The Estimation of the Potato Late Blight Infestation
Pressure under the Changed Climate in the Czech Republic


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Climate conditions exert a significant influence over the spreading, life cycle duration, infestation pressure and the overall occurrence of majority of agricultural pests and diseases. This study is focused on the most important potato disease Potato Late Blight (*Phytophtora infestans*, de Bary 1876) that have lead to severe potato yield collapses in the past. Potato late blight (PLB) relationship to the seasonal climate conditions have been study for more than a century with temperature and leaf wetness conditions being rather well defined. Above average temperatures during the early summer (from June) are likely to advance the time of the first outbreaks of PLB, leading to early crop defoliation and reduced yields if not matched by proper crop protection scheme. Even though that several dozens of PLB models have been develop in the past they are suitable mostly for the monitoring purposes and in general require input data that are not widely available in the climatological databases (e.g. hourly data on temperature and air humidity). Therefore the aim of the study was to develop a robust model allowing the assessment of the risk of the early outbreaks or increases in the intensity of PLB
under the present and expected climate conditions using daily weather data. For this purpose we used dynamical model tool DYMEX that enabled us to develop a model capable of monitoring favorable conditions of the PLB activity under the present climate. The model is a set of modules from which each one monitors the completion of given parameters (e.g. the course of temperatures, relative humidity or rain in the range required for PLB activity). The output of the model is a number of hours with favorable conditions for the PLB outbreak in particular days. Model enables the observation of separated periods suitable for disease activity and detection of the most principle factors implicating the first occurrence. Simulations in current climate conditions in 10 locations showed that model can well indicate the middle and strong range of the infection. Following the validation and calibration of the model input meteorological data were altered according to three Global Circulation Models (ECHAM4, HadCM3, NCARPCM) that were driven by two emission scenarios (A2, B1) with two assumed levels of climate system sensitivity for period 2050. Temperature growth is according to given scenarios assumed at the mean of 0,8 °C for 2025 and 2,2 °C for 2050. Under all climate change scenarios we noted marked change in infestation pressure of evaluated disease and the higher number of favorable days for PLB outbreak, the number of hours with favorable conditions which are necessary for the outbreak of infection is according to scenarios achieved earlier, especially occurrence of these days in May constitutes the significant treat for the potato yields.

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