

INFLUENCE OF CLIMATIC CONDITIONS ON GRAPE COMPOSITION OF TEMPRANILLO IN LA MANCHA DO (SPAIN)



Jesús MARTÍNEZ¹, Juan Luis CHACÓN¹, María Concepción RAMOS²

¹Regional Institute for Agri-Food and Forestry Research and Development of Castilla-La Mancha (IRIAF), Tomelloso (Spain)

²Dpt. Environment and Soil Sciences, University of Lleida-Agrotecnio CERCA Center, Lleida (Spain)



OBJECTIVE

The aim of this work was to analyze the variability in grape composition of the Tempranillo cultivar related to climatic conditions, in La Mancha Designation of Origin (DO), and the potential changes that grapes may suffer under future warmer climates.

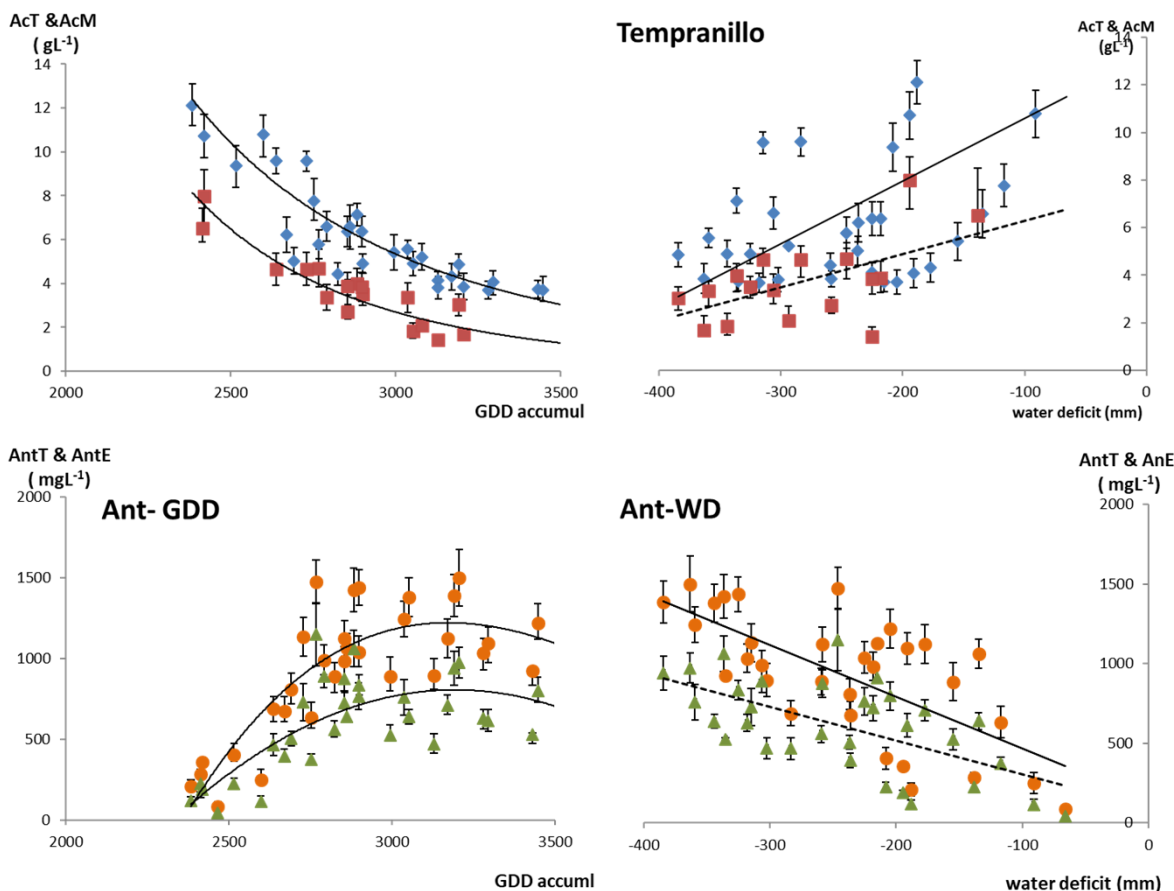
MATERIAL AND METHODS

The plots were located at 663 m.a.s.l. (latitude: 36,170500N, longitude: 3,004975W). The vines were cultivated under irrigated conditions. Irrigation was applied considering about 25% of crop evapotranspiration and it represented 120-150 mm per year, on average. Daily temperature (maximum, minimum and mean), precipitation and potential evapotranspiration (estimated according to Penman Monteith) for the period 2000-2019 were analyzed. Having previously delimited the chill and heat phases, the thermal requirements, expressed in growing degree days (GDD), needed to reach each phenological stage, were calculated. In order to analyze water deficits, precipitation plus irrigation minus crop evapotranspiration (P+R-ETc) was considered in the analysis. Grape composition, including pH, titratable acidity (AcT) and malic acid (AcM), was analyzed for all plots and years according to the official OIV methods (OIV 2004). Total and extractable anthocyanins (AntT and AntE) were also analyzed for the Tempranillo cultivar using the Glories method, in years with contrasting weather conditions (in the period 2000-2004 and 2017-2019).



RESULTS

High variability in grape composition was observed in the period analysed. The period between veraison and harvest was the one that seemed to have higher influence on acidity. In addition, it was confirmed that increasing water deficits decreased acidity. Regarding anthocyanins, it was observed that the increase in water deficits favour the increase of anthocyanins, both total and extractable anthocyanins. The lowest values were recorded in the hottest year (2017).



Evolution of titratable acidity (blue symbols) and malic acid (red symbols) with increasing accumulated temperatures (GDD) until reaching ripening (upper left figure). Variation of titratable acidity (blue symbols) and malic acid (red symbols) with water deficit (upper right figure). Evolution of total (orange symbols) and extractable (green symbols) anthocyanins (AntT and AntE) for Tempranillo with accumulated temperatures (bottom left figure), and water deficit (bottom right figure) during ripening.

CONCLUSIONS

The increase in temperature is particularly negative for Tempranillo, which is a naturally low acidity cultivar. In this cultivar, anthocyanins are also affected by increasing temperatures despite the compensation that greater water deficits can have on them. This study confirms the negative impacts of climate change for Tempranillo cultivar in Castilla-La Mancha winegrowing region.

