Developmental changes in grape composition and the implications for wine volatile profiles

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Grape composition exerts a primary influence on wine flavour and aroma profiles. In order to manage wine style through changes in grape composition, the knowledge of when important changes occur in the berries is essential. This study sought to identify stages of berry development that are most critical in defining wine volatile composition.

Methods

Cabernet Sauvignon and Riesling grapes at different stages throughout development were fermented, after normalising sugar content, and the volatile compounds in the resulting wines were profiled. For both varieties, the compounds were grouped into clusters which best described the different changes in concentration of the volatile compounds in the wines.

Results

Cabernet Sauvignon

Conclusions

• Berry composition, with regards to how it influences wine volatile composition, is in a state of flux throughout development.
• It is clear that compounds do not simply accumulate in a time period late in the ripening process.
• Cluster analysis of the data found four overlapping periods of accumulation of compounds in the wines made from both Cabernet Sauvignon and Riesling grapes (Clusters A, B, E and F for each).
• Overall, there would appear to be more accumulation of compounds occurring during the post-veraison period in Riesling grapes than in Cabernet Sauvignon grapes.
• The later time points were predominantly associated with decreasing or stable concentrations of a number of wine volatile compounds.
• It is important to remember that while the accumulation of compounds that have a positive effect on wine attributes is an essential part of fruit ripening, the depletion of compounds with negative wine sensory impacts is also occurring.
• Many of the compounds increasing after veraison are yeast-derived esters: more work is needed to understand how grape composition influences the production of these compounds.