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Influence of irrigation frequency on berry phenolic composition of red grape varieties cultivated in four spanish wine-growing regions

Abstract

The global warming phenomenon involves the frequency of extreme meteorological events accompanied by a change in rainfall distribution. Irrigation frequency (IF) affects the spatial and temporal soil water distribution but its effects on the phenolic composition of the grape have been scarcely studied. The aim of this work was to evaluate the effects of four deficit irrigation frequencies of 30 % ET_o: one irrigation per day (T01), two irrigations per week (T03), one irrigation per week (T07) and one irrigation every two weeks (T15) on berry phenolic composition at harvest. The experiment was carried out during two consecutive seasons (2021 and 2022), in vineyards of Garnacha Tinta (in Badajoz: T03, T07, T15), Tempranillo (in Valladolid: T03, T07, T15), Syrah (in Albacete: T03 and T07) and Mencía (in Lugo: T01, T03, T07). Polyphenolic substances were extracted from grapes. Thirty-six compounds grouped into anthocyanins and non-anthocyanins compounds were analyzed by HPLC. In 2021, practically no effect on the accumulation of phenolic compounds caused by FI was observed. Only the concentration of acetates in Syrah increased with the T07 treatment compared to T03. In 2022, T07 compared to T03 favored the accumulation of anthocyanins compounds in Tempranillo and Syrah, while Mencía was hardly affected and Garnacha Tinta even decreased its values significantly. In Tempranillo, T15 tended to slightly increase the anthocyanin content compared to T03, while in Garnacha Tinta the concentration of acetates tended to decrease. T01 applied to Mencía tended to increase the anthocyanin content, mainly compared to T03. Regarding non-anthocyanins compounds, the different irrigation treatments did not affect the accumulation of the analysed compounds. The results show that the phenolic composition of grapes, mainly anthocyanins, can be affected by the irrigation strategy applied and its effects may vary depending on the variety and the year.

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