

The JRC's role in agricultural and environmental research

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Joint Research Centre, DG JRC

D.5 Food security Unit

Agriculture & Environment & Climate Team

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

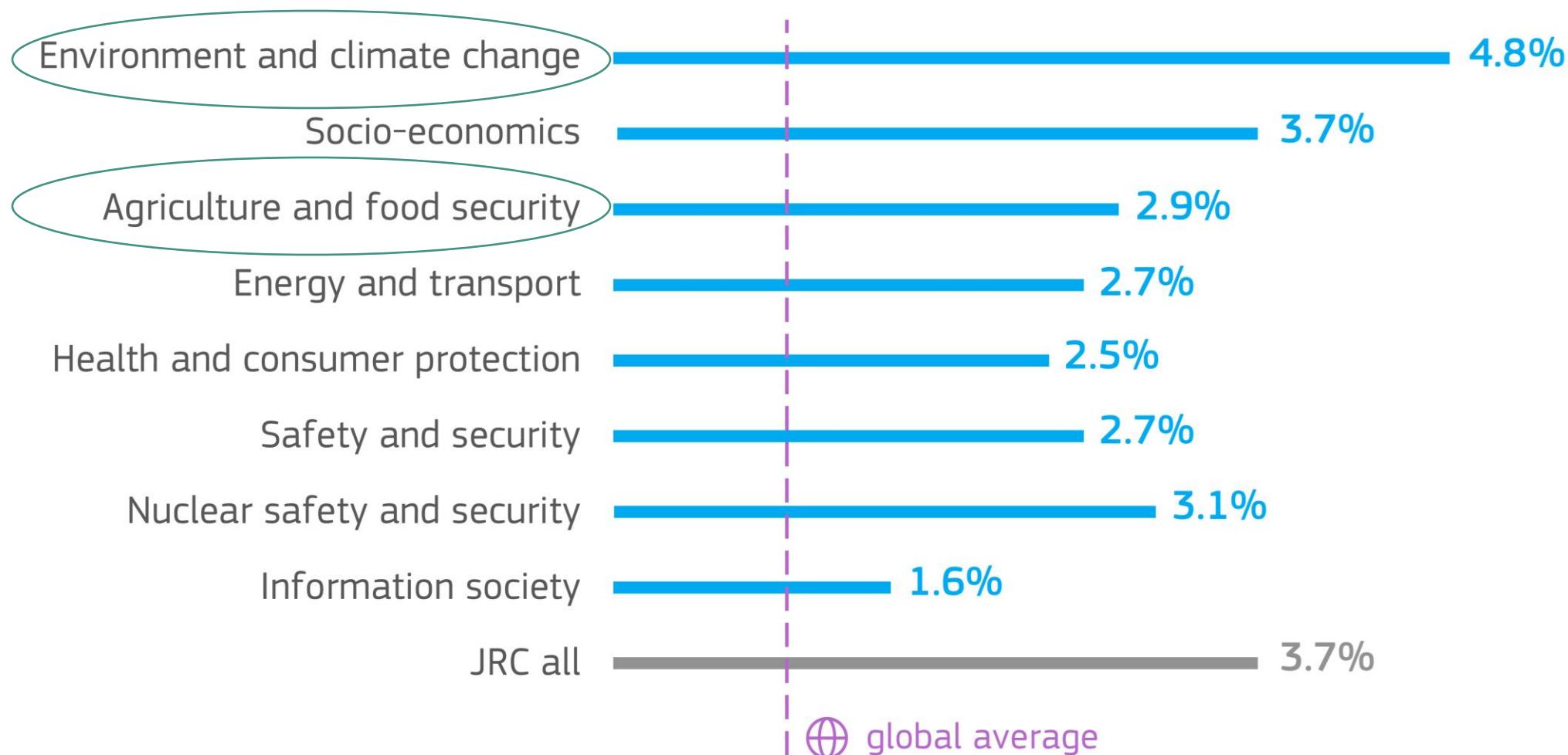
Chinese Academy of Sciences – CN

National Centre for Scientific Research – FR

5% publications



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



