

# The JRC's role in agricultural and environmental research

Andrea Hagyo, PhD.

Joint Research Centre, DG JRC

D.5 Food security Unit

Agriculture & Environment & Climate Team

CZ Info Day, Prague

15 January 2026

# Science for policy



## Our purpose

The Joint Research Centre provides independent, evidence-based knowledge and science, supporting EU policies to positively impact society.

# JRC scientific publications

**3.7% publications**

in the top 1% most  
cited worldwide

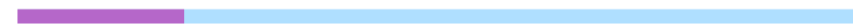
**24.5% publications**

in the top 10%

International Institute for Applied Systems Analysis – AT



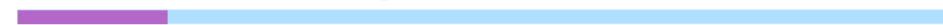
University of Oxford – UK



**Joint Research Centre**



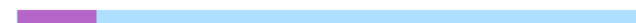
University of Cambridge – UK



Max Planck Society – DE



National Institute of Standards and Technology – US



Chinese Academy of Sciences – CN



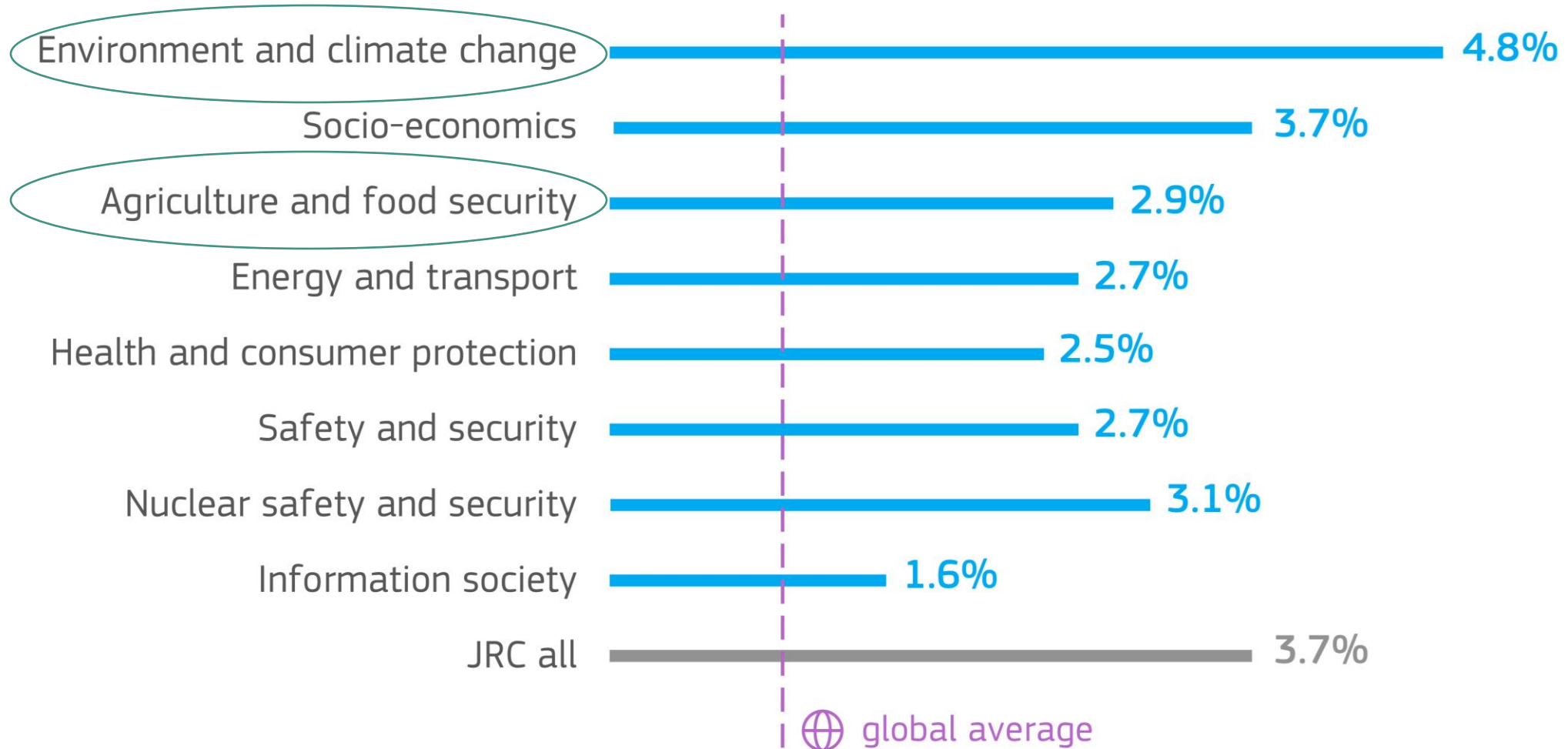
National Centre for Scientific Research – FR



5% publications



## Percentage of JRC publications among the globally most cited 1% (2018-2022)

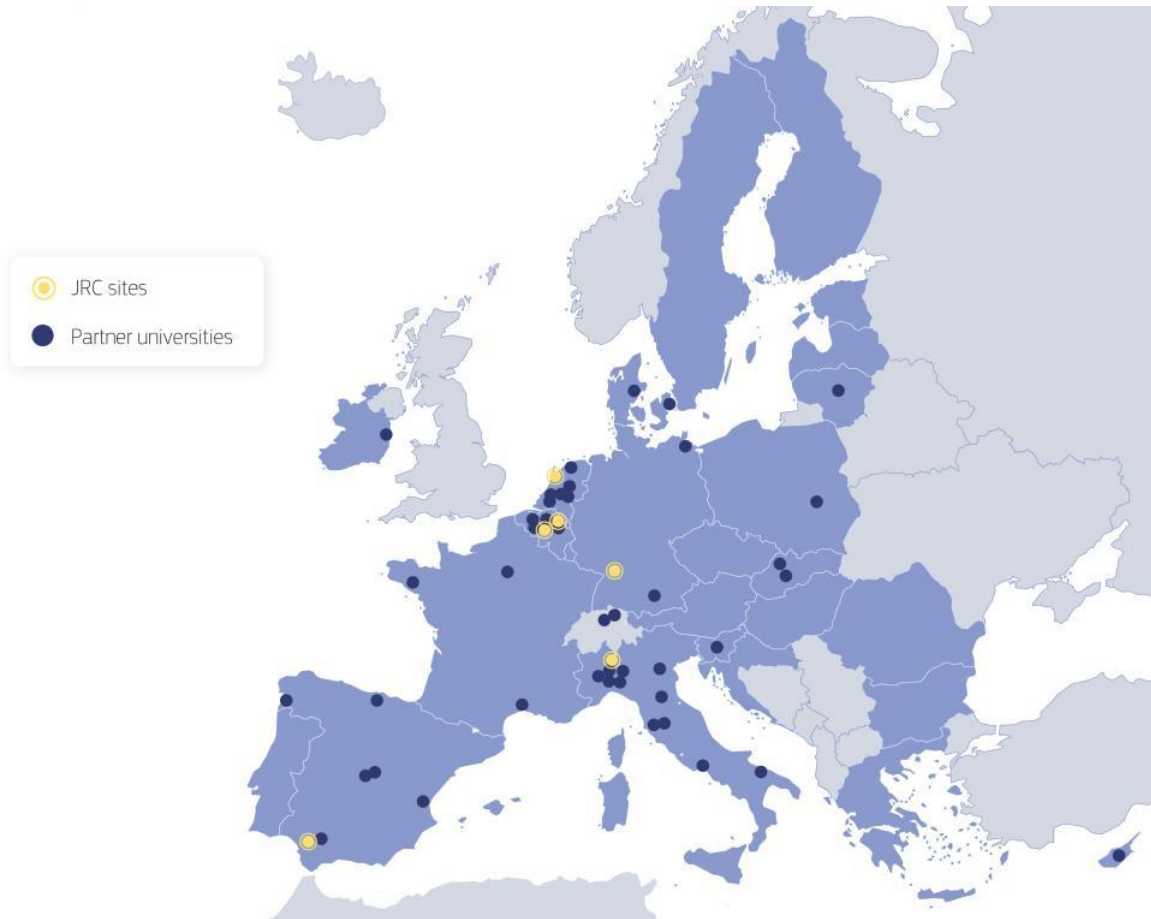


# JRC in the Horizon Europe programme



- Non-nuclear **direct actions of the JRC**  
**under Pillar II 'Global Challenges and European Industrial Competitiveness'**
- **Horizon Europe Work Programme Group**
- Where indicated in the work programme, **JRC may participate as member of the selected consortium Beneficiary with zero funding or associated partner.**
- Can contribute with specific **platforms, EU-wide data, models and/or through knowledge centres.**

