



**HAL**  
open science

## Potential of crop mixtures to reduce pesticide use in France. A data analysis

Elodie Yan, Marco Carozzi, Nicolas Munier-Jolain, Philippe Martin

### ► To cite this version:

Elodie Yan, Marco Carozzi, Nicolas Munier-Jolain, Philippe Martin. Potential of crop mixtures to reduce pesticide use in France. A data analysis. XVII. Congress of the European Society for Agronomy, Aug 2022, Potsdam, Germany. 2022. hal-03927116

**HAL Id: hal-03927116**

**<https://hal.inrae.fr/hal-03927116v1>**

Submitted on 9 Nov 2023

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# Potential of crop mixtures to reduce pesticide use in France. A data analysis.

Elodie Yan<sup>1</sup>, Marco Carozzi<sup>1</sup>, Nicolas Munier-Jolain<sup>2</sup>, Philippe Martin<sup>1</sup>

<sup>1</sup> Université Paris-Saclay, INRAE, AgroParisTech, UMR SADAPT, F-91120, Palaiseau, France. Contact : [elodie.yan@inrae.fr](mailto:elodie.yan@inrae.fr)

<sup>2</sup> Université Bourgogne-Franche-Comté, INRAE, Institut Agro Dijon, UMR Agroécologie, F-21000, Dijon, France

**Context** Agriculture specialisation and the massive use of pesticides on arable crops in France are major concerns. Systemic changes are needed to move towards pesticide-free agriculture.

