

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

**Activity #8:** Prediction, prevention, and mitigation of smoke-taint (and other air-borne aromas) in grapes and wines

Principal Investigator(s): Dr. Wesley Zandberg (University of British Columbia)

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

Smoke-taint originates when ripening wine grapes are exposed to forest fire smoke. Smoke-taint is notoriously difficult to predict ahead of harvest because the chemicals in smoke that are responsible for its pungent aroma (these are called “volatile phenols”; VPs) are transformed by grape enzymes into a plethora of non-volatile—and hence non-detectible by smell—analogs. These masked VP are released by the activity of yeasts during the fermentation process. The overall focus of this research activity is three-fold, encompassing the development of predictive methods, early detection strategies and, most importantly, the development of preventative or mitigation techniques.

To improve our predictive abilities, research will be conducted in improving existing analytical tests, assess the differences in grape varietal sensitivity as well as attempt to correlate simpler atmospheric measurements with the air-borne concentrations of VPs. Detection efforts will also focus on the development of analytical procedures that can be used in nearly real-time by vineyard (or winery staff). Finally, prevention and mitigation strategies will explore the applicability of approved agro-sprays for blocking the absorption of VPs into grape tissues as well as several techniques enabling their targeted elimination either before or after primary fermentation.

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

We have devised a new smoke-taint prediction method that more accurately predicts the concentrations of smoke-derived aroma compounds in wines made from smoke-exposed grapes. A study of smoke-taint in white grapes has been completed; this project includes both targeted and untargeted analyses. Several new collaborations have been launched with BC wineries. A protocol for rapidly evaluating crop protection methods in the lab, rather than the vineyard, has been developed. Finally, we have already secured 11 varieties of grapes which will be transferred out doors in summer 2025, establishing a small research vineyard at UBC.

**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 most important impact of this research's three aims is smoke-taint prevention, followed by mitigation, whether through removal of taint-causing compounds from grapes, ideally before harvest, or from must/wine. Our research has conclusively verified that the vast majority of smoke-taint-associated compounds enter grapevines through the grape (not the roots of leaves). Accordingly, protective barriers of grape berries would be of greatest benefit to growers. Current efforts are using lab-based model systems to screen barrier products. Mitigation would benefit both growers and wineries; in both instances the targeted removal of taint-causing compounds would permit the wine industry to salvage crops produced during fire-affected growing years. Finally, we view our efforts toward improved smoke-taint prediction methods in light of their ability to yield more impactful mitigation and prevention objectives; this is because a clearer understanding of how smoke-taint chemically occurs is required if targeted removal strategies or barrier products are to be developed.

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

Not at this time.