

Determination of polyphenolic profile of Pinot Noir wines with UPLC-ESI-IT-MS technique

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Abstract

Polyphenols are large and complex group of compounds that determine the quality of wines and influence the colour, mouthfeel, astringency and bitterness. They are divided into two main groups: flavonoids and nonflavonoids. In this study, the focus of research was set on determination of polyphenolic profile of red wines from Pinot Noir variety (*Vitis Vinifer* L.) (vintage 2021), produced in Imako winery, Štip, R.N. Macedonia. UPLC-ESI-IT-MS technique was used for identification and quantification of different groups of phenolic compounds, based on the mass spectra of individual compounds compared to the spectra from the literature. In total, 50 phenolic components have been identified, divided into the following groups: phenolic acids and derivatives, stilbens, flavonols, dihydroflavonols, flavan-3-ols and anthocyanins. Gallic acid was detected producing the deprotonated ions in negative ion mode at 169 and 153, forming fragments at m/z 125 and 109, respectively as a result of loss of CO₂ from the carboxylate group. The presence of anthocyanins (glucosides, acetylglucosides and *p*-coumaroylglucoside derivatives of delphinidin, cyanidin, petunidin, peonidin and malvidin), the main pigments in red wines and responsible for the colour, was confirmed. All of them presented a similar fragmentation pattern containing two signals, the original M⁺ molecular ion, and the fragments [M-162]⁺, [M-204]⁺ and [M-308]⁺ which are result of elimination of glucose, acetylglucose and *p*-coumaroylglucose residues, respectively. The flavan-3-ol monomers, (+)-catechin and (-)-epicatechin were detected at m/z 289. (-)-Flavan-3-ol dimers with molecular ion at m/z 577 were identified as procyanidins B1, B2, B3 and B4. Differences between vinification techniques were noticed confirming that maceration time influence the phenolic content in wine.

Keywords: wine, polyphenols, UPLC-ESI-IT-MS, Pinot Noir.