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# Structural properties of grape berry cell wall

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The effectiveness of enzyme-mediated maceration processes in red winemaking relies on a clear picture of the target (berry cell wall structure) to achieve the optimum combination of specific enzymes to be used. However, we lack the information on both essential factors of the reaction (i.e. specific activities in commercial enzyme preparation and the cell wall structure of berry tissue). In this study, the different combinations of pure recombinant enzymes and the recently validated high throughput cell wall profiling tools were applied to extend our knowledge on the grape berry cell wall polymeric deconstruction during the winemaking following a combinatorial enzyme treatment design. The multivariate data analysis on the glycan microarray (CoMPP) and gas chromatography (GC) data revealed that the pectin lyase performed as effectively as commercial enzyme preparations in de-pectination of berry cell walls, and the combination of endo-polygalacturonase and pectin methyl esterase did not degrade the pectin as we predicted, but rather unraveled it. The combinations that contained other enzymes were shown to degrade side chains, but not de-pectinate and de-polymerise, also provided useful and new information on the complexity of the grape berry cell wall architecture. By adding the information acquired from this study to previous berry cell wall studies, a hypothetical model describing cell wall structure of different tissue types of grape berry was established. This model can aid us in a number of future studies apart from winemaking, such as fruit development and ripening and plant pathogen interactions of grapes. Most importantly it provides testable hypotheses for future studies on grape berry deconstruction using wine enzymes tailored for specific hydrolysis of cell wall polymers.