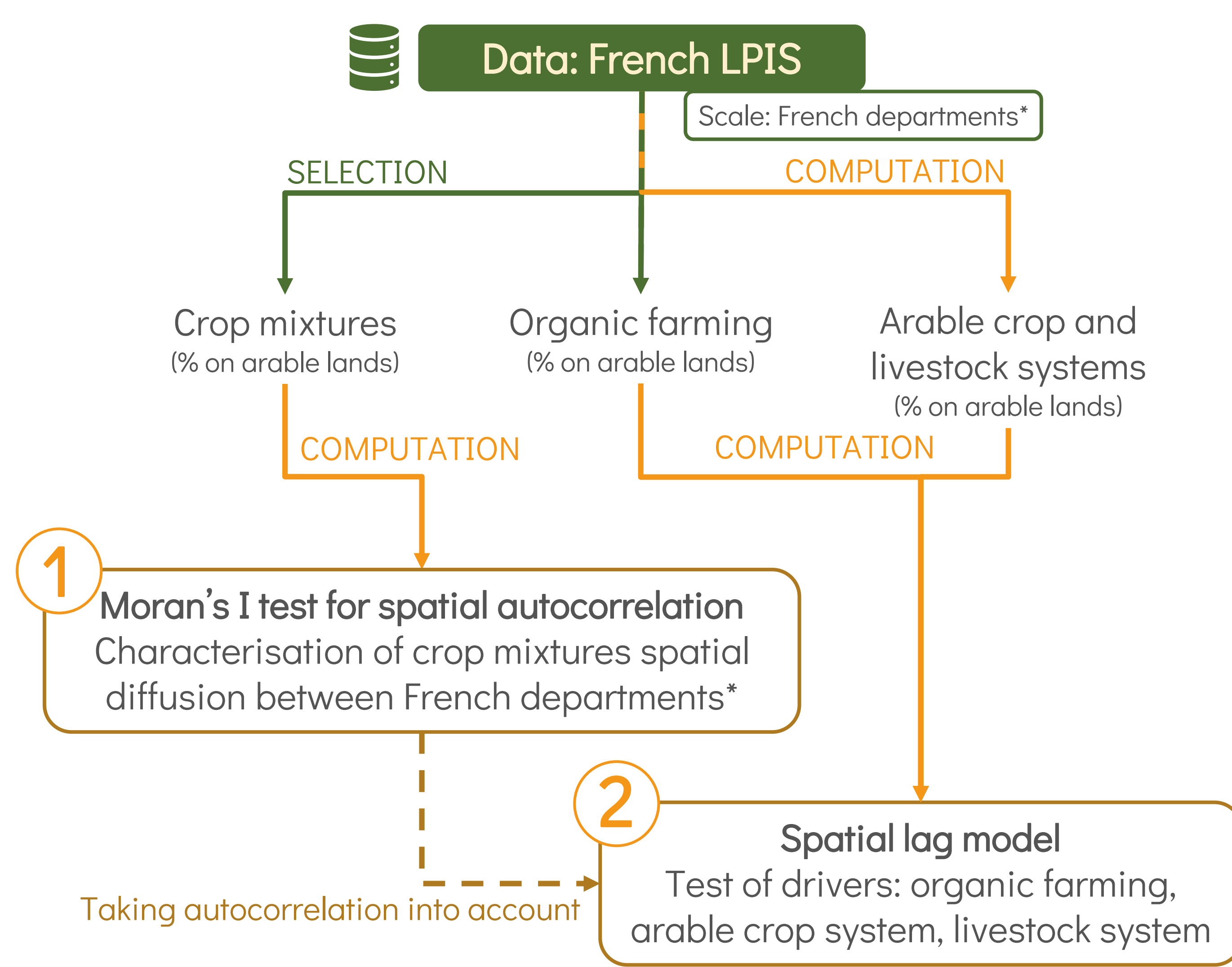
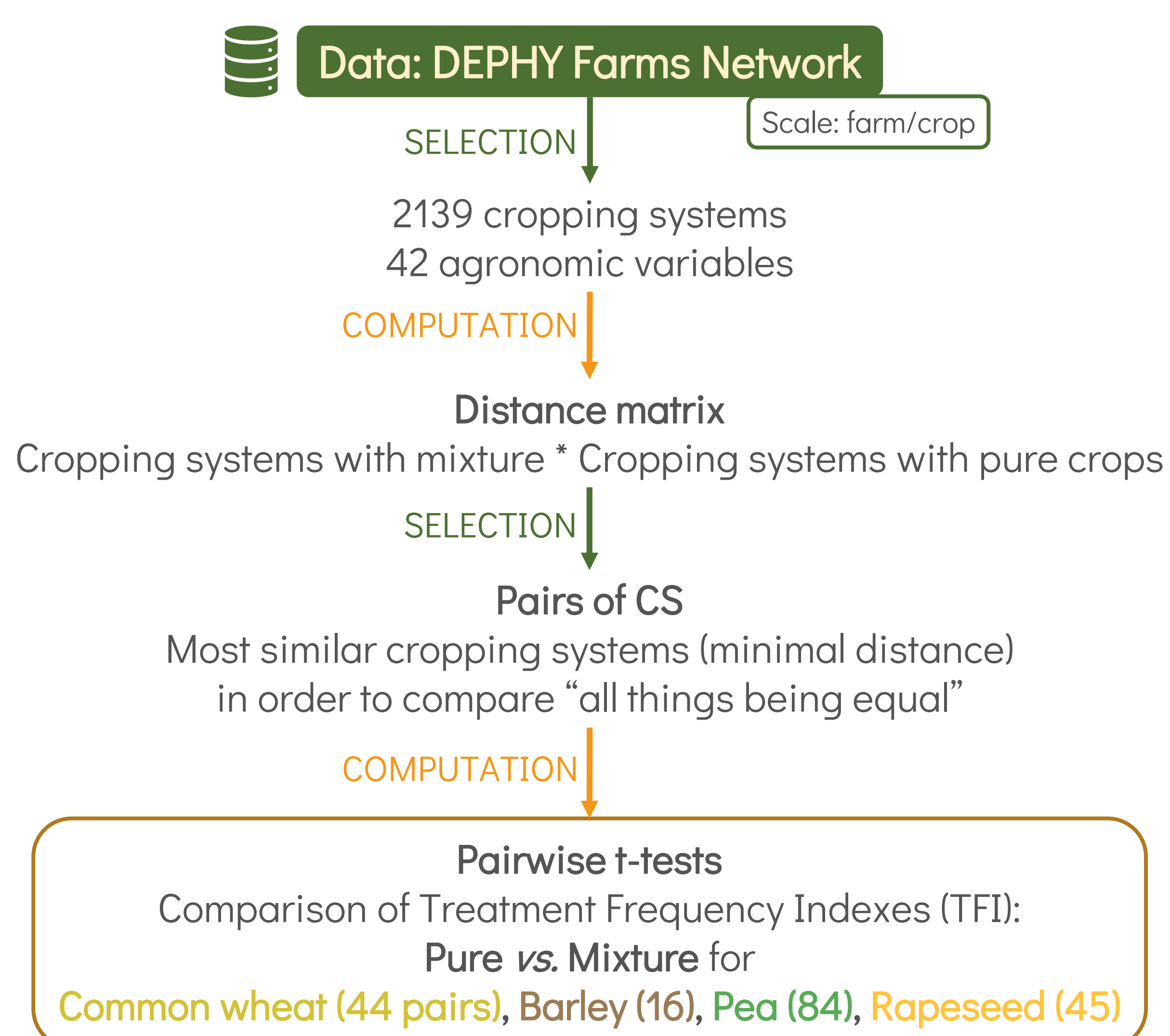
**Hypothesis** Crop diversification through crop mixtures effectively reduces pesticide use in arable crops. Growing crop mixtures in arable crop systems is currently more challenging than in livestock systems.