# Collaborative Doctoral Partnership (CDP) programme



Joint doctoral research between Higher Education Institutions (HEI), such as universities, and the JRC

Build and strengthen long-term relationships

Collaborative Doctoral Partnership (CDP) programme  
- The Joint Research Centre: EU Science Hub



# JRC Directorate D – Sustainable Resources

## Our mission

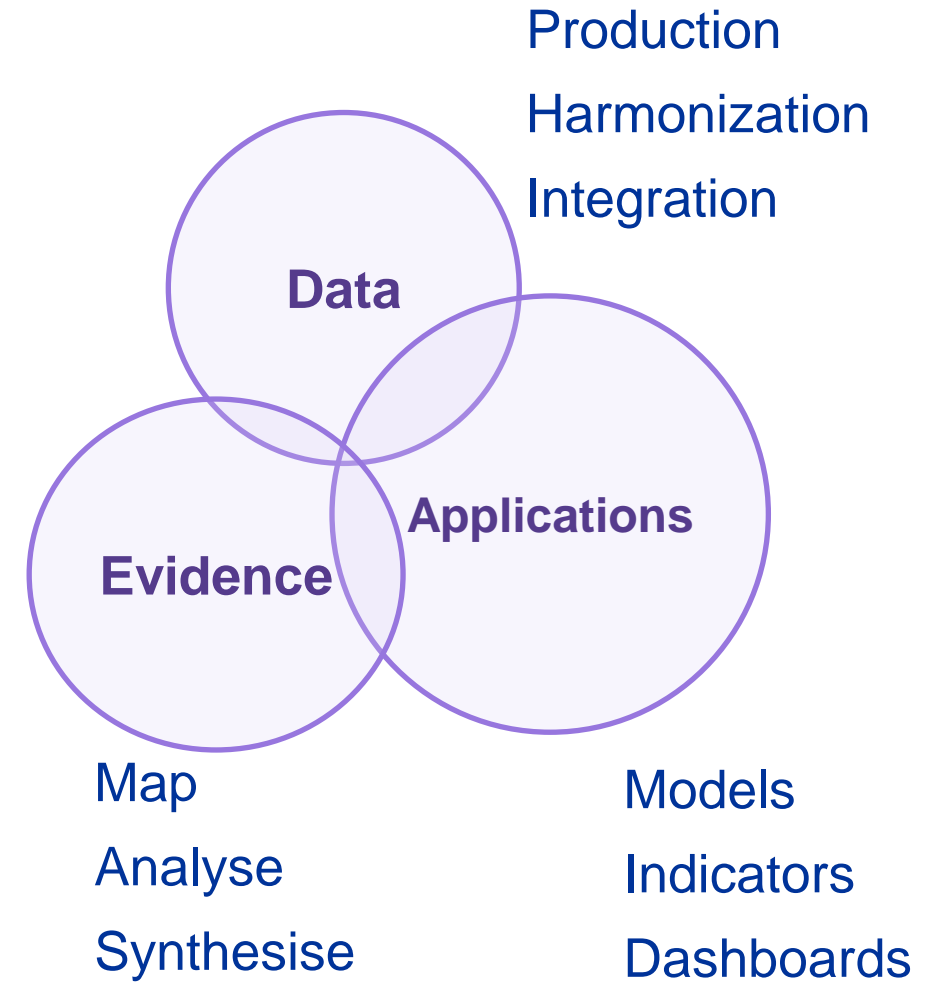
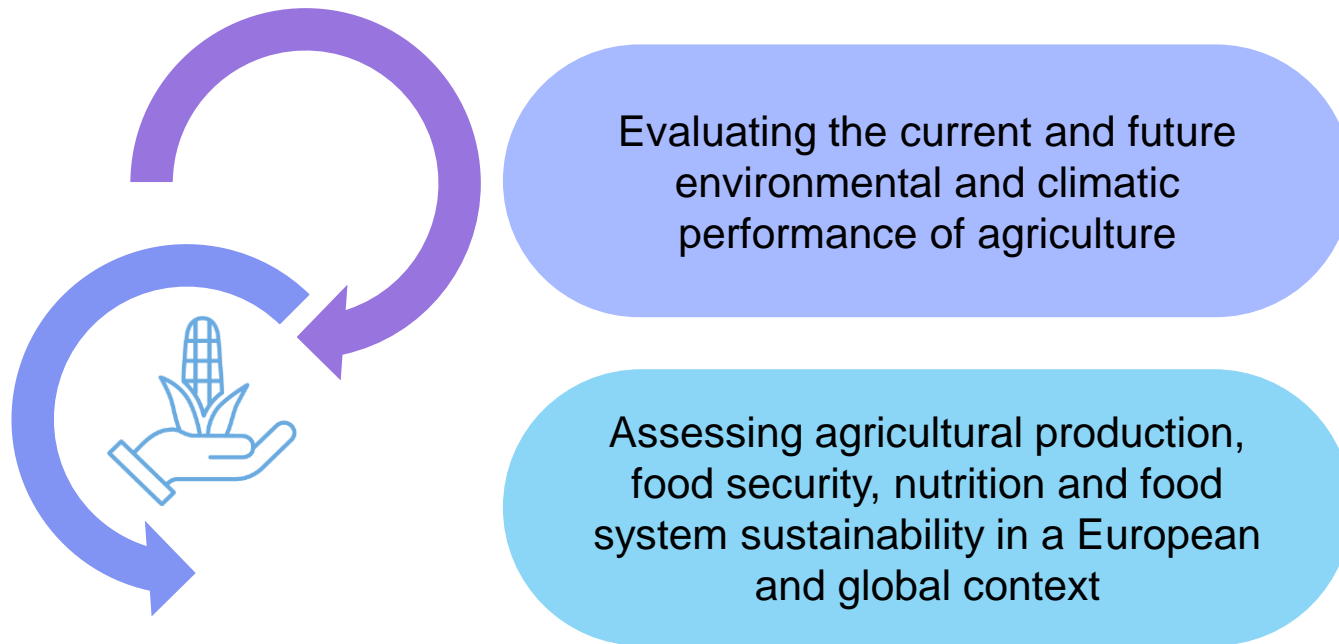
to provide independent scientific evidence to support the development, implementation, evaluation and coherence of EU policies in the areas of

- agriculture and rural development,
- international development cooperation,
- environment and climate change,
  - blue growth and fisheries,
  - the bioeconomy,
  - industry and trade.



