

The BCPC Congress

7-8 November 2023, Harrogate, UK

Potential for reducing pesticide use lessons from networks of demo farms

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- **A strong societal and political pressure to reduce pesticide use in Europe**

European Green Deal, Farm-to-fork strategy >> target : -50% by 2030



- **Some pioneer farmers do use less pesticides than neighbouring farms**

implementing a holistic vision of Integrated Pest Management (IPM), *based on combinations of non-chemical approaches, including a stronger use of ecology-based processes, more diversity and more biodiversity, eventually combined with innovative technologies (robotics, precision agriculture, Decision Support Systems, biocontrol).*

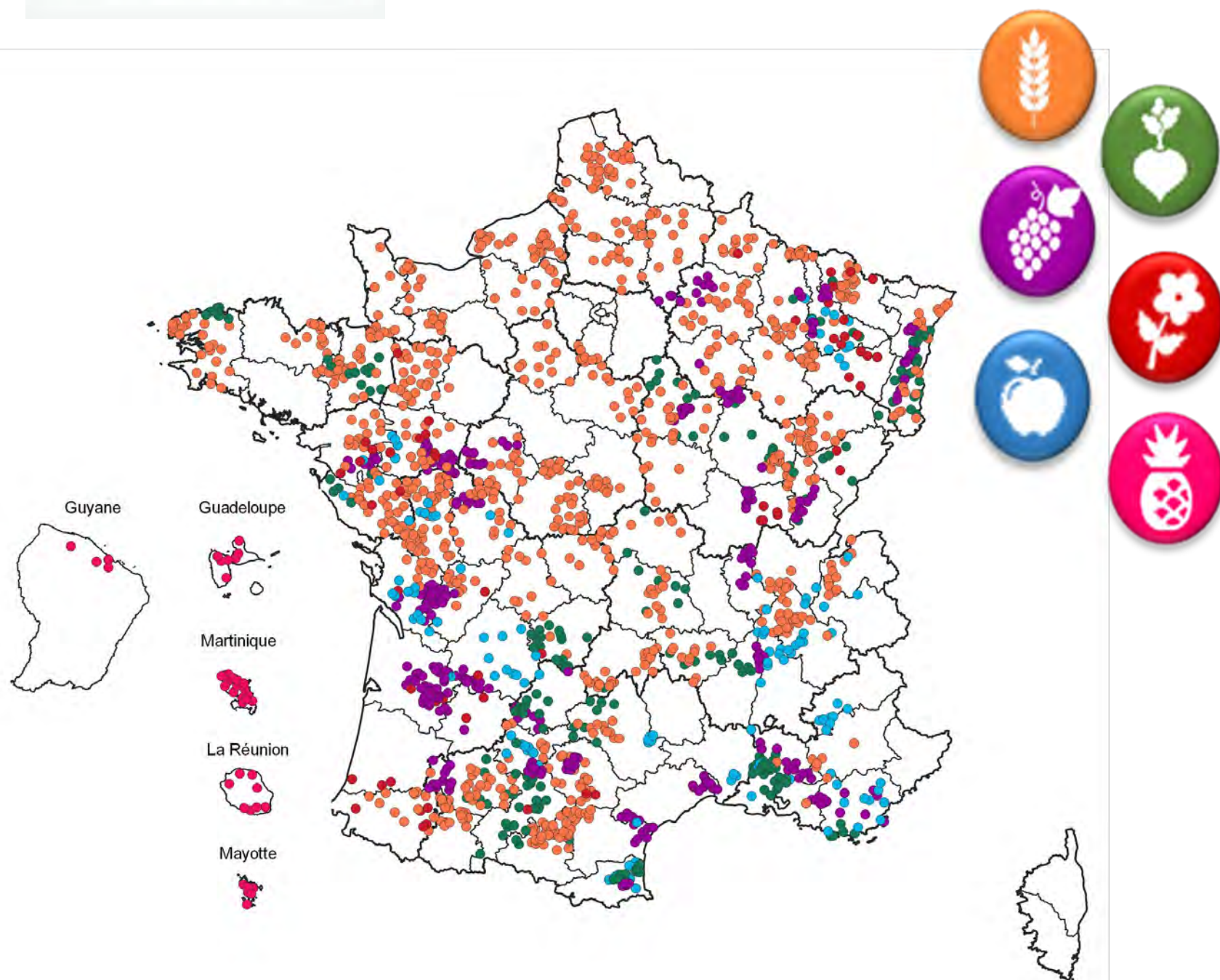


**Main objective : demonstrate with those pioneer farmers...
...that IPM indeed works**

*reduces the reliance on pesticides
while boosting economic profitability at the farm level*



In France : the DEPHY network of demo farms









Launched in 2010

- **Up to 3.000 volunteer farmers**
6 agricultural sectors *arable crops, vineyards, orchards, vegetables, ornamentals, tropical crops*
- **Large agricultural partnership**
chambers of agriculture, farming organizations, academic & applied research...
- **Explicit objective: decrease pesticide use**
- **Explicit approach: cropping system re-design >>**
holistic view of IPM
“find my own solutions adapted to my specific context!”
... through individual and collective support, promoting peer-to-peer knowledge exchange
- A shared information system to collect data



Evolution of the Treatment Frequency Index from initial practices to 2018-2020

	TFI
 Arable Crops : -26%	2,6 → 1,9
 Vegetables : -33%	3,5 → 2,3
 Ornamentals : -38%	6 → 3,7
 Tropical Crops : -18%	4,7 → 3,8
 Viticulture : -24%	10,4 → 7,9
 Orchards : -35%	15,3 → 10

“These averages hide a wide variability across farms!”

A unique database for producing knowledge on IPM systems

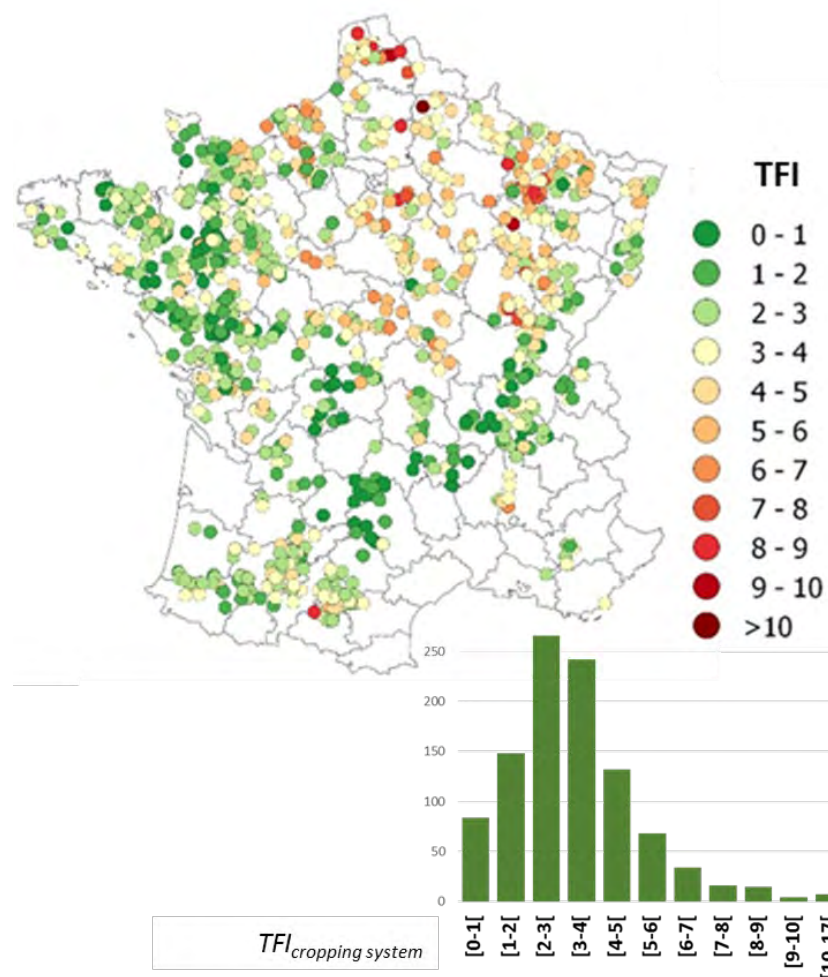


PhD Martin Lechenet, 2017



Sector : Arable Field Crops

1. What are the technical strategies *of farmers using little amounts of pesticides ?*
2. Low TFI = low productivity? Low profitability? *Cost-efficiency of IPM*
3. Scenario of general adoption of IPM-based systems at the country level – *what consequences?*



TFI : Treatment Frequency Index

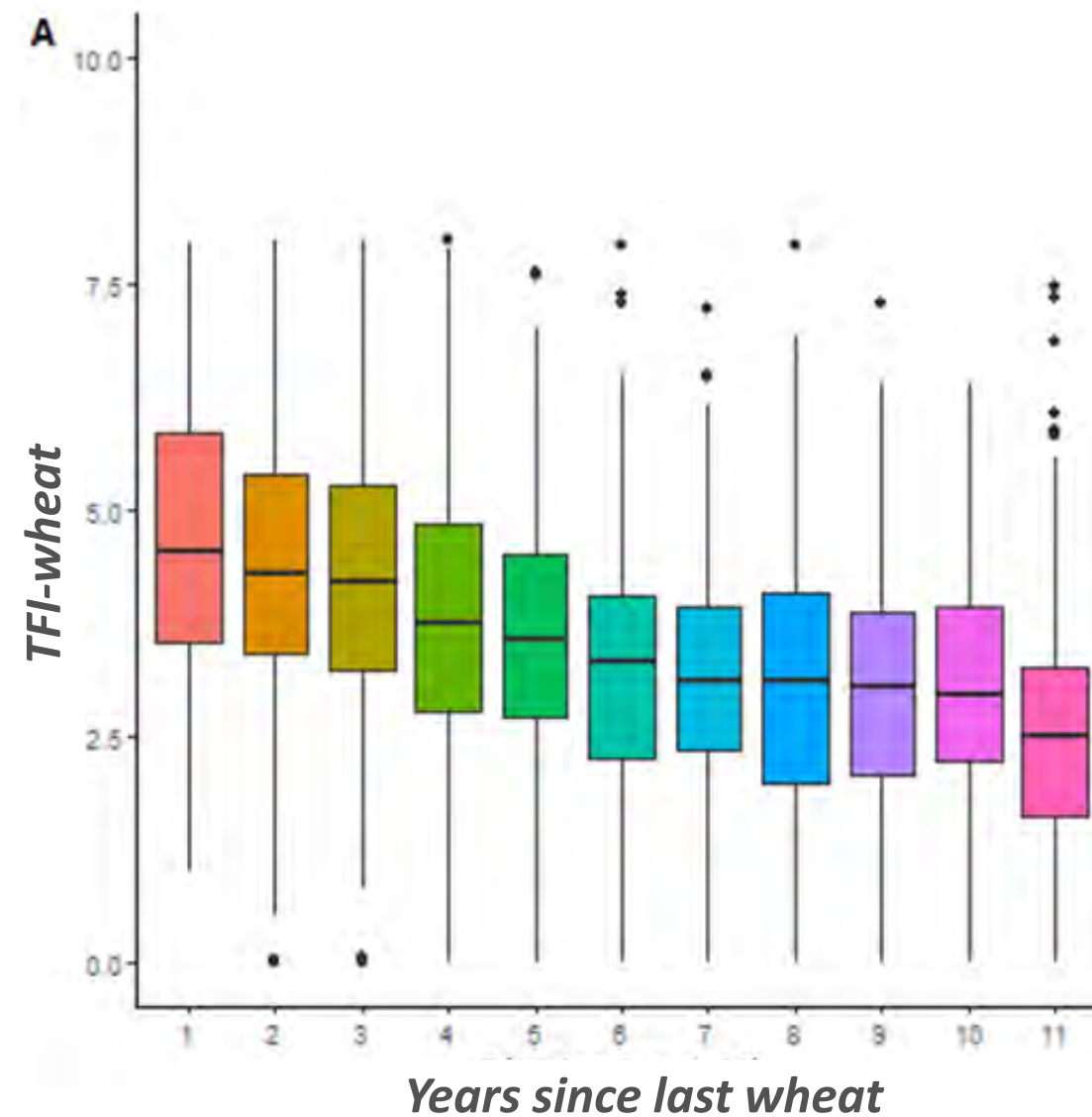
1 Profiles with low TFI always combine several management measures

