

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

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

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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?

Project Leads selected 11 vineyard sites located in the Annapolis Valley of Nova Scotia after several discussion with the growers. A total 6 conventional management sites (3 sites with Chardonay cultivar and 3 sites with L'Acadie cultivar) and 5 organic management blocks (3 sites

with Chardonay cultivar and 2 sites with L'Acadie cultivar) were identified, study vine rows selected, and relevant information from each site was collected in Spring 2024. During summer 2024, organic amendments (biochar and compost) were selected based on their physical and chemical characteristics and on preliminary assays (i.e.: germination test and chemical analysis). Quick survey on the soil fertility at each vineyard during summer was also done. Purchased materials and equipment necessary for the project was done and comprehensive work plans for all field experiments over the course of the project was made. Project Leads coordinated a work plan for implementation of treatments in the different sites based on the experimental design.

In Spring 2024, bud break was visually assessed at all 11 sites. During the growing season 2024, above-ground samples, associated with the Sub-objectives 2a – 2c, were collected at all 11 sites to create a baseline before establishing the treatments at each vineyard site. Air temperature and environmental data were collected weekly and petioles were collected from each site for nutrient analysis and cluster count information were collected as a metric of vine productivity to establish a baseline. In addition, traps were established at all 11 sites in late May 2024 to collect soil-emerging phylloxera. Traps were checked weekly, where contents were collected and processed in the lab. Selected plots were prepared for wildflower seeding and seeds introduced. Weekly monitoring for possible beneficial species was conducted within target blocks through visual assessment of vines. In addition, weekly monitoring for other key economic pests (ex.: Japanese beetle, grape berry moth, spotted lanternfly) was conducted through visual assessment of vines and reports of presence/absence by growers and other industry stakeholders during the growing seasons 2024.

In October 2024, soil was collected at one depth (0-15 cm) for the soil health and fertility (sub-objective 1a) and soil biological diversity and function (sub-objective 1b) samples and at three depth (0-15, 15-30, 30-50 cm) for soil organic carbon samples (sub-objective 1c) before the establishment of the treatments. A total of 264 soil samples per depth were collected (11 sites x 8 treatments x 1 depth x 3 sub-samples). The soil samples were collected in the same locations in the field for each soil analysis. Following the soil samplings at each site, the soil samples were distributed between the collaborating researchers for the soil analyses associated to their specific objective(s). The soil samples are currently undergoing analysis.

In November 2024, the biochar and compost were applied on the soil surface by hand in the area under the vines at each site as planned based on preliminary analyses from samples provided during summer 2024 (biochar and compost). The quantity of compost applied was based on the quantity of carbon applied from the biochar. The organic amendment was then incorporated with finger hoe by the growers following the applications of the amendments.

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.

Not at this time.