



HAL
open science

The challenging issue of climate change for sustainable grape and wine production

Nathalie Ollat, Cornelis van Leeuwen, Inaki Garcia de Cortazar Atauri,
Jean-Marc Touzard

► To cite this version:

Nathalie Ollat, Cornelis van Leeuwen, Inaki Garcia de Cortazar Atauri, Jean-Marc Touzard. The challenging issue of climate change for sustainable grape and wine production. *OENO One*, 2017, 51 (2), pp.59-60. 10.20870/oeno-one.2016.0.0.1872 . hal-01608710

HAL Id: hal-01608710

<https://hal.science/hal-01608710v1>

Submitted on 26 May 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial 4.0 International License

The challenging issue of climate change for sustainable grape and wine production

Nathalie Ollat¹, Cornelis van Leeuwen¹
Iñaki Garcia de Cortazar-Atauri² and Jean-Marc Touzard³

¹UMR EGFV, Bordeaux Sciences Agro, INRA, Univ Bordeaux, F-33882 Villenave d'Ornon, France

²Agroclim, INRA, Avignon, France

³UMR 0951 Innovation, Inra, France

*This article is published in cooperation
with the ClimWine international conference held in Bordeaux 11-13 April 2016.
Guest editor: Nathalie Ollat*

The links between grape production, wine quality, climatic conditions and geographical origins are tied, making ongoing climate change a quite challenging issue for this economical sector. How climatic conditions will be affected locally, how local climate will interact with topography, resulting in a high climatic variability at vineyard scale, how vine performances, berry composition and wine quality will be modified, what can be done to adapt vine growing and wine making practices to these new conditions? Here are the numerous questions the wine industry has to face in the following decades. In this context, it is obvious that this issue will require the development of close collaboration between actors, including producers and wine makers, extension services, marketing, policy makers and scientists. In the scientific community itself, addressing this issue requires multidisciplinary studies and new approaches for performing science.

Since 2012, the LACCAVE project, developed in France to study the long term impacts and define adaptation strategies for viticulture and oenology, was based on this vision. It gathers, in the frame of the Metaprogramme ACCAF (Adaptation to climate change of Agriculture and Forestry) led by the French Institut National de Recherche Agronomique (INRA), scientists from 23 French laboratories dealing with different aspects of climate change: climatology, physiology, pathology, agronomy, oenology, genetics, economics and, social sciences. After 4 years working together, they have developed a shared vision about climate change and its impacts on grape and wine production. They also delivered several important results to the industry in order to define adaptive strategies. ClimWine2016, the final international symposium of Laccave project was held in the same spirit. Scientists from 20 different countries came to Bordeaux from April 11 to 13 2016 to present their work related to climate modeling, impacts on vines and wines, possible adaptations at different scales, and socio-economic outputs. This symposium was also an important opportunity not only to

exchange between among themselves researchers, but also with some representatives of the industry.

General trends of already observed and expected climate change and their impacts on grape growing show that the planet has is warmer than at any time in our recorded past and extremes in temperature and precipitation have increased (Jones, 2017, in this issue). Most vineyards throughout the world face the same situation and some vineyards from low latitudes as Portugal may be endangered in the following decades (Fraga *et al.*, 2017). Climatic modelling at the appropriate scale is crucial to simulate future conditions (Quenol *et al.* 2017). In particular, high resolution atmospheric modelling provides useful information to understand climate variability at high spatial and temporal scale and to allow better decision-making for adaptation at the terroir level (Sturman *et al.*, 2017). Water availability will become a major concern. Considering that simulations for precipitations are characterized by a large uncertainty, it is determinant to analyze the evaporative demand of the atmosphere which has so far shown different evolutions according to the considered vineyard. Wind appears to be a key component of these variations (Schultz, 2017). Impacts of climate change on grapevine physiology are numerous. Phenology, driven mainly by temperature, is the first component to be affected and is a key parameter for varietal adaption (Garcia de Cortazar-Atauri *et al.*, 2017). However temperature effects are complex and carbon balance at the whole plant level should be considered (Torregrosa *et al.*, 2017). Interactions with high CO₂ have to be taken into account and impacts of future climatic conditions may be larger than might be predicted from experiments examining factors one by one (Edwards *et al.*, 2017). Fruit composition, especially aroma compounds, is a real matter of concern. These molecules contribute to the typical identity of wines and are highly variable according to climatic conditions and growing practices (Pons *et al.*, 2017). The evolution of pest and diseases is another important issue which is much more difficult to document.

DOI: <http://dx.doi.org/10.20870/oeno-one.2016.0.0.1872>

Worldwide repartition of diseases does not really help to get clear idea of risk occurrence in the future (Bois *et al.*, 2017). To face these new conditions and ensure the sustainability of the industry, adaptation should be considered at every level of the production and value chains. At short term scale, winemaking and oenological practices may contribute to process grapes with higher sugar content and lower acidity contents (Dequin *et al.*, 2017). At longer time scale, site selection, management practices and plant material selection present a high potential to face adapt to the new climatic conditions (van Leeuwen and Destrac, 2017). Looking at the past to understand the future may be very informative and some traditional techniques abandoned recently may have a high adaptive potential (Santesteban *et al.*, 2017). A major challenge will be to adapt plant material to these new conditions because adaptation is a very complex trait. New approaches, as ecophysiological modelling, should be developed encouraged (Vivin *et al.*, 2017). For example, these approaches appear to be very promising to develop new varieties and rootstocks better adapted to drought (Simmoneau *et al.*, 2017).

