Hydrolysable tannins in aged wine spirits: a fresh perspective using alternative ageing technology and high-resolution mass spectrometry

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Wine spirits (WSs) are usually aged in wooden barrels, but using wood pieces instead of barrels, with or without micro-oxygenation, is a technological alternative that has been investigated by our team. The current research was focused on identifying ellagitannins, their derived species, and the evolution of degradation pathways. For this propose, in this study, the behavior of hydrolysable tannins in a wine spirit aged in 50 L demijohns with chestnut wood staves and three levels of micro-oxygenation or nitrogen, was examined.[1,2] Gallotannins and ellagitannins were identified by LC-ESI-HRMS/MS using a Q-TOF in samples collected at 8, 21, 60, 180, 270, and 365 days of ageing, and their relative abundances compared according to the ageing technology. The studied compounds derive from the wood and have a significant sensory impact in the aged wine spirits due to their association with astringency, which is closely related to the quality of these beverages. For the first time, the importance of oxygen in gallotannins and ellagitannins formation/degradation pathways in WS was established, and results aided to explain the steady increase in gallic and ellagic acid contents on WS during ageing. The results also highlighted the presence of penta-O-galloyl-β-D-glucose, tetra-O-galloyl-β-D-glucose, tri-O-galloyl-β-D-glucose, di-O-galloyl-β-D-glucose, and mono-O-galloyl-β-D-glucose, 2,3-(S)-hexahydroxydiphenoyl-β-D-glucose, pedunculagin, isomers vescalagin/castalagin, as well as two products stemming from ethanol-promoted oxidation of castalagin/vescalagin and vescalin/castalin, in the WS aged with chestnut wood (**Figure 1**).
This study provided a better understanding of ellagitannin derivatives and determined their presence on WSs, which are associated with an increase in gallic and ellagic acid concentrations during ageing.[2]

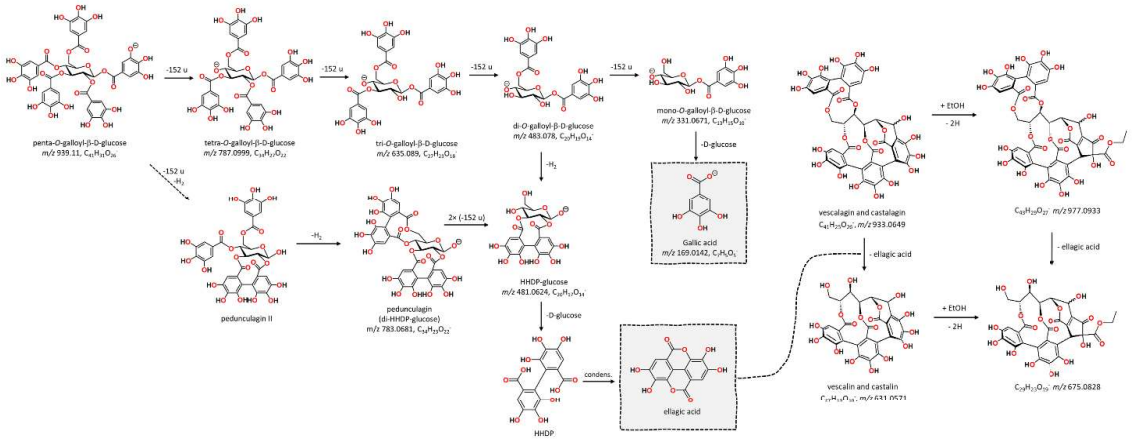

Figure 1. Proposed fragmentation patterns and degradation pathways of gallotannins and ellagitannins. Structures of vescalagin/castalagin isomers and their degradation pathway for the two derivatives that were tentatively assigned to the ethanol-promoted oxidation products of vescalagin/ castalagin and vescalin/castalin.

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