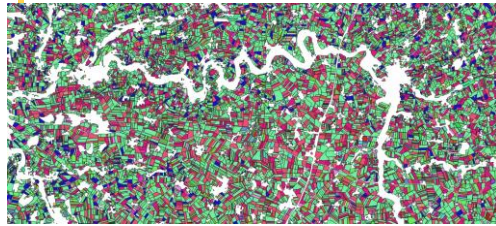
# JRC's agri-environmental research

## D.5 Food security Unit

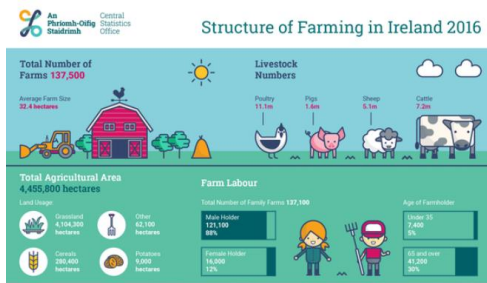




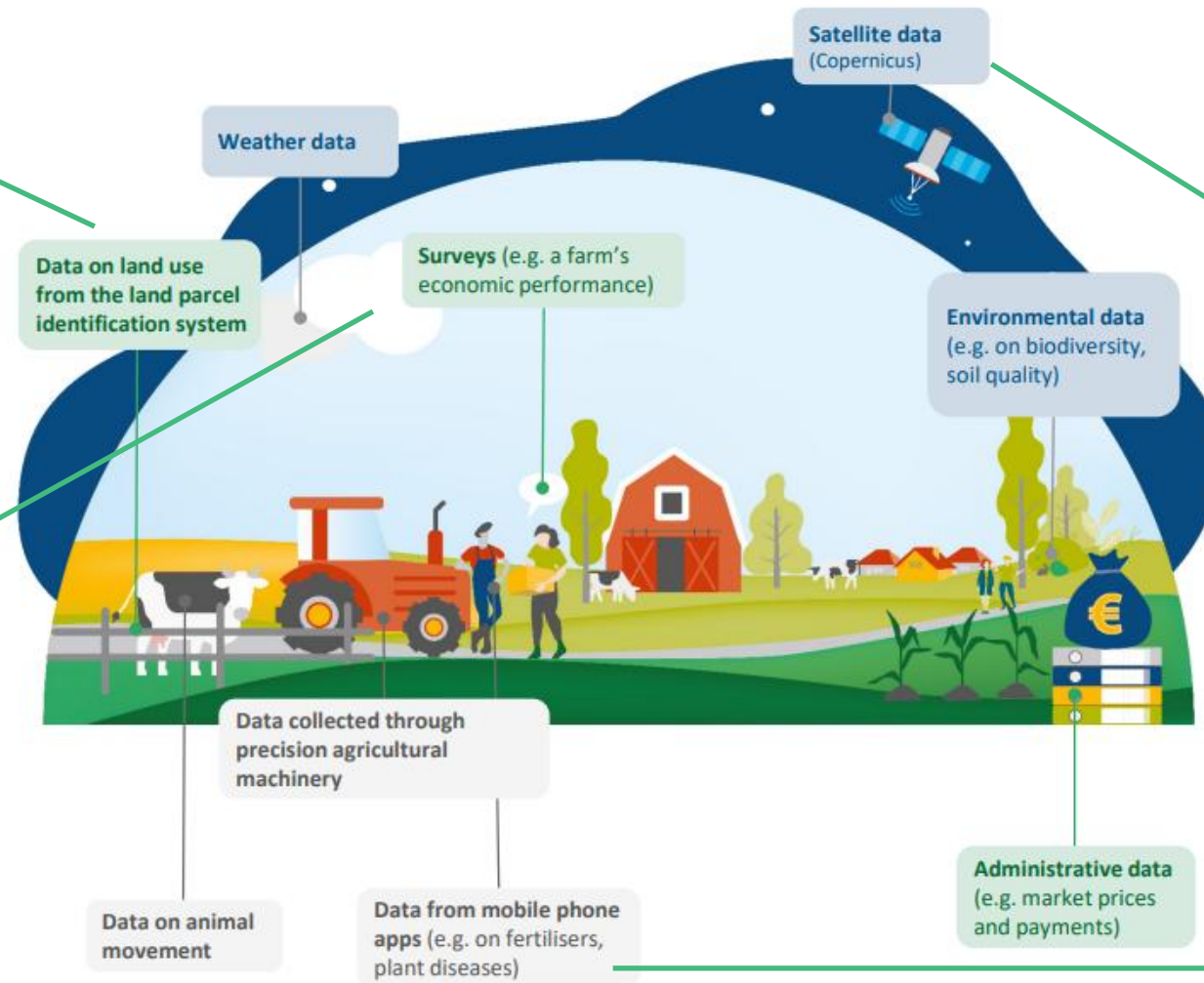
# Stats & data collected & created around the farm



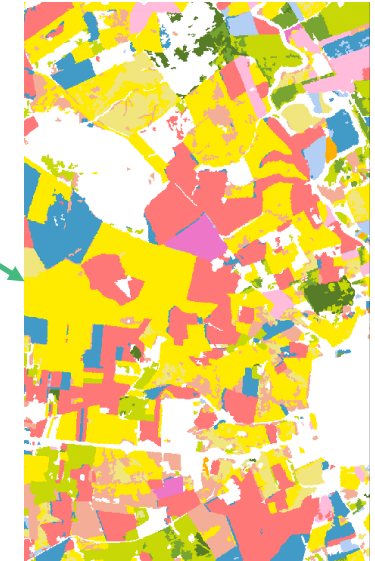
**Parcel and holding data - IACS**



**Farm holding data**



Source: ECA.



**Pixel data**



**Available, comparable, interoperable, used, fit?**

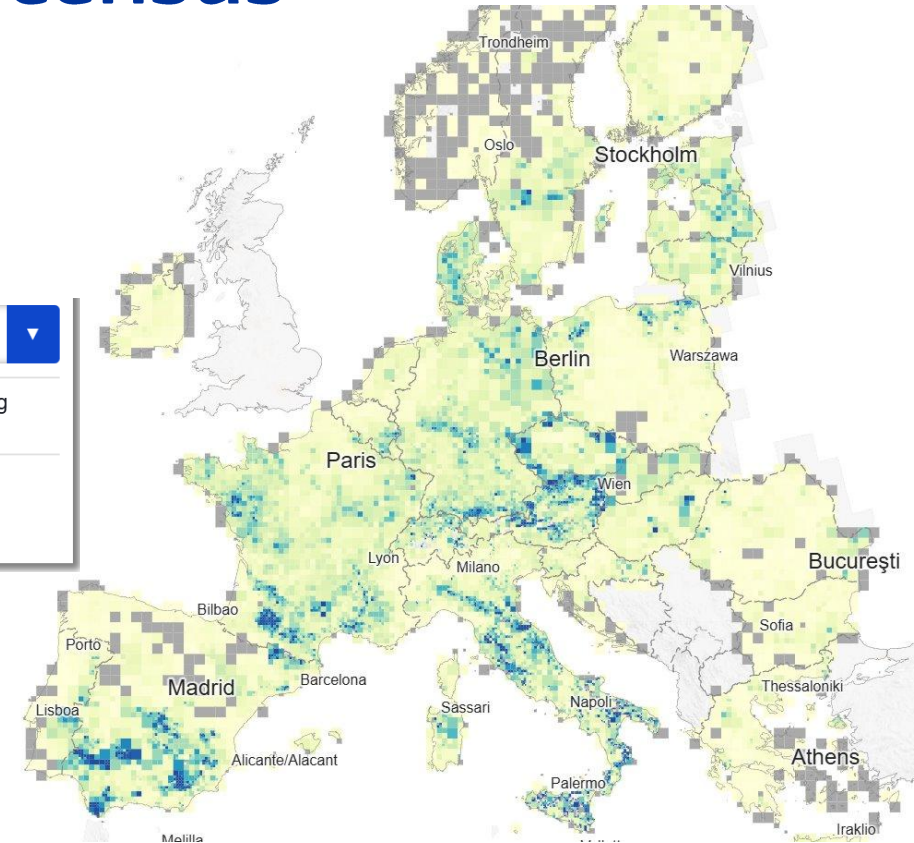
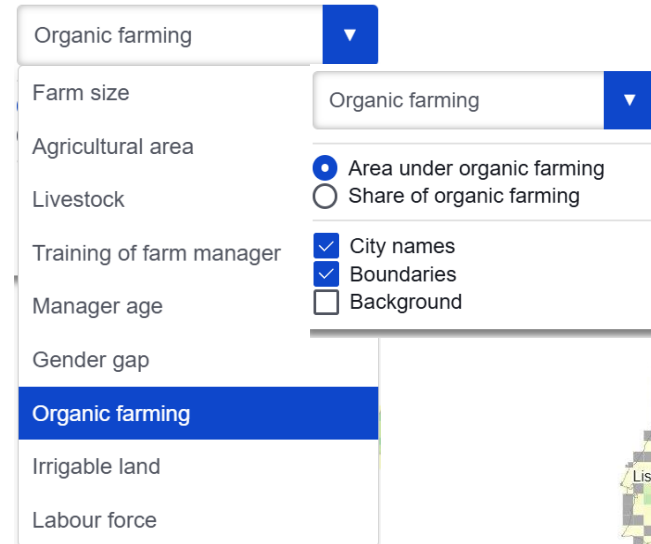


# Geospatial data from agricultural census

## Spatially gridding the Integrated Farm Statistics

### EUROSTAT and JRC

- New method for disclosure control guaranteeing privacy of data
- Multi-resolution grids
  - 1-5-10-20-40-80 km



Skoien et al., 2025 [A flexible approach for statistical disclosure control in geospatial data | Journal of Geographical Systems](#)

[Geospatial data from agricultural census - Experimental statistics - Eurostat](#)

Lampach et al., 2025 [ESSDD - Statistical Atlas of European Agriculture: Gridded Data from the Agricultural Census 2020 and the Spatial Distribution of CAP Contextual Indicators](#)