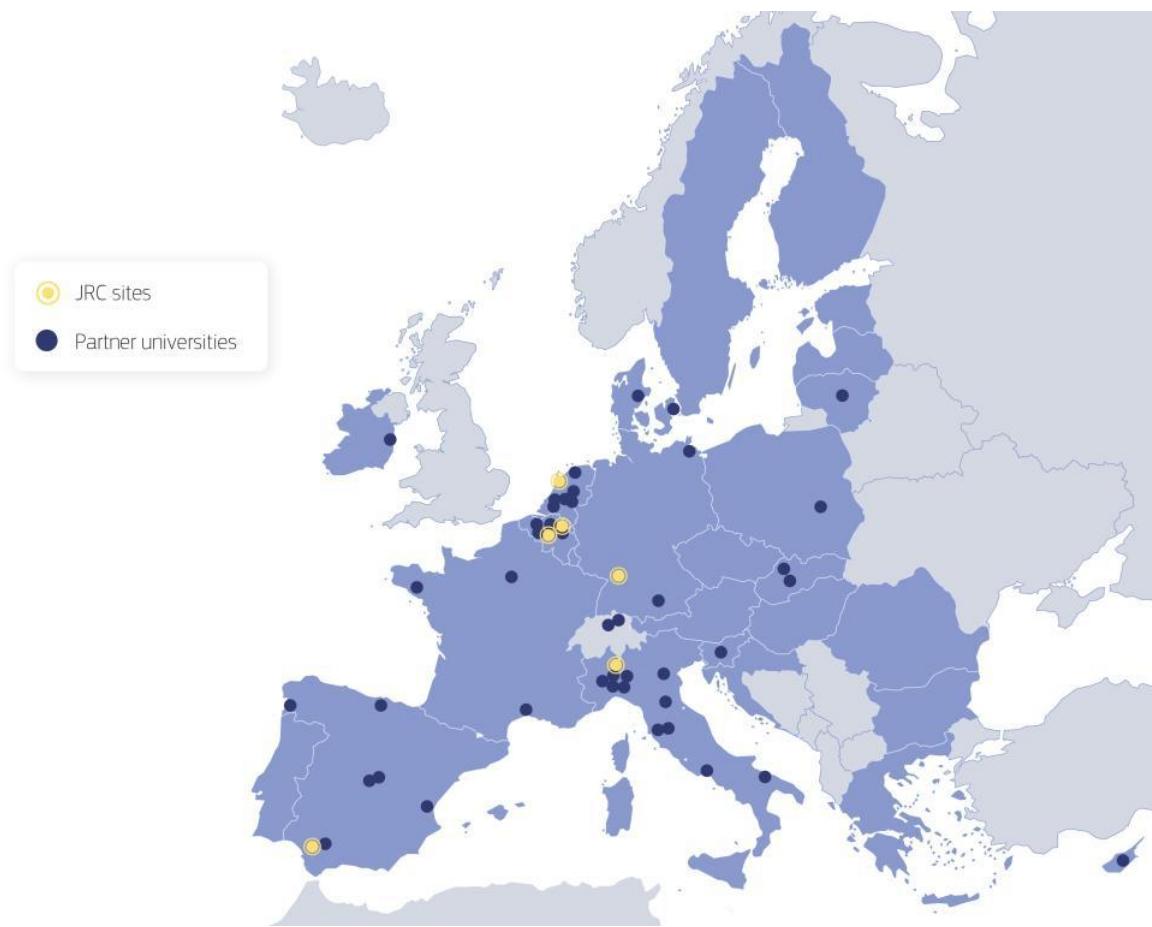
JRC in the Horizon Europe programme



- 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** e.g.
 - KC for Global Food and Nutrition Security
 - KC on Earth Observation
 - KC for Biodiversity
- Applicants are encouraged to consider possible contribution to JRC platforms.



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

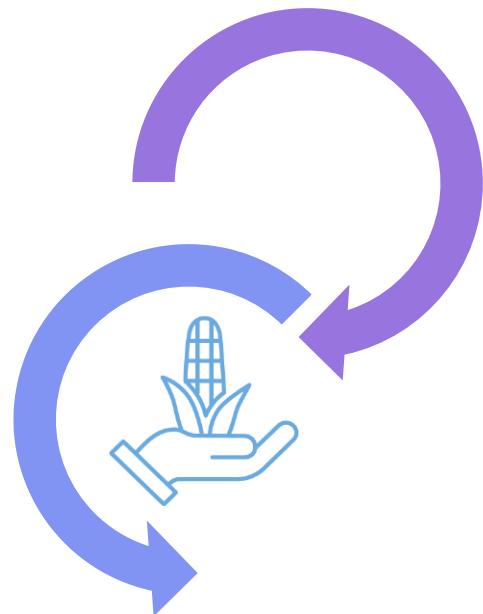
Our mission

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.