- ✓ Temporary grasslands
- ✓ Crop diversification : rustic crops, sowing seasons
- ✓ Cultivar diversification, disease resistant cultivars
- ✓ Cereal delayed sowing dates
- ✓ Reduced doses
- ✓ Soil tillage – alternating ploughing
- ✓ Moderate fertilisation

Lechenet et al., *Agricultural Systems* 2016

1. What are the technical strategies *of farmers using little amounts of pesticides ?*

Effects of crop diversification



Guinet et al., unpublished

A unique database for producing knowledge on IPM systems



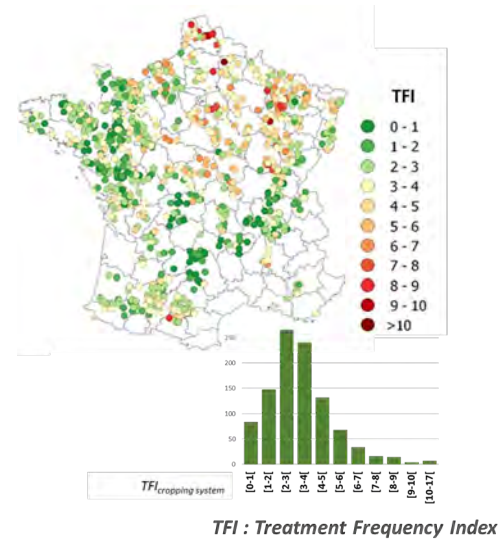
PhD Martin Lechenet, 2017



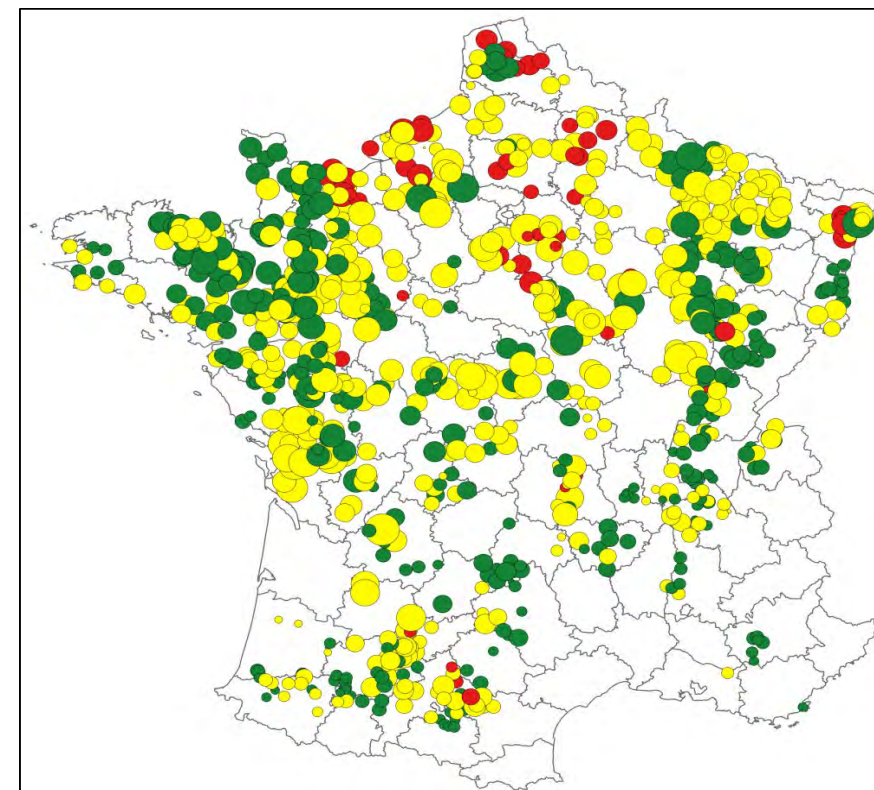
Sector : Arable Field Crops

2. Low TFI = low productivity? Low profitability? *Cost-efficiency of IPM*

2 *Correlation between pesticide use and performances* scale = Cropping System

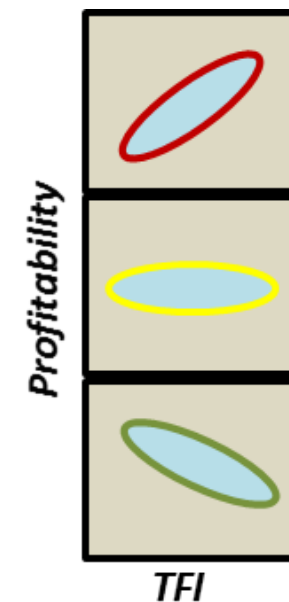
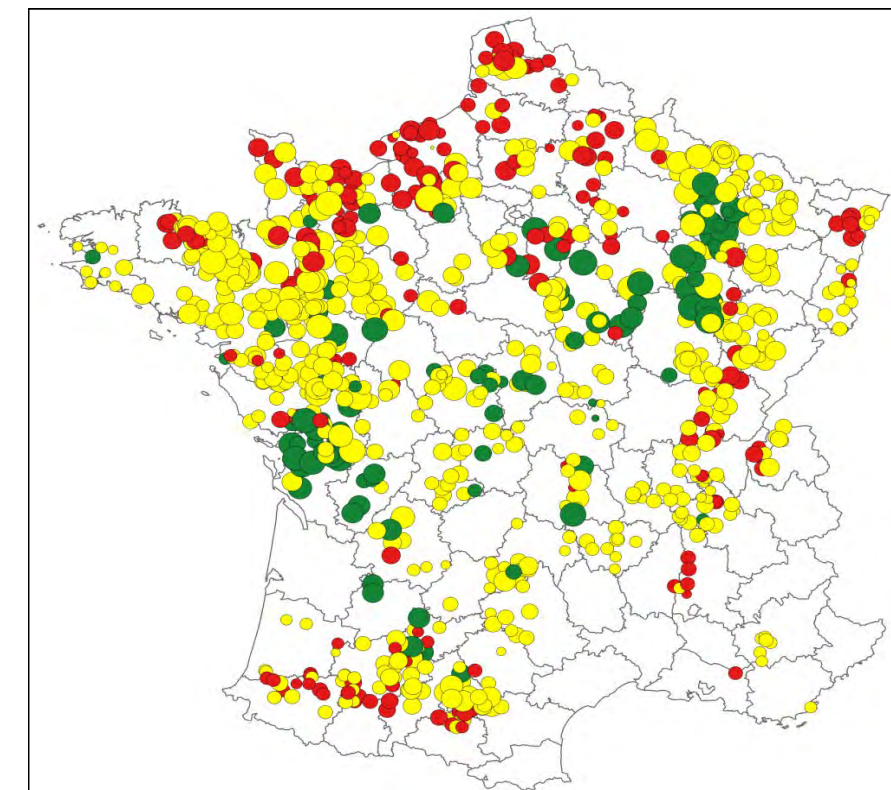


productivity



- Positive slope : antagonism
- Nil slope : no antagonism
- Negative slope : no antagonism

profitability



Lechenet et al., Nature Plants 2017

A unique database for producing knowledge on IPM systems



PhD Martin Lechenet, 2017



Sector : Arable Field Crops

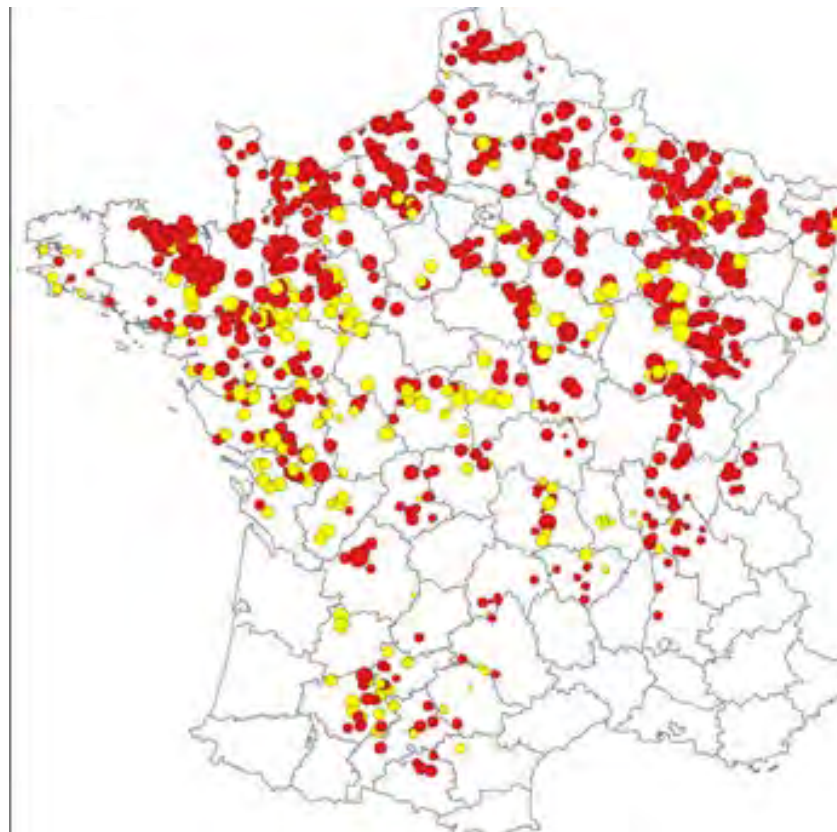
Correlation between pesticide use and performances scale = Wheat crop



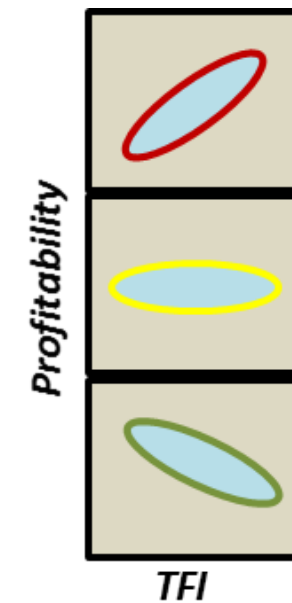
“Scale matters !”



