

Influence of climate change on the chemical and sensory quality of wine

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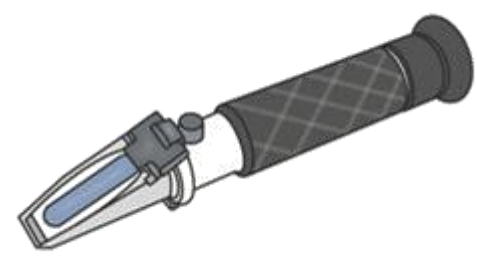
Tutor: Prof. Paola Piombino

The project aims at investigating the impact of climate change (CC) on the sensory quality of wine, through the study of chemical and sensory interactions between/among CC aroma markers (Volatile Organic Compounds: VOCs) and other CC compositional markers of the wine matrix (ethanol, pH, Total Acidity:TA). A special focus will be given to the role of pH. Chemosensory and chemometric analytical approaches will be applied to investigate these aspects both in model and in real matrices representative of different wine styles.

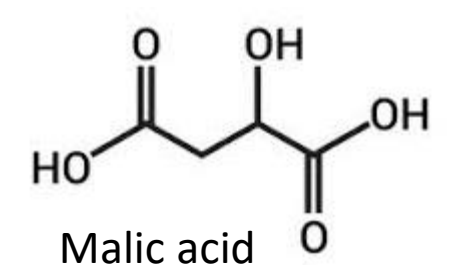
State of Art

Climate change has multiple effects on grape and wine composition including

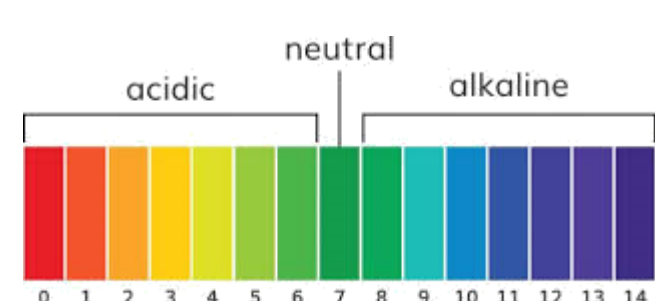
a) increased grape sugar



b) lower TA due to reduced malic acid



c) higher pH



d) modification of VOCs composition



(Mira de Orduña, 2010).

The effects of the CC are notable on the **accumulation, of odors with aromas of dehydrated fruits** such as dried figs, dried apricots, and plums typical of vintages with high average temperatures (Pons et al., 2017). This is the result **of an early chemical and sensory decay**, which lead to reduce commercial value and shelf-life of wine with a consequent negative impact on export opportunities.

The effects of climate change and their overall impact on the sensory quality of wine has not been evaluated to date. Specifically, **how climate changes in terms of nonvolatile matrix and volatile fraction may mutually influence the perception of taste and flavor characteristics** of wine has not been studied.



PhD Thesis Objectives and Milestones

1

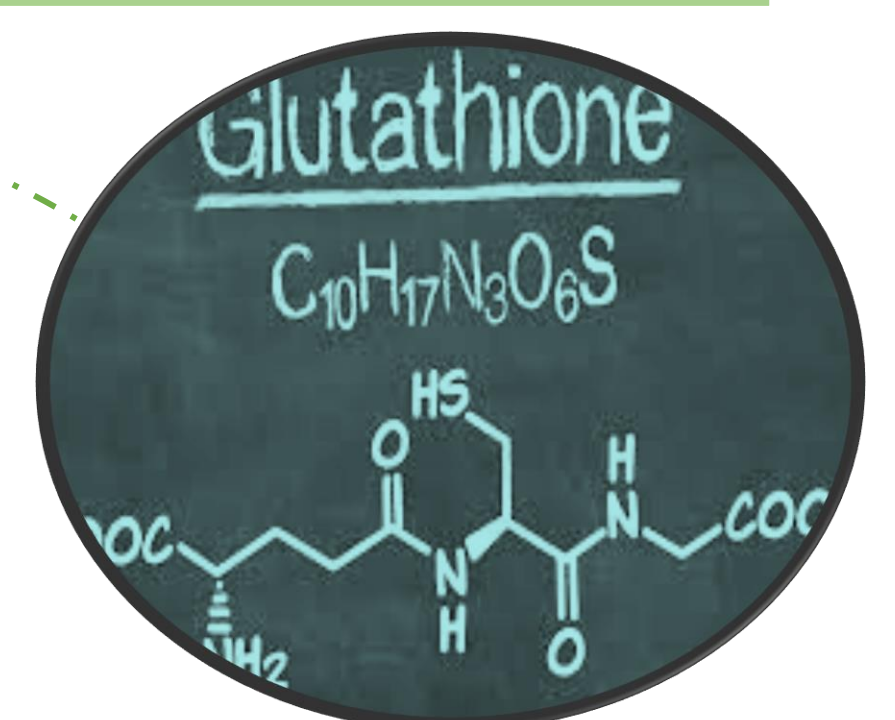
Study of perceptual interactions and matrix effect to investigate the effects of the non-volatile matrix on the release and perception of CC aroma markers. Analytical sensory methods and chemical analysis (SPME/GC/MS) will be performed.



2

Study of the influence of pH on the sensory perception of wine oligopeptides

to investigate if wine pH can impact the perception of potentially sensory active oligopeptides. Analytical sensory methods will be applied.



3

Study of the effects of different must pH during fermentation

by a multiapproach study. Microbial ecology during fermentation and its impact on oenological performances, wine flavour quality and longevity will be investigated.



The aim of this project is to **understand the potential impact of CC on the whole wine flavor quality by considering the matrix effect and sensory interactions.**

These insights could be useful to correctly address the current winemaking issues linked to climate change through a precision oenology approach.

References selected

- Mira de Orduña, R. (2010). Climate change associated effects on grape and wine quality and production. *Food Res. Int.*, 43(7), 1844- 1855.
- Pons, A. et al. (2017). What is the expected impact of climate change on wine aroma compounds and their precursors in grape?. *OENO One*, 51(2), 141–146.