



Climate change impact on the occurrence of selected pests in the regional scale in the Czech Republic

E. Kocmankova (1), M. Trnka (1), Z. Zalud (1), D. Semerádová (1), M. Dubrovský (3), J. Juroch (2), and M. Možný (4)

(1) Mendel University, Brno, Czech Republic (jevicka@email.cz), (2) State Phytosanitary Authority, Brno, Czech Republic, (3) Institute of Atmospheric Physics, Academy of Sciences of the Czech Republic, Prague, Czech Republic, (4) Agrometeorological observatory in Doksany, Czech Hydrometeorological Institute, Doksany, Czech Republic

Climate conditions exert significant influence over the the population dynamic, life cycle duration, infestation pressure and the overall occurrence of majority of agricultural pests and diseases. Particularly in the case of those 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. The presented study is focused on the most important potato pest i.e. Colorado potato beetle (*Leptinotarsa decemlineata*, Say 1824) and most important pest of grain maize i.e. European corn borer (*Ostrinia nubilalis*, Hübner 1796). Simulations of potential distribution of pests in the Czech Republic in the conditions of climate change were made with the usage of dynamical model CLIMEX and by the interpolation of output EI from 43 locations there are climate conditions of almost whole area of the Czech Republic considered as favorable for pest' survival. The models validation was based on the comparison of the modeled potential pests' distribution with the field observations in the current climate conditions. Under the expected climate conditions the pests will most likely be able to complete their development earlier and in higher population densities. Both mechanisms might cause a subsequent increase of the severity of the pest infestation. In addition to this the higher temperature and its earlier coming in the beginning of the vegetative season may support the mobility and faster local spread of some species. The estimates of the future climate is based on the assumption of slow increase of green house gases emissions and low climate sensitivity to their rising concentration (LOW B1) as well as the "opposite" scenario assuming rapid growth of emissions and the high sensitivity of the climate system (HIGH A2). Three GCM models that were driven by these emission scenarios included HadCM3, NCAR-PCM and ECHAM4.

For Colorado potato beetle the realization of HIGH A2 in combination with HadCM3 means almost the half of the arable land endangered by the occurrence of bivoltine population by 2025. The same model indicates for 2050 this area increasing by 72 %. According to ECHAM A2 2050 is the occurrence of partial third generation likely in the 45 % of arable land and completed third generation in the 0.2 % of arable land.

The results show that climate will be a significant factor determining the development and survival of the European corn borer. According to the presented models estimations the area of the univoltine population establishment could be through the next 20 – 30 years significantly larger and till 2050 it could cover most of the agriculturally suitable land in the Czech Republic. The threat of the ECB bivoltine population expansion in the next decade is not immediate but is likely between 2025 – 2050 at least in the warmest areas in the Czech Republic.

There is the apparent risk of the increasing damage caused by pests due to the shifts in the climate conditions. It should be stressed that the study is based on so called potential distribution which means the expected geographical distribution of the given species is based only on the climate conditions regardless of any other factors determining the species abundance or distribution.

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