Canadian Grapevine Certification Network
CGCN • RCCV
Réseau Canadien de Certification de la Vigne

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

Activity #11: Wine flavour modification through non-traditional yeasts, oenological treatments and taint remediation

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

The Ontario, and broader Canadian, wine industry is searching for ways to further improve wine quality through flavour modification to increase the competitiveness of domestic wines to capture a higher percentage of wine market share. Canadian wine has always competed on quality rather than price. Our research program will focus on processes that will provide new and improved wine attributes, making our industry more resilient to the challenges of climate change that negatively impact fruit quality, and more resilient to market pressure requiring our wines to be price competitive but with added quality.

Although it is widely accepted that making great wines begins in the vineyard with quality fruit, winemakers still require additional oenological tools to enhance the aroma profile of wines to offer resilience in winemaking to overcome threats from climate change. Those tools include non-traditional yeast strains that alter and improve the volatile aroma compounds in wine, oenological additives and fermentation temperature that allow yeast to create flavours that further enhance wine character. This program will use all of these tools to address industry priority issues facing winemakers.

This project has two main objectives in wine flavour modification, addressing key areas of concern in the Ontario grape and wine industry with application to industries in British Columbia, Quebec and Nova Scotia.

Objective 1: Assess the commercial application of locally isolated *S. uvarum* strains to mitigate the impact of botrytis and sour rot taints in white grape varieties through consumption of acetic acid and assess their use to form volatile fatty acids and acetate esters that increase the fruity volatile aroma compounds in Riesling and Chardonnay wine.

Objective 2: Increase volatile thiol concentrations in Vidal table wine through a yeast micronutrient additive, fermentation temperature and yeast strain to enhance the “Sauvignon blanc” characteristic of Vidal to diversify uses of the Vidal grape, improve marketability and increase the domestic wine market share.

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

Mitigation of the impact of Botrytis and sour-rot infected fruit on wine quality.
Riesling fermentations using sour rot fruit and *S. uvarum* CN1 versus *S. cerevisiae* EC1118 were repeated in 2024. The repeat fermentations showed no issues of nitrogen deficiency in the fermentations. *S. uvarum* CN1 did mitigate the impact of sour-rot on wine quality. *S. uvarum* CN1 strain implanted and dominated the Riesling fermentations containing clean fruit, sour rot/botrytis infected fruit with 0.2 g/L acetic acid and sour rot/botrytis infected fruit with 0.4 g/L acetic acid. All fermentations in the CCOVI research winery went to dryness consuming all the sugar. CN1 significantly decreased the acetic acid in the wines as compared to the control *S. cerevisiae* EC1118 at each rot level while also increasing the glycerol by 2 g/L and lowering the ethanol by 0.5% v/v. CN1 did produce wines with a different aromatic profile compared to EC1118 with a noticeable rose attribute. There were significant differences in the volatile organic compounds and free fatty acid levels in the wines fermented with CN1 and EC1118 with lower levels in 2024 wines compared to the 2023 wines. No faults have developed in the 2024 wines likely due to the yeast not experiencing a nitrogen deficiency in 2024. Sensory evaluation will help discern if CN1 improves wine quality.

2024 CCOVI Chardonnay wines fermented with *S.uvarum* CN1 and 6 additional local *S. uvarum* strains. All strains fermented chardonnay juice to dryness. All yeast implanted into the fermentations and all *S. uvarum* strains dominated their fermentations to dryness. All wines produced with *S. uvarum* strains had lower acetic acid, higher glycerol and lower ethanol in comparison to the commercial control. All *S. uvarum* strains produced lower levels of volatile fatty acids and higher levels of many VOCs in the wine in comparison to EC1118, producing favourable complex aromas and flavours in the wine. Based on the sensory bench trial conducted between the research team (Frederik Rivard, Daniel Phillipow, Reid Ball, Dr. Kelly, Dr. Inglis and Gabriel DeMarco of Cave Spring), it was decided that CS6 isolate along with CN1 would be utilized to ferment Chardonnay on a commercial scale at Cave Spring in Oct of 2025.

