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Prediction of Frost Risks and Plagues using WRF model: a Port Wine region case study

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In viticulture where the quality of the wine, the selection of the grapevines or even the characteristics of the farming soil, also depending from local soil features like topography, proximity of a river or water body, will act locally on the weather. Frosts are of significant concern to growers of many cultures crops such as winegrapes. Because of their high latitude and some altitude, the vineyards of the Demarcated Douro Region (DDR) are subjected to the frost, which cause serious damages. But the hazards of vineyard don't confine to the incidents of the fortuitous and meteorological character. The illnesses and plagues affect frequently the vineyards of Demarcated Douro Region due, namely to the weather, to the high power of the regional stocks, to the dense vegetation badly drained and favourable to the setting of numberless fungi, viruses and/or poisonous insects. In the case of DDR it is worth noticing the meteorological conditions due to the weather characteristics. Although there are several illnesses and plagues the most important enemies for the vine in the DDR are the mildew, oidium, grey rottenness, grape moth,. . . , if the climatic conditions favour their appearance and development. For this study, we selected some months for different periods, at the 16 weather stations of the Region of Douro. We use the Weather Research and Forecast Model (WRF) to study and possibly predict the occurrence of risk and plagues (mildew) episodes. The model is first validated with the meteorological data obtained at the weather stations. The knowledge of frost and plagues occurrence allows one to decrease its risks not only by selecting the cultural species and varieties but also the places of growth and the planting and sowing dates.