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- towards climate change services

Estimation of the change in the harmfulness of selected pests in expected climate - European area

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Climate change is likely to be a dominant factor affecting the lifecycle and overall occurrence of pest's species whose development is directly linked with climate conditions. This study is focused on the estimation of the potential occurrence and generation growth of selected pests causing the significant damages on the yield of crops over western part of Europe in changing climate. Modelled species involved the main pest of potato Colorado potato beetle (Leptinotarsa decemlineata, Say 1824), the pest of maize European corn borer (Ostrinia nubilalis, Hubner 1796), the pest which causes the damages in orchards and decreases the yield of apples, Codling moth (Cydia pomonella, Linnaeus 1758) and Cereal leaf beetle (Oulema melanopus, Linnaeus 1758) seriously affecting wheat production. The development of these pests' is driven mainly by temperature of the environment, which is in turn function of air temperature. The climate change is likely to lead to an earlier once and prolongation of the growing season and in the same time accelerate pests' developmental rate and will increase number of generations. Estimates of potential distribution of selected pest species for the present as well as expected climate conditions are based on the dynamical model CLIMEX. This approach exploits the expression of the overall climate suitability for the species longterm survival in terms of ecoclimatic index. The CLIMEX model was at first validated with observed data of pests' occurrences using CRU 10′ climate data set a source of climate data. All pest models listed were then used to study the effects of climate change on pests by estimating changes in population dynamics and/or infestation pressure during the first half of the 21st century. Outputs of the models were applied within the European scale in the 10′ resolution using digital terrain model. Simulations of the impacts of expected climate on the pests distribution were conducted under three global circulation models (HadCM3, NCAR-PCM, and ECHAM4) and scaled by low and high values of global temperature change. The models provide information about the possible tendency in the species 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.

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