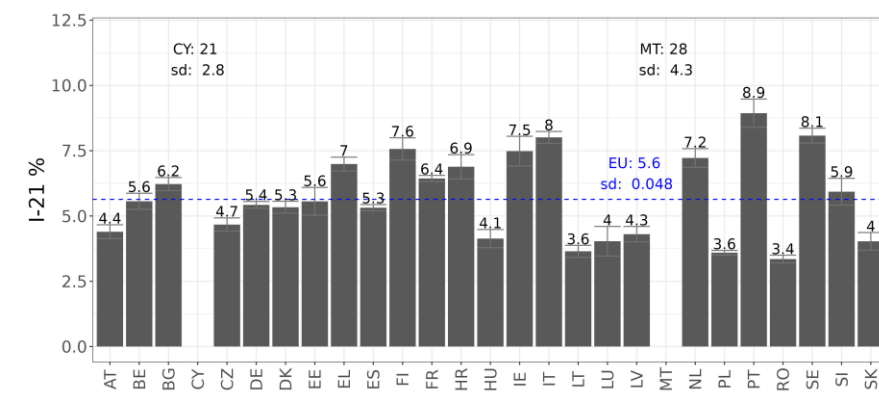


# Strengthening EU monitoring schemes

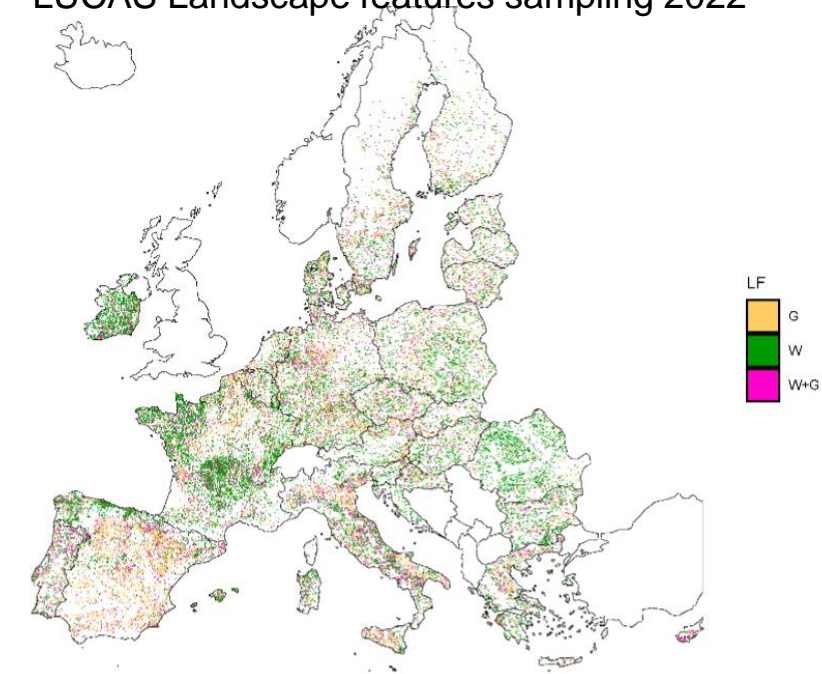
LUCAS: EU's Land Use/ Land Cover Survey

## LUCAS Landscape Features

- LF in 93,000 LUCAS quadrats of 100x100m
- Spatial representativeness at MS level (possibly NUTS2)
- Consistent quantification of LFs for the EU and MS level
- Information on different types of landscape features



LUCAS Landscape features sampling 2022



Musavi et al., *in preparation*

# Monitoring of biodiversity in Agricultural Landscapes (EMBAL)



- In all 27 EU MSs
- 3000 plots
- 500 x 500 m
- Plot, parcels, transects
- Land cover, landscape elements, habitat types, biodiversity and pollination resources

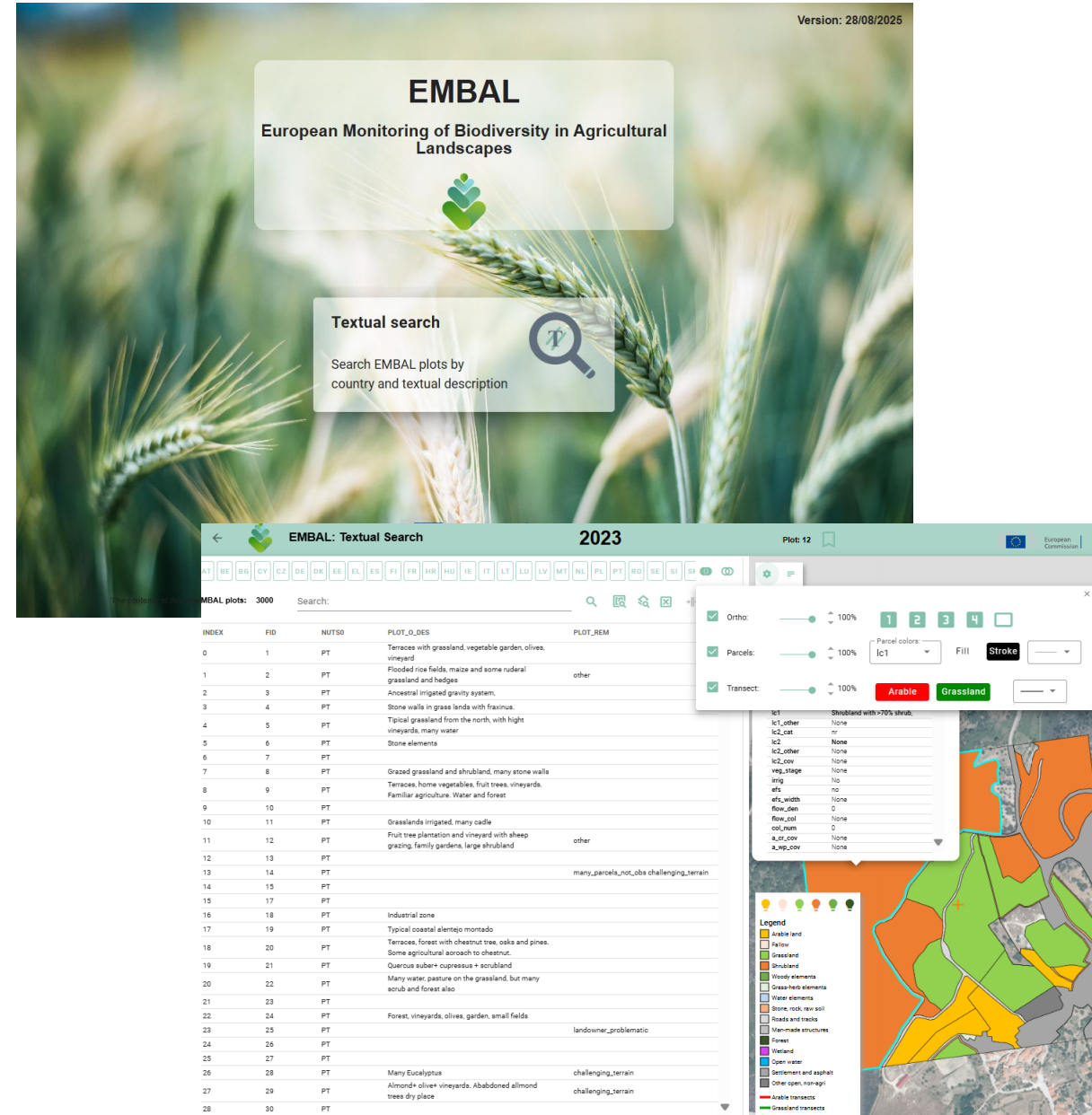
## EMBAL dataset in JRC Data Catalogue

### 1. Geo-anonymized viewer

- Access with ECAS account

### 2. Full version with plots, transects, photos accessible after

- approved research proposal and
- signature of Confidentiality Agreement



Version: 28/08/2025

**EMBAL**  
European Monitoring of Biodiversity in Agricultural Landscapes

**Textual search**  
Search EMBAL plots by country and textual description

EMBAL plots: 3000

2023

Plot: 12

| INDEX | FID | HUTSO | PLOT_O_DESC   | PLOT_REM                                 |
|-------|-----|-------|---|--|
| 0     | 1   | PT    | Terraces with grassland, vegetable garden, olives, vineyard.                                |  |
| 1     | 2   | PT    | Flooded rice fields, maize and some ruderal grassland and hedges                            | other                                    |
| 2     | 3   | PT    | Ancestral irrigated gravity system.   |  |
| 3     | 4   | PT    | Stone walls in grass lands with fraxinus.   |  |
| 4     | 5   | PT    | Typical grassland from the north, with high vineyards, many water                           |  |
| 5     | 6   | PT    | Stone elements  |  |
| 6     | 7   | PT    |   |  |
| 7     | 8   | PT    | Grazed grassland and shrubland, many stone walls  |  |
| 8     | 9   | PT    | Terraces, home vegetables, fruit trees, vineyards, Familiar agriculture. Water and forest   |  |
| 9     | 10  | PT    |   |  |
| 10    | 11  | PT    | Grasslands irrigated, many cattle   |  |
| 11    | 12  | PT    | Fruit tree plantation and vineyard with sheep grazing, family gardens, large shrubland      | other                                    |
| 12    | 13  | PT    |   |  |
| 13    | 14  | PT    |   | many_parcels_not_sbs challenging_terrain |
| 14    | 15  | PT    |   |  |
| 15    | 16  | PT    |   |  |
| 16    | 17  | PT    | Industrial zone   |  |
| 17    | 18  | PT    | Typical coastal elemento montado  |  |
| 18    | 19  | PT    | Terraces, forest with chestnut tree, oaks and pines. Some agricultural orchard to chestnut. |  |
| 19    | 20  | PT    | Quercus suber+ cupressus + scrubland  |  |
| 20    | 21  | PT    | Many water, pasture on the grassland, but many scrub and forest also                        |  |
| 21    | 22  | PT    |   |  |
| 22    | 23  | PT    | Forest, vineyards, olives, garden, small fields   | landowner_problematic                    |
| 23    | 24  | PT    |   |  |
| 24    | 25  | PT    |   |  |
| 25    | 26  | PT    | Many Eucalyptus   | challenging_terrain                      |
| 26    | 27  | PT    | Almond+ olive vineyards. Abandoned almond trees dry place                                   | challenging_terrain                      |
| 27    | 28  | PT    |   |  |
| 28    | 29  | PT    |   |  |
| 29    | 30  | PT    |   |  |