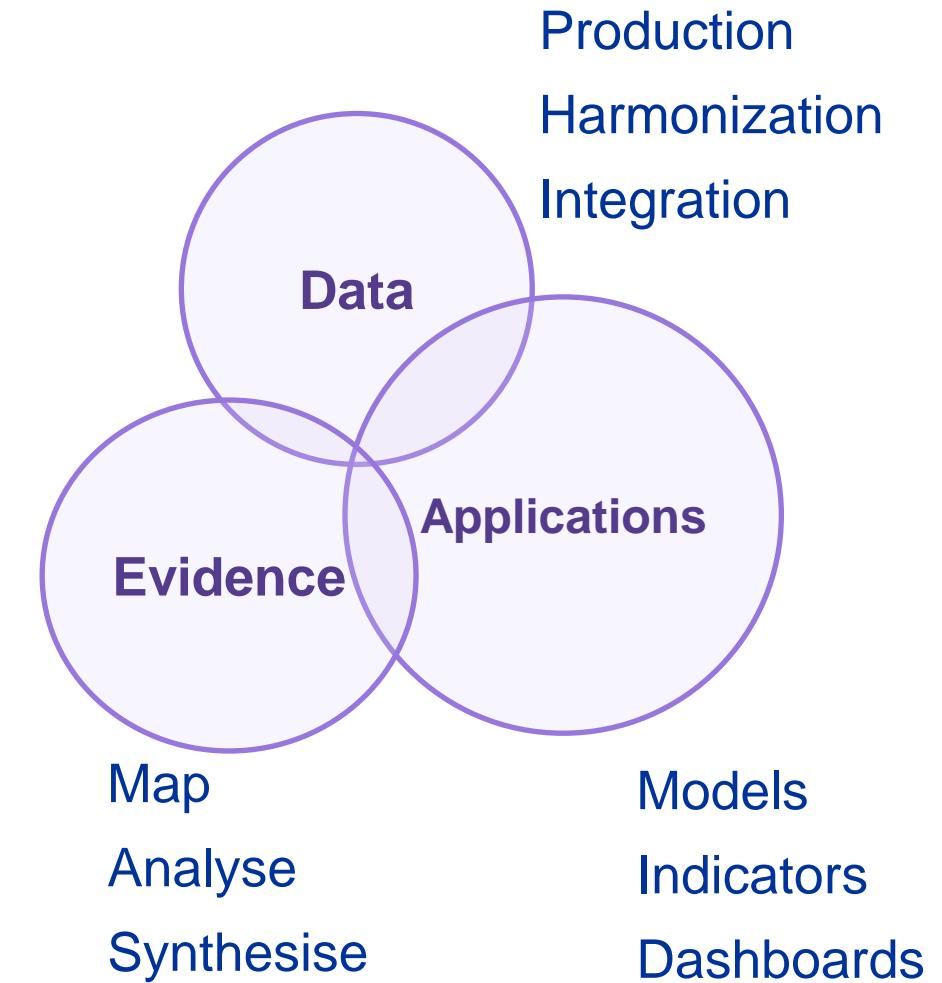


JRC's agri-environmental research

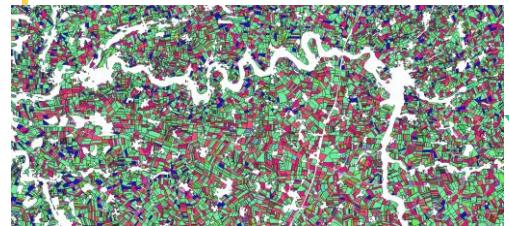


Evaluating the current and future environmental and climatic performance of agriculture

Assessing agricultural production, food security, nutrition and food system sustainability in a European and global context



