# Climate Change and Viticulture

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It can be thought that climate change will seriously impact viticulture both on a global and a local scale, because of the well-established link of wine production with climate, also demonstrated by historical studies.

As for any crop production, the impact of anthropogenic increase of greenhouse effect will include the stimulating effect on photosynthesis of the forecasted doubling of carbon dioxide atmospheric concentration. It could result in an increased instantaneous dry matter production by about 20 %, which will be counterbalanced when considering the integration during the whole cycle by the shortening of active period due to the acceleration of phenological stages. These changes will lead to noticeable modifications in cultural practices in order to retrieve the eco-physiological equilibrium between carbon sources and sinks.

However, due to the close relation of vine production (especially in terms of quality) with climate, it may be thought that the most significant impact will result from the climate change as predicted by climate modelers for the end of this century. Whilst other climatic variables as rainfall will have to be considered, the first order effect may be assessed by only considering temperature and its increase in a context of global warming. Serious questions arise about the possibility to keep the same cultivars by adjusting vineyard cultural and enological practices. As the characteristics of harvested production will be seriously modified, will it be possible to keep the same varieties (often cultivated during centuries) which give their unique value only by adjusting cultural practices and enology? Will it be possible to take profit from a warming which in many cases could be beneficial for wine? The answers will be different for the various producing areas, depending upon the characteristics of the local predicted climate change, but also upon the socio-economic specificities, among them history and tradition may play a significant role.

For instance, in the case of Europe, calculations with classical bio-climatic indices firstly lead to a significant moving of the traditional limits for vine cultivation, which could correspond to a shift of somewhat 500 to 800 km towards north. If such changes may be anticipated as easily acceptable adaptations for most of agricultural crops, the computed evolutions in the characteristics of the main traditional producing areas raises serious questions in the well-known context of ‘terroirs’. Climatic scenarios for the end of the century in Europe predict a warming mean-value between 2 to 4° C (more in summer, with a reduced rainfall by 20 to 30% at this period). There are great probabilities that it will generally exceed the established limits for grape cultivars strongly associated with a given climate range. One can foresee the displacement of the traditional northern limits for grapevine cultivation and worry about the fate of the most southern vineyards in Spain.

For most of the producing areas in warm climates of the southern hemisphere, the perspective of increased temperatures possibly becoming excessive will lead to geographical shifts, maybe more easily than in Europe, but the availability of water for irrigation appears as a serious threatening in any case.