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# Impact of different nitrogen levels in the vineyard and wine-making processes on the chemical profile of Chasselas wines

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## Introduction

As reviewed by Bell and Henschke (2005), several studies showed that the terroir and particularly the vine nitrogen status can significantly impact the quality of the wine. A positive correlation between N concentration in Chasselas must and sensory expression of the wine has been highlighted by Spring (2002 & 2005). This study aims at a more thorough investigation of the interactions between N concentration in the must and the winemaking process, especially malolactic fermentation (MLF) and oxygen uptake by the wine, and their effects on the chemical profile of Chasselas wines. Their impact on the ageing potential of the wines will also be studied.

## Material & Methods

Chasselas grapes from two experimental vineyards (high and low N level) were processed according to a small scale standardized winemaking procedure varying MLF. The same grapes were also used to produce wines at industrial scale, following the winemaking procedure decided by our cellar master. Half of the small and industrial scale trials received 4mg/L oxygen one week before bottling, which was carried out similarly for all wines. Wines were stored under controlled conditions (temperature and humidity) and subsequently analyzed by GC/FID and GC/MS for volatile compounds and also by FTIR and colorimetric methods for classical parameters (alcohol, acidity, pH, SO2…).

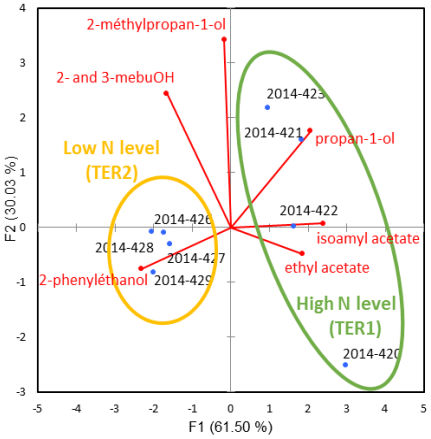


**Figure 1: Differentiation of the wines according to the terroirs after analysis of the volatiles.** PCA of the results obtained by GC/FID analysis of the wines produced according to the small scale standardized winemaking procedure, from millesim 2014.

## Results

The first results obtained confirmed that the vine nitrogen status and the type of winemaking procedure have an impact on the chemical profile of the wine. The analysis of volatile compounds, especially higher alcohols which concentrations in the wine are known to show a direct relationship with the initial nitrogen concentration in the must, allows to differentiate the wines according to the vineyard from which they come (Fig. 1).

Wines could also be distinguished according to the millesim and to the type of winemaking procedure thanks to the analysis of classical parameters performed in 2016 (Fig 2). In addition, differences were observed regarding the volatile profile measured in the wines by GC/MS. Again, wines could be distinguished according to the millesim (results not shown) and to the winemaking procedure (with or without MLF) (Fig. 3). At this stage, wine from millesim 2015 had just been bottled whereas wine from the year 2014 had already one year of bottle storage. No effective impact of oxygen addition prior to bottling could yet be highlighted.

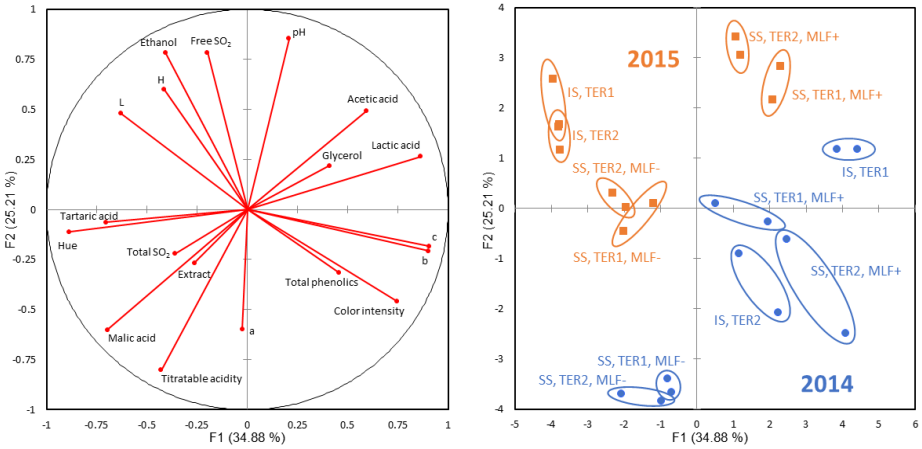


**Figure 2: Classification of the wines according to the millesim and winemaking procedure through classical parameters analysis.** PCA of the results obtained by FTIR and colorimetric methods, performed during spring 2016, on the wines from millesim 2014 and 2015. IS: industrial scale; SS: small scale.

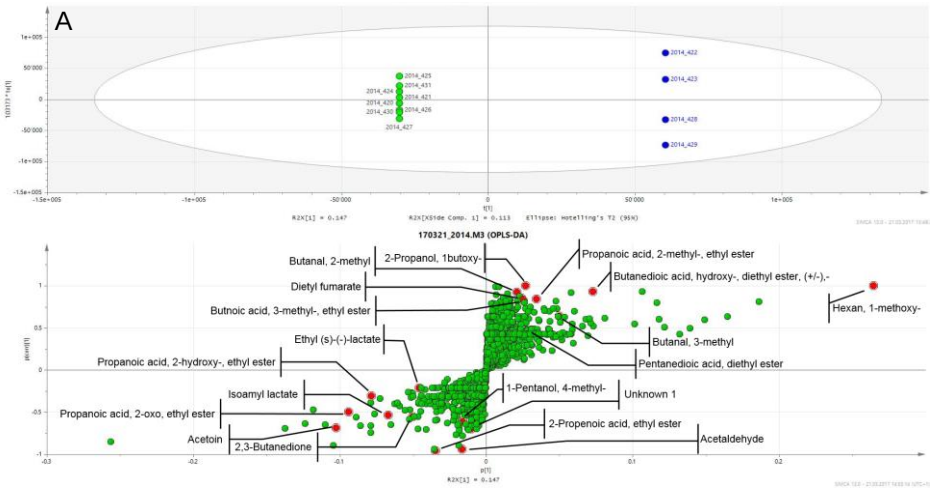


**Figure 3: Classification of the wines according to the winemaking procedure thanks to volatile compounds.** [A] OPLS-DA score plot of the GC/MS analysis of wines from vintage 2014. Wines with MLF are in green, without MLF in blue dots. [B] S-plot of all measured compounds. Red dots figure most discriminant compounds related to wines with MLF (left) and without MLF (right).

## Future work

Wines from the vintage 2016 have already been bottled. A combined analysis of the wines produced during the three years of experiment will be undertaken shortly. This should allow us to compare the three millesims and to have a first overview of the evolution of the wines, especially the volatile profile, after one or two years of bottle storage. The analyses, as well as wine tasting, will be performed all along the storage (5 to 8 years).