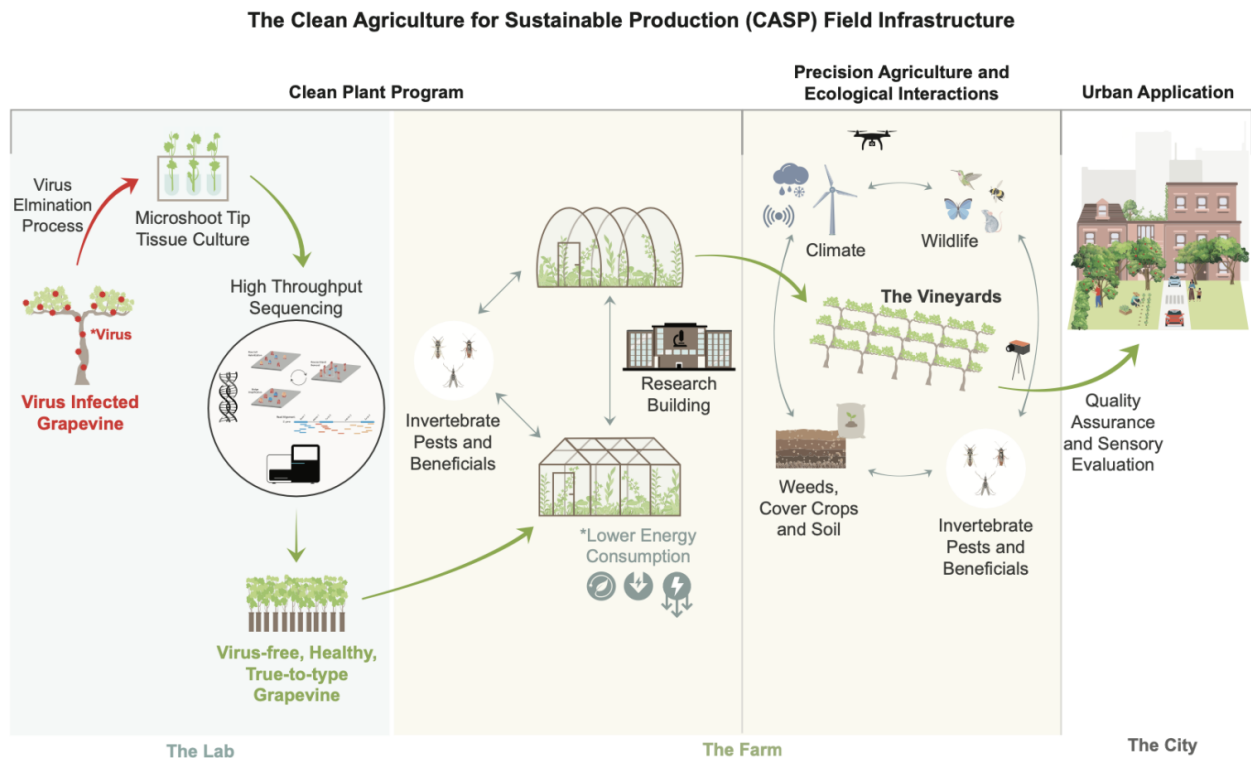


# Innovative grape and wine industry research in a cool climate region

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The Clean Agriculture for Sustainable Production (CASP) Field Infrastructure

**Jim Willwerth, Assistant Professor and Researcher at the Cool Climate Oenology and Viticulture Institute (CCOVI), discusses how the Institute is supporting the transformation of Canada's agricultural ecosystem, and a self-reliant, sustainable model for the rest of the world**

Canada's grape and wine industry contributes \$11bn to the national economy each year and sustains a workforce of about 45,000 full-time equivalent employees. <sup>(1)</sup> The Canadian grape and wine industry recognized the need for research, education and outreach. All world-class wine-producing regions have research institutes to support their industry, and visionaries of the Canadian grape and wine industry wanted the same. The Cool Climate Oenology and Viticulture Institute (CCOVI) was established in 1996 at Brock University, located in the heart of the Niagara Peninsula in Ontario, Canada. It is a

partnership between Brock University and key industry stakeholder groups. CCOVI is an internationally recognized research institute dedicated to the advancement of the Ontario and Canadian grape and wine industry.