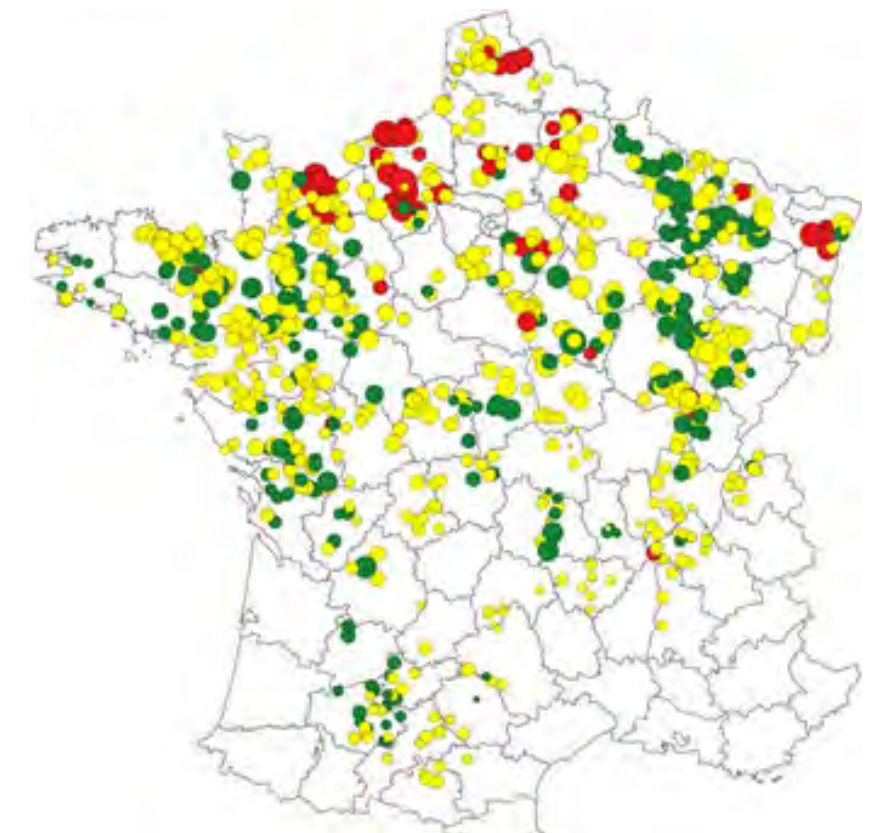
productivity



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profitability



A unique database for producing knowledge on IPM systems

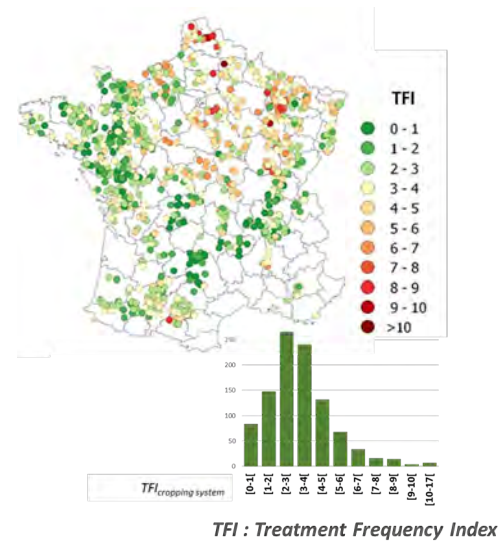


PhD Martin Lechenet, 2017



Sector : Arable Field Crops

3. Scenario of general adoption of IPM-based systems at the country level – *what consequences?*

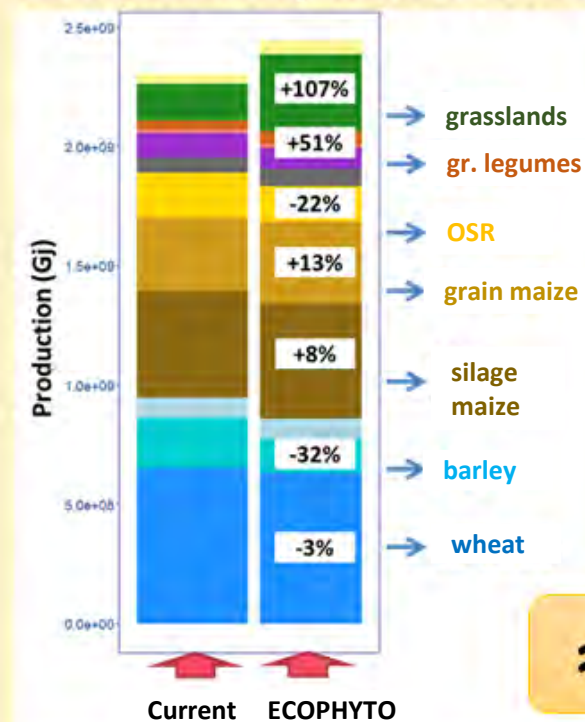


3

Pesticide use

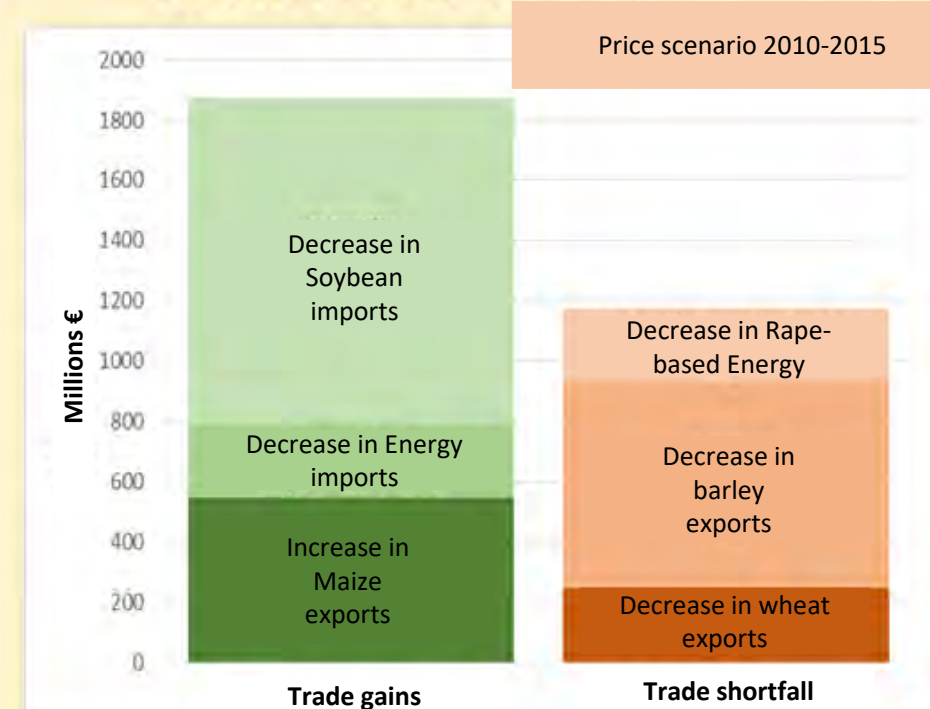
≈ - 40 %

Productivity of French agriculture



≈ + 6%

French trade balance



A unique database for producing knowledge on IPM systems

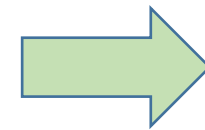
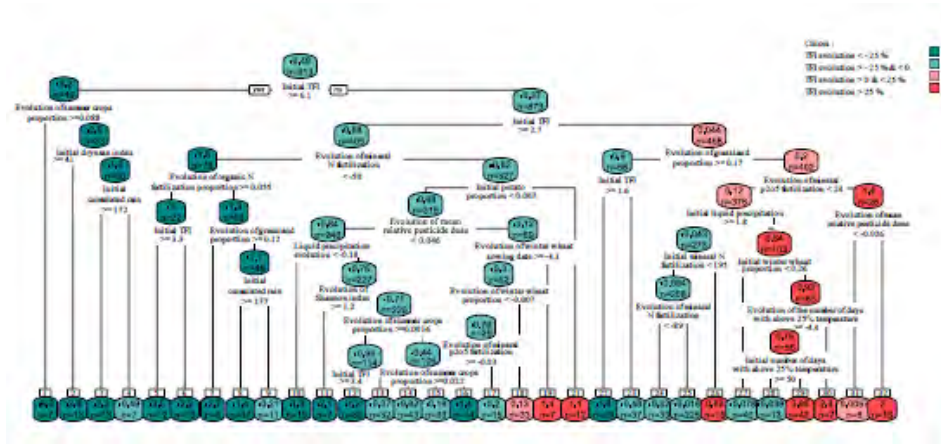


