Effective and efficient pest management decisions of farmers

Webinar: Pathways for advancing pesticide policies
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Agenda

- Framing the problem
- Farmers’ decision making process
- Policy instruments for effective and efficient pest management decisions
- Adoption of pesticide-free production systems
Framing the problem

- Farmer behavior is central for effective and efficient pesticide policies.
- Crucial pest management decisions are made by the farmer.
- Recent studies: 20-40% of current pesticide use levels can be attributed to inefficient pest management decisions of farmers (e.g. Lechenet et al., 2017; Jacquet et al., 2011; Nave et al., 2013).
- Understanding farmers’ behavior is crucial for the uptake of policies, new technologies and alternative production systems (Dessart et al., 2019).
Farmer decision-making processes

- Decisions made by farmers in a complex system under strong uncertainty (e.g. Horowitz & Lichtenberg, 1994).

- Deviation from profit maximizing behavior: uncertainty, information, (risk) perception & preferences, farmers’ objectives and habits (e.g. Pedersen et al., 2012, Perry et al., 2019, Möhring et al., 2020a,b).

- Uncertainty may e.g. lead to the use of more toxic pesticides or deviation from effective timing (Möhring et al., 2020a,b)

- Perceptions and risk preferences may, e.g. lead to reduced adoption of technologies/production systems for pesticide reduction.

- Farmer behavior and preferences are heterogeneous (e.g. Pedersen et al., 2012, Iyer et al., 2020).

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Pedersen et al.(2012). Optimising the effect of policy instruments: a study of farmers’ decision rationales and how they match the incentives in Danish pesticide policy. Journal of Environmental Planning and Management, 55(8), 1094-1110.
Policy instruments for effective and efficient pest management decisions

- Heterogeneous behavior and decision rationales of farmers need to be accounted for in policies:
  - **Differentiated** pesticide taxes and subsidies.
    - Account for heterogeneous toxicity of products, heterogeneous preferences and risk premia ((Finger et al., 2017; Möhring et al., 2019).
  - **Targeted** insurance solutions (Norton et al., 2016, Möhring et al., 2020c).
    - Have to consider both, effects on risk and land use decisions to reduce pesticide use.
  - **Independent and reliable** information and extension services.
    - Target uncertainty and lack of information, e.g. information about arrival and severity of pests, new techniques, substitution of pesticides (Rose et al., 2016, Möhring et al., 2020b).

- Heterogeneity of farmers implies that allowing for farmers’ self-selection can reduce complexity and specificity and may increase cost-efficiency of policies.

Adoption of pesticide-free production systems

- Swiss Producer organization IP-SUISSE currently establishing pesticide-free wheat production program.
  - No synthetic pesticides allowed in wheat (but not organic!)
  - Incentives: markup on market price (label) + direct payments
  - Major Swiss retailer Migros: only sells «pesticide-free» bread from 2023 on
  - Goal: large-scale adoption

- PestiFreeWheat Project - ETH (AECP), IP-SUISSE, Migros (JOWA):
  - Goal: Identify determinants, challenges and adoption barriers for the uptake of pesticide-free wheat production in Switzerland
  - Large-scale survey and bio-economic model (Böcker et al., 2019, Möhring & Finger, 2020):
    - Farmers expectations of the program & risk preferences are central for adoption and have to be accounted for.
    - Not only expected yields and production risk- expected environmental benefits central.

Take-home messages

- Pest management decisions are subject to uncertainties, (risk) preferences and expectations.
- Effective and efficient pesticide policies have to account for heterogeneous farmer behavior.
- Adoption of novel, pesticide-free systems is driven by expectations and risks.
- Farmer behavior is central for the reduction of environmental and health risks from pesticide use.
Thank you very much for your attention

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