

# Modelling the spatio-temporal distribution of climate-sensitive plant pest species

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**Introduction** Climate-sensitive pests are species whose risk-potential is expected to change significantly as a result of the climatic changes observed to date and predicted for the future. The model's focus on climate-sensitive species closes a gap in the assessment of new pests. Up to now, changes in their long-term risk potential due to climate change have been difficult to assess and were therefore not sufficiently taken into account in pest risk analyses. The prediction of the establishment potential and possible spread of pests and evaluation of different environmental- and management scenarios is of great ecological and economical importance and essential for pest management.

**Concept/Goal** Our goal is to create a simulation model that will allow these predictions and scenario analyses, and to establish in the long term a framework as a standard procedure for supporting plant health risk analyses of climate-sensitive pests. The objective is to create a transferrable, generalized open-source model framework that is easy to extend and easy to couple with individual host plants, current climate data sets as well as new presence/absence data of the pest. The model will predict the probability of survival and establishment as well as forecast the possible spread of the pests based on species-specific

spread parameters and distribution properties. The dynamic model consists of different components: The host plant sub-model predicts future cultivation areas and land use changes, taking into account climate change and political trends. The habitat sub-model calculates the climatic suitability of the different areas today and in the future. The dispersal sub-model then generates the probable dispersal of the respective pest, taking into account various dispersal pathways, including those related to humans.

**Results** The results of the model will be presented graphically in the form of distribution- and risk maps. The output will be used in risk analyses to better assess the economic and environmental risks of the species. Additionally, identified high-risk areas for pest establishment can support the planning of survey activities. Furthermore, the model-output could be a decision-support tool for example for plant growers and breeders.

**Outlook** We want to keep the model open source and assure transferability to as many pest groups as possible (fungi, insects, arachnids, nematodes, bacteria) so that the model can be enhanced by different sub-models as well as species-specific functions and parametrization.