PhD Romain Nandillon, in progress

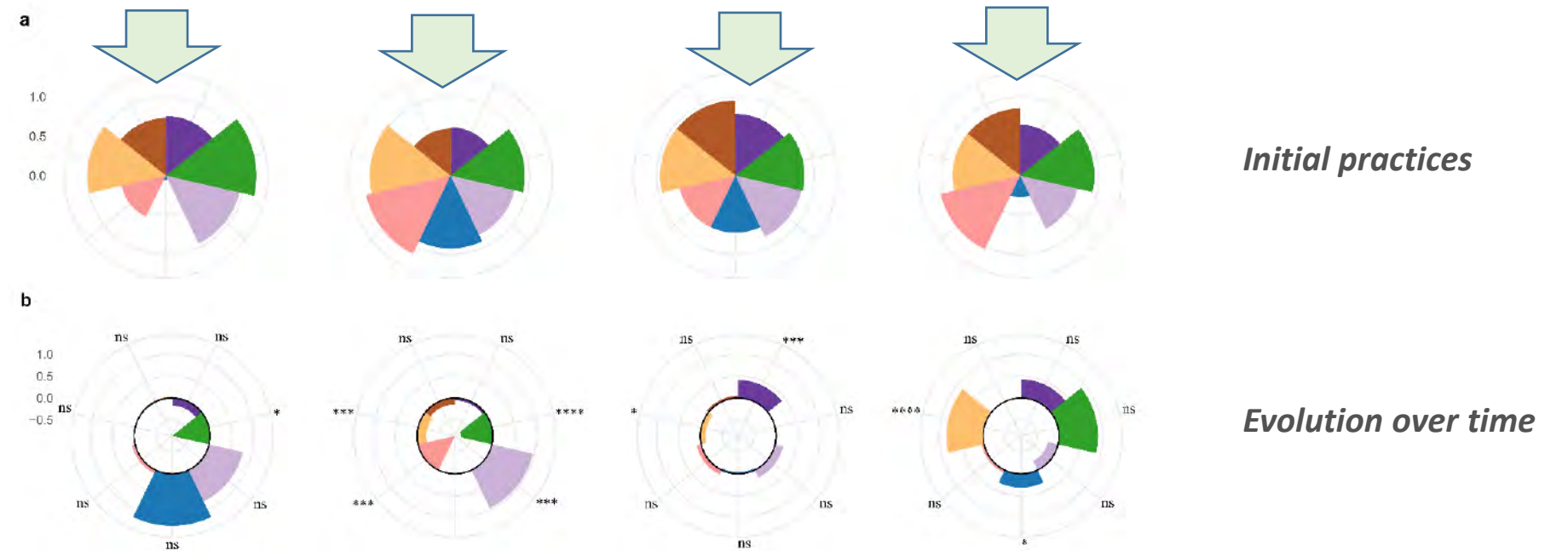


Evolution of practices along time (≈ 10 years)

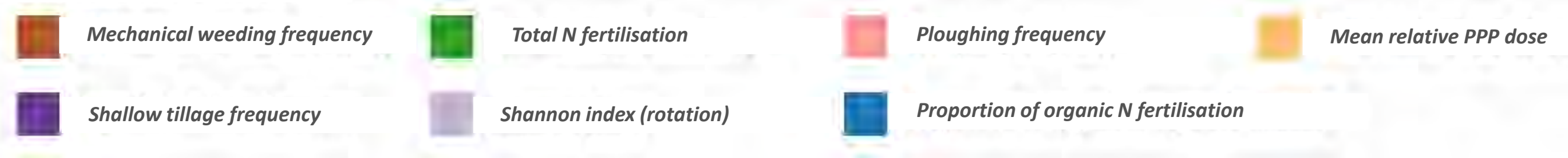
Sector : Arable Field Crops



Cluster number	1	21	26	31
Number of farms	7	29	40	18
Average initial TFI	9.65	2.14	1.66	1.72
Average TFI evolution	-6.52 ($P \leq 0.05$)	-1.43 ($P \leq 0.0001$)	-0.08 ^{ns}	1.99 ($P \leq 0.0001$)



Management practices



A unique database for producing knowledge on IPM systems

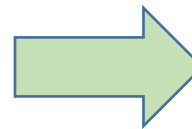
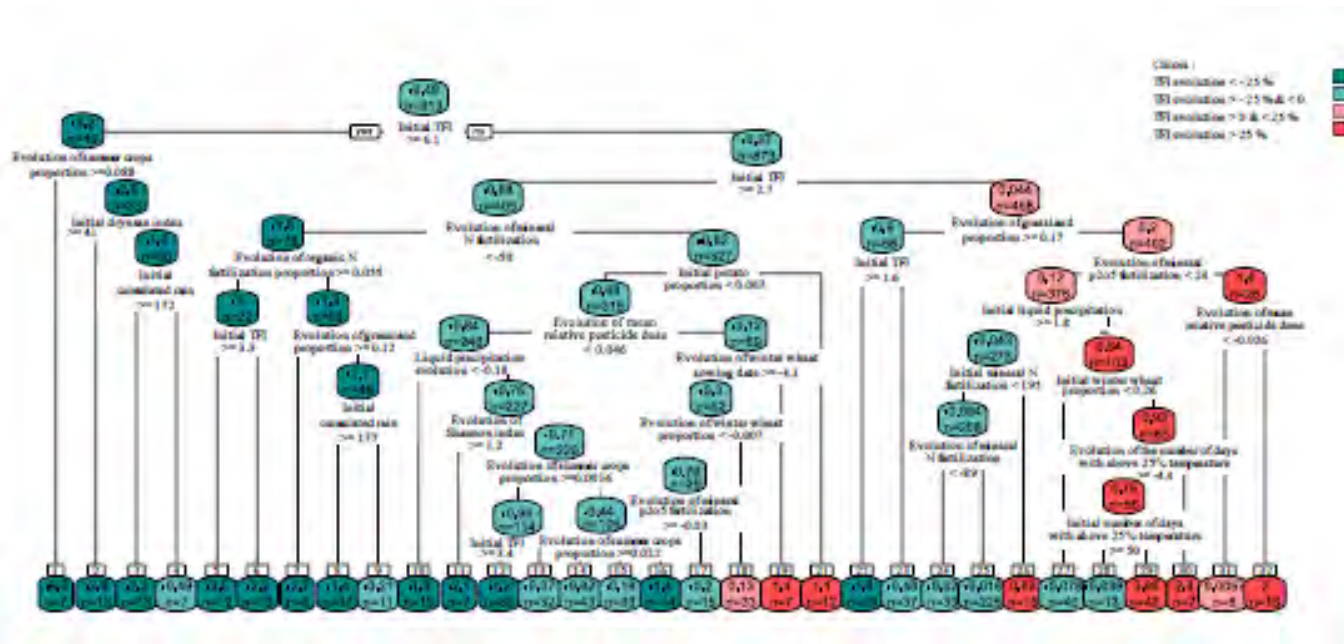


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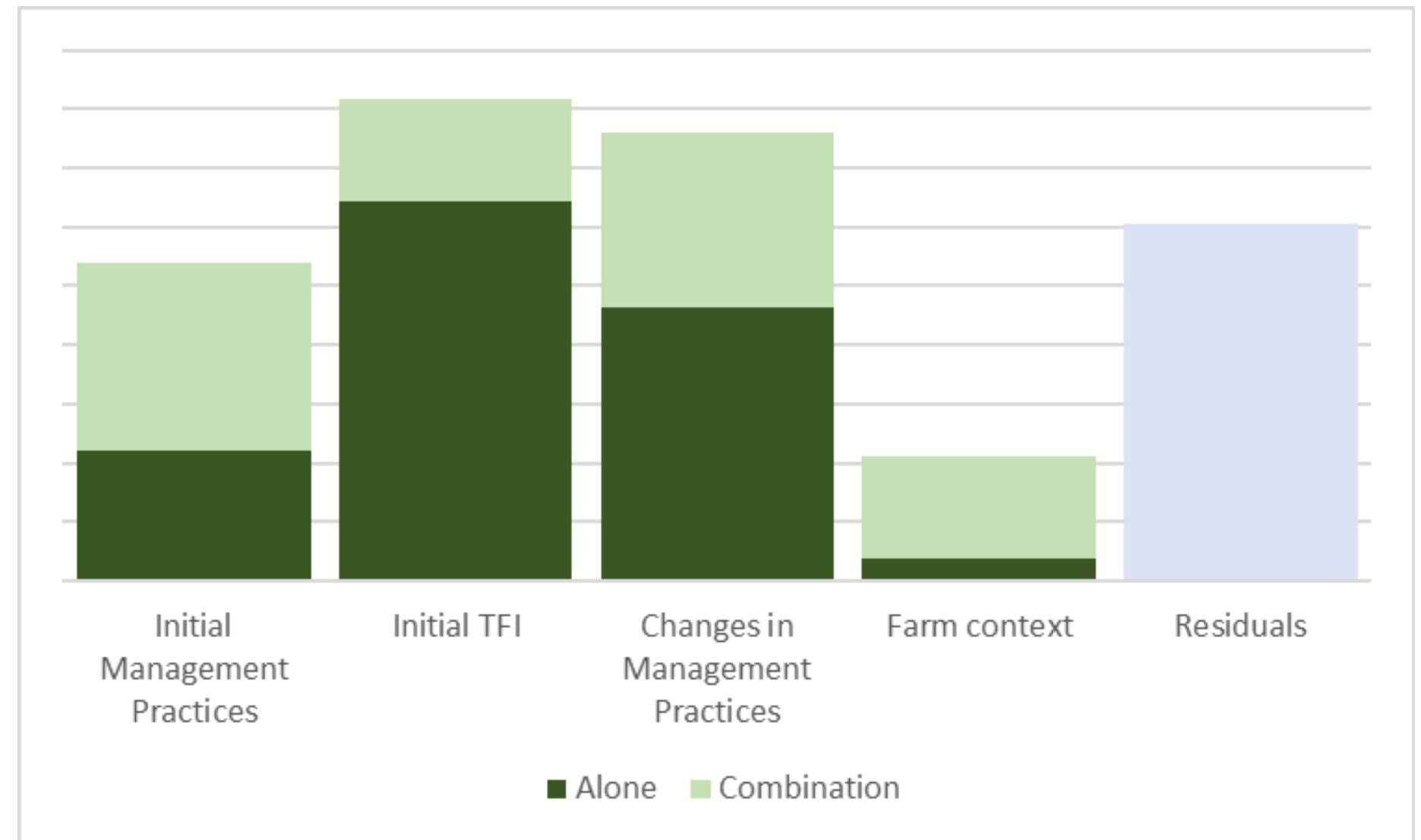
Sector : Arable Field Crops

Evolution of practices along time (≈ 10 years)



