

Modelling landscape level impacts of western corn rootworm adaptation to crop rotation in Europe

Mark Szalai^{1,2,*}, Stefan Toepfer^{1,3} & Jozsef Kiss¹

¹Szent Istvan University, Plant Protection Institute, Hungary

²PlasmoProtect Ltd, Hungary

³CABI-Europe, Switzerland * szalai.mark@mkk.szie.hu

Background

- Western corn rootworm (*Diabrotica virgifera virgifera*, WCR) larvae can cause yield loss in maize by feeding on the root system.
- Rotation of maize is an efficient and widely used control measure in Europe
- Adaptation of WCR to crop rotation was reported from the USA since late eighties

Objective

Develop a model to investigate the recent rotational strategies & the hypothetical occurrence of adaption in Europe

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Model structure

- discrete spatiotemporal stochastic model to study WCR population levels
- lattice-based and cellular automaton-like
- cell update according to the rotation strategies
- population dynamics: generational growth & adult dispersal

More details of model structure and effects of rotational strategies on WCR population levels:

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Then the adaptation to rotation was introduced...

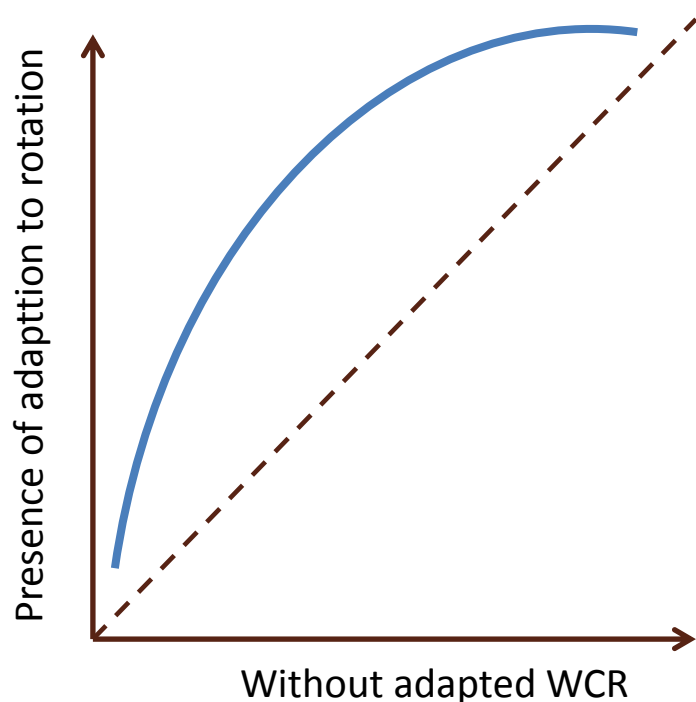
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Simulation results

cca. 10000 runs

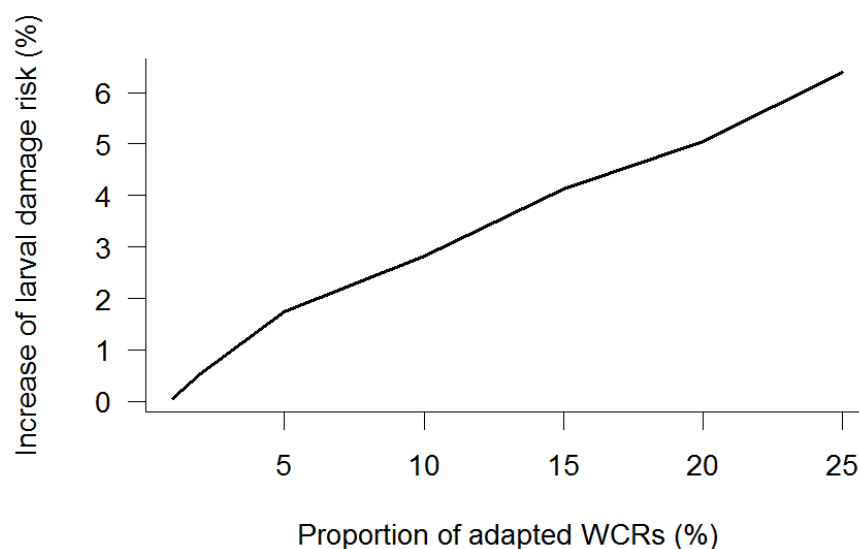
General pattern:

The proportion of maize having **population levels above threshold** – the **risk of the larval damage** in the subsequent year on landscape level – was higher introducing adapted WCRs



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This increase was higher as the frequency of adapted WCRs was higher



Conclusion

The hypothetical occurrence of adaptation of WCR to rotation could increase the proportion of maize with population levels above threshold, i.e. the risk of the larval damage on landscape level

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