- Aims**
- Assessing the reduction of pesticides enabled by crop mixtures in France
  - Identifying the spatial and temporal dynamics of crop mixtures and associated drivers

## Material & Methods: 2 databases

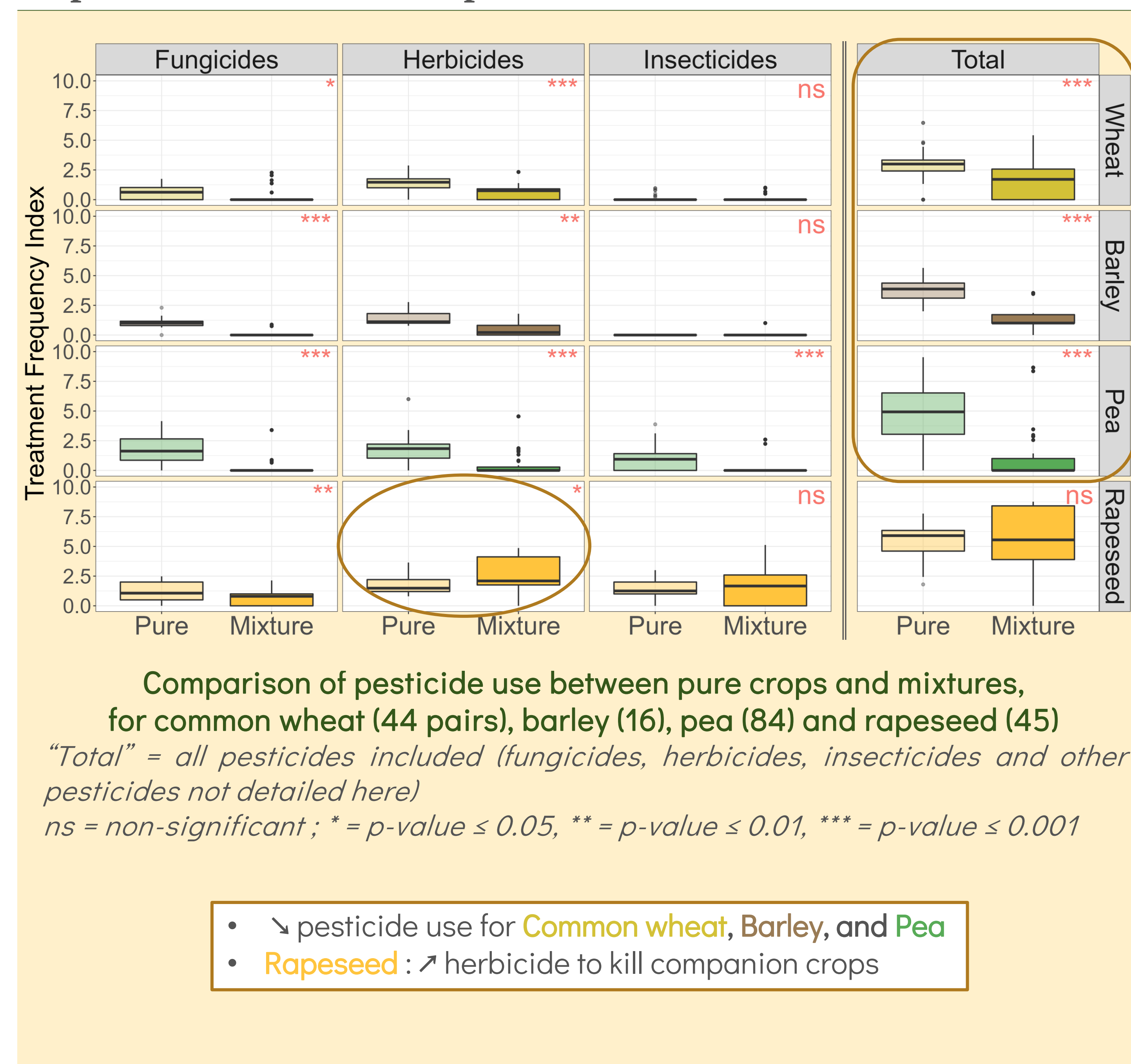
**DEPHY: 3000 farmers voluntarily committed to reducing their use of pesticides**  
**Treatment Frequency Index (TFI) as a proxy for pesticide use** (Lechenet et al., 2017)

**French Land Parcel Identification System (LPIS): geographic information system for agricultural parcel identification** (Levavasseur et al., 2016)