Factors explaining $\Delta IFT_{final - initial}$

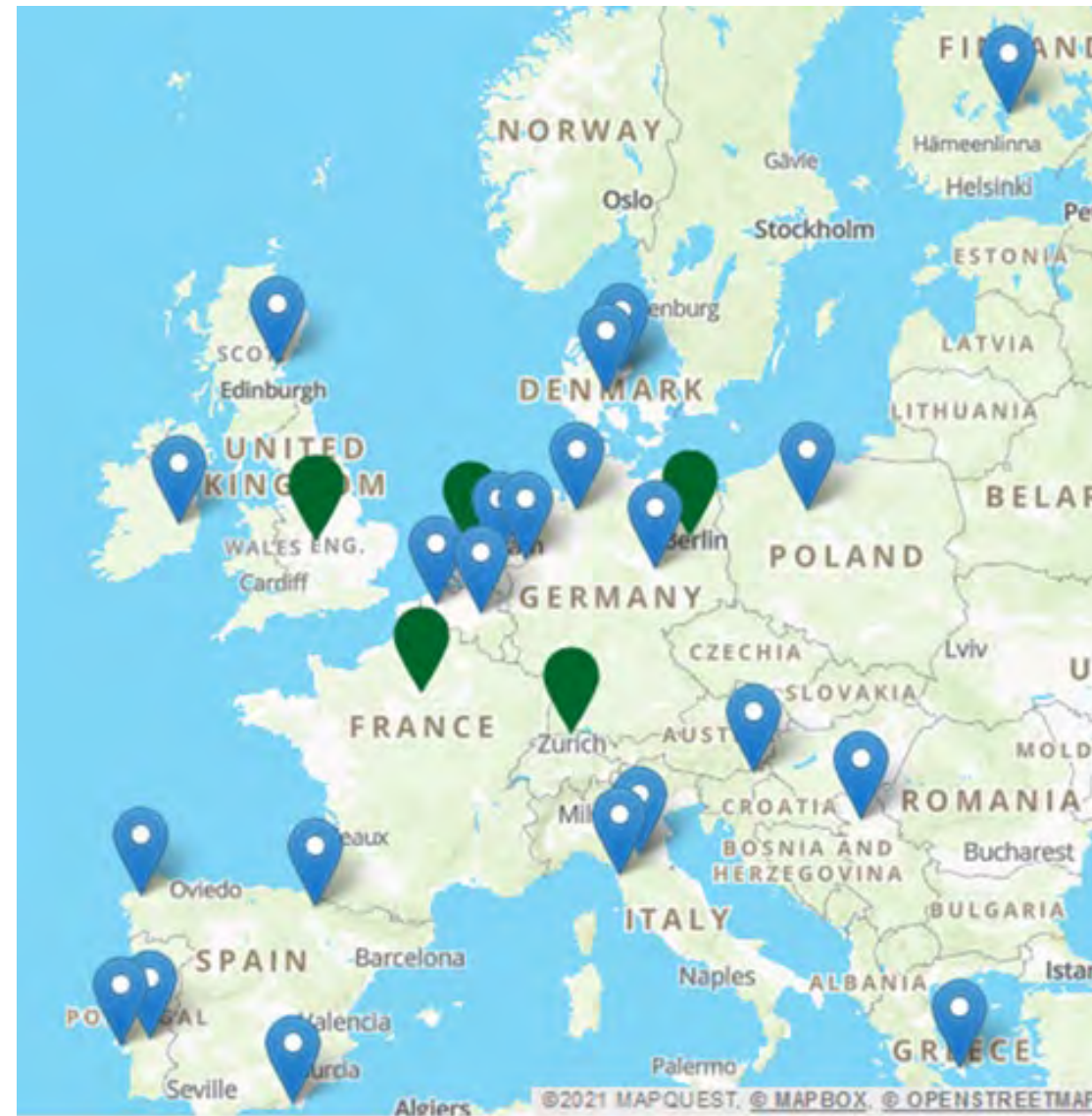
Variance partitioning among groups of factors



Improving decision making for treatments seems to be a major component of the decrease in PPP use

IPMWORKS A European network of demonstration farms promoting low pesticide use and economically efficient management strategies

2020-2024



5 pre-existing national networks

22 new networks of demonstration farms
Each led by a « Hub Coach »

PRINCIPLES OF IPMWORKS FARM GROUPS

- 10 to 15 farmers *in each hub*
- supported by an advisor-facilitator *Hub Coach*
- farmers exchange practical knowledge
- shared objective *better control pests and diseases with less pesticides, thanks to systemic IPM*
- DEMOs promote cost-effective IPM strategies

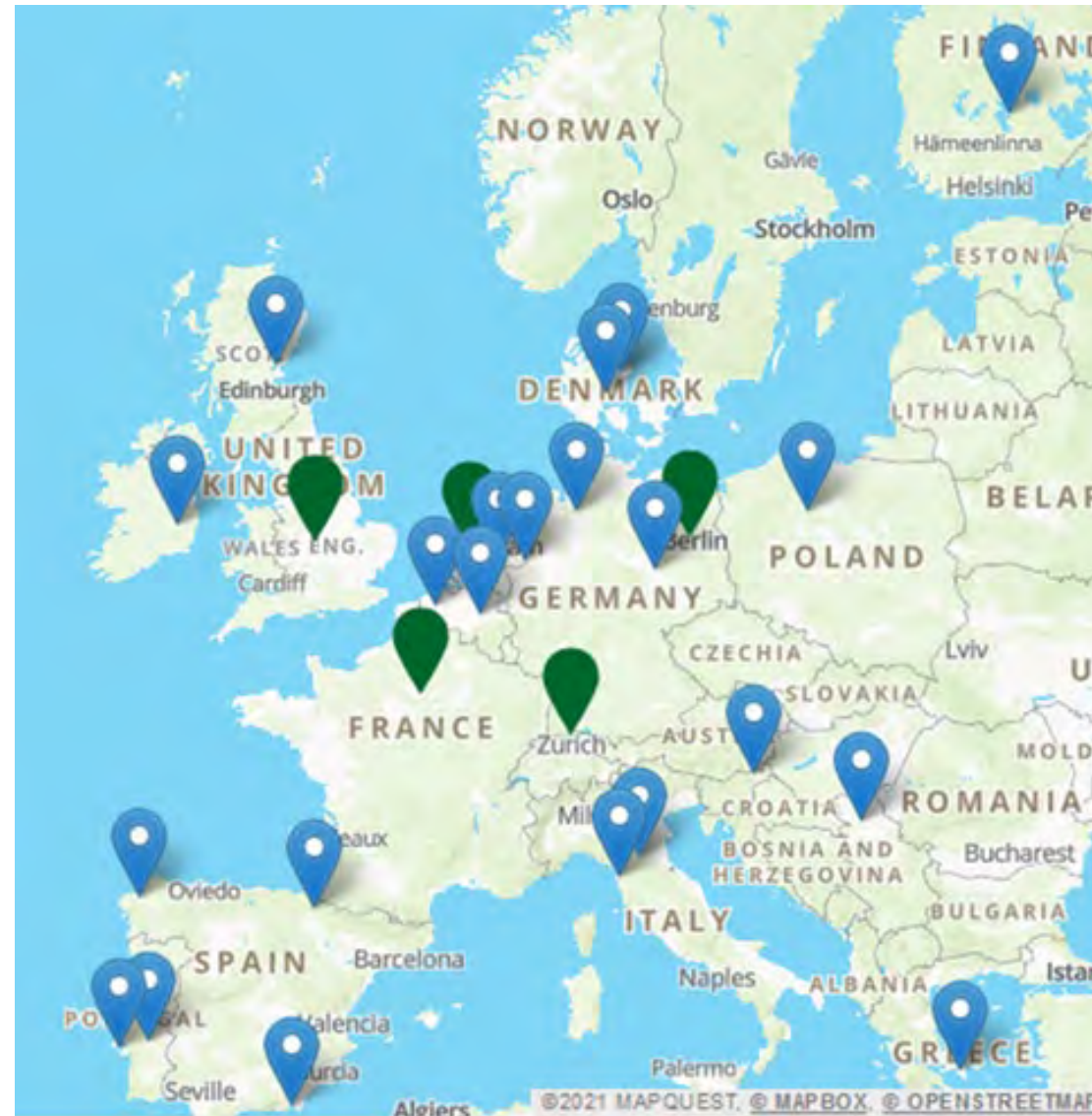
« *Integrated Pest Management...
... indeed works !* »



“Holistic” Integrated Pest Management (IPM)

The 5 pillars of holistic IPM





➤ **5 sector leaders**
in charge of technical knowledge sharing, coordination of activities & communication at the sector level



+ IFOAM coordinating Organic farms

A specific methodology for fostering IPM adoption

Based on peer-to-peer knowledge exchange... and facilitation

○ 22 Hub coaches with a specific Role

'IPMWORKS hubs are guided by a hub coach. Do you want to know how they work? Check it out in this video!'

