

ABIM

24 October 2023

Basel

# ➤ Pesticide-free European Agriculture in 2050

Three narrative scenarios.

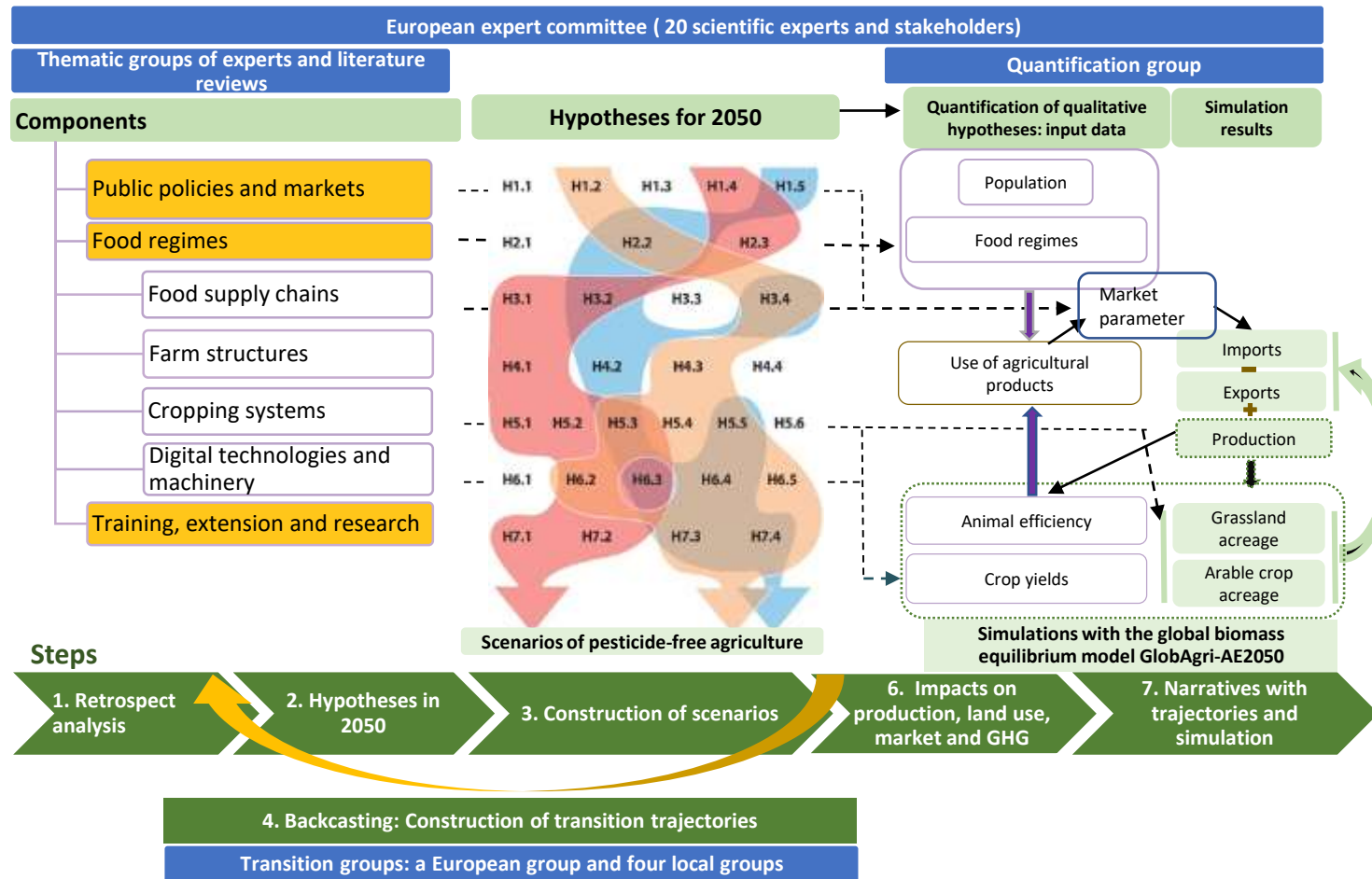


## > Context

- Crop protection is compulsory
- Pesticides are a critical issue for agriculture, society and environment
  - A pillar of most present agricultural systems
  - Three cognitive biases
    - Pesticides will always be there: NO
      - Loss of molecules, loss of efficiency, nothing new in the pipeline
    - Pesticides are an input: NO
    - We look for alternatives: NO
- French Priority Research Program 'Growing and Protecting Differently' coordinated by Inrae
  - 10 large research projects targeting a Zero-pesticide objective. Forcing academic research to explore new areas (microbiota, odorscapes,...)
  - A foresight study 'Pesticide-free European agriculture in 2050'
    - Including four case studies « supply chains x territories » provided by the European Research Alliance (gathering 37 research organisations from 21 European countries)



