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Climate change impacts on the viticulture in Croatia; viticultural zoning and future potential

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The potential environmental impacts on grapevine yield, sugar and acidity can be very diverse depending on heat and available water in changing climate. Due to the strong dependence of vines on atmospheric conditions, a set of bioclimatic indices has been developed and used in many studies to combine meteorological and grape cultivation information in a quantitative manner. The set mainly consist average temperature growing season (TGS), Growing degree-days (GDD∼WI), Huglin Index (HUI), Dryness index (DI), Cool night index (CI). Although many authors calculated these indices for the specific locations, new gridded meteorological datasets created from measurements and/or regional climate models (RCMs from EURO-CORDEX) enabled spatial analysis of these indices which allow the viticultural zoning of larger regions.
Since changes in temperature and humidity will act (i) differently on all developmental stages of vines in certain wine growing areas (i.e. on their phenological characteristics) and (ii) differently on different varieties, a comprehensive database of bioclimatic indices has been calculated and analysed using all available meteorological and agronomic measurements as well as the results of RCMs. The horizontal grid spacing of 0.11° enabled fine determination of bioclimatic indices for present and future climate in Croatia. In addition, statistical analyses have been done examining sugar content and total acidity and date of harvest in the present and future climate from selected wineries and selected varieties. The results show whether the part of the country, which is suitable for grape cultivation in present climate, continues to be favourable in the future. The spatial distributions in the future climate also suggest that the existing zoning of wine-growing areas is not adequate for the Croatian territory.