Propagation of local yeast isolates at Escarpment Labs for commercial use. The propagation of wine yeast isolates at a commercial yeast preparation company, Escarpment Laboratories, was successful. The method was used to prepare paste cultures for commercial winery fermentations. Implantation of the yeast into commercial fermentations was successful and the fermentations completed as planned. This has commercial potential as Escarpment Labs is interested to sell the yeast under license. A second winery and a meadery trialed the propagated yeast in 2025 and were happy with the outcome of the fermentations.

2025 Commercial Chardonnay wines fermented with *S. uvarum* CN1 and CS6. All fermentations completed within 8 days with CS6 fermenting faster than CN1. Both strains implanted into the fermentations but did not show the same dominance over background yeast in the juice as observed in the small scale ferments the prior year at CCOVI. The *S. uvarum*

isolates represented 55-60% of the yeast at the end of the fermentation. VOC, VFA and sensory analysis still need to be completed on the 2025 wines to complete the assessment of the *S. uvarum* isolates on a commercial scale.

Improving the aromatic profile of Vidal table wine

All 7 fermentation conditions that were varied in temperature and either contained or lacked the yeast nutrient additive Sauvignon Blanc Stimula™ from 2024 were measured for the impact on the aromatic profile of Vidal Table wine. Sensory differences were detected between the wine treatments in a bench trial. Analysis of the volatile aroma compounds via GC MS showed significant differences among treatments with the most impact assessed for the higher temperature regime followed by the lower temperature in the presence of Stimula. This condition was chosen to ferment the 2025 Vidal wines to assess the impact of yeast strain coupled to the temperature regime and Stimula additive. VOC and VFA and volatile thiol values in the 2025 wines will be measured in 2026.

Vidal wines were found to contain the volatile thiols 3MH and 3MHA. This is the first time to our knowledge volatile thiols have been documented in Vidal wine.

A modified method for Volatile thiol quantification has been developed and will be used to quantify the differences in Volatile thiols in the Vidal research wines in 2026.

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?**

Although it is widely accepted that making great wines begins in the vineyard with quality fruit, winemakers still require additional oenological tools to enhance the aroma profile of wines to offer resilience in winemaking to overcome threats from climate change. Those tools include non-traditional yeast strains that alter and improve the volatile aroma compounds in wine, oenological additives and fermentation temperature that allow yeast to create flavours that further enhance wine character. This program will use all of these tools to address industry priority issues facing winemakers and help the industry be resilient to market pressures, allowing our wines to be price competitive but with added quality.

Threats from our changing climate are creating erratic weather patterns within a growing season that can result in wet damp conditions close to harvest. These conditions can result in *Botrytis*/sour rot infections in fruit at harvest, which in turn cause fermentation issues and negatively impact wine quality. At the end of 2028, it is expected that the outcome from the research activities will provide solutions or at least tools for the winemaker and find a home for grapes that may otherwise have been discarded for the grower. Using indigenous local *S. uvarum* yeast to consume acetic acid during wine fermentation and form new fruity volatile

higher alcohols, fatty acids and esters may minimize the flavour impact from rotted fruit and provide new competitive markets for aromatic white wines. These solutions may provide resilience to the sector in dealing with challenges from climate change (erratic weather events) and ensure continued economic growth of the $11.5 billion industry across Canada.

Enhancing the volatile aromatic profile in wines from the leading white sustainable varieties (Vidal in Ontario and Seyval in Quebec) by enhancing the production of volatile thiols can offer new growth opportunities for these wines at a competitive price-point that consumers are willing to pay. Our research has already shown consumers will buy a local dry Vidal wine that has a fruity profile in the $13-$16 category. Research results from the proposed program would have significant benefits in Ontario, where 20% of the grape crop is from Vidal and the Icewine market is shrinking, thus offering resilience to this sector of the industry by diversifying the wine style that Vidal can be used for. In Quebec, where both Seyval and Vidal are common white sustainable varieties, and in Nova Scotia where their growing conditions are ideal for aromatic sustainable white wines, improving the aromatic nature of these wines will further mitigate the impact of climate change on grape quality and improve the economic growth of the sectors in these provinces. Finding an application for indigenous Canadian yeast, none of which are currently available in the marketplace, would further help Canadian wine differentiate itself in the marketplace not only in terms of aroma/flavour profile, but also in terms of marketing local wine made with local yeast using local grapes.

