



Canadian Light Source
Centre canadien de rayonnement synchrotron

WINE TESTING WITHOUT THE TASTING



Daniel Alphonso, Dylan, Hira, Bronwyn Williams, Genevieve Olson, Jamie Laguerta, Paolo Labrador, Thomas Pantea - St. Thomas More
Anna-Maria Boechler, Robert Blyth, David Muir, Gillian Walker, Tracy Walker - CLS Staff

INTRODUCTION

This project investigates the concept of 'terroir', which claims that the factors of soil, climate, tradition, and terrain directly affect the taste of wine. Given the resources available to us at the CLS, we were able to study the concept of terroir through the aspect of soil and see if the flavour of wine is impacted through it along with the grapes.

The wine industry is a prominent establishment in British Columbia, and in particular in the Okanagan region. Finding out more about what made Okanagan wines so special, despite the Okanagan region's small size and lack of population was the perfect place to delve into our experiment.



Chemical Composition of Wine

Water
Carbohydrates
Acids
Phenolics
Nitrogenous Compounds
Inorganic Substances

SOIL SAMPLING



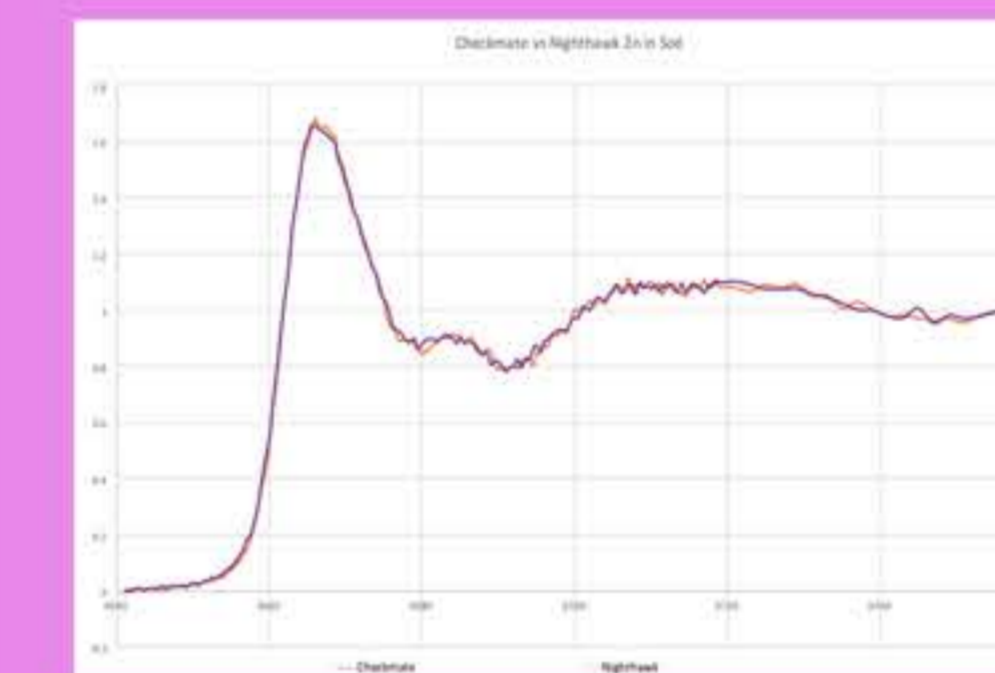
For all our samples we collected soil near the roots of the grapes we collected. They were collected with a clean shovel, dug up to an appropriate depth where roots were found.

