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Climate change impacts on the thermal growing conditions of cherry trees in Portugal

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Temperate fruit trees in general and more precisely cherry trees have preferred thermal growing conditions. These conditions are assessed in this study through two innovative indices: degree-hours (GDH) and chill portions (CP) for mainland Portugal. GDH is applied to the growing season (February–October) to evaluate the thermal accumulation/forcing. On the other hand, CP is used during the winter dormancy period (October–February) to determine the chilling accumulation. Data of minimum and maximum daily temperatures from an observational dataset (E-OBS) are used to estimate these two indices. A downscaling procedure is applied to the indices in order to increase the spatial resolution of the patterns ($\sim$1 km) over the period of 1981–2015. These two indices allow a detailed definition of the thermal zones for cherry tree cultivation. Data for climate change projections, obtained from a set of EURO-CORDEX models, are applied to these indices under future emission scenarios (RCP4.5 and RCP8.5) and for the future period of 2041–2070. Overall, significant decreases in chill accumulations and increases in thermal accumulation are projected throughout the country. However, a decrease in the thermal accumulation is projected in the inner south of Portugal, owing to temperatures frequently above the optimum values (26ºC). These outcomes combined with substantial reductions in chill accumulation, make this region the most vulnerable to climate change. Nonetheless, some identified local/regional specificities should also not be overlooked in future planning of cherry tree cultivation in Portugal.