Jolien Claerbout, Hub Coach at INAGRO, Belgium

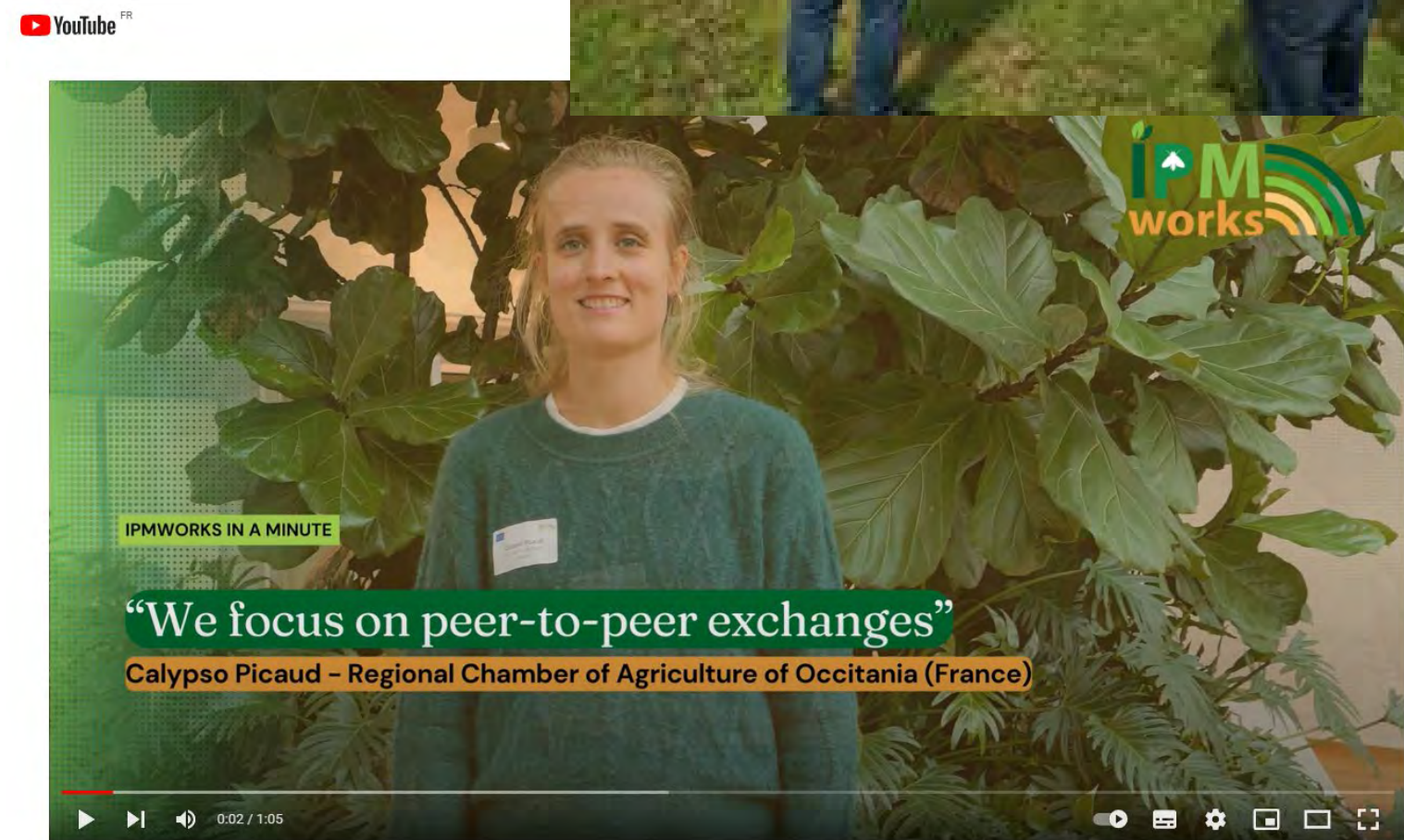
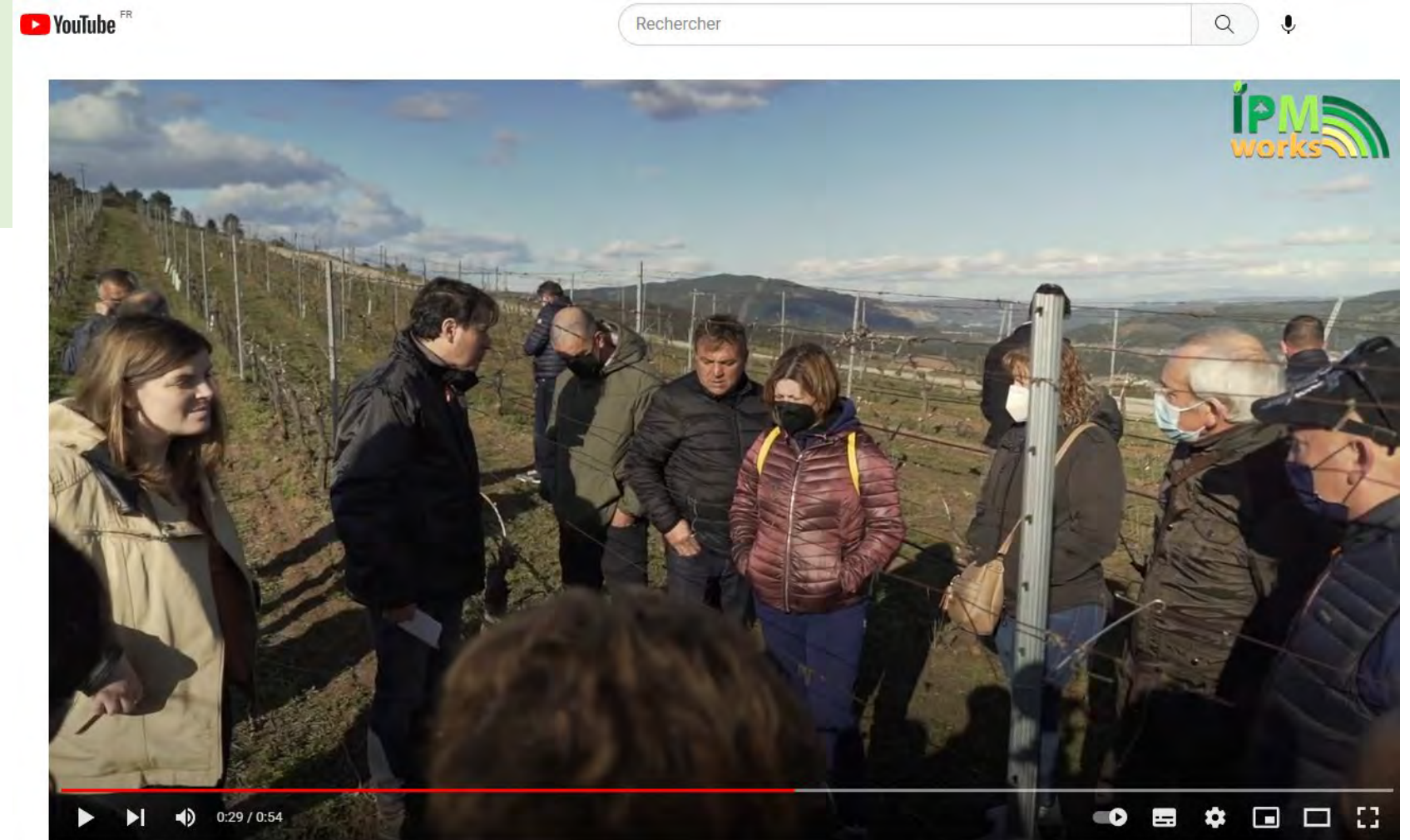
<https://www.youtube.com/watch?v=7zLqcKrjD7U>



- 1 **Individual advice to farmers** help them « think holistic »... and find non-chemical solutions
- 2 **Collective coaching of the group**
facilitate peer-to-peer knowledge exchange
- 3 **Organisation of Demo events** >> hit other farmers, enlarge the audience
- 4 **Share information with other Hub Coaches**
Technical skills of IPM & soft skills for facilitation IPM adoption
- 5 **+ collect data** describing IPM-strategies
>> demonstrate to farmers
 - decrease in pesticide use
 - cost-efficiency

A specific methodology for fostering IPM adoption

Based on peer-to-peer knowledge exchange... and facilitation



Strategy for data collection *in IPMWORKS farms*

1 **Survey #1 : 2021**

Qualitative data : IPM awareness, IPM adoption, approximate of PPP use, and self-assessment

2 **Survey #2 : 2023**

Quantitative data Details of cropping systems and crop management

>> Computation of indicators of pesticide use and pesticide impact, indicators of cost-efficiency

>> Demonstration that « IPM indeed works ! »

3 **Enquête #3 : 2024**

Similar to Survey#1

Evaluation of changes in IPM adoption in IPMWORKS farms thanks to the work done in hubs

**A compromise between required data for the demonstration...
...and limited time available for hub coaches**

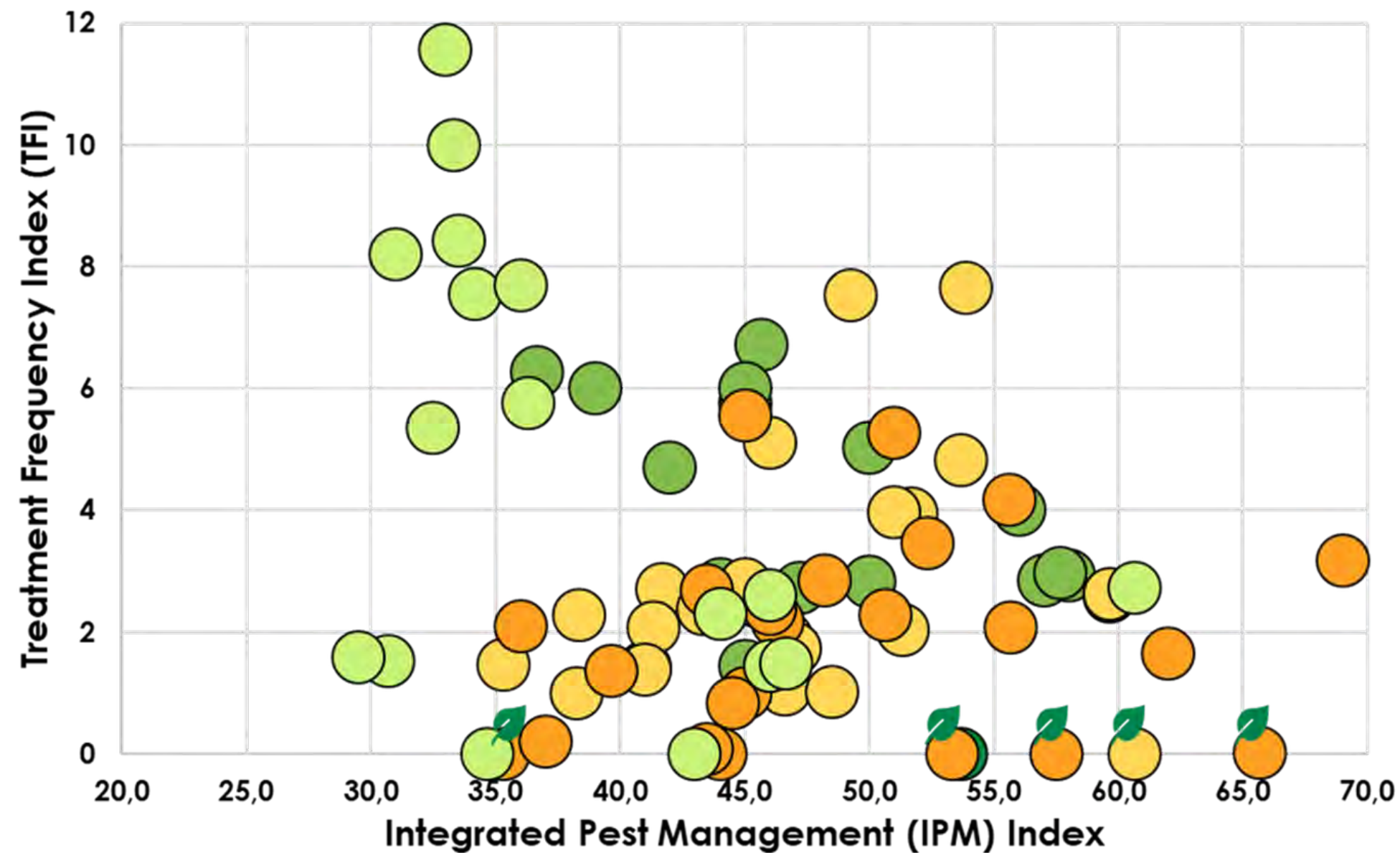
A few results from Survey#1



Attempt for an IPM adoption score

sum of scores for a range of IPM measures

● Winter crops ● Summer crops ● Diversified ● Diversified with grass ● Potato/Sugar beet-based



