Effect of grape harvest time on the metabolomic profile of ribolla gialla monovarietal sparkling wines

AIM: The timing of grape harvest is crucial factor to be considered in the winemaking process, as delayed harvest increases the content of varietal aromas, esters, aldehydes, and alcohols, while concentration of green odor related compounds decreases [1,2]. In order to target optimal grape ripeness and maximize positive attributes of Ribolla Gialla sparkling wine, an experiment with three different harvest dates was established to determine whether an extended harvest might lead to an increase of important odor-impact compounds, and possibly improve wine sensory profile. METHODS: The harvest timing trial was examined across three consecutive seasons in Friuli Venezia Giulia region, Italy, where the first harvest was set when a minimum compromise was reached between the accumulation of sugars and the level of titratable acidity of the grapes. The second and third harvests were separated by a maximum of seven days, depending on meteorological conditions. In addition to sensory evaluation, a multitargeted metabolomics approach was applied for chemical characterization of wine samples, focusing on volatile compounds, lipid substances, and aromatic amino acid metabolites.RESULTS: As far as the composition in volatile compounds is concerned, the results have shown a significant advantage in the transition from first to the second harvest time, which resulted in enhanced production of esters, while in certain cases, the additional third harvest caused the increase of acetic acid and other volatile fatty acids. The lipid composition was not affected by the harvest time; however, the lipid content varied depending on the seasonal factor. Concerning tryptophan metabolites, it has been clearly shown that the extension of harvest date was not necessarily correlated with the formation of untypical aging substances that could compromise the quality of sparkling wines. Lastly, the sensory analysis revealed that the highest scores for preference were assigned to the wines from the second harvest. These samples were associated with 'floral' and 'tropical' descriptors, which appeared to be in accordance with the chemical analysis. CONCLUSIONS: The presented results indicate significant and coherent modulations of wine aroma profile in relation to grape harvest date. Therefore, this study could represent a great practical feedback for winegrowers, in order to determine the optimal harvest time.

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