Growing seasons in Chile: Observation and prediction

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Abstract

Temperature data for 42 Chilean locations were analysed and heat sums calculated (for base 5°C and 10°C). Also, the length, starting and ending dates of the growing seasons were obtained. Temperature values normally found in Chilean climatological records, i.e. monthly and annual means, were related with temperature accumulations. In Chile it is possible to predict the accumulation of temperature from the annual mean temperature (r=0.995, P<.001, for base 5°C and r=0.984, P<.001, for base 10°C) or from the mean monthly temperature of January. In this latter case, a good adjustment with an exponential curve is found (r=0.76, P<0.001, base 5°C; r=0.78, P<0.001, base 10°C). For Chile, temperature courses along the year were approximated by using a harmonic analysis. No significant differences were observed between predicted and observed values. By integrating these equations as a function of time, it is possible to determine both the accumulation of temperature and the length of growing seasons for different threshold temperatures. A significant relationship was found between these variables and the latitude, and gradients were also obtained. Differences exist between littoral and continental stations in the extension of growing seasons and the accumulation of temperatures.

Keywords Plant Physiology, Significant Relationship, Harmonic Analysis, Temperature Data, Threshold Temperature