Decrease in winter chill in Chile by the end of 21st century due to climate change

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Deciduous fruit trees require adequate cold winter temperatures to overcome dormancy and to maintain their productivity. In the future this chill requirement may not be met in Chilean fruit tree production systems, which will experience warmer winters due to climate change. To study the impact of climate change on Chilean agriculture, we selected eight sites of agricultural interest in the north (Ovalle) the central regions (Quillota, Rengo, Curicó, Talca) and in the south (Chillán, Temuco and Osorno). Winter chill availability was estimated for the past and the future by using projections from 15 different climate models. A weather station was selected for each site with minimum and maximum temperature records from 1967 to 2017. Using these records for calibration, synthetic temperatures for 2000 to 2100 were projected for two different Representative Concentration Pathway (RCP) scenarios (RCP4.5 and RCP8.5). Winter chill availability, safe winter chill and the number of spring frost events were projected for reference years 2050 (for the period 2035 – 2065) and 2085 (for the period 2070 – 2100). Results show a dramatic reduction of winter chill in the northern regions by 2085 in the RCP8.5 scenario. Central regions could lose as much as 30 chill portions by 2085. No major impacts were found in southern regions. Spring frost events across the country decreased over time for both RCP scenarios. Climate change will affect future fruit production in Chile. In northern regions the minimum chill requirement of some species may only be achieved if mitigation strategies are implemented.

Key words: bud rest, sweet cherries, temperature increase, food security, chilling models

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