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The influence of climate in the Portuguese "Vinho Verde" wine production

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Assessing the role of climate on wine production is an important issue for the winemaking sector worldwide. More specifically, Portuguese viticulture represents an important contribution to the national exports of agro-food products. Located in the northwestern Portugal, the 'Vinho Verde' Wine Region produces an exceptional wine type that has been emerging as a renowned international brand. The present study aims to improve the understanding of climate-yield relationships in this region. A long wine production series (1945-2010) is used and some transformations are carried out in order to achieve robust statistical relationships. A preliminary stepwise approach is carried out so as to choose a number of significant predictors that are used in a logistic modelling of three classes: low, normal and high production. Six weather regimes are also taken into account to assess the large-scale atmospheric forcing on production. Furthermore, a 3-yr cycle in production is isolated by a wavelet spectral analysis. Ten predictors are ultimately selected: the dryness and hydrothermal indices, the 3-yr lagged production, the mean temperatures in March and June, the precipitation in June and the frequencies of occurrence of two regimes in May, and of one in February and September. On the whole, moderate water stress during the growing season, high production 3-yrs before, cool weather in February-March, settled-warm weather in May, warm moist weather in June and relatively cool conditions preceding harvest tend to be favourable to relatively high wine production. The model shows a high skill (72% of agreement after cross-validation), highlighting not only the key role played by atmospheric factors, but also its usefulness for production prediction. This may represent an important added-value for viticultural-oenological management in this specific winemaking sector. Acknowledgements: This study was supported by the project "Short-term climate change mitigation strategies for Mediterranean vineyards - ClimVineSafe" [PTDC/AGR-ALI/110877/2009] and by FEDER/COMPETE - Operational Competitiveness Programme [FCOMP-01-0124-FEDER-022692].