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► To cite this version:

Helder Fraga, Inaki Garcia de Cortazar Atauri, Aureliano Coelho Malheiro, João Alexandre Santos. Climate change impacts on viticultural yields in Europe using the STICS crop model. *ClimWine 2016 (Sustainable grape and wine production in the context of climate change)*, Institut National de Recherche Agronomique (INRA). UMR Ecophysiologie et Génomique Fonctionnelle de la Vigne (1287)., Apr 2016, Bordeaux, France. 152 p. hal-02743510

HAL Id: hal-02743510

<https://hal.inrae.fr/hal-02743510v1>

Submitted on 3 Jun 2020

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Climate change impacts on viticultural yields in Europe using the STICS crop model

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Climate has a predominant role on growth and development of grapevines (Fraga et al., 2013). Consequently, climate change may become an important challenge to the winemaking sector. The present study aims to develop climate change projections for grapevine yields in Europe. For this purpose, gridded climatic variables over a recent-past (1950-2000) and RCP8.5 future scenario (2041-2060), are coupled with the STICS crop model (Brisson et al., 2008). For each grid-cell in the European sector, soil (e.g. type, texture, depth) and terrain parameters are used as model inputs. Grapevine and crop management parameters are also determined. Yield simulations under current and future climates are then compared to identify climate change impacts. For 1950-2000, the crop model is able to accurately simulate yields for the main current European wine regions, showing lower yields in Southern Europe and higher yields in more central/northern regions. For 2041-2060, the results depict an increase in yield in the later regions, and a decrease in the former, mostly over inner Iberia. The projections also show a northwards extension of the potential grapevine growth areas, emerging new potential winemaking regions up to 55°N. The current study is a first attempt to apply the STICS crop model to the whole European sector, by using climatic, soil and terrain data as inputs. By using climate change projections as inputs to crop models, the present approach may represent a vital decision support system for the European winemaking sector.

Acknowledgments: This work was supported by the project “ModelVitiDouro” - PA 53774”, funded by the Agricultural and Rural Development Fund (EAFRD) and the Portuguese Government by Measure 4.1 - Cooperation for Innovation PRODER program - Rural Development Programme. This work was also supported by national funds by FCT - Portuguese Foundation for Science and Technology, under the project UID/AGR/04033.

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