IMPACTS OF THE PROJECTED CHANGES IN TEMPERATURE UNDER SCENARIOS OF CLIMATE CHANGE ON VINE PHENOLOGY OF THREE RED VARIETIES CULTIVATED IN RIOJA (SPAIN)

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Abstract:

Context and purpose of the study - Grapevine is one of the crops that may suffer more negative impacts under climate change, due not only to changes in temperature but also due to water available. Some of the most direct effects of climate variability on grapevines are the changes in the onset and timing of phenology events and changes in the length of the growing season, which may have further effects on grape quality. The aim of this research was to analyze the changes in vine phenology of some red varieties (Tempranillo, Grenache and Carignan) cultivated in Rioja Oriental (Rioja DOCa), under different climate change scenarios.

Material and methods - The research includes the analysis of three plots located in the municipality of Viana (Navarra). Vine phenology referred to flowers separated (stage H) and veraison (stage M), Baillod and Baggiolini, 1993) was analyzed in the three plots for the period between 2005 and 2018. Climate characteristics were analyzed by considering the information recorded, for the same period in Viana meteorological station, which belongs to the Agencia Estatal de Meteorología (AEMET) of Spain. The thermal requirements to reach each of these phenological stages were evaluated and expressed as the GDD accumulated from DOI=60 (Parker et al, 2011). Temperature and precipitation changes under two Representative Concentration Pathway (RCP) scenarios –RCP4.5 and RCP8.5- were simulated based on an ensemble of models, using the MarkSim™ DSSAT weather file generator. Predictions for 2050 and 2070 for the changes on phenology were done, based on the projected changes in temperature and taking into account the observed thermal requirements during the period of analysis.

Results - An advance of the phenological stages was predicted, higher for veraison than for flowers separated, and higher for the varieties with later phenology (Carignan> Grenache > Tempranillo). Under the RCP4.5 emission scenario, the stage of flowers separated may be advanced about 5 days by 2050 and about 7 days, by 2070; and veraison may be advanced about 4 days by 2050 and about 7 days by 2070. Under the RCP8.5 emission scenario the advance could be up to 6 and 12 days for the stage of flowers separated and up to 6 and 15 days for veraison, respectively for the same time periods. This implies reaching maturity at the end of August, under high temperatures and with a risk of producing an imbalance between phenolic maturation and sugar and acid concentrations.

Keywords: Climate change, Grenache, Carignan, Tempranillo, Rioja.

1. Introduction

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