Legend

- Arable land
- Grassland
- Shrubland
- Wetland
- Open water
- Barren land and asphalt
- Other open, non-agri
- Arable transects
- Grassland transects

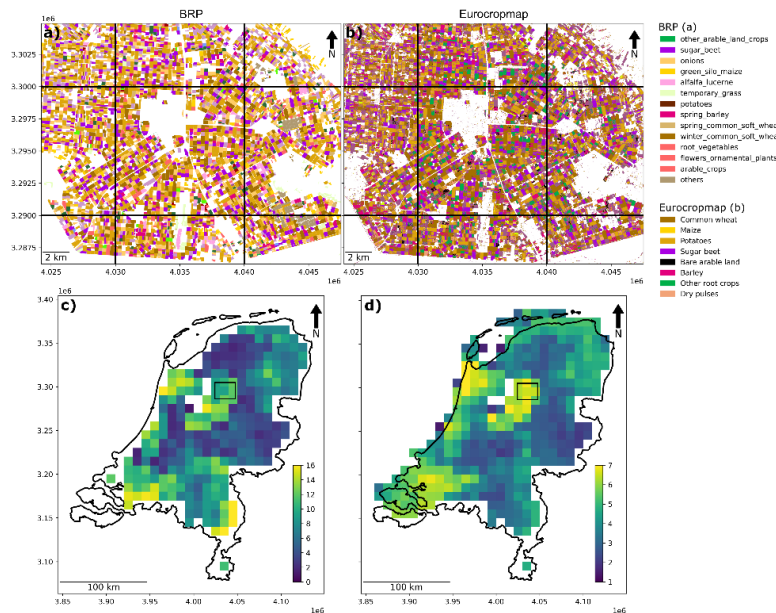


# Innovative geospatial agri-environmental monitoring

## Integrating in-situ observations, statistics, and Earth Observation with advanced analytics

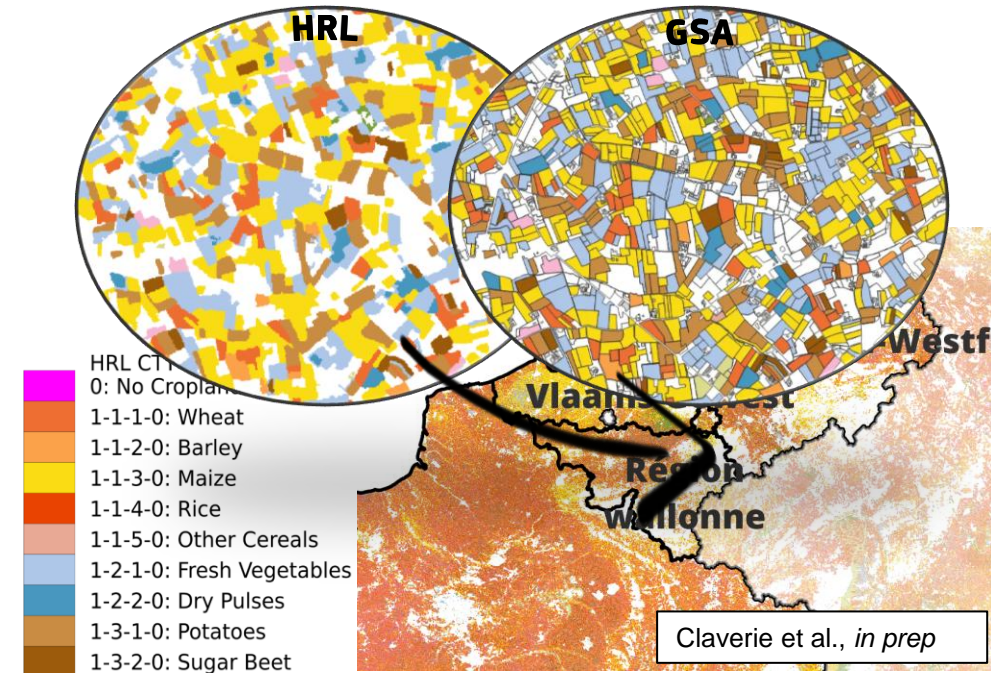
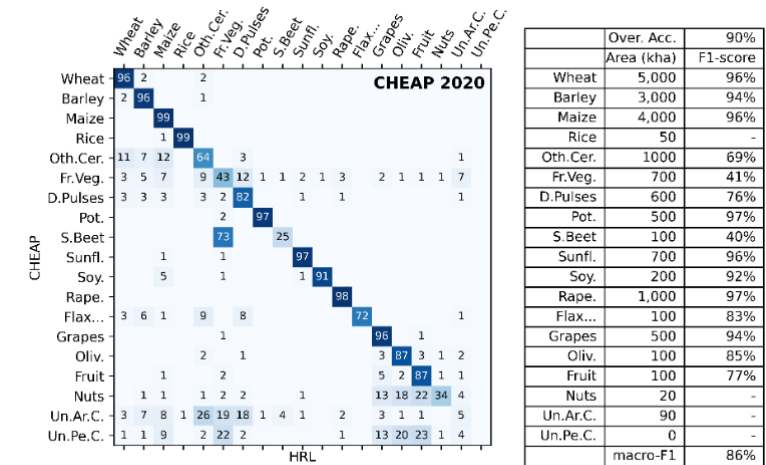
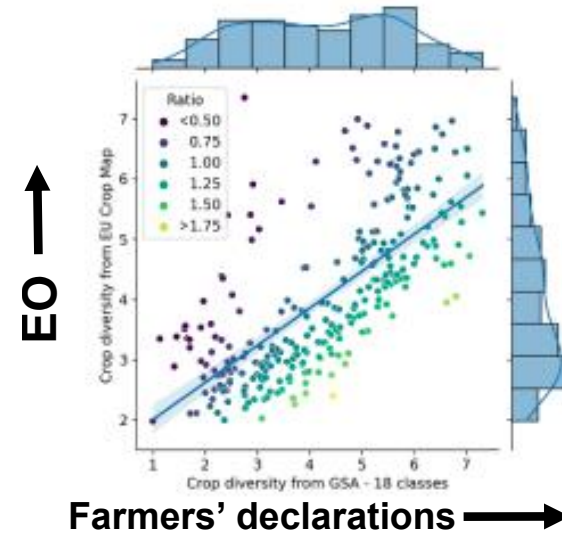
Release, apply, and collaborate to generate EU wide data, analyses and indicators

