Manipulation of Yeast Autolysis by Physical Treatments: Effects on the Volatile Profiles of Méthode Champenoise Sparkling Wines

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Introduction

- Méthode Champenoise consists of two successive fermentations. The first fermentation transforms grape juice into a still base wine. The second takes place in bottle with subsequent ageing on yeast lees.
- Ageing on lees is associated with the breakdown of yeast cells (autolysis) and results in the release of non-volatile and volatile compounds that add flavour-complexity to these wines.
- Conventional ageing on lees is time consuming and not cost-efficient due to length of time for this complexity to develop (up to 10 years).

Aims

- To investigate the effect of 'forced' autolysis by ultrasound-, microwave- and enzyme-treatments of yeasts on the aroma and related volatile compounds of Chardonnay (CH) and Pinot Noir (PN) sparkling wines aged on yeast lees for 6, 12 and 24 months
- To compare 'forced' autolysis treatments against the control (normal tirage 15°C).
- To decrease the time required on lees to develop 'autolytic' character.

Results

- 29 aroma compounds have been quantified, as well as 17 analytes related to oxidation.
- A clear separation of CH and PN samples was found based on the ageing time (Figures 1 & 2).
- A clear separation of microwave- and ultrasound-treatments from the enzyme-treatment and control was found for both CH and PN varieties after 24 months of ageing on lees.

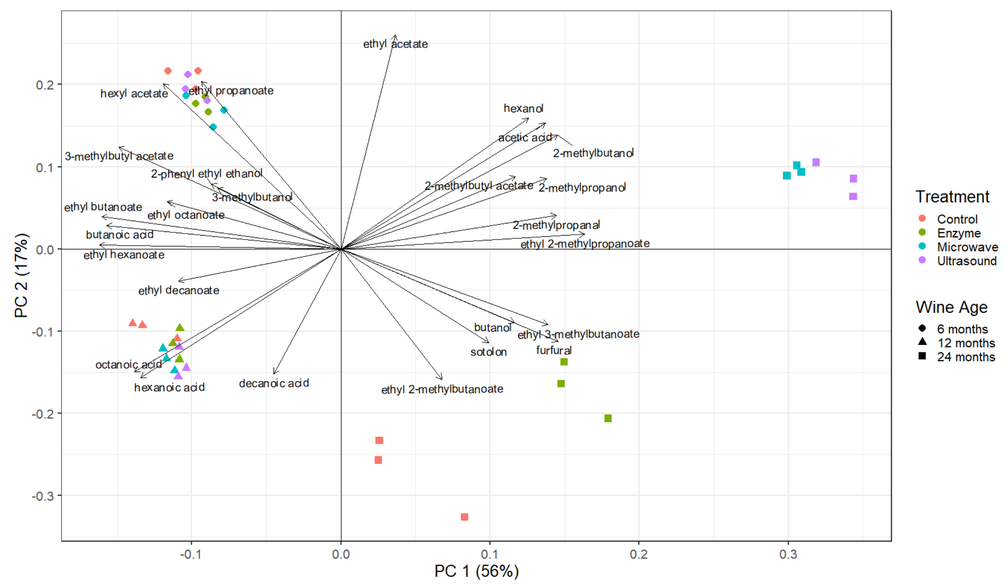

Figure 1. PCA of Chardonnay sparkling wine volatile compounds.

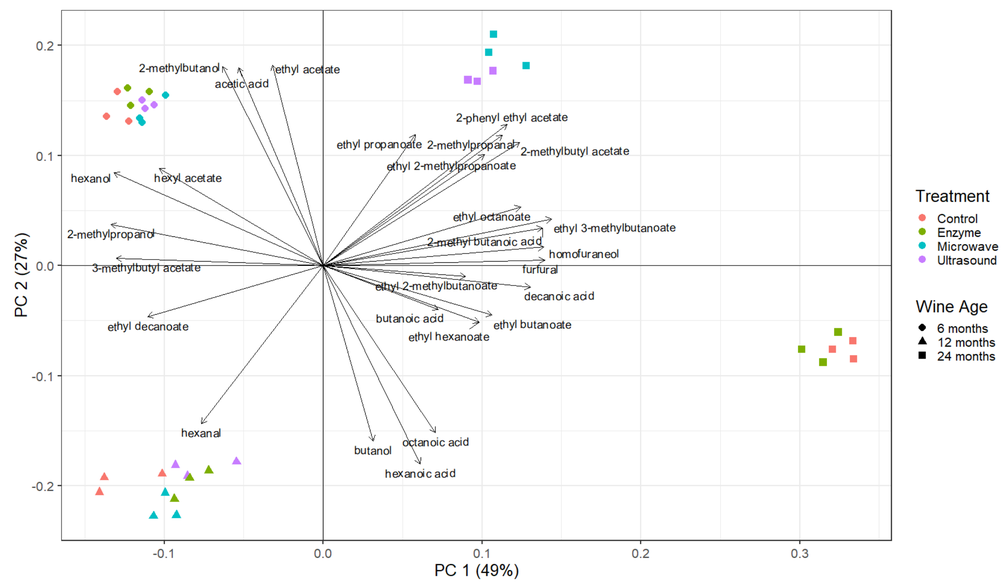

Figure 2. PCA of Pinot Noir sparkling wine volatile compounds.

Conclusions

- Compounds associated with ageing on lees did not accumulate earlier as a result of treatments which mechanically damaged yeast cell wall structure (see poster 46).

Different autolysis treatments produce sparkling wines with different volatile profiles. These differences between treatments, however, are noticeable only after 24 month ageing on lees

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