

Possibilities to Evaluate the Climatic and Meteorological Potential for Viticulture in Poland: The Case Study of the Jagiellonian University Vineyard

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Abstract : Current global warming causes changes in the traditional zones of viticulture worldwide. During 20th century, the average global air temperature increased by 0.89°C. The models of climate change indicate that viticulture, currently concentrating in narrow geographic niches, may move towards the poles, to higher geographic latitudes. Global warming may cause changes in traditional viticulture regions. Therefore, there is a need to estimate the climatic conditions and climate change in areas that are not traditionally associated with viticulture, e.g., Poland. The primary objective of this paper is to prepare methodology to evaluate the climatic and meteorological potential for viticulture in Poland based on a case study. Moreover, the additional aim is to evaluate the climatic potential of a mesoregion where a university vineyard is located. The daily data of temperature, precipitation, insolation, and wind speed (1988-2018) from the meteorological station located in Łazy, southern Poland, was used to evaluate 15 climatological parameters and indices connected with viticulture. The next steps of the methodology are based on Geographic Information System methods. The topographical factors such as a slope gradient and slope exposure were created using Digital Elevation Models. The spatial distribution of climatological elements was interpolated by ordinary kriging. The values of each factor and indices were also ranked and classified. The viticultural potential was determined by integrating two suitability maps, i.e., the topographical and climatic ones, and by calculating the average for each pixel. Data analysis shows significant changes in heat accumulation indices that are driven by increases in maximum temperature, mostly increasing number of days with $T_{max} > 30^{\circ}\text{C}$. The climatic conditions of this mesoregion are sufficient for *vitis vinifera* viticulture. The values of indicators and insolation are similar to those in the known wine regions located on similar geographical latitudes in Europe. The smallest threat to viticulture in study area is the occurrence of hail and the highest occurrence of frost in the winter. This research provides the basis for evaluating general suitability and climatologic potential for viticulture in Poland. To characterize the climatic potential for viticulture, it is necessary to assess the suitability of all climatological and topographical factors that can influence viticulture. The methodology used in this case study shows places where there is a possibility to create vineyards. It may also be helpful for wine-makers to select grape varieties.

Keywords : climatologic potential, climatic classification, Poland, viticulture

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