### Farmers' declarations compared to Earth Observation

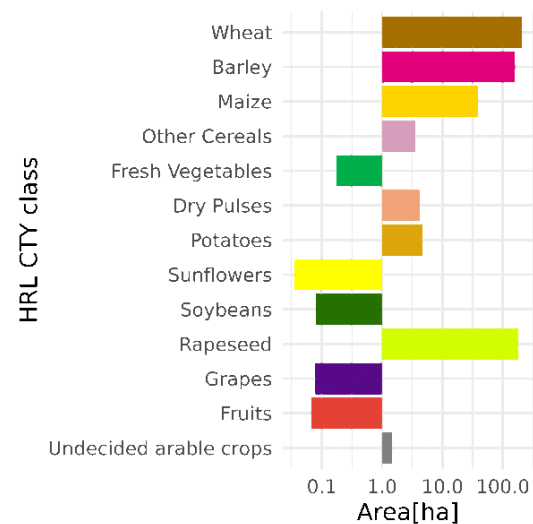
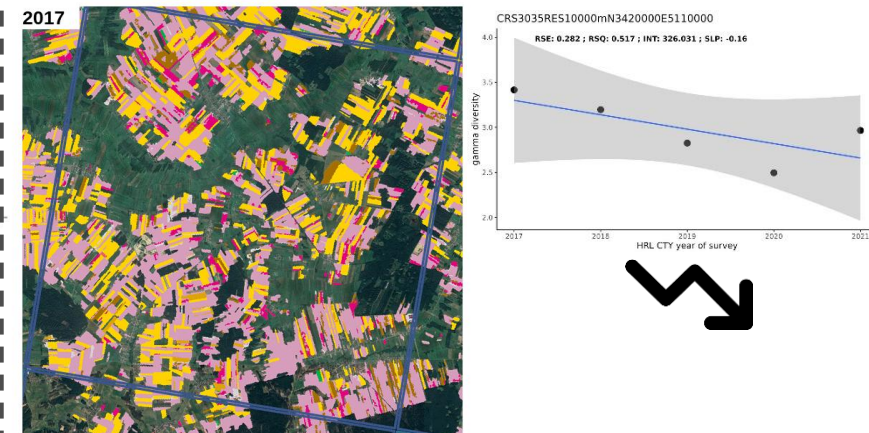
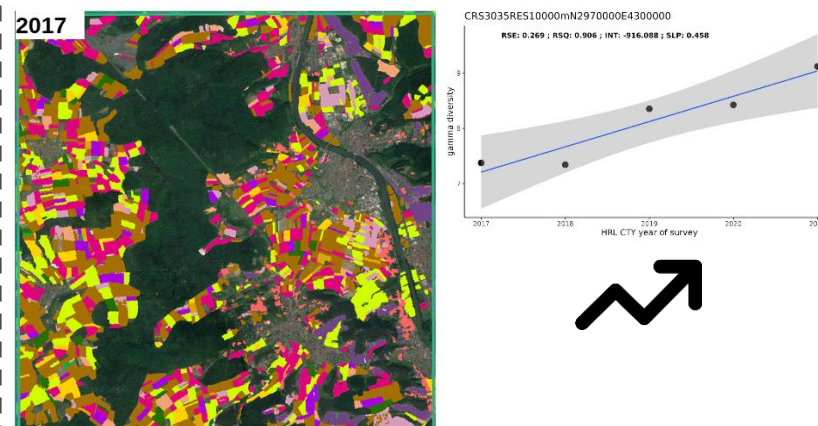
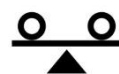
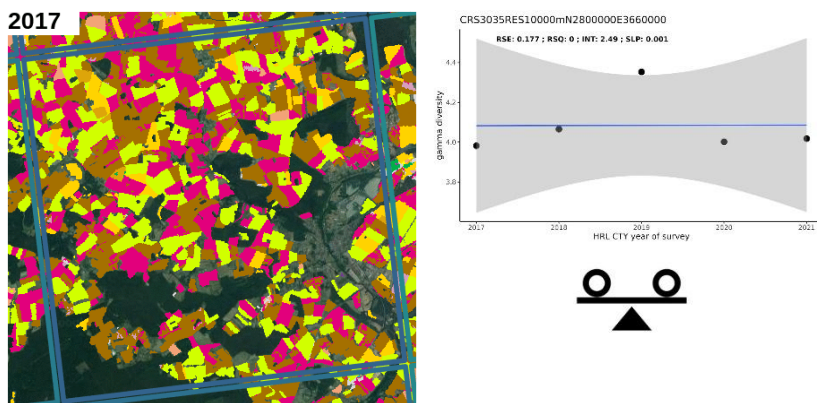


Van der Velde et al., 2025

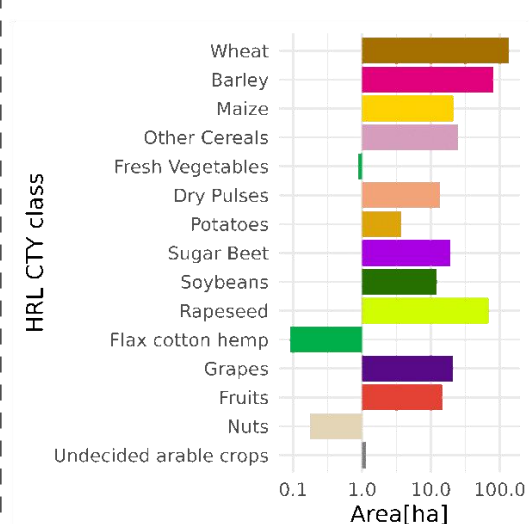
Shannon crop diversity



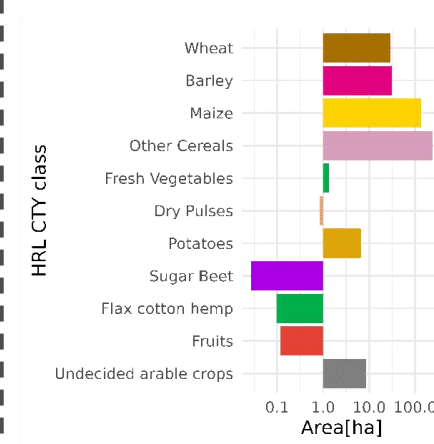
# Crop diversity as a time-series



Centre-Val de Loire (FRB0),  
France



Unterfranken (DE26),  
Germany

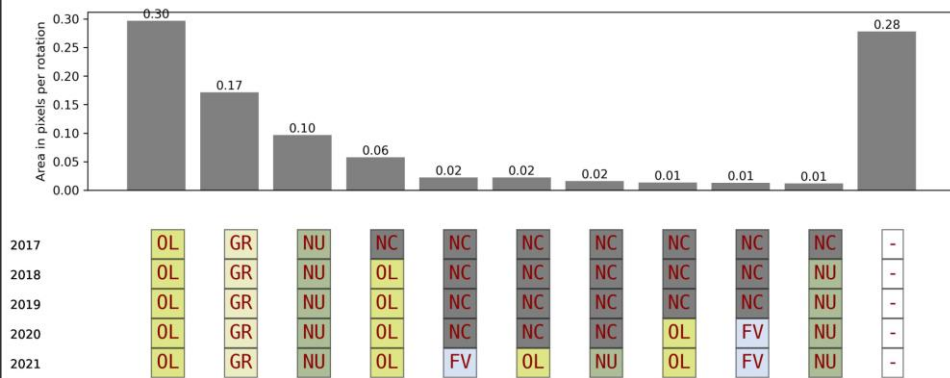


Podlaskie (PL84),  
Poland

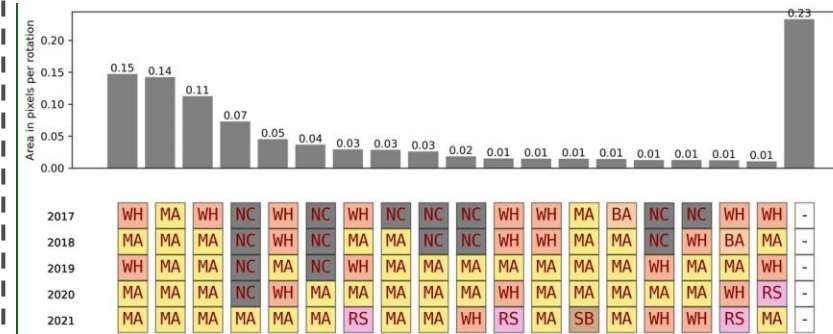




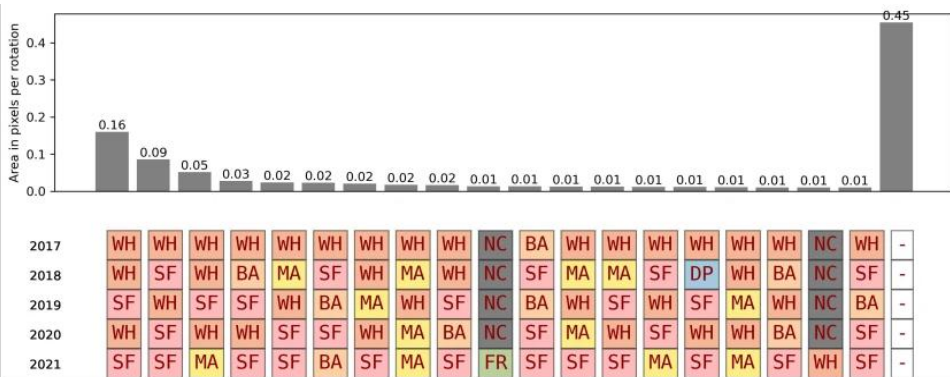
# Examples of most common rotations at LAU4