PROCEDURE

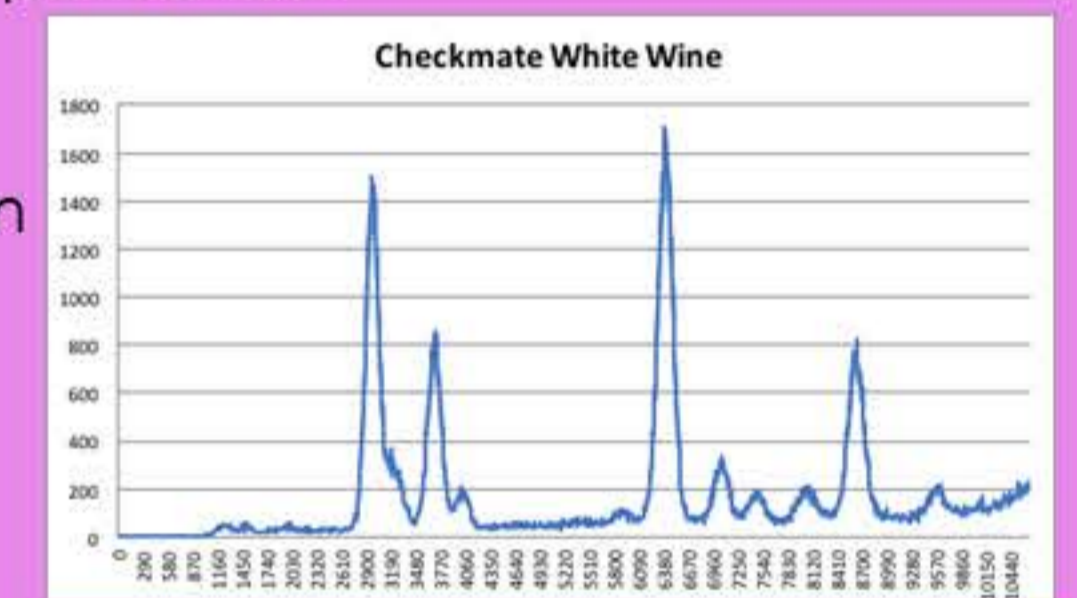
- All samples were stored in coolers and labelled with the winery, grape type, soil depth, and date. For each grape, we collected samples of the soil, grape flesh, and grape skin.

- The majority of the samples we collected were from the southern Okanagan region with the exception being Vista D'Oro which is located in Langley, BC. We worked on the beamline IDEAS which limited us to testing for period four elements in our samples.

- XRF scans are primarily used to determine chemical composition
- Specific energies correspond to certain elements
- This type of scan typically takes five minutes to run.