Organic farms

A few results from Survey#1

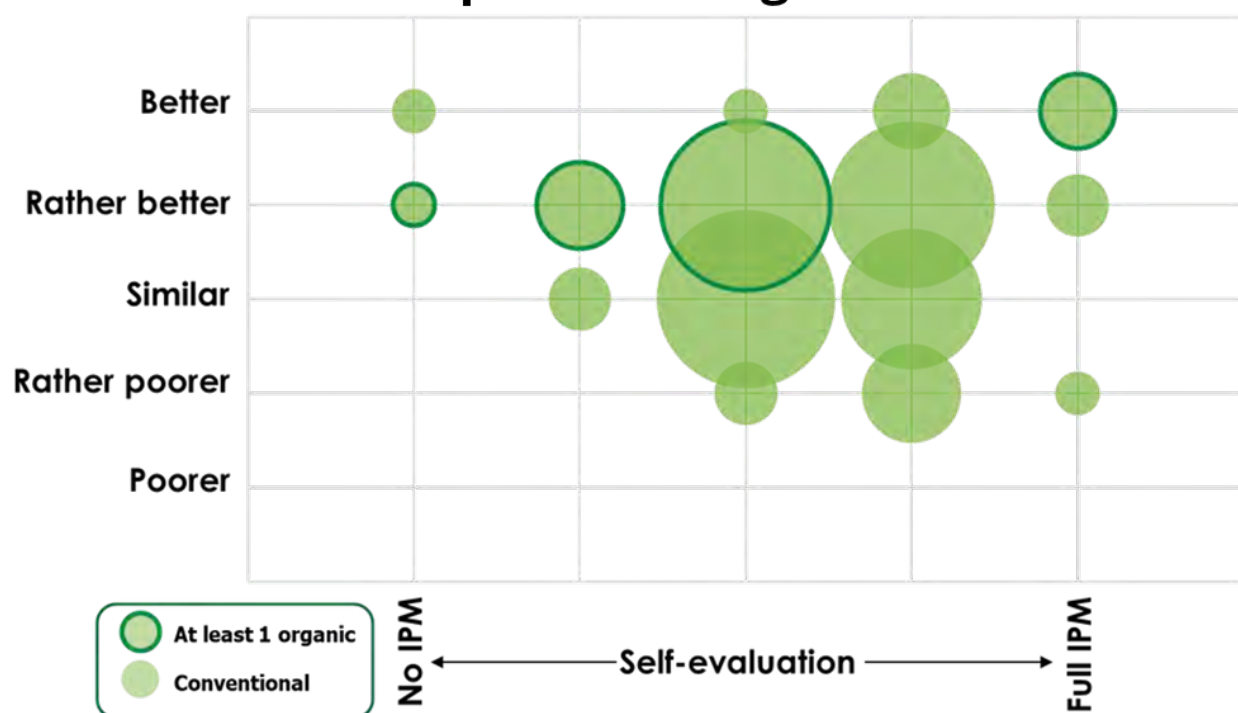
Self-assessment *Quality of pest control*



Self-assessment
as compared to neighbour farms

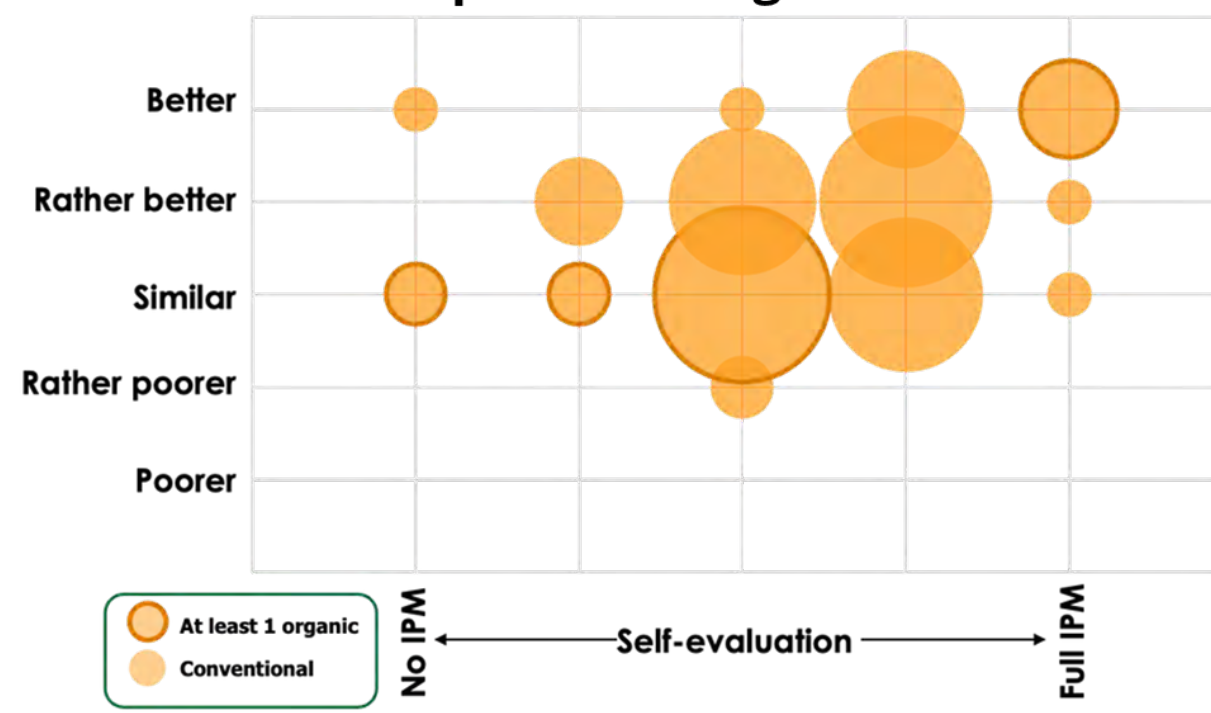
Quality of Weed Control

as compared to neighbour farmers...



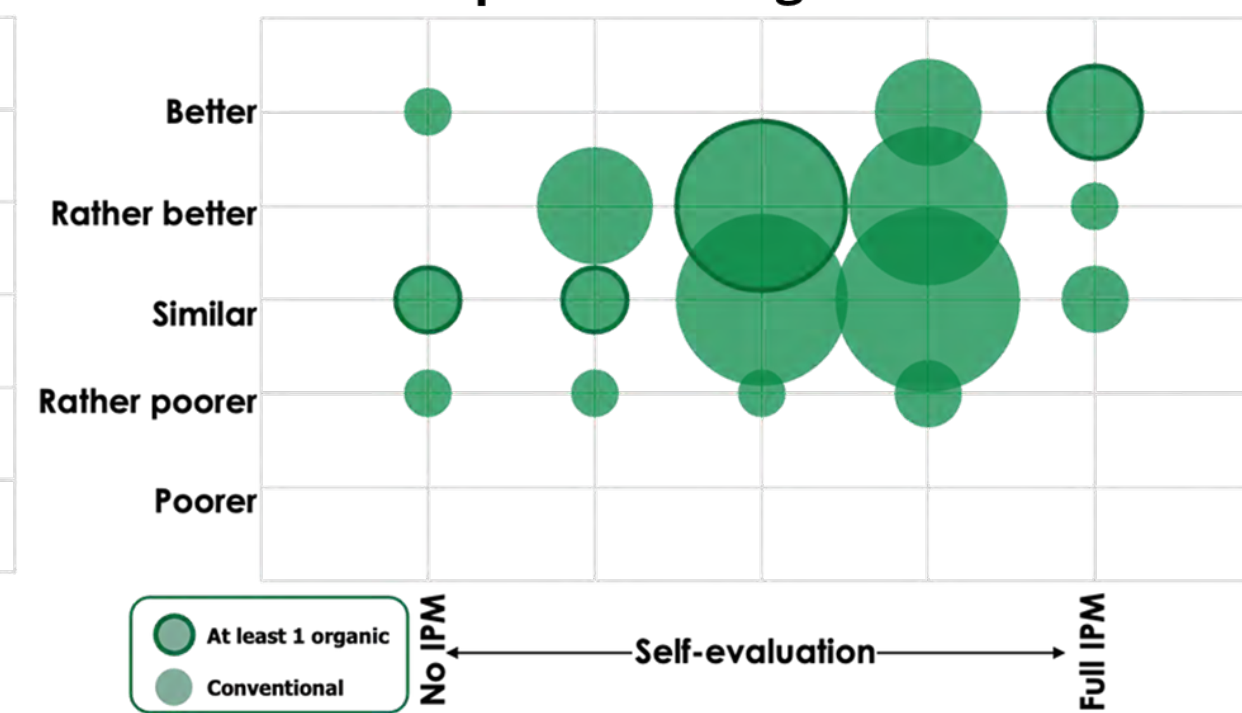
Quality of Disease Control

as compared to neighbour farmers...



Quality of Pest Control

as compared to neighbour farmers...



« IPM allows satisfying pest/weed/disease control »