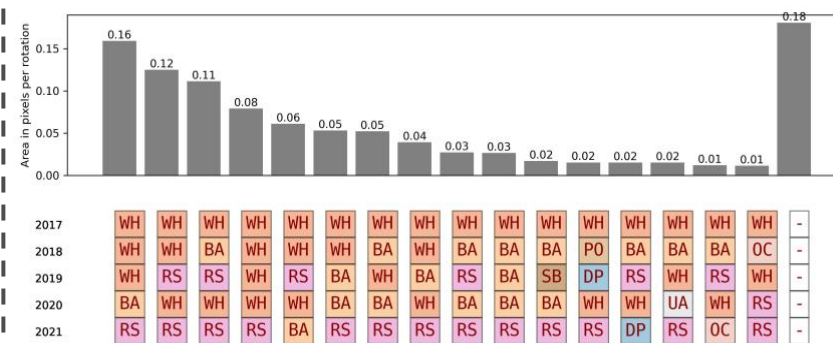
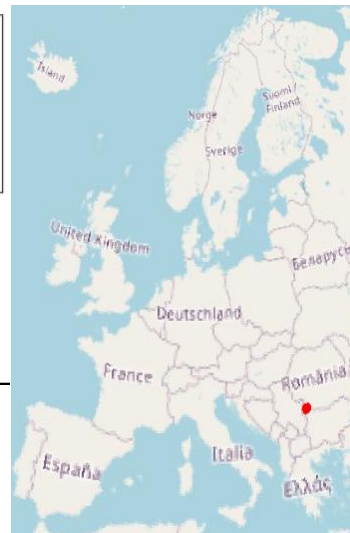
Mainly permanent crops: Olive trees, Grapes and nuts (south of Spain)



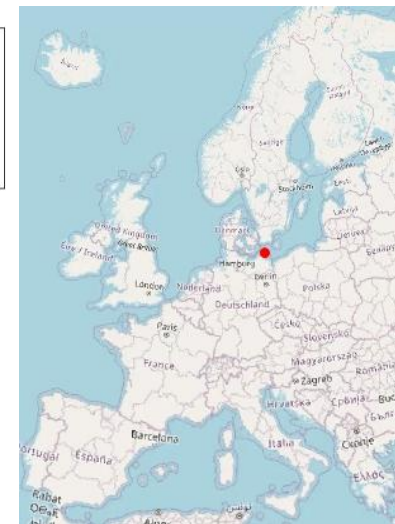
## Cereals : Wheat- Maize – Rapeseed (West of France)



Wheat – sunflower –barley (South of Romania)



Wheat – barley -rapeseed (North of Germany)



# Earth observation for improved monitoring of woody features?

- Compare EMBAL data against new 3m EO Trees Outside of Forest product (*collaboration with University of Copenhagen*)
- Highly detailed simulations of woody features restoration based on parcel boundaries and Copernicus Small Woody Features (Marcantonio et al., 2025)

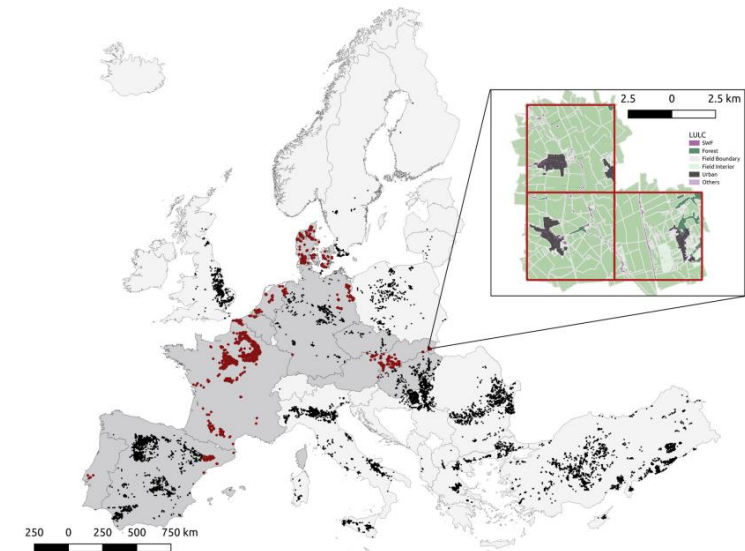
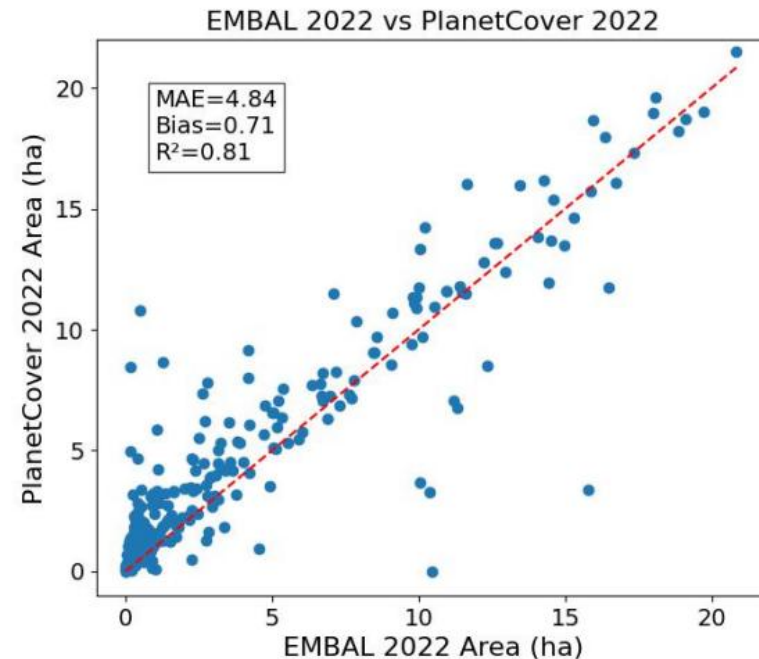
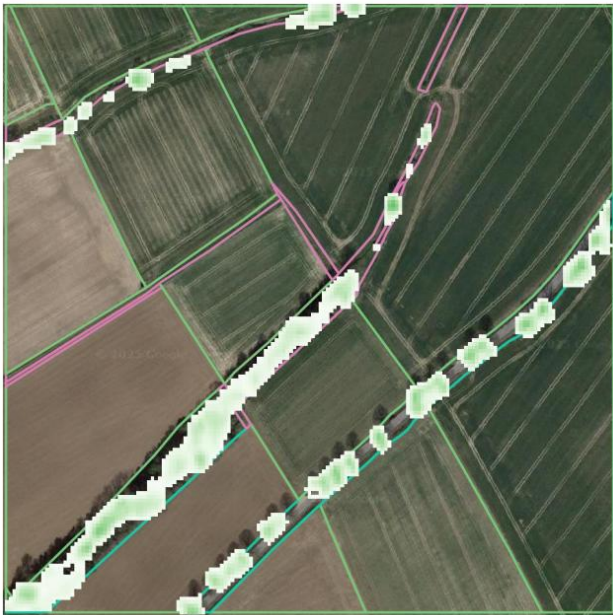


Fig. 1 Overview of the subset of  $5 \times 5$  km grid cells for the 27 EU Member States selected for the simulations. Black cells represent cells with crop surface > 90%, red cells the subset of these cells with GSA parcel boundaries, which are shown

(in grey) in the example inset together with the other land use/cover categories. The countries coloured in darker grey are those represented in the final set of cells





# JRC Farming practices Evidence Library

## JRC-Farming-Practices dataset (version 2023)

- Systematic screening of peer-reviewed meta-analyses
- 34 categories of sustainable farming practices
- 3700 records

The chart illustrates, for the selected combination of classes of practices and sustainability outcomes, the distribution of results showing significant **positive** or **negative** effects, **non-significant** effect or **non-statistically-tested** results. Numbers represent the count of available results.

