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The influence of storage on the “chemical age” of red wines

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The quality of any wine produced by a winery should fulfil certain legal requirements and comply with the winemaker standards. From the winery to the consumer many factors can influence the wine quality, especially the storage conditions and duration. Optimum temperature and humidity conditions may improve wine quality through ageing, while incorrect or excessively long storage leads to negative results.

In order to evaluate the global effects of storage on red wine composition, 20 Sangiovese wines were stored in two different conditions (cellar or domestic) for a period of 2 years. Untargeted LC-MS analysis showed various putative markers for the type and length of conservation, while targeted LC-MS confirmed and expanded these results within specific metabolic groups.

Wines stored under typical domestic condition showed an accelerated (up to 4 times faster) and negative development, while wines stored under the optimum cellar conditions had a slow and positive ageing.

The formation of several monosulfonated flavanols during the domestic ageing provided the first evidence in wine of a reaction between wine tannins and the exogenous antioxidant bisulfite. Moreover, ageing under domestic conditions appeared to induce an accelerated decrease of wine pigments, while specifically promoting the formation of the pinotin A-like pigments.

Finally, this study pointed out the capability of untargeted metabolomics to provide a larger and more complete coverage of the global chemical changes, to detect even small and unexpected changes in complex samples, to expand our understanding of wine chemistry, and to explore better known and novel oenological problems.