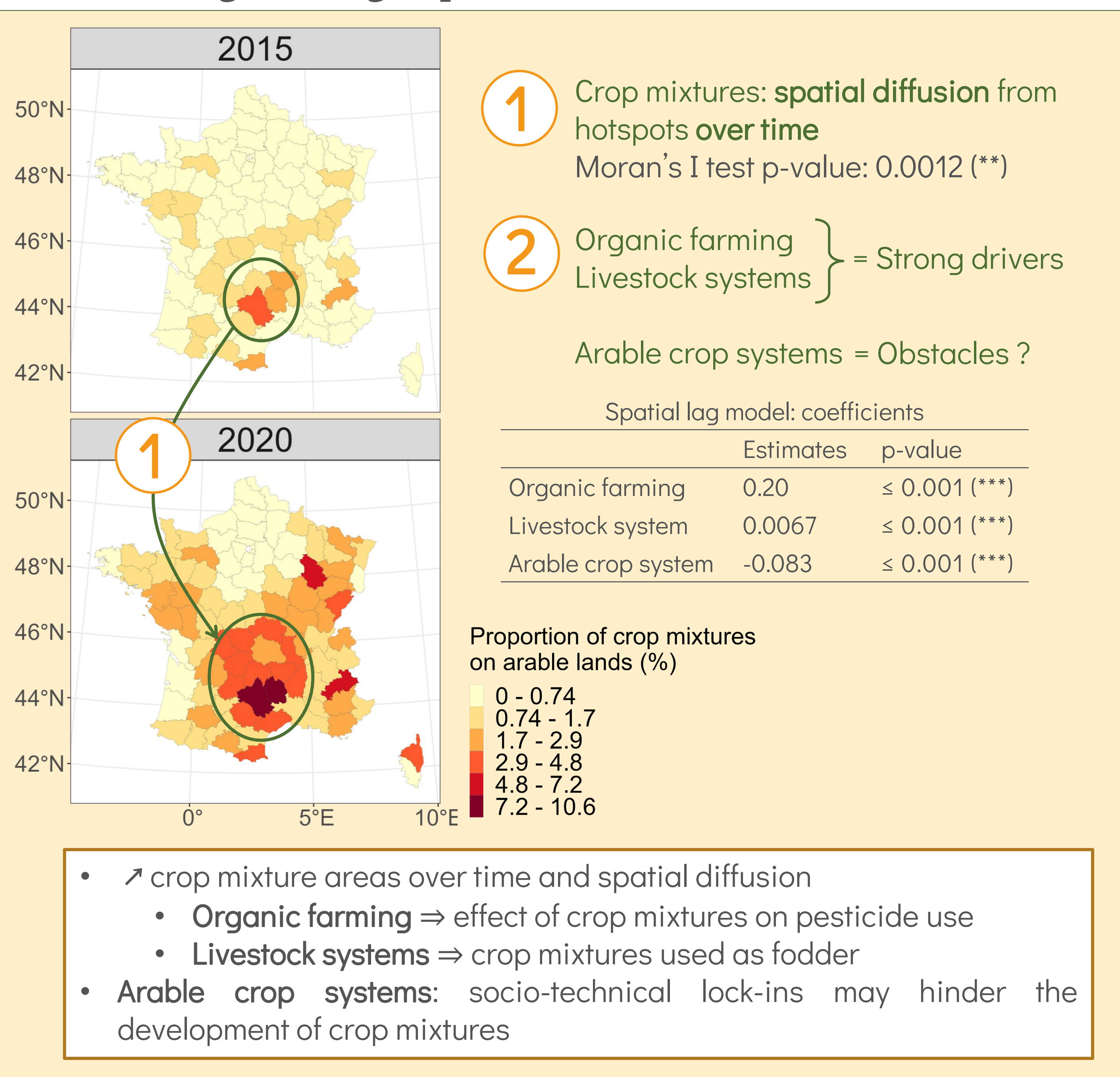


## Results

Crop mixtures: a lever to reduce pesticide use...



... and diffusing according to specific drivers



## Conclusion

- DEPHY analysis showed that **crop mixtures are promising levers to reduce pesticide use in arable crops**. However, it is necessary to carefully **choose which crops to grow**; e.g. for rapeseed, companion crops may no longer be fully frost-shattered in some regions under climate change.
- LPIS analysis showed that **crop mixtures and organic farming are strongly linked**, confirming crop mixtures' ability to reduce pesticide use.
- Our analysis pointed out that it is currently **easier to grow mixtures in livestock systems than in arable crop systems**, as mixtures are used to feed animals (e.g. pea-based mixtures).

## Perspectives

We will now further investigate the actual benefits of crop mixtures for farmers to better understand how to promote them.