# ➤ A foresight method combining scenario construction, backcasting approach and impact modelling

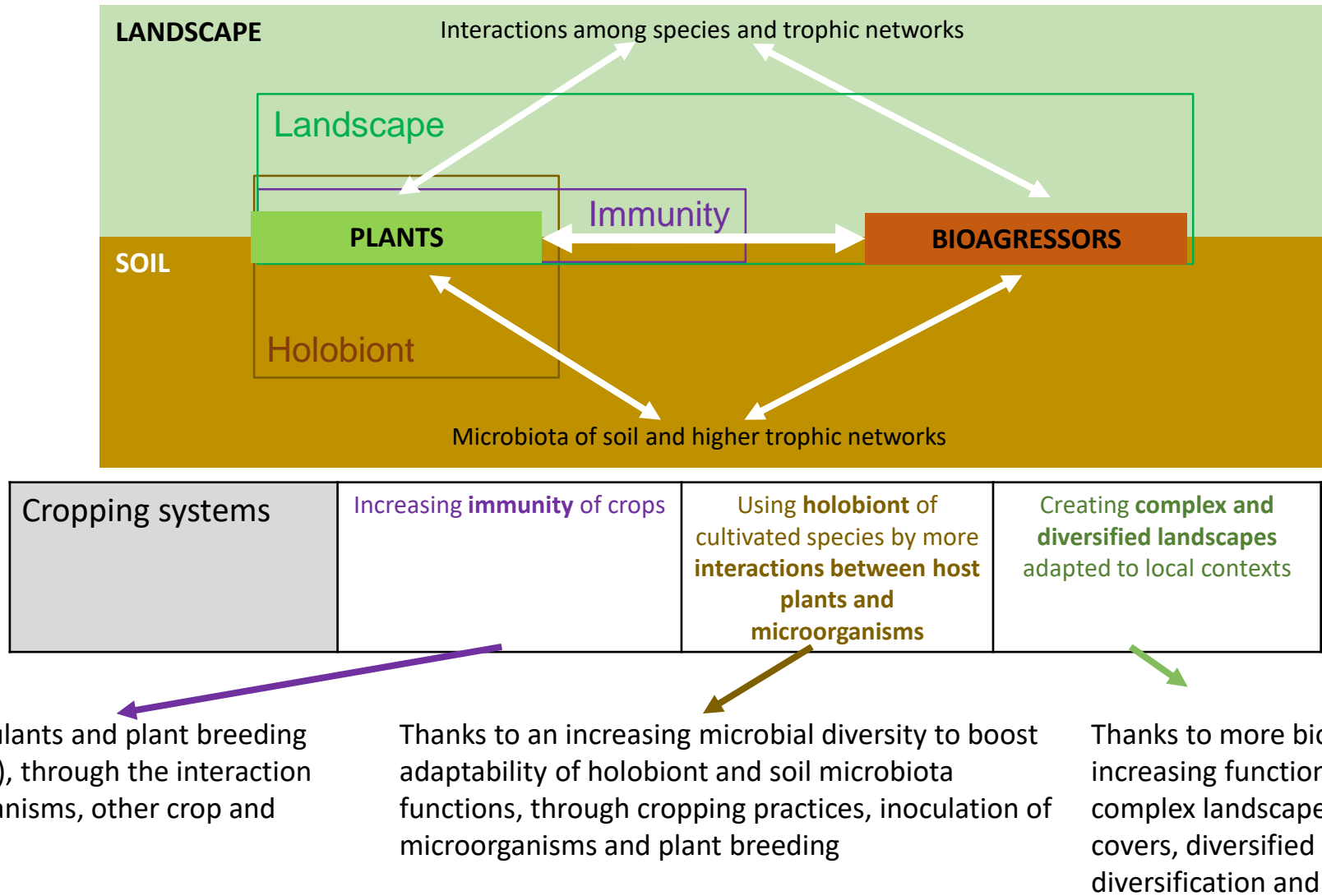


## Foresight results:

- Three scenarios and their transition trajectory
- Quantified impacts of scenarios
- Four case studies on four European regions



# ➤ Hypotheses for pesticide-free crop protection in 2050



➤ Scenario 1 (S1) : World and European food chains based on digital technologies and plant immunity for a food market without pesticides