A XANES scan on soil from two different wineries

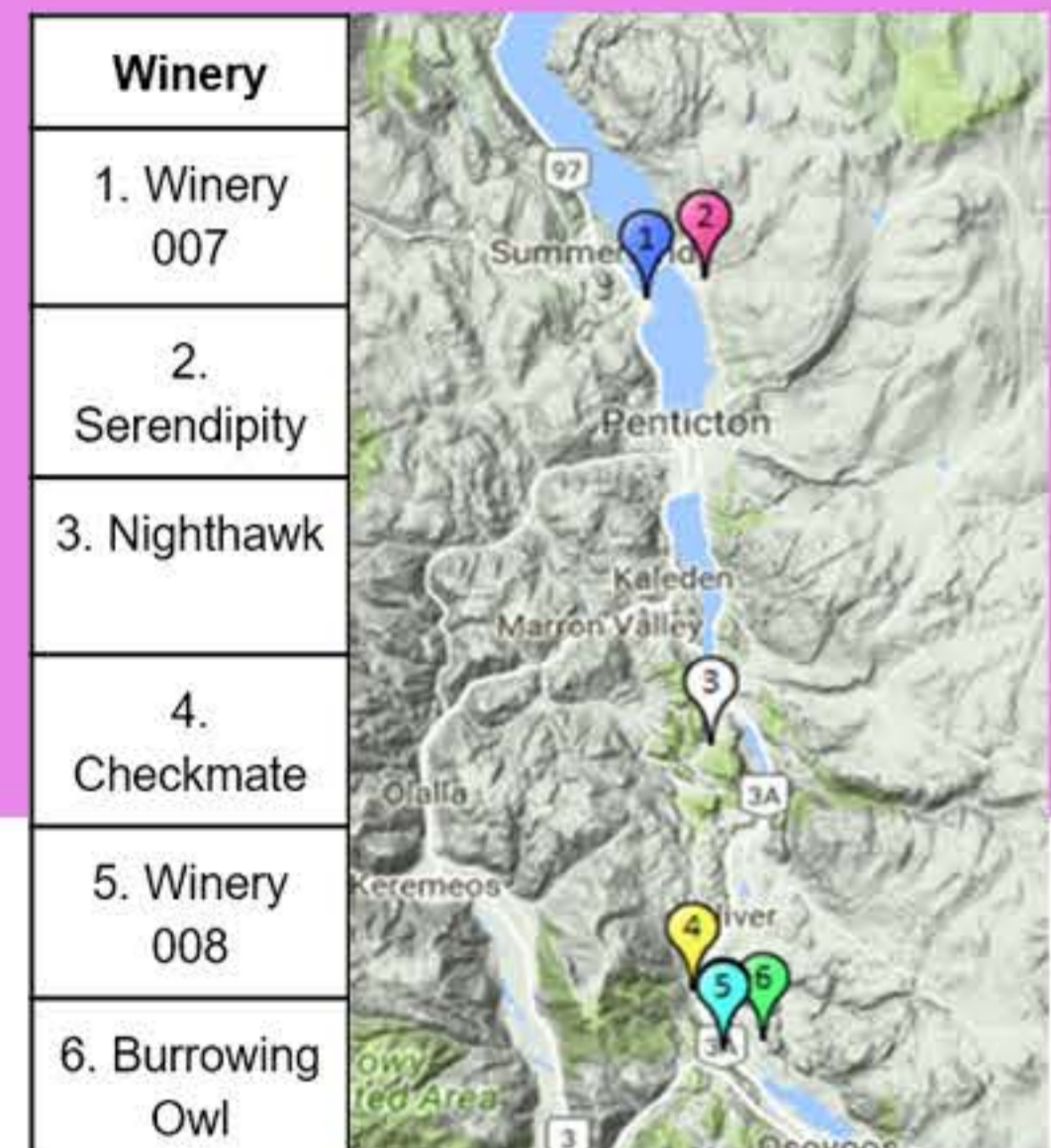


An XRF scan on white wine

XANES is a more detailed scan that is run on elements that are found to be particularly interesting. This scan takes around thirty minutes to complete. XANES gives Chemical speciation as opposed to the overall composition.

WHY THE OKANAGAN?

We chose the Okanagan for the location of our wine research because it is packed with wineries and is world famous. The wine in the Okanagan differs from wines found in the rest of British Columbia primarily as a result of location and different lengths in growing season. Grapes grown in the Okanagan have a much longer growing period, allowing them to achieve a higher sugar content. As a result of this, when the grape juice is fermented, they also accumulate a high alcohol content as sugar are converted into alcohols