A few results from Survey#1

Self-assessment Economics

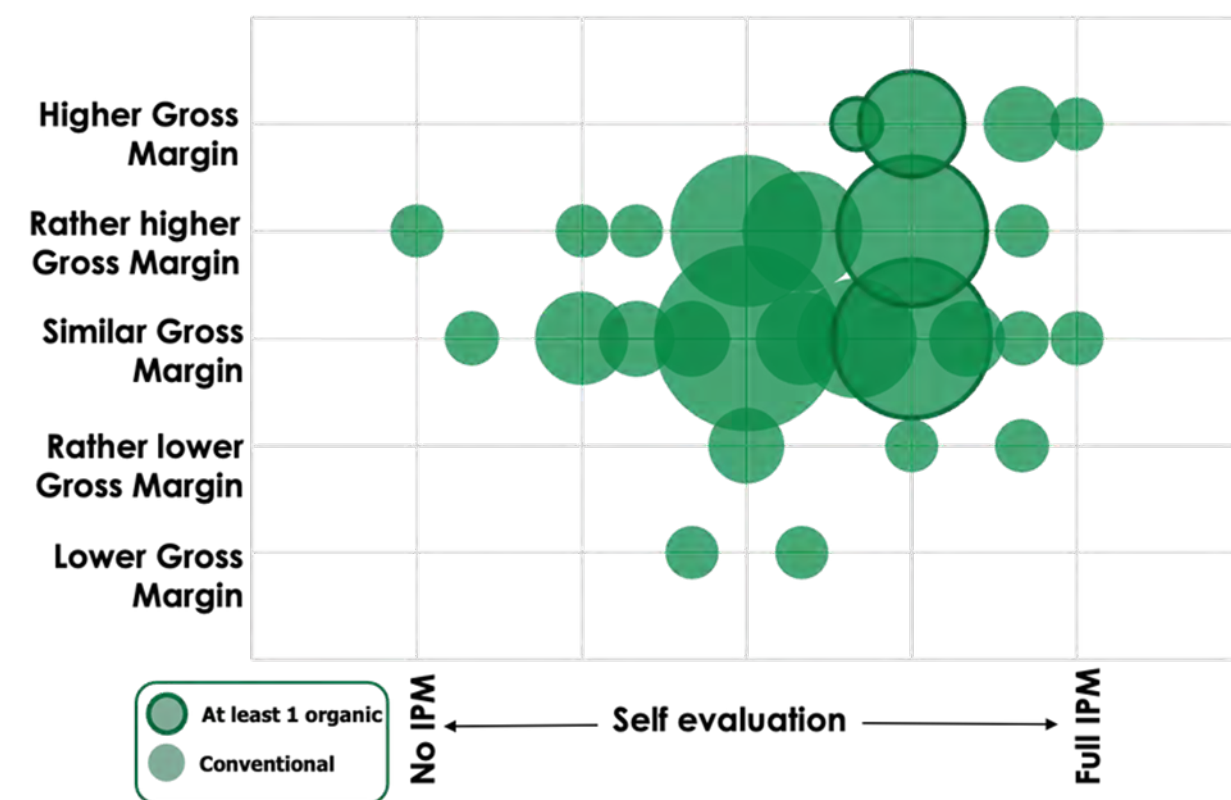
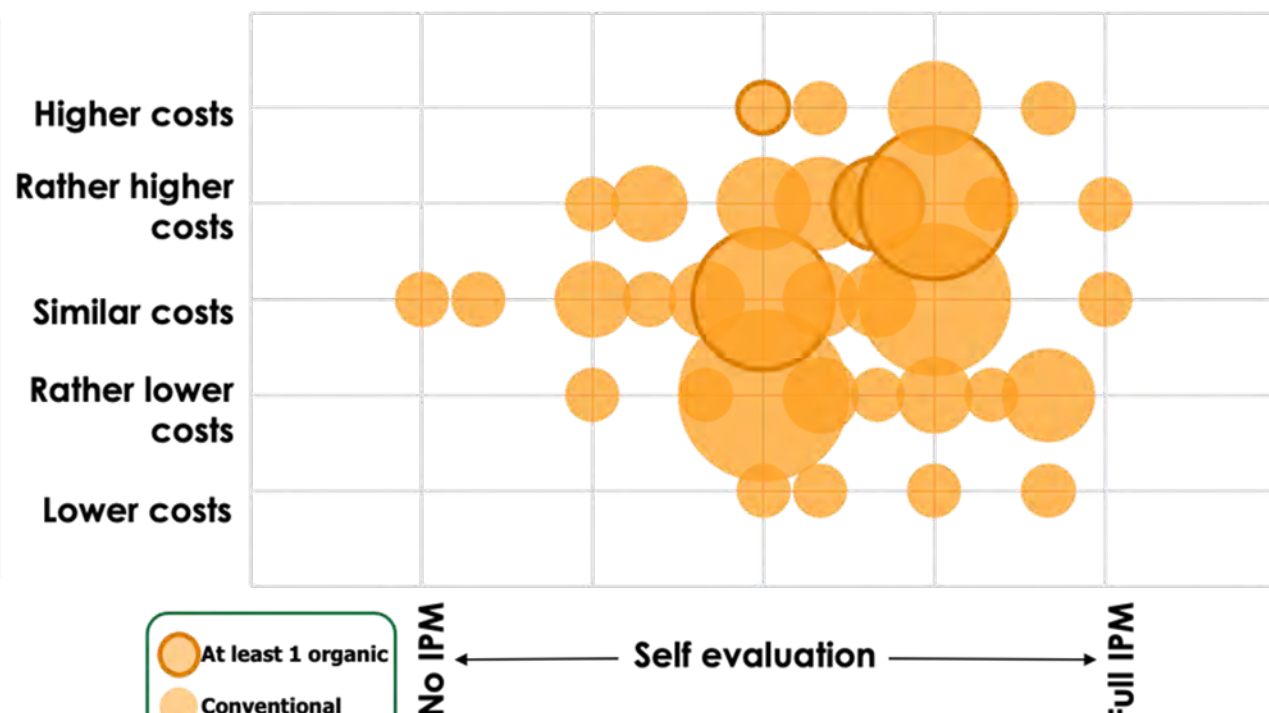
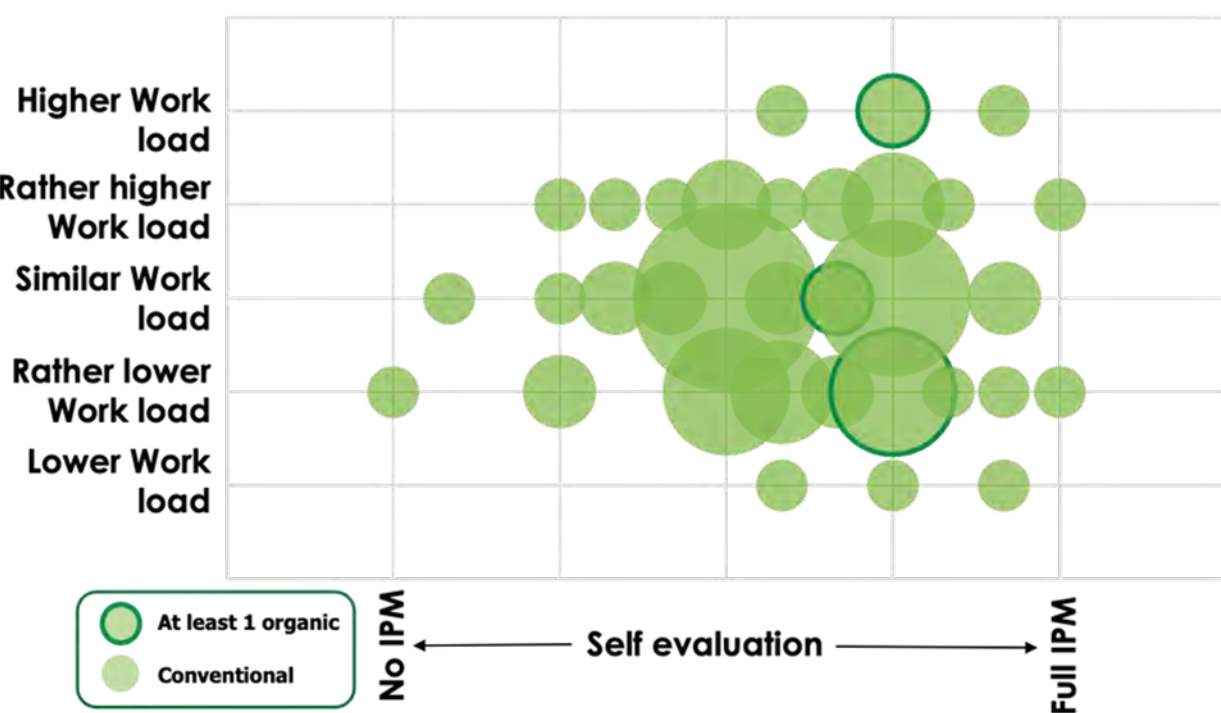


Self-assessment
as compared to neighbour farms

Workload / ha as compared to neighbour farmers...

Equipment Costs as compared to neighbour farmers...

Gross Margin as compared to neighbour farmers...



« *IPM is cost-effective* » ...to be confirmed with quantitative data

Some productions <https://ipmworks.net/>



Booklets survey#1

One for each sector

The collage displays several survey booklets from the IPM works project. Visible titles include 'Main arable crops in participating countries', 'Pesticide Use', 'Variety Choice', 'Self-evaluation', 'Decision Support System', 'Self-evaluation FARM PROFITABILITY', 'Workload/ha', 'Equipment Costs', and 'Cross Margin'. Each booklet features charts, graphs, and text related to agricultural practices and farmer awareness.

Booklets Individual IPM strategies

This section features four detailed IPM strategy booklets:

- How I implement IPM My farm:** A booklet by Joaquín Martínez Rodiño (Meis, Rias Baixas, Galicia) detailing a holistic IPM strategy with low pesticide input in a European farm. It includes logos for IPM works and feuga.
- My strategy:** A seasonal flowchart showing IPM measures from Winter to Fall.
 - WINTER:** Vineyard pruning, Organic fertilisation.
 - SPRING:** Installation of pheromones for the control of codling moth.
 - SUMMER:** Fungicide treatment against (Mildew) based on observations and alerts. Includes a note: 'Removal of the leaves from the vineyard to increase the quality of the grapes and improve the health of the vines..'
 - FALL:** Installation of bat boxes in the vineyard as a biocontrol agent. Implementation of vegetative covers to improve the soil.
- My results:** A summary of farm evolution trends.
 - Pests control:**

Very good	Medium	To improve
grape moth	Downy mildew	wood diseases
weeds	Powdery mildew	Botrytis
	Green mosquito	
 - Evolution of use of pesticides:**

Very good	Medium	To improve
Insecticides	fungicides	Low risk of APP
Herbicides	biocontrol	
 - Sustainability indicators:**

Very good	Medium	To improve
Use of products that are dangerous or toxic to the environment	Workload	Energy costs
Use of chemical fertilisers	Work distribution throughout the year	Complexity of the non-mechanised harvesting process
Handling of dangerous or toxic products		Awareness and knowledge of new practices
Overall satisfaction level of the vitiegrower		
Workforce		
- Our feedbacks:**
 - Joaquín Martínez Rodiño (España):** "A change of mentality is needed, adopting a global approach that allows us to discover and adopt new measures to protect the vineyard and its environment while maintaining economic profitability."
 - Main objective of the farmer:** Reduce the environmental impact of agricultural activity while maintaining crop profitability.
 - Advantages of the system:** Lower environmental impact, reduction of the use of chemical synthesis products such as fertilizers and pesticides.
 - Limitations:** climatic limitations due to humidity and high precipitations in the region.
 - Angela Muñiz Varela (España):** "Galician viticulture is highly conditioned by climatic conditions: high humidity and mild temperatures that favour the appearance of fungal diseases such as mildew, which also requires a great effort in terms of sanitary control. Despite this, the IPMWorks group are committed to alternative methods."
 - Opportunities for future developments:** Development of "environmentally friendly" agriculture, biodiversity and multi-cropping. Promoting generational replacement through the economic and social sustainability of agricultural activity. New treatments for fungal diseases with a natural base and greater adoption of technological solutions that facilitate the work of farmers.

Some productions <https://ipmworks.net/>



IPM Resource Toolbox



HOME ADD RESOURCE IPMWORKS LOGIN

Disclaimer This IPMWORKS Resource Toolbox is a repository for IPM resource developed by the EU IPMWORKS project (101000339). The cooperating partners have no economic responsibility whatsoever for losses due to using this service.

Sectors

Select sector

Country of origin

Select region

Project

Select project

Resource types

Select resource type

Search

Reset



IPM Decisions Stepping-up IPM decisions support for crop protection



Pollen beetle treatment thresholds (UK oilseed rape)



LEAF Simply Sustainable IPM Guide



Trapview: Automated pest monitoring system



Dropleg Lechler: under-leaf spray application technique



SporSenz: in-the-field sensor for plant diseases in soil and water



IPMWORKS YouTube channel

Contribution to debates at European Institutions



HORIZON 2020
N. 101000339



*Public Hearing at the European Parliament,
Brussels, 23 May 2023*



*Exhibition at the European Parliament, Strasbourg,
13-16 February 2023*

The BCPC Congress, 7-8 November 2023, Harrogate, UK



Policy recommendation for the
Sustainable Use of Pesticides
Regulation (SUR)

Draft



Thanks for your attention !



The BCPC Congress, 7-8 November 2023, Harrogate, UK