Food supply chains	Supplying pesticide-free foods as a sanitary security standard	Supplying safe foods for safe diets with lower animal products	Supplying foods preserving human and environment health (much lower proportion of animal products) and providing diversified landscapes
Farm structures	Specialization and financiarisation of farms with residual family farms	Local diversity of farm structures	Site-dependent and diversification of farm structures
Cropping systems	Reinforcing immunity defences of crops	Using holobiont of cultivated species with more interactions between host plants and microorganisms	Conceiving complex and diversified landscapes adapted to local conditions
Digital technologies and machinery	Autonomous robots acting on each plant	Sharing equipments sensors and data)	Modula equipments adapted to practice peculiarities

➤ Scenario 2 (S2) : European food chains based on plant holobionts, soil and food microbiota, for healthy food and diets

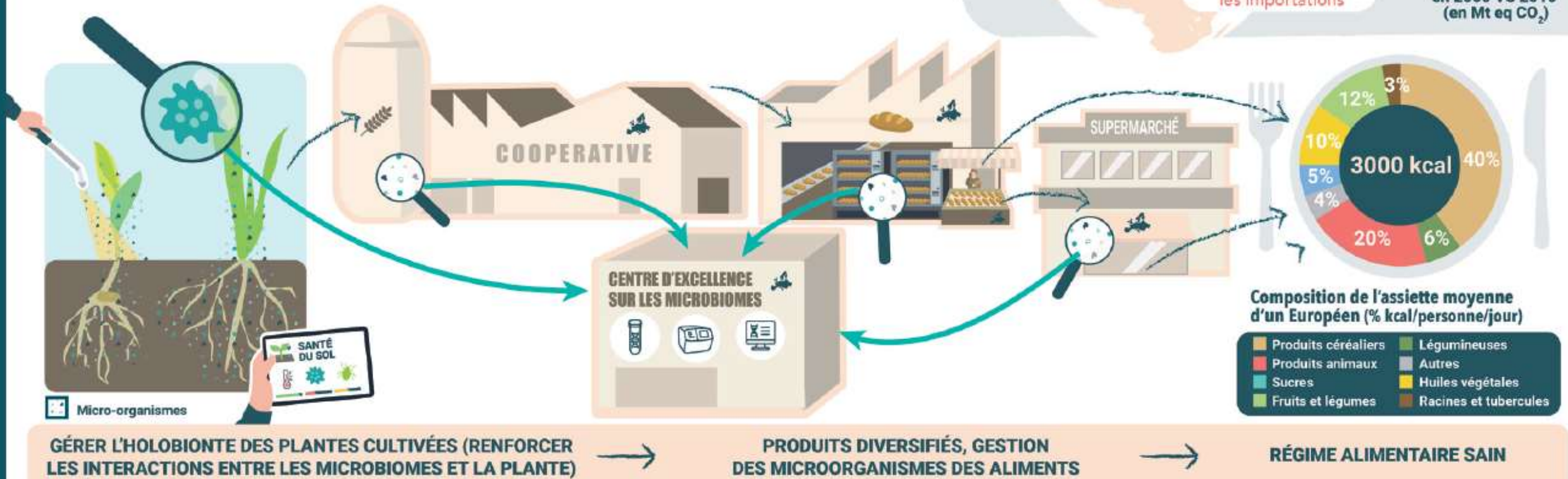
➤ Scenario 3 (S3) : Complex and diversified landscapes and local food chains for a One Health European food system

