

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

**Activity 16:** Increase productivity, climate change adaptation and resilience of northeastern Canadian vineyards through different weed, insects, fungal disease and virus control strategies

Principal Investigator(s): Dr. Caroline Provost (Centre de recherche agroalimentaire de Mirabel), Dr. Mamadou Lamine Fall, Dr. Odile Carisse (AAFC Saint-Jean-sur-Richelieu)

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

Grape growers worldwide face many challenges when managing pests in vineyards, such as fungal diseases, insects, viruses and weeds. Several methods, techniques and products are available to control pests, and it is necessary to implement integrated control strategies that respect the environment and human health. The selection of resistant grape varieties, site selection, management methods, cultural practices, the use of biological control products, the establishment of cover crops, and pest modelling (insects, diseases) are all aspects to be considered in developing an integrated pest management strategy. What's more, climate change is having an ever-greater impact on vineyard pests and grapevine production, so we need to adapt our practices to keep pace with these changes.

This project is in line with all these aspects of evaluating methods and practices to effectively control pests in vineyards while limiting negative impacts on the environment and adapting to climate change. This project comprises four activities related to various issues. Activity 1: The evaluation of disease-resistant grapevine cultivars and other specific cultivars under Eastern Canadian conditions could be an excellent alternative to reduce the use of pesticides, mainly copper, in organic vineyards and improve wine quality and diversity of supply. The main objective of this activity is to evaluate and optimize the potential of new and existing grape cultivars under the growing conditions of Eastern Canada to increase wine production in Canadian vineyards. Activity 2: The impact of viruses (GLRaV and GRBV) has been widely studied for *V. vinifera* cultivars, but until now, little is known about its effects on yield and physiology (e.g. photosynthesis, cold hardiness, etc.) of symptomless hybrid cultivars. This activity aims to understand the impacts of GLRaV-3 and GRBV on grapevine physiology and productivity in hybrid cultivars. Activity 3: The use of cover crops in the vineyard (row space, alleyway, floral strip) is expected to benefit this ecosystem and enhance environmental and grapevine performance. However, maximizing the benefit of CC requires a careful consideration of

environmental features driving multitrophic interactions between CC-vine-soil-insect-microbes in vineyards. The main objective is to characterize the impacts of floor management on ecosystem resilience, grapevine performance and pest management in organic vineyards. Activity 4: Diseases of fruit and foliage caused by fungi such as *Erysiphe necator*, *Botrytis cinerea*, and *Elsinoe ampelina* and oomycetes (*Plasmopara viticola*) are generally controlled by the application of fungicides, either synthetic or organic. In this activity, we propose to use process-based modelling to quantitatively describe the development of the main grapevine diseases, namely downy mildew (*P. viticola* fssp *aestivalis* and *riparia*), powdery mildew (*E.necator*), Botrytis bunch rot (*B. cinerea*), and anthracnose (*E. ampelina*). The main objective is to develop and validate disease decision tools to improve the management of the main grapevine fungal diseases under conventional, in transition, and organic production systems.

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

2023-2024 was the first year of the project, and adjustments had to be made due to the late date for receiving responses. Thus, the grape varieties to be planted in the grape variety trial network (act. 1) were selected, and then the vines were planted in July 2023. Data on the presence of diseases, nutrient deficiencies and insects were collected, as well as the survival rate of the vines following planting. No activity was carried out on viruses (act. 2). A literature review and trial preparation were carried out for the project to evaluate cover crops for weed control in vineyards (act. 3). Finally, the work will begin in 2024-2025 for the activity on disease modeling (act. 4).

**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?**

The project addresses several concerns of the Canadian grape and wine industry: 1) climate change and the environment, 2) economic growth, and 3) ecosystem resilience. Adapting farming practices to climate change is essential to ensure the sustainability of agricultural production. In this project, several aspects may be involved in these three main concerns. For example, we evaluate grape cultivars and cover crops for anticipated climate changes, such as more prolonged droughts, intense rainfall, increased fungal diseases (related to heat and humidity), and winter temperature variations. We also evaluate cover crops to increase carbon sequestration and contribute to GHG reduction. The impacts of cover crops for weed, disease, and insect management will be determined,

and we will also evaluate new disease-resistant cultivars that will reduce phytosanitary treatments. In addition, viruses will be studied in particular to better understand their impacts on production and explore control methods. Integrated pests management related to climate change will improve soil conditions, homogenize vegetative growth, reduce costs associated with pest control, reduce phytosanitary treatments, and provide new practices while maximizing yields, grape quality, and wine quality. At the end of the project, the knowledge acquired will allow producers to optimize their field practices to increase their business's profitability. The research is important to several sectors of the wine industry in Québec, as well as in Ontario, New Scotia, and British Columbia. The winery community will benefit equally since the potential exists for appropriate pests management to enhance grape productivity and wine quality, hence, sales and reputation. The improved reputation may lead to greater recognition, benefiting the tourism and hospitality industries.

- 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 for this year.