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Impact of Change Climate Conditions on the Climate Niches of Colorado Potato Beetle and Potato Late Blight in Central Europe

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Climate conditions exert a significant influence over the spreading, population dynamic, life cycle duration, infestation pressure and the overall occurrence of majority of agricultural pests and diseases. Thereby in the case of pest species whose development is directly linked with the climate conditions the shift of their climatic niche or their infestation capability is to be expected under the changing climate. This study is focused on the most important potato pest i.e Colorado potato beetle (*Leptinotarsa decemlineata*, Say 1824) and also disease that have lead to severe potato yield collapses in the past i.e. Potato late blight (Phytophtora infestans, de Bary 1876). Colorado potato beetle (CPB) development is affected mainly by temperature of its environment, which is a function of air temperature. The climate change and increased temperatures might lead to an earlier beginning of the growing season and it can accelerate ECB development and make the life cycle shorter. CPB consequently can complete higher number of generations per growing season. The model provides information about the possible tendency in the CPB development in the future climate conditions, it can point the areas endangered by the occurrence of higher number of completed generations and with likely increased economic losses. Potato late blight (PLB) known requirements for temperature and duration of wetting make disease development best

be predicted by assessing the rate of occurrence of the disease cycles. Warmer weather in the early summer is likely to advance the time of first outbreaks of PLB, leading to early crop defoliation and reduced yields. Model allows the assessment of the risk of early outbreaks or increases in the intensity of disease. For the estimation of the mentioned pests occurrence in expected climate conditions there was used a dynamic model CLIMEX that enables to determine suitability of a given location climate for the pests survival and infestation capability based on known pests requirements to climate conditions. The suitability is expressed in terms of an Ecoclimatical index as a connection of the Growth and Stress indices.

Following the validation and calibration of the model input meteorological data were altered according to four Global Circulation Models (ECHAM4, HadCM3, NCAR-PCM and CSIRO) that were driven by three emission scenarios (A2, B1, A1B) with three assumed levels of climate system sensitivity for period 2025 and 2050. Model output, for current and expected climate conditions, were visualized by GIS (Geographical Information Systems) using a digital landscape model. Under all climate change scenarios we noted marked shift of pests' potential niche to higher altitudes and change in infestation pressure of both evaluated species.

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