

The economics of pesticide use (Phd outline)

Niklas Möhring¹, Robert Finger¹

¹Agricultural Economics and Policy Group, ETH Zurich



1 Introduction

- Pesticides are an **important input** for agricultural production.
- But pesticide use has **adverse effects** on the environment and human health.
- A better understanding of **application behavior** will help to:
 - re-assess and newly design pesticide policies^[1]
 - make food production more sustainable



2 Background & Research Topics

- Pesticide applications are highly **heterogeneous** (see Figure 1).
 - Strong subjective component (i.e. through risk attitudes^[2]) in decisions^[3].
 - Non-profit-maximizing pesticide use often observed^[4].
- **Decision making process** has to be better understood.

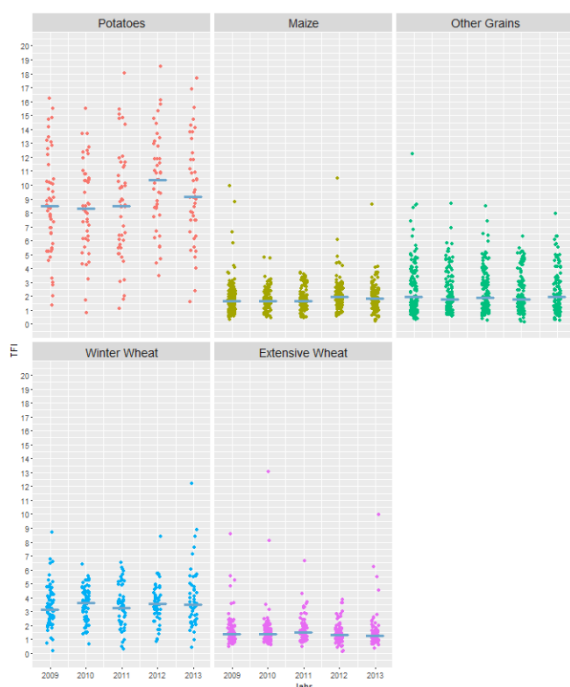


Fig. 1. Distributions of treatment frequency index for pesticide applications of a sample of 300 Swiss farmers from 2009-2013. Aggregated means per year, farmer and culture. Blue line depicts median of distribution.

Research Topics:

- 1) **Patterns in pesticide application** and their determinants.
- 2) **Pesticides in the production process** – linkage to **expectations/ risk perception** and attitudes.
- 3) **Innovative tools to reduce externalities** from pesticide use.



3 Detecting patterns of pesticide use

Analyzing **spatial** (see Figure 2) and **temporal patterns** of pesticide use (with distance/similarity measures^[5], sequence analysis^[6])

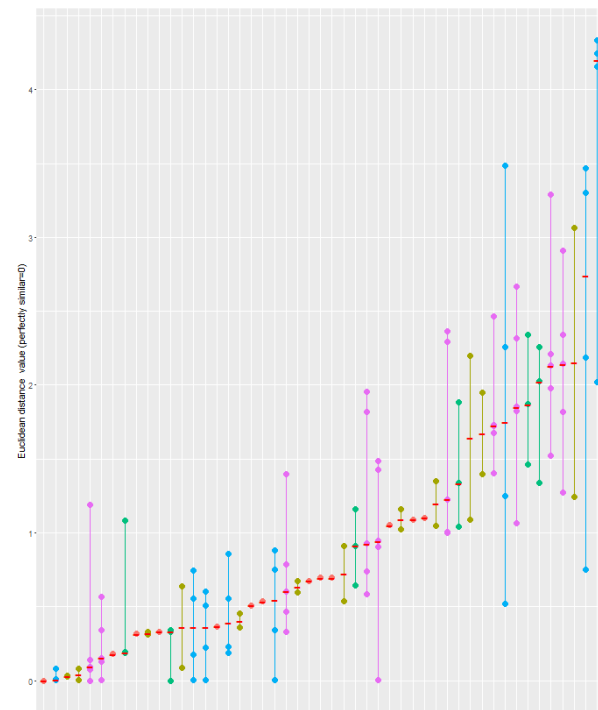


Fig. 2. Dissimilarity (euclidean distance) between pesticide types applied on potato plots per year. Each line indicates a single farmer; the red bar median dissimilarity per farmer (over all years); the points indicate dissimilarity in single years.

- **Identifying groups** of farmers with similar application behavior
- **Revealing socio-economic determinants**
- **Adapting policies**



4 Explaining production decisions

Exploring the role of pesticides for **production levels / risk**:

- The influence of pesticides on income risks.
- The **interlinkage** of pesticides and other inputs (i.e. fertilizer, irrigation).
- The **role of management** (i.e. crop rotation, mechanical/biological pest control, timing).



5 Innovative tools to reduce pesticide use

Developing **innovative tools** and policies to **reduce externalities** from pesticide use:

- Insurance based solutions^[7] (i.e. using Index based insurances)
- Spatially explicit policies^[8] (i.e. using Geo-Information-Systems)
- Incentives for local cooperation (i.e. for rape seed production^[9])

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