyard sustainability. It focuses on using organic soil additions (like compost and biochar) and natural under-vine vegetation to support healthier

soils, more resilient grapevines, and beneficial insects—under both organic and conventional growing systems.

MAIN PROGRESS UPDATES FROM 2025–26

- **Field trials established:**

The 2025 growing season was unusually dry, providing an important stress test for vineyard soils and vines. This was the first full season after soil amendments were applied in fall 2024. Natural under-vine vegetation was successfully established at all 11 vineyard sites, and all activities remained on schedule.

- **Extensive soil testing:**

Over 1,300 soil samples were collected to measure soil health and fertility, water-holding capacity, organic matter, carbon, and biological activity. Early results show clear differences between sites and between organic and conventional management, confirming that local soil conditions and practices matter. Laboratory analyses are ongoing.

- **Living soil and carbon research:**

Soil microbes and beneficial fungi are being tracked to understand how amendments affect nutrient cycling, carbon storage, and natural pest control. Soil carbon was also measured at multiple depths to better understand long-term carbon storage and soil health.

- **Vine performance and fruit quality:**

Vine nutrition, yield components, and fruit quality were monitored. Early results show no negative effects of amendments on vine performance, even during drought. Detailed quality analyses are still underway.

- **Water, temperature, and frost resilience:**

Soil moisture and temperature were monitored across sites. Biochar-amended soils showed increased water-holding capacity, which is especially important during dry conditions. Early frost-related testing established baseline data for future risk assessments.

- **Pest management and biodiversity:**

Potential beneficials including syrphid flies, parasitoid wasps, predatory Hemiptera, and lacewings are among the broader insect groups we have found in the vineyards. Monitoring of grape phylloxera and other pests is ongoing. No new invasive insect pests were detected in the study vineyards during 2025.

- **Greenhouse trials:**

Complementary potted trials were developed in 2025–26 to assess the effects of organic soil amendments on water retention and cold hardiness of *L'Acadie* grapevines. In addition, a separate potted trial using wildflower plantings was established to evaluate their potential to reduce phylloxera emergence or damage. Both trials will continue into 2026.

- **Training the next generation of experts**

Two Master's students were hired in 2025 and are actively contributing to the project. One student is examining the effects of biochar, compost, and their combination on soil aggregate stability, soil organic carbon fractions, and microbial functioning across vineyard soils managed under both conventional and organic systems. The second student is investigating the impact of soil organic amendments on grapevine growth and frost injury, helping to better understand how soils influence vine resilience.

OVERALL PROGRESS

The project is progressing well, with field trials established, strong early data collected, and no negative impacts observed. Results are on track to provide practical, science-based recommendations to support more resilient and sustainable vineyards in Nova Scotia and beyond.

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 findings will support the development of innovative best management practices that incorporate ground management and organic amendments in conventional and organic systems, to promote sustainable agricultural practices that build soil carbon, improve soil health and fertility and enhance biodiversity in order to have significant impact on quality of modern viticulture systems. The research findings will also support the production of high-quality wine-grapes through use of more sustainable practices, with reduced inputs that include fertilizers and pesticides, that minimize risks to the environment and ensure long-term sustainability of their vineyards as farms face impacts from climate change.

The proposed research will focus on: (1) development of new and modified practices to improve soil carbon loads, soil health and fertility using ground management and organic amendments in conventional and organic systems, (2) enhancing existing ecosystem services specifically, carbon sequestration capacity, nutrient management, reduce soil compaction, (3) optimizing under vine management treatments to mitigate frost and the likelihood of injury from frost events in the Spring, (4) promote biodiversity of beneficial species that will improve pest management, (5) evaluate the performance of new disease resistant varieties in NS in efforts to reduce inputs, and (6) contributing to the new Canadian Digital Soil Data Portal, an online repository of soil databases and information.

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.

Popular Press Article: Dr. Vicky Lévesque was interviewed by CBC (Nova Scotia) and an article was produced from the media interview posted on August 4, 2025. The title of the article: *"Can charred wood help Nova Scotia farmers — and the climate?"*

Link of the article: <https://www.cbc.ca/news/canada/nova-scotia/can-charred-wood-help-nova-scotia-farmers-and-the-climate-1.7563202>

Media interview on Radio: Dr. Vicky Lévesque was invited by Radio-Canada journalist Adrien Blanc to participate in an interview broadcast on the morning show "Le Réveil Nouvelle-Écosse". The topic of the interview was: *"Is biochar a solution to drought in the context of the Atlantic provinces?"* Broadcast in French: <https://ici.radio-canada.ca/ohdio/premiere/emissions/le-reveil-nouvelle-ecosse-et-t-n/segments/rattrapage/2147403/actualite-jour>