# Quantification of impacts of scenarios

2050

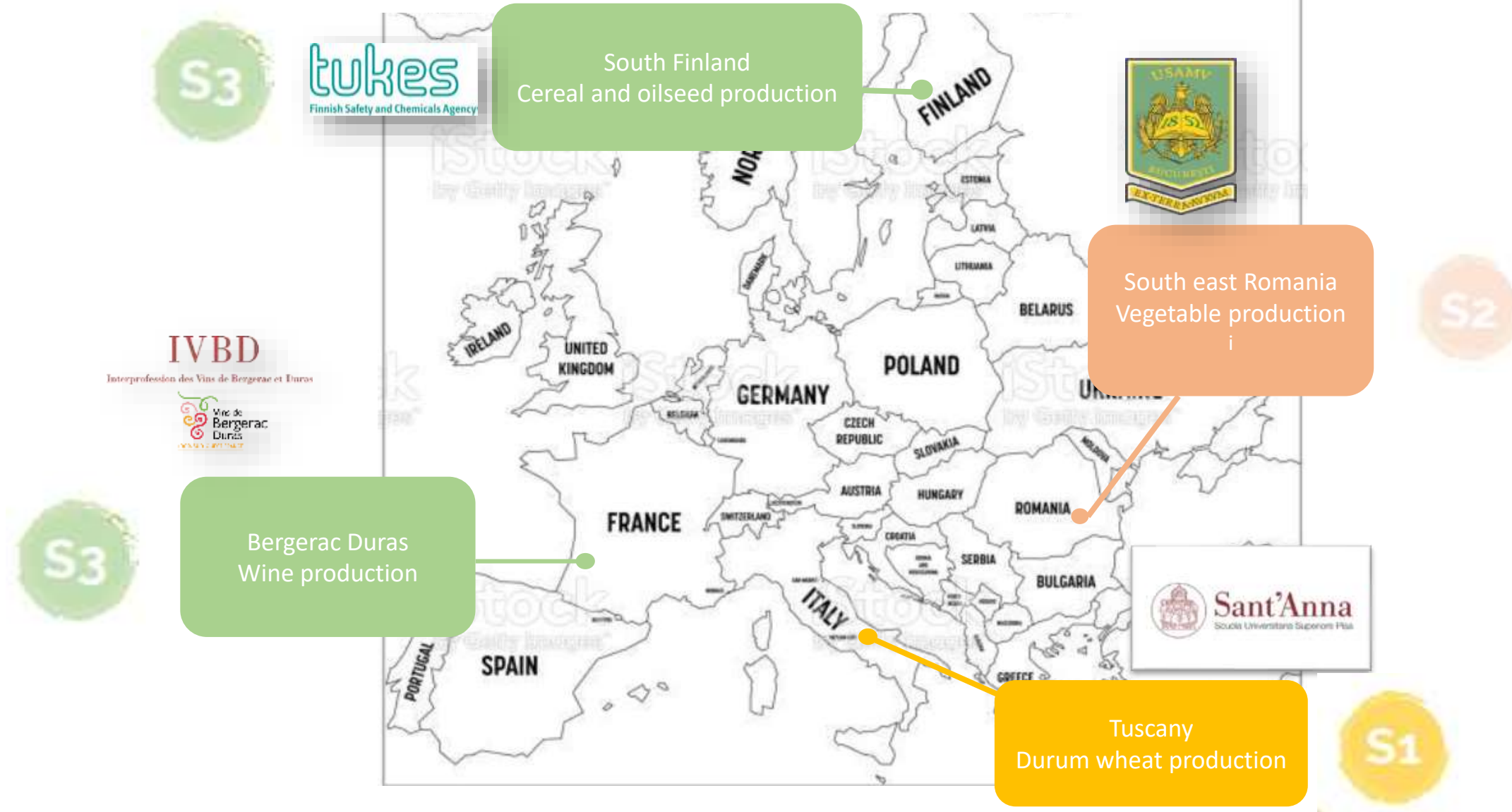
## SCÉNARIO 2

### microbiomes sains



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# ➤ Overview of the four case studies





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PLANT SCIENCES



Sant'Anna  
Scuola Universitaria Superiore Pisa

INRAE



@GoAgroecology

➤ Building transition pathways  
towards chemical pesticide-free agriculture  
in 2050

