Session 1: Present situation of *Diabrotica* in European countries

The *Diabrotica virgifera virgifera* situation in Hungary: Modelling plant protection regulations on landscape level

Die Befallssituation mit Diabrotica virgifera virgifera *in Ungarn: Räumliche Modellierung von Pflanzenschutzregelungen*

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Diabrotica virgifera virgifera spread into Hungary in 1995, reached all maize production areas of the country by 2003, and is currently considered a well-established and well known pest within the pest species complex of maize. A discrete spatiotemporal simulation model was developed to investigate the effectiveness of maize rotation strategies against *D. virgifera virgifera* within the current framework of Hungarian integrated pest management legislations as well as for other potential legislations. The modelled agricultural landscape was simplified into a lattice, encapsulated into a torus, with fields as cells. The population dynamics of *D. virgifera virgifera* was simulated as an interacting particle system of the cells considering the inter-maize-field movements of adults and the presence of subsequent generations exclusively in continuous maize. The yearly update of cells according to different rotation strategies was applied for ten consecutive years, and was determined by the proportion of maize in the modelled agricultural landscape, the proportion of first year maize among all maize fields (% of rotation), and the presence/absence of legislations to grow maize for not more than 2, 3, 4 or 5 consecutive years. The model output was the proportion of maize fields at risk of reaching *D. virgifera virgifera* densities above a defined economic threshold.

Variance based global sensitivity analysis was conducted to identify the key input factors of the model. These factors were the percentage of rotation and the generational growth rate of *D. virgifera virgifera*. The proportion of maize in the modelled landscape was not a key input factor in the investigated range being typical for European maize growing areas, i.e. between 20% and 60%. In our simulations a 100% rotation of maize was not necessary to keep *D. virgifera virgifera* populations below the threshold level in the majority of maize fields of the landscape. Presence of the aforementioned legislations could decrease the proportion of maize fields with pest populations above economic threshold levels. The simulation model is suggested to be used by rural development policy makers at regional level decisions as well as for recommendations for appropriate integrated pest management guidelines.

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