## **Challenges and need for innovation**

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Canada, like many other countries, is facing numerous challenges that impact agriculture. A changing climate, increased urbanization, growing population, increased costs and shortage of labour are a few issues that impact farmers and agricultural production, including the grape and wine industry. The need for sustainable agriculture management has never been more critical.

That is why Brock University is building a state-of-the-art research farm where scientists are coming together to help transform Canada's agriculture ecosystem into a self-reliant, sustainable model for the world. This is possible from funding through the Canada Foundation for Innovation (CFI) Innovation Fund and the Ontario Research Fund: Research Infrastructure.

## **The Clean Agriculture for Sustainable Production (CASP) Field Infrastructure**

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The Clean Agriculture for Sustainable Production (CASP) Field Infrastructure will be a world-leading, farm-based research centre that will transform Canadian agriculture to become a self-reliant and eco-friendly production system. Co-leading the multi-institutional project are CCOVI researcher and Assistant Professor of Biological Sciences Dr Jim Willwerth and CCOVI Principal Scientist Dr Sudarsana Poojari. The first phase of the project is a national Clean Plant Program for grapevines in Canada to ensure a high-quality domestic supply of grapevine material and reduce dependence on imported material. This builds on initiatives such as a partnership with the Canadian Grapevine Certification Network (CGCN) and the national grapevine germplasm repository, where CCOVI and a wide variety of partners work together to produce certified virus-free grapevines.

Grapevines are prone to infection by several viruses and other harmful agents, often spread through infected planting material or insect vectors in vineyards. <sup>(3)</sup> A clean plant program utilizes propagation technologies to produce healthy vines. These techniques identify and eliminate viruses, ensuring that the grapevines are free from pathogens to produce healthy grapevines for growers for long-term sustainability in the vineyard. Research to develop innovative technologies plays a key role in safeguarding the productivity and sustainability of the grape and wine industry with a domestic supply of healthy vines.

The second phase of the project, Precision Agriculture and Ecological Interactions, examines ways in which grapevines interact with the ecosystem and research and development of precision agriculture for applications in the field and greenhouse. This includes assessing how different grapevine genotypes, such as cultivar, clone and/ or

rootstock, perform under different environmental conditions. Research results indicate that even clones and rootstocks can impact the cold hardiness within a cultivar selection.

(2) The objective is to identify and select superior grapevine material that is adaptable and resilient to erratic or extreme weather. In addition, this program will involve developing monitoring tools and smart technologies, including novel sensor technology, Artificial Intelligence, and Machine Learning, that can provide an early warning system for growers that detects factors that impact yields and production. The farm will also serve as a testing ground for new mechanization technologies to improve efficiencies in vineyard management. The goal is to improve horticultural management by developing field and greenhouse technologies and systems that improve sustainability, reduce production costs and carbon footprints and develop more tolerant plants to abiotic stress and biotic pests.

In the third phase of the project – Urban Applications – the research farm will be used as a test bed for developing innovative approaches to integrate new ideas into an urban setting. There is a gap in monitoring the long-term effects of agriculture, soil conservation and biodiversification in Canada. This project will enable long-term monitoring and research. This includes urban applications with respect to biodiversification, soil conservation, carbon sequestration and improving the health and productivity of community gardens, urban green landscapes, and green roof technologies. Such innovation will help the decision-making process and improve efficiencies while understanding interactions among plants and other organisms, supporting the selection of more resilient crops and increasing the overall resiliency of the agroecosystem. This will help inform local adaptation and local biodiversity and how this knowledge can be transferred into urban areas for biodiversification and soil conservation programs in cities as well as other ‘green’ programs such as community gardens and green rooftops.

Innovation is essential for sustainable agriculture, not just in Canada but globally. This includes increasing productivity while reducing environmental impacts and costs. Challenges such as weather extremes and volatility can have profound impacts on agroecosystems such as vineyards, and the uncertainty of our future climate globally only increases the need for innovative solutions to mitigate and adapt to these changes. Research and innovation in agriculture require both a local and global approach to combat the future challenges farmers will face to ensure stable supply chains and food security with a growing population and increasing demands.

## References

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