TUSCANY – DURUM WHEAT

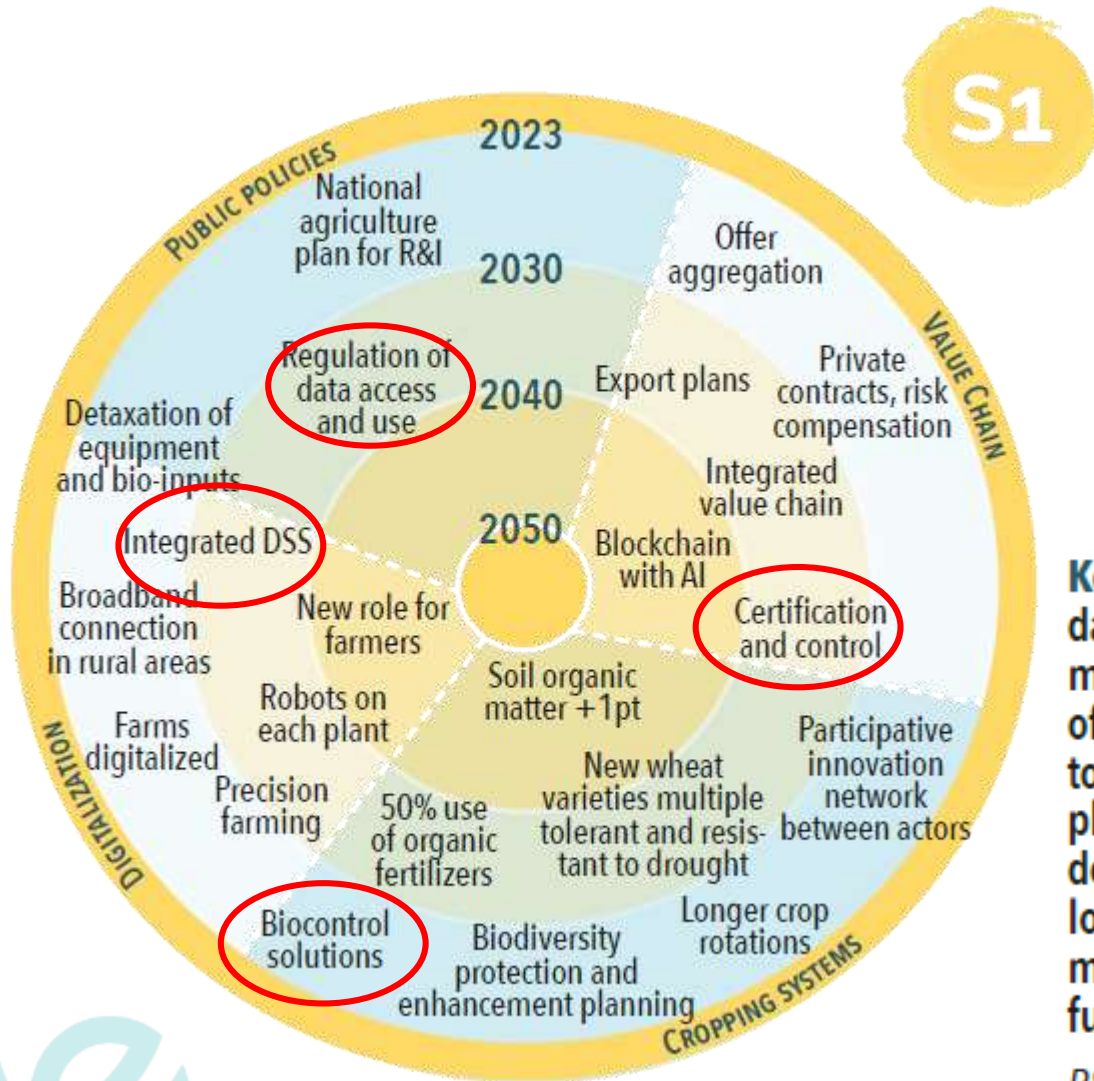
Stefano.Carlesi@santannapisa.it

Giovanni.Pecchioni

@santannapisa.it



# TUSCANY – DURUM WHEAT 2050



## 2050 scenario for durum wheat production in Tuscany (Italy)

Durum wheat is produced without chemical pesticides, in **compliance with market standard**, and Tuscan pesticide-free wheat and pasta products are exported worldwide. Production occurs in **large and specialised farms in Tuscan plains**, equipped with cutting-edge technologies, allowing farmers to work at **very large scale with little labour force** and with a high working speed. The use of precision farming is spread and almost all the equipment used for the main operations, from sowing to mechanical weeding until harvesting, are satellite-guided.

**Key transition steps :** Global food companies and retailers set production standards including on the use of chemical pesticides, and contract with Tuscan farmers for risk compensation. Farmers gather into big cooperatives where products offer is aggregated. They are certified against the private standards, and get access to participative innovation network and technical support. A national agriculture plan funds research and innovation into breeding, digital technologies, and their de-taxation, to facilitate farmers' investments. Farmers mobilize these new technologies of precision farming to reduce progressively the use of pesticides. They also manage soil health to increase its organic matter. The durum wheat chain becomes fully integrated and exports on international markets.

*R&I : research and innovation ; DSS : Decision Support System ; AI : Artificial Intelligence*

## ➤ Conclusions

- Pesticide-free agriculture is a possible long-term target, compatible with other Green Deal objectives
- Many achievements already available and more challenging research to be done on crop protection. **BIOCONTROL** has a **huge potential** and the whole cropping systems and agricultural landscapes have to be tuned to exploit this potential.
- High-throughput screening and testing required to offer more options and disruptive innovations (unlocking!)
- Upstream and downstream part of the supply chains must change in a coordinated way.
- Transition pathways have to be defined with local holders and must combine several domains. Farmer's mindset and social representations
- Stable and committed public policies are critical (SUR, CAP)



# ➤ Pesticide-free European Agriculture in 2050

Thank you for your attention!