



## MAXIMUM RESIDUE LEVELS: A FARM-LEVEL PERSPECTIVE

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Source: BauernZeitung

- Plant protection is central for food production (Oerke, 2006, Savary et al., 2019)
- High dependency on pesticides – often cheap, effective and easily applicable
- ...with effects on the environment, human health and productivity (Skevas et al., 2013, Stehle & Schulz, 2015, Landrigan et al., 2018, Tang et al., 2021, Frank, 2024)
- Policy goals (local, regional, global) for pesticide risk reduction
- MRLs affect trade: trade volumes and stability, firms' trade behavior, and the diversity of products traded (Engemann et al. 2025; Fiankor et al. 2025; Fiankor and Shingal 2025)
- But might also have (unintended) consequences on production– evaluating these requires to consider the complex context

Savary, S. et al. (2019) The global burden of pathogens and pests on major food crops. *Nat. Ecol. Evol.* **3**, 430–439.

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Stehle, S., & Schulz, R. (2015). Agricultural insecticides threaten surface waters at the global scale. *Proceedings of the National Academy of Sciences*, 112(18), 5750-5755.

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Frank, E. G. (2024). The economic impacts of ecosystem disruptions: Costs from substituting biological pest control. *Science*, 385(6713), eadg0344.

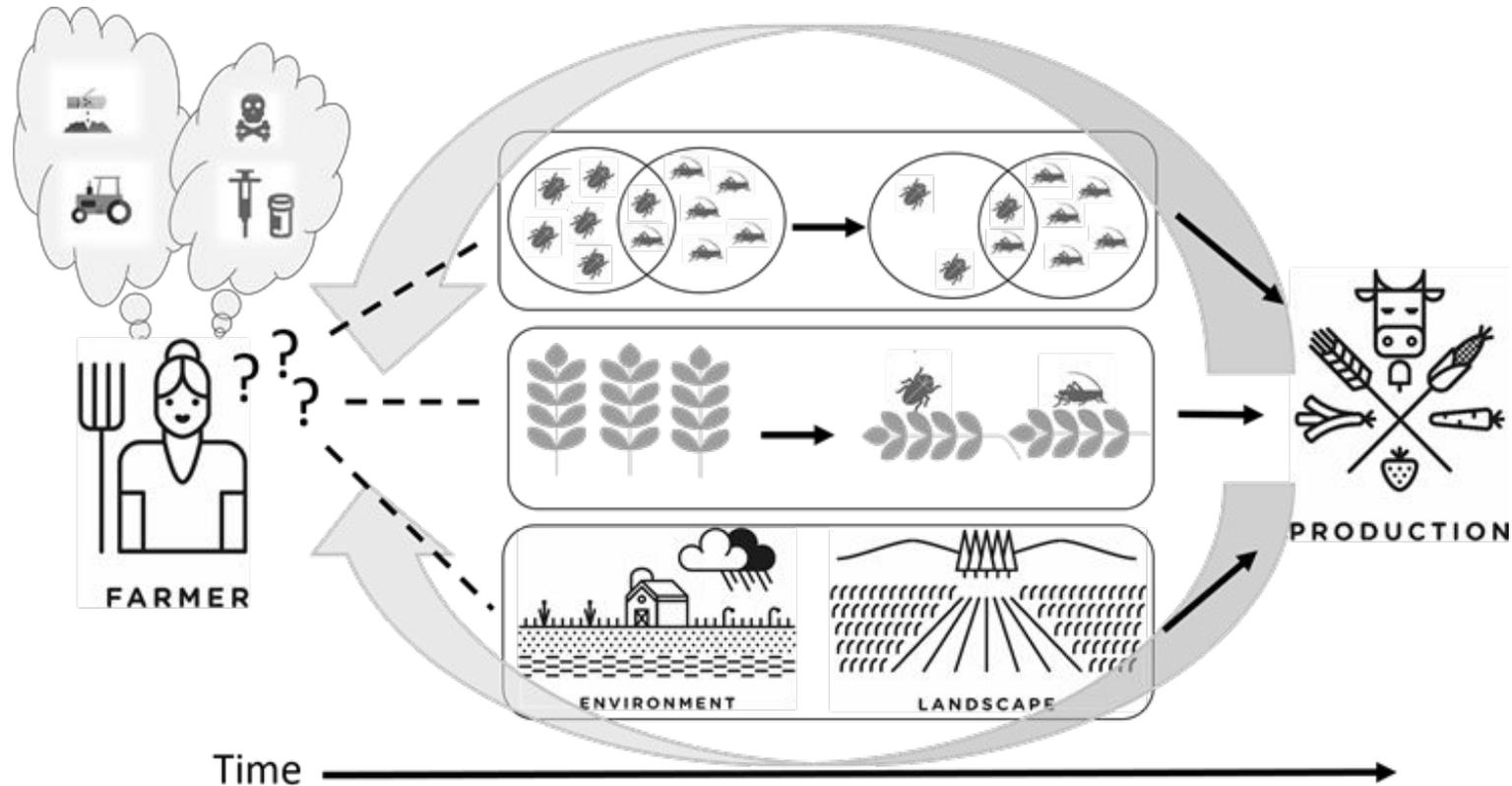
## Key factors for plant protection

- **Pesticide policies & regulations**
  - Market-based
  - Informational
  - Regulations
- **Farmer and consumer actions**
  - Farmer decision-making processes
  - Consumer choices and preferences
- **Plant protection systems**
  - Pesticide admissions and regulations
  - Novel pest management systems
  - Plant breeding strategies
  - Novel technologies



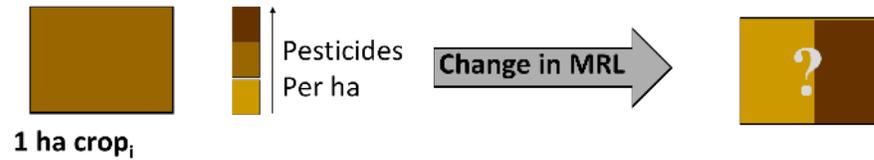
# Farmer decision-making processes

- Complex: needs to account for agronomic, ecological, economic relations and farmer behaviour (e.g., Finger et al., 2024)



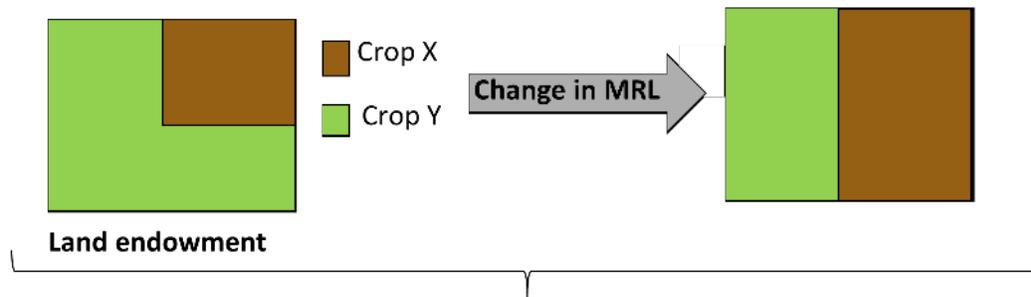
# The role of MRLs

## Competitiveness of crop



- Retailers often set MRL levels and additional rules that are below official levels
- Often no toxicological reasoning
- Important for farmers

## Effect on diversity



- **Farm-level diversification**
- **Input use**
- **Aggregate food production & diversity**

# THANKS FOR YOUR ATTENTION

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