This special issue of *OenoOne*, which includes some of the key contributions to ClimWine2016 symposium, provides a large overview of the most recent knowledge related to the challenge of facing climate change. It is therefore a unique document to support our global thinking to maintain the performances of the wine industry in the future. The ClimWine2016 convenors deeply thank *OenoOne* for this contribution the possibility to make these articles easily accessible

Références

- Bois B., Zito S. and Calonnec A. Climate vs grapevine pests and diseases worldwide: the first results of a global survey. *OENO One*, 51, 2, DOI: 10.20870/oeno-one.2016.0.0.1780
- Dequin S., Escudier J.-L., Bely M., Noble J., Albertin W., Masneuf-Pomarède I., Marullo P., Salmon J.M. and Sablayrolles J.M., 2017. How to adapt winemaking practices to modified grape composition under climate change conditions. *OENO One*, 51, 2, DOI: 10.20870/oeno-one.2016.0.0.1584
- Edwards E. J., Unwin D., Kilmister R. and Treeby M., 2017. Multi-seasonal effects of warming and elevated CO₂ on the physiology, growth and production of mature, field grown, Shiraz grapevines. *OENO One*, 51, 2, DOI: 10.20870/oeno-one.2016.0.0.1586
- Fraga H., García de Cortázar Aauri I., Malheiro A. C., Moutinho-Pereira J. and Santos J. A., 2017. Viticulture in Portugal: A review of recent trends and climate change projections. *OENO One*, 51, 2, DOI: 10.20870/oeno-one.2016.0.0.1621
- García de Cortázar-Aauri I., Duchêne É., Destrac-Irvine A., Barbeau G., de Rességuier L., Lacombe T., Parker A. K., Saurin N., van Leeuwen C., 2017. Grapevine phenology in France: from past observations to future evolutions in the context of climate change. *OENO One*, 51, 2, DOI: 10.20870/oeno-one.2016.0.0.1622
- Li Yuanbo and Isabel Bardaji, 2017. Adapting the wine industry in china to climate change: challenges and opportunities. *OENO One*, 51, 2, DOI: 10.20870/oeno-one.2016.0.0.1184
- Pons A., Allamy L., Schüttler A., Rauhut Doris, Thibon C. and Darriet Ph, 2017. What is the expected impact of climate change on wine aroma compounds and their precursors in grape? *OENO One* DOI: 10.20870/oeno-one.2016.0.0.1868
- Quénol H., Garcia de Cortazar Aauri I, Bois B., Sturman A., Bonnardot V. and Le Roux R., 2017. Which climatic modeling to assess climate change impacts on vineyards? *OENO One*, 51, 2, DOI: 10.20870/oeno-one.2016.0.0.1869
- Santesteban L. G., Miranda C., Urrestarazu J., Loidi M. and Royo J. B., 2017. Severe trimming and enhanced competition of laterals as a tool to delay ripening in Tempranillo vineyards under semiarid conditions. *OENO One*, 51, 2, DOI: 10.20870/oeno-one.2016.0.0.1583
- Schultz H. R., 2017. Issues to be considered for strategic adaptation to climate evolution. Is atmospheric evaporative demand changing? *OENO One*, 51, 2, DOI: 10.20870/oeno-one.2016.0.0.1619
- Simonneau T., Lebon E., Coupel-Ledru A., Marguerit E., Rossdeutsch L. and Ollat N., 2017. Adapting plant material to face water stress in vineyards: which physiological targets for an optimal control of plant water status? *OENO One*, 51, 2, DOI: 10.20870/oeno-one.2016.0.0.1870
- Sturman A., Zavar-Reza P., Soltanzadeh I., Katurji M., Bonnardot V., Parker A., Trought M., Quénol H., Le Roux R., Gendig E. and Schulmann T., 2017. The application of high-resolution atmospheric modelling to weather and climate variability in vineyard regions. *OENO One*, 51, 2, DOI: 10.20870/oeno-one.2016.0.0.1538
- Torregrosa L., Bigard A., Doligez A., Lecourieux D., Rienth M., Luchoire N., Pieri P., Chatbanyong R., Shahood R., Farnos M., Roux C., Adiveze A., Pillet J., Sire Y., Zumstein E., Veyret M., Le Cunff L., Lecourieux F., Saurin N., Muller B., Ojeda H., Houel C., Péros J.-P., This P., Pellegrino A. and Romieu C., 2017. Developmental, molecular and genetic studies on grapevine response to temperature open breeding strategies for adaptation to warming. *OENO One*, 51, 2, DOI: 10.20870/oeno-one.2016.0.0.1587
- van Leeuwen C. and Destrac-Irvine A., 2017. Modified grape composition under climate change conditions requires adaptations in the vineyard. *OENO One*, 51, 2, DOI: 10.20870/oeno-one.2016.0.0.1647
- Vivin P., Lebon É., Zhanwu Dai, Éric Duchêne, Élisabeth Marguerit, Iñaki Garcia de Cortazar-Aauri, J. Zhu, Thierry Simonneau, Cornélis van Leeuwen, Serge Delrot and Nathalie Ollat, 2017. Combining ecophysiological models and genetic analysis: a promising way to dissect complex adaptive traits in grapevine. *OENO One*, 51, 2, DOI: 10.20870/oeno-one.2016.0.0.1588