Presentation type: oral

Session: Population dynamics of maize pests and implications for pest management

Title: Simulating maize rotation strategies to develop IPM for *Diabrotica v. virgifera* in Europe

Abstract:

A discrete spatiotemporal simulation model was developed to investigate the effect of maize rotation strategies against the maize pest *Diabrotica virgifera virgifera* (Coleoptera: Chrysomelidae) in Europe. The modelled agricultural landscape was simplified into a lattice where fields became cells defined as continuous maize, first year maize or non-maize crop. The yearly update of cells according to the rotation strategy was applied for ten consecutive years, and was determined by the proportion of maize in the modelled agricultural area, the proportion of first year maize among all maize fields (% of rotation), and the presence/absence of policy restrictions to grow maize for not more than 3, 4 or 5 consecutive years. In these lattices of cells *D. v. virgifera* adults only emerged in continuous maize fields and some dispersed among neighbouring maize fields for oviposition. In the subsequent year, i.e. after the update, a part of the population was eliminated due to rotation, and a generational growth rate was applied where maize was grown again. The model output was the proportion of maize fields reaching densities above a defined economic threshold level. Sensitivity analysis was conducted to identify key input factors among the 20 input factors of the model.

Most influential input factors appeared to be the % of rotation (a factor of rotation strategy) and the generational growth rate of *D. v. virgifera*. Astonishingly, the proportion of maize was not a key input factor in case that at least 20% and up to 60% of the fields were maize. Simulation results indicated a general pattern of model output having a low flat stage after a turning point. When at least 80% rotation was applied, the proportion of maize fields with population densities above the threshold level was low, i.e. less than ~5%, among all maize fields even at different levels of other input factors. The presence of policy restrictions could shift this turning point towards an even lower % of rotation.

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