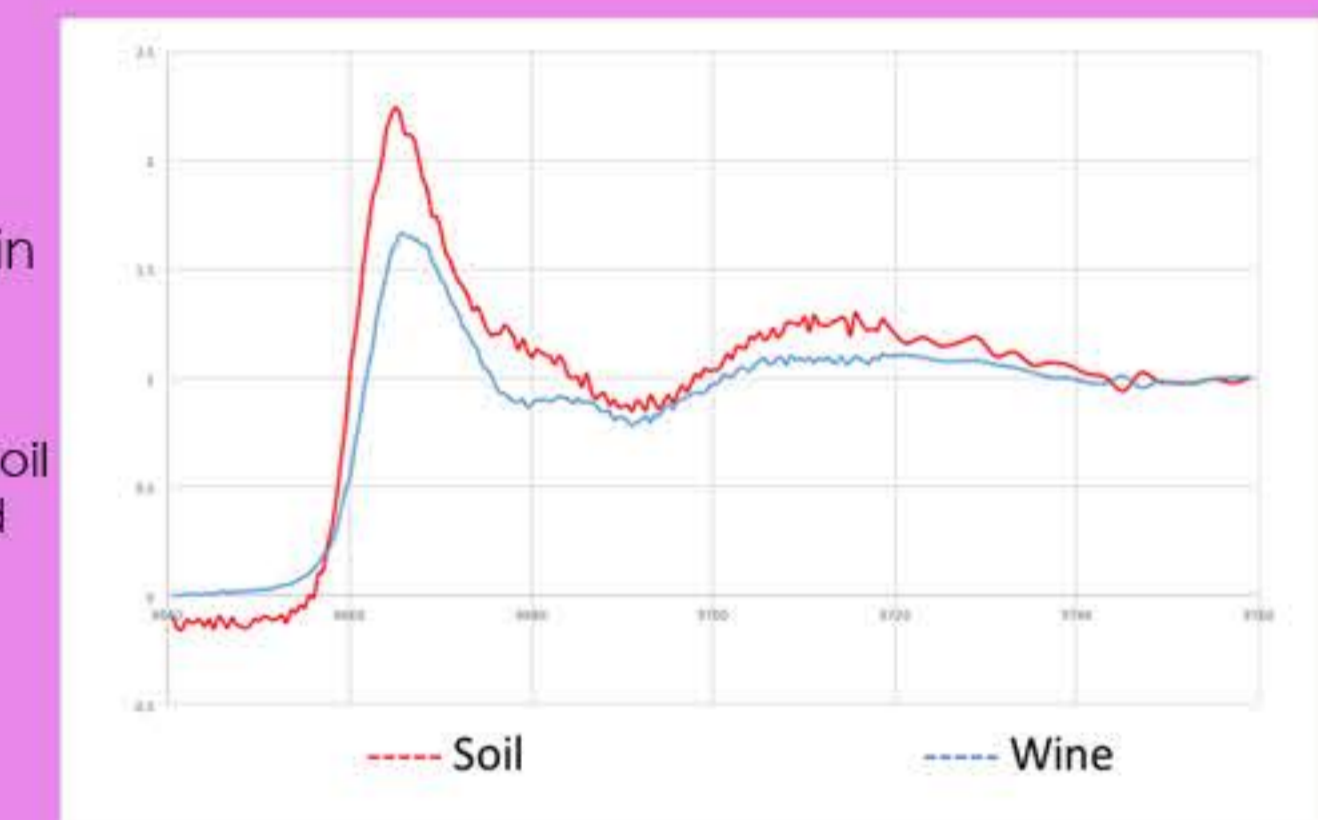
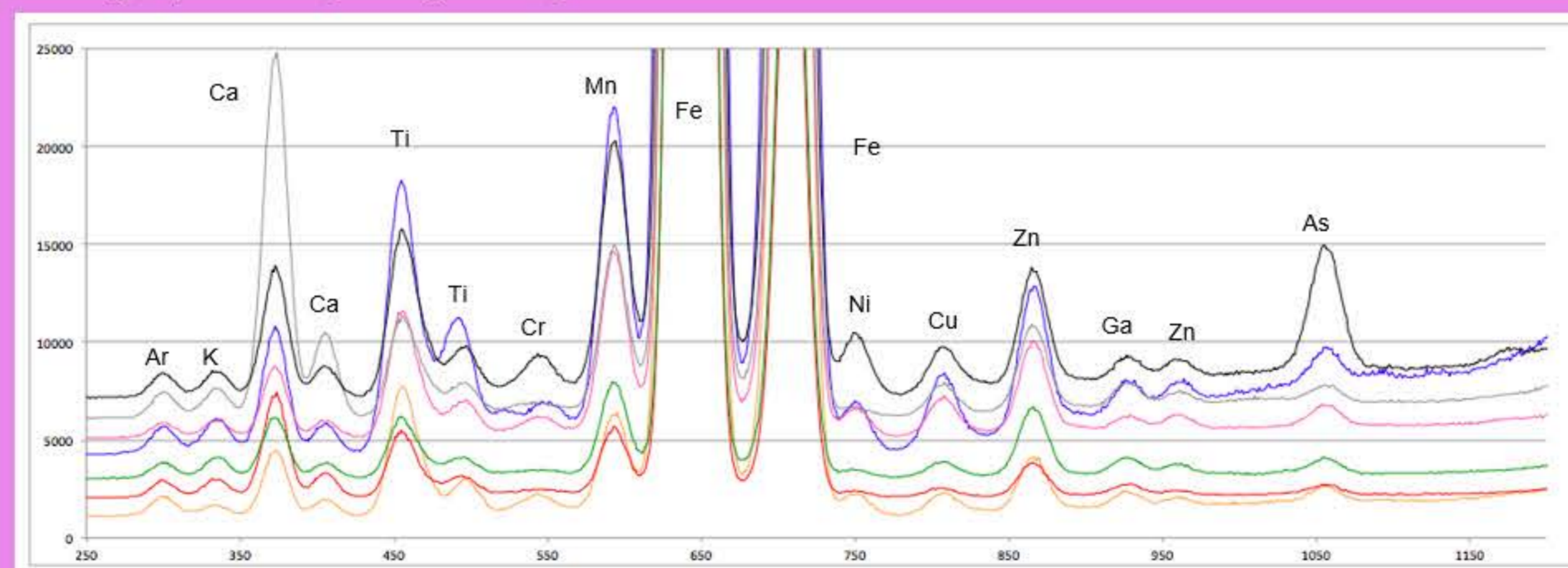


