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First description of sugar units of wine glycosylated simple phenols

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Simple phenols are low molecular weight compounds widely diffused in plant kingdom and with the same role and effects of more complex phenolic compounds. They are usually present both in free and glycosidically bound forms, being in the last case a natural storage of free phenolic compounds because they can be freed by hydrolysis to the corresponding free forms during fermentation or wine processing. In wine, phenolic compounds have traditionally attracted attention due to their organoleptic properties, such as astringency and bitterness, and because they affect the color and aroma of wines. In particular, wine aroma can be partially influenced by the occurrence and levels of glycosidic precursors accumulated during grape maturation, because their chemical hydrolysis can be significantly impacted by pH during ageing or treatment with β -glucosidase.

Unfortunately, aroma precursor analysis generally involves complex and time-consuming procedures combining preliminary extraction of glycoconjugates, acid or enzymatic hydrolysis, aglyconic form separation and finally gas-chromatography detection of the latter. Furthermore, no more information is until now available on sugar unit structure that characterizes simple phenol precursors.

A new approach for a detailed description of the sugar units that constitute the phenolic glycosides was developed in order to characterize Chardonnay and Cabernet Sauvignon wines, comparing original phenolic glycosides derived from grape with those ascribable to tannin treatments (oak and chestnut tannins) and to oak wood (light and strong roasted) transfer during ageing. The glycosylated fraction was manually isolated from wine on an Isolute Env+ SPE cartridge and further automatically fractionated with HPLC using an Acquity UPLC BEH C18 analytical column. The compounds of interest were detected through full MS-data dependent MS/MS analysis in negative ion mode and with heated electrospray ionization (HESI-II). Each collected fraction was then enzymatically hydrolyzed and analyzed using ionic chromatography coupled with pulsed amperometric detector in order to investigate the freed sugar units.

Keywords: LC-HRMS, glycosilphenol, bound simple phenols