How to improve and measure bottled wine evolution, and predict it

Author: Topo Angelo
Supervisor: Comuzzo Piergiorgio
Co-supervisor: Battistutta Franco

UNIVERSITÀ DEGLI STUDI DI UDINE

Introduction

To evaluate the shelf-life of bottled white wine, it is important to consider different realistic environmental conditions (temperature, light exposure and humidity) applied to bottled wine during storage and shipping. Its shelf-life depends on wine composition, packaging and storage conditions, the latter is difficult to be predicted to the winemaker (Boulton et al.,1996).

Optimal conditions of storage for the wine would be: absence of light, approximately 16°C and 60-70% humidity (Arapitsas et al., 2020).

To preserve the quality of the wine sulfur dioxide or other alternatives can be added, to prevent browning and formation of off-odors (Silva Ferreira et al., 2002).

Another deviation during tasting can be light-strike fault, mediated by riboflavin. It is a photo sensitive vitamin, unstable at wavelengths between 370 and 450 nm (Grant-Preece et al., 2017; Dozon and Noble, 1989).

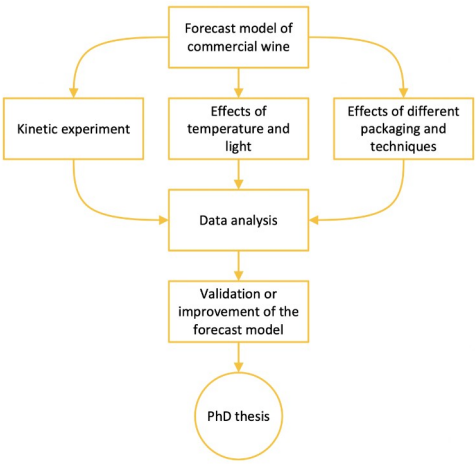
Aim

The aim of this study is to create a forecast model, useful for the winemaker to refine the wine in the pre-filling operation, and to make the right choice for packaging elements for optimizing ageing and improving shelf-life and evolution. This includes the study of different bottles and closures.

Experimental conditions

- Different white wines
- Different types of closures and bottles
- Exposion to different temperatures and light intensities

Experimental plan



Analytical methods

- Sulfur dioxide
- ABS 280 and 420
- Dissolved oxygen
- Thiol compounds
- Aroma GC-MS
- Oxidation test
- Riboflavin
- Cyclic Voltammetry
- Polyphenols

Gantt Chart

(for the second and third year)

Activity \ Quarter	1	2	3	4	5	6	7	8
1 Creation of a forecast model								
2A Kinetic experiment								
2B Evaluation of the effects of temperature and light								
2C Evaluation of techniques and packaging								
2D Data analysis								
3 Validation or improvement of the forecast model								
4 Thesis, paper and poster								

Expected results

Creation of a forecast model able to evaluate the evolution step of the wine, identify the optimal time lapse of consumption, and give answers to improve it.

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References

Arapitsas P, Dalledonne S, Scholz M, Catapano A, Carlin S (2020) White wine light-strike fault: A comparison between flint and green glass bottles under the typical supermarket conditions, Food Packaging and Shelf Life 24, 100492.

Boulton R B, Singleton V L, Bisson L F, Kunkee R E (1996) Principles and practices of winemaking, Chapman & Hall.

Dozon N M, Noble A C (1989) Sensory study of the effect of fluorescent light on a sparkling wine and its base wine. American Journal of Enology and Viticulture 40, 265–271.

Grant-Preece, P., Barril, C., Schmidtke, L. M., Scollary, G. R. & Clark, A. C. (2017) Light-induced changes in bottled white wine and underlying photochemical mechanisms. Critical Reviews in Food Science and Nutrition 57, 743–754.

Silva Ferreira A C, De Pinho P G, Rodrigues P, Hogg T (2002) Kinetics of oxidative degradation of white wines and how they are affected by selected technological parameters, Journal of Agricultural and Food Chemistry 50, 5919–5924.