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The role of cell wall polysaccharides in the extraction of anthocyanins and tannins: results, perspectives of a more positive contribution

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Topic: Wine chemistry, wine components

Title: The role of cell wall polysaccharides in the extraction of anthocyanins and tannins: results, perspectives of a more positive contribution.

Authors:

Jean-Claude Boulet^{a,b}, Elissa Abi-Habib^a, Stéphanie Carrillo^a, Stéphanie Roi^a, Frédéric Veran^a, Arnaud Verbaere^{a,b}, Emmanuelle Meudec^{a,b}, Anais Rattier^{a,b}, Marie-Agnès Ducasse^c, Bodil Jorgensen^d, Jeanett Hansen^d, Sophie Le Gall^{e,f}, Céline Poncet-Legrand^a, Véronique Cheynier^{a,b}, Thierry Doco^a, Aude Vernhet^a.

^a Univ. Montpellier, SPO, INRAE, Institut Agro Montpellier Supagro, 34070 Montpellier, France

^b INRAE, PROBE research infrastructure, PFP polyphenols analysis facility, 34070 Montpellier, France

^c IFV, experimental unit of Pech Rouge, 11430 Gruissan, France

^d Department of Plant and Environmental Sciences, University of Copenhagen, 1870 Frederiksberg, Denmark

^e INRAE, UR BIA, 44316 Nantes, France

^f INRAE, PROBE research infrastructure, BIBS biopolymers analysis facility, 44316 Nantes, France

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Abstract.

The composition of grape berry cell walls was studied on two grape varieties, two years and two maturation levels at the same time as the extraction of anthocyanins and tannins. The chemical composition of skins, seeds, and pulps, focused on polyphenols and polysaccharides, was compared to the chemical composition in polyphenols after extraction from the skins in model solutions or after wine making of the berries. Polyphenols were mainly characterized by UPLC-MS and HPLC-SEC. Polysaccharides were characterized by analysis of the neutral sugar compositions, and also by the CoMPP (comprehensive micropolymer profiling) analysis, a new method which targets the functional groups of cell wall polysaccharides.

The extractions rates showed huge differences between the non acylated and the para-coumaroylated anthocyanins. The former were much easier to extract than the latter. Particularly in model solutions, the extraction of p-coumaroylated anthocyanins was almost negligible. The extraction rate of tannins was between those of the two anthocyanin families. Moreover, in wines as in model solutions, the final concentrations in tannins, non acylated and p-coumaroylated anthocyanins showed correlations that did not exist in the berry compositions, suggesting a similar mechanism of extraction associating those three families of polyphenols. According to the CoMPPs, these mechanisms would mainly rely on polysaccharidic families, namely hemicelluloses, homogalacturonans, rhamnogalacturonans, and extensins.

The major role of the cell wall polysaccharides in the extraction of tannins and anthocyanins was confirmed. CoMPPs revealed a much more complex mechanism than expected, e.g. homogalacturonans in skins and pulps associated to an increase and a decrease of the polyphenols extractibilities, respectively. Moreover, our study changed the standpoint on cell wall polysaccharides. Up to now, they were considered as detrimental since they bind polyphenols, and were thus expected to increase losses. But they also release soluble polysaccharides (PRAGs) which contribute positively to the colloidal stability of wines.