



## **Predicting grapevine winery production in the Douro based on favourable weather conditions**

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Weather conditions have a strong impact on seasonal grapevine production. For the cooperative wineries of the Douro winemaking region, accurate early predictions of grapevine production may result in major socio-economic benefits. Hence, the present research aims at developing a new model for grape production directed at regional wineries. To develop the model, statistical relationships between daily historic meteorological conditions and grape productions for three wineries within the Douro (Mesão Frio in the Baixo-Corgo sub-region, Favaios in the Cima-Corgo sub-region and Freixo in the Douro-Superior sub-region) were analysed. The model runs on a daily basis, comparing the thermal/hydric conditions against the average conditions in high (>75th percentile) and low (<25th percentile) production years. The results indicate site-specific relations between favourable (unfavourable) weather conditions and high (low) productions. Moderately cool pre-flowering temperatures and moderately warm conditions during berry development tend to underlie higher productions. Furthermore, these higher productions are normally found in years with higher precipitation levels preceding flowering. The model skill is analysed on a daily basis and the correlation coefficients between modelled and observed productions range from 0.68 to 0.84. These daily forecasts of potential grape production allow growers to optimize harvest and post-harvest activities. Stakeholders from the Douro winemaking region may apply this model as a decision support tool of viticultural management.