4. **Do you have any communications materials, publications, or other content related to this research activity that you would like CGCN-RCCV to share?**

Oral Presentations:

- Kelly, J. (2026). Microbial trends and hybrid grapes in cool climate winemaking: research and industry applications. Ohio Grape and Wine Conference, Dublin, OH, USA, February 16, oral presentation.
- Kelly, J. (2026). *Saccharomyces uvarum* as a practical fermentation tool for quality and resilience in Ontario winemaking. Ohio Grape and Wine Conference, Dublin, OH, USA, February 17, oral presentation.
- Kelly, J. (2026). Aromatic enhancement of Vidal table wine through increased volatile thiol production. Ontario Fruit and Vegetable Convention, Niagara Falls, ON. February 18, oral presentation. **ofvc - Session Schedule**
- Inglis, D.L. (2025) Preventing high volatile acidity in wine using natural Canadian indigenous yeast isolates. Presented at the Canadian Grapevine Certification Network Optimizing the Quality of Canadian Wines symposium, July 23, 2025. Online.

- Ball, R., Inglis, D.L., and Kelly, J. (2025) Aromatic Enhancement of Vidal Table Wine Through Increased Volatile Thiol Production. Presented at the 49th Annual American Society of Enology and Viticulture-Eastern Section Annual Meeting, Athens, Georgia July 8-10, 2025. Oral presentation
- Phillipow, D.A., Kelly, J. and Inglis, D.L. (2025) Characterization of *Saccharomyces uvarum* CN1 and Its Potential for Rot-Affected Aromatic White Wines. Presented at the 49th Annual American Society of Enology and Viticulture-Eastern Section Annual Meeting, Athens, Georgia July 8-10, 2025. Oral presentation

Poster Presentations:

- Rivard, F., Kelly, J., and Inglis, D. Metabolic and Aromatic Impact of Seven Indigenous *Saccharmoyces uvarum* Strains from Ontario, Canada on Chardonnay Fermentation. Poster presentation, Ontario Fruit and Vegetable Convention, Niagara Falls, ON, Feb. 18-19, 2026.
- Ball, R., Kelly, J., Xu, S., Bowman, D., Duncan, D., and Inglis, D. Enhancement of Vidal Wine Through Use of Alternative Fermentation Regimens. Poster presentation, Ontario Fruit and Vegetable Convention, Niagara Falls, ON, Feb. 18-19, 2026.
- Ball, R., Kelly, J., Xu, S., Bowman, D, Duncan, D, and Inglis, D.L.* (2026). Enhancement of Vidal wine aroma through use of alternative fermentation regimens. Poster presented at the International Cool Climate Wine Symposium, Christchurch, New Zealand, Jan 26-28, 2026. *presenting author.
- Phillipow, D.A., Kelly, J., Yang, F. and Inglis, D.L.* (2026) Characterization of Saccharomyces uvarum CN1 for aromatic white wines and Its Potential for managing sour-rot infected fruit. Poster presented at the International Cool Climate Wine Symposium, Christchurch, New Zealand, Jan 26-28, 2026. *presenting author.
- Rivard, F. and Inglis, D.L.* (2026) Metabolic and Aromatic Impact of Seven Indigenous *Saccharomyces uvarum* Strains from Ontario, Canada on Chardonnay Fermentation. Poster presented at the International Cool Climate Wine Symposium, Christchurch, New Zealand, Jan 26-28, 2026. *presenting author.