↓ Sustainability Outcomes / Farming Practices →



## Joint Research Centre Data Catalogue

[Home](#) [Datasets](#) [Collections](#) [About](#)

[European Commission](#) > [EU Science Hub](#) > [JRC Data Catalogue](#) > [Datasets](#) > [JRC-Farming-Practices dataset \(version 2023\) – An ...](#)

DATASET

## JRC-Farming-Practices dataset (version 2023) – An evidence library of the effects of Farming Practices on the environment and the climate

Collection:

JRC-FP-dataset : JRC-Farming-Practices data collection – An evidence library of the effects of Farming Practices on the environment and the climate

[www.nature.com/scientificdata](https://www.nature.com/scientificdata)

scientific **data**

OPEN

DATA DESCRIPTOR

Evidence library of meta-analytical literature assessing the sustainability of agriculture – a dataset

Andrea Schievano<sup>1</sup>, Marta Pérez-Soba<sup>1</sup>, Simona Bosco<sup>1</sup>, Ana Montero-Castaño<sup>1</sup>, Rui Catarino<sup>1</sup>, Mathilde Chen<sup>2</sup>, Giovanni Tamburini<sup>3</sup>, Beatrice Landoni<sup>4</sup>, Otho Mantegazza<sup>4</sup>, Irene Guerrero<sup>1</sup>, Maria Bielza<sup>5</sup>, Michael Assouline<sup>1</sup>, Renate Koeble<sup>6</sup>, Frank Dentener<sup>1</sup>, Marijn Van der Velde<sup>7</sup>, Carlo Rega<sup>7</sup>, Andrea Furlan<sup>7</sup>, Maria Luisa Paracchini<sup>1</sup>, Franz Weiss<sup>1</sup>, Vincenzo Angileri<sup>1</sup>, Jean-Michel Tarras<sup>1</sup>, David Schuster<sup>1</sup>



Joint Research Centre

Livestock Feeding and Sustainability:  
Mapping Environmental,  
Climate, and Productivity Outcomes

Bosco, S., Chen, M., Bielza, M., Montero Castaño, A., Schievano, A., Catarino, R., Guerrero, I., Tamburini, G., Pérez-Soba, M., Weiss, F., Dentener, F., Torres, J.-M., van der Velde, M., Makowski, D.  
2025



# Classification scheme of farming practices

ISSN 1831-9424



## A classification scheme based on farming practices

A tool for labelling interventions with environmental and climate-related commitments in Common Agricultural Policy strategic plans

Angileri, V., Guerrero, I., Weiss, F.

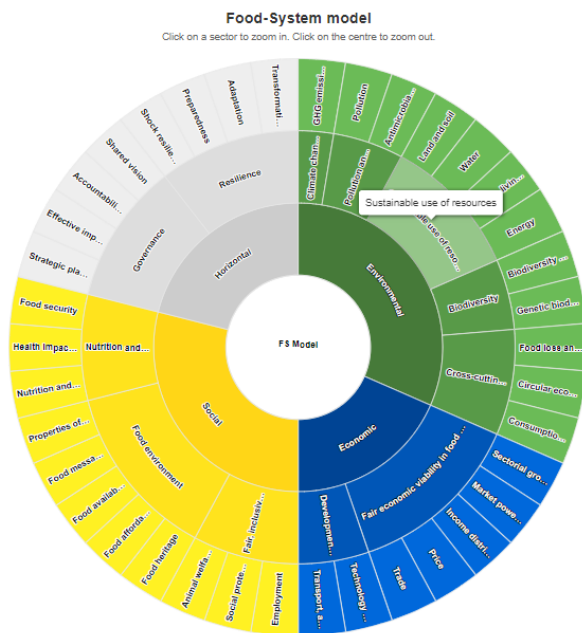
2024



Comprehensive, common classification scheme to systematise interventions in CAP Strategic Plans

- a typology of more than 350 farm practices
- organised by 18 sections,
- with 45 farm practices at 'Tier 1',
- 164 farm practices at 'Tier 2' and
- 157 farm practices further refined at 'Tier 3'.



[illegible]

Home
Methodology
EU overview
Country Profile
Help

You can visualize here data of one indicator at a time for all EU in the form of map or bar chart, with manual or auto-play options to change the year.

FS model
Supply chain component

Select indicators grouped by the dimension and supply chain component. Please note that some indicators fall into several chain components.

Search indicators

Environmental
37

Primary food production
17

Food processing
7

Food distribution
5

Common farmland birds indicator

Consumption Footprint - Food

Consumption Footprint - Food (biodiversity loss)

Food loss and waste

GHG food system emissions

Food consumption
8

Economic
27

Social
19

Consumption Footprint - Food (biodiversity loss)

Assessment of the potential biodiversity loss per capita due to the use of resources and to emissions, along the entire EU food supply chain.  
This is an extensive indicator: original values depend on the extent of the country.

2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022

EU-27
14.78k
species.yr

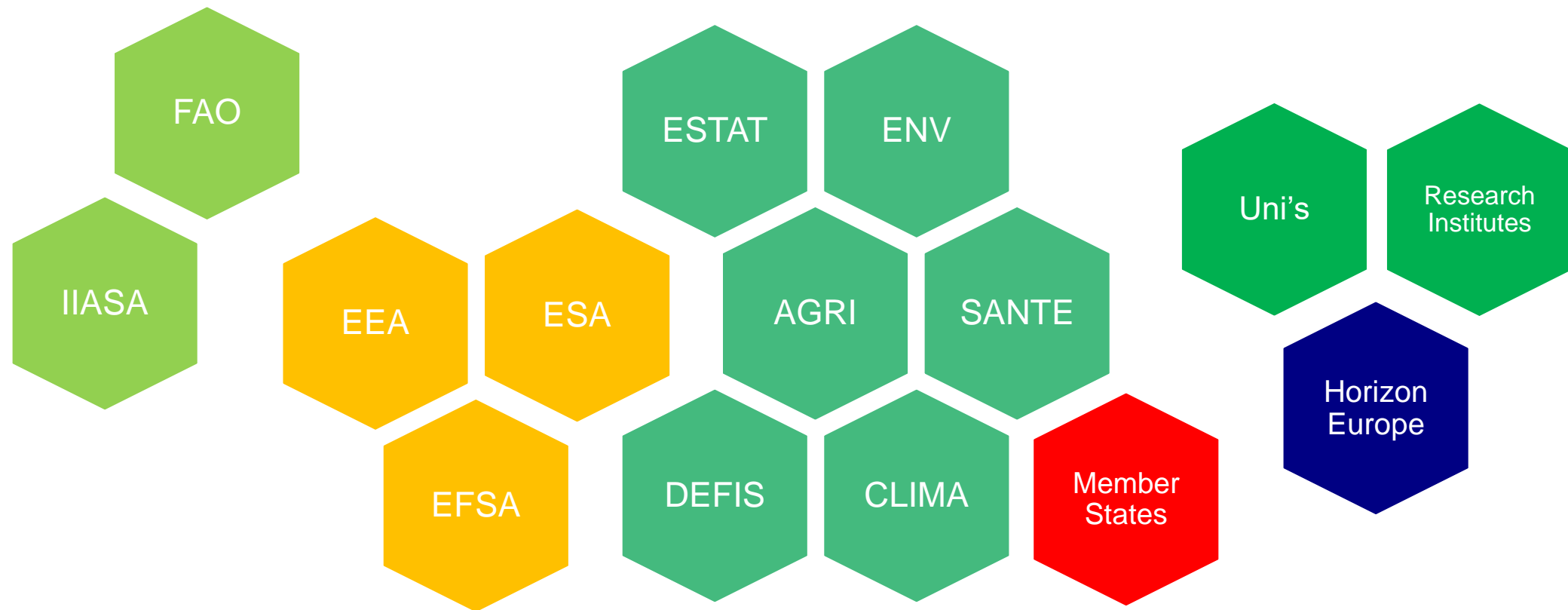
Force denomination  
OFF ON  
Switch ON to divide by Population

Map
Bar chart
Timeline
Table

Consumption Footprint - Food (biodiversity loss)
2022

species.yr
2.96k
24.79

# Network and collaboration essential for our work



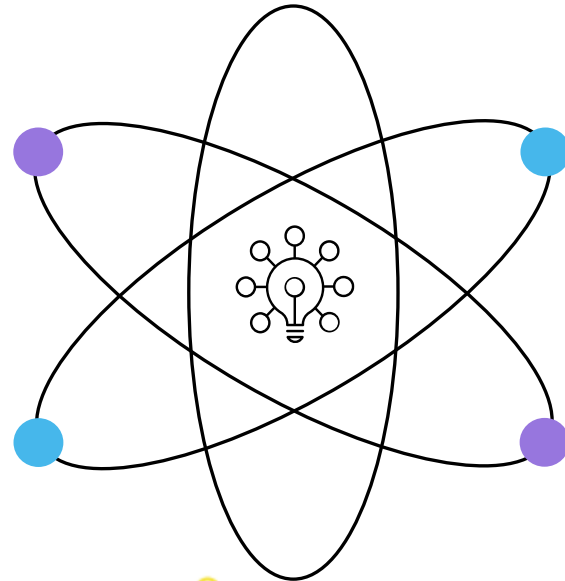
# Cooperation with Horizon Europe projects



Modern approaches to the monitoring of biodiversity



Towards Sustainable Land-Use in Europe



Innovating crop rotations for climate-resilient agriculture

Achieving Ecological Resilient Dynamism for the European food system through consumer-driven policies

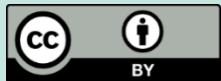
## BIOCLIMA

Improving Monitoring for Better Integrated Climate and Biodiversity Approaches, Using Environmental and Earth Observations





# Thank you



[andrea.hagyo@ec.europa.eu](mailto:andrea.hagyo@ec.europa.eu)

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