RESULTS

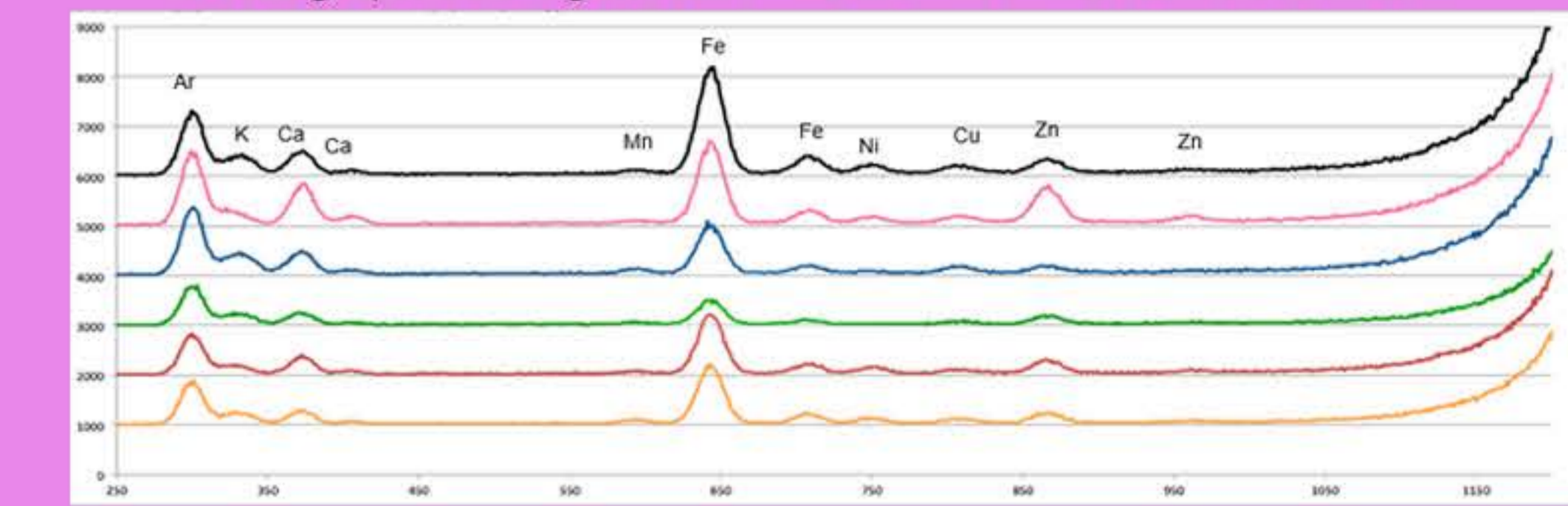
XRF results showed that similar elements carried over from soil to wine. The biggest variations were found in Zinc, Copper, and Nickel.

XANES scans showed that zinc speciation was similar between soil samples from different vineyards, but different between soil and wine from the same vineyard

XRF graph comparing composition of soil across different wineries



XANES graph showing the differences between zinc in soil and wine



XRF graph comparing composition of wine across different wineries

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Checkmate Artisanal Winery
Nighthawk Vineyards
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Vista D'Oro Farms & Winery
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CONCLUSION

- There were variations in the amounts of Copper, Zinc and Nickel present in the wine samples.

- Most of the elements present in the soil samples did carry over into the wine, yet only in small amounts and concentrations.

- When analyzing soil samples, the XANES plots demonstrated very similar patterns. The difference in XANES plots occurred when comparing soil to wine. This could also suggest something happens in the winemaking process, most likely in the fermentation stage.