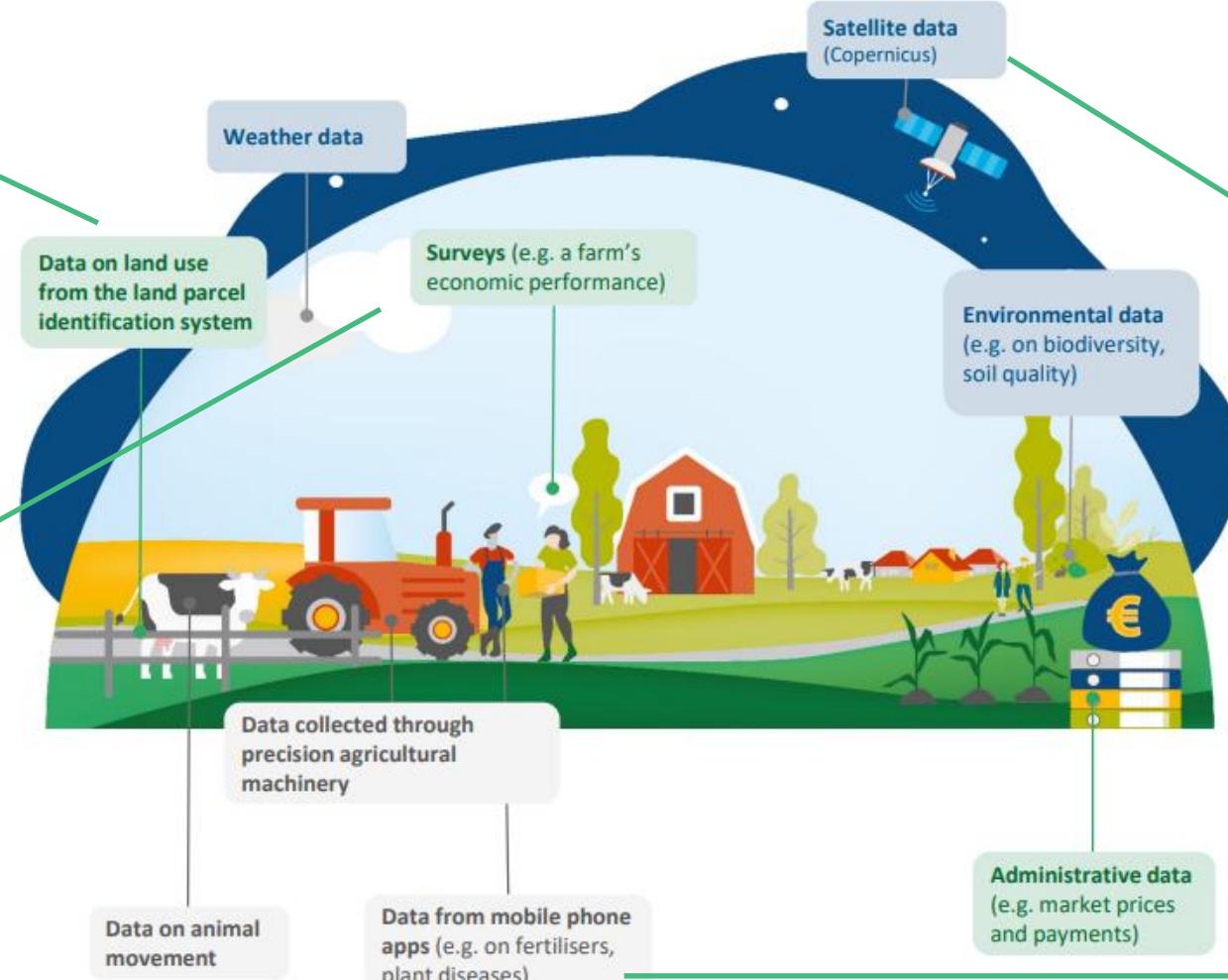
Stats & data collected & created around the farm



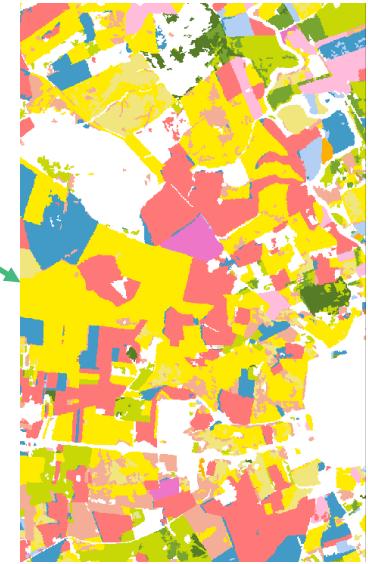
Parcel and holding data - IACS



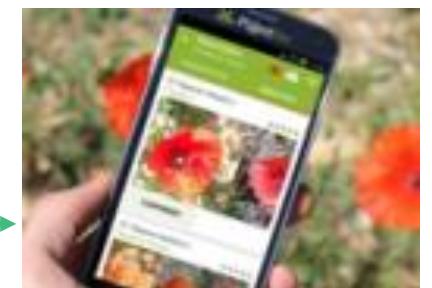
Farm holding data



Source: ECA.



Pixel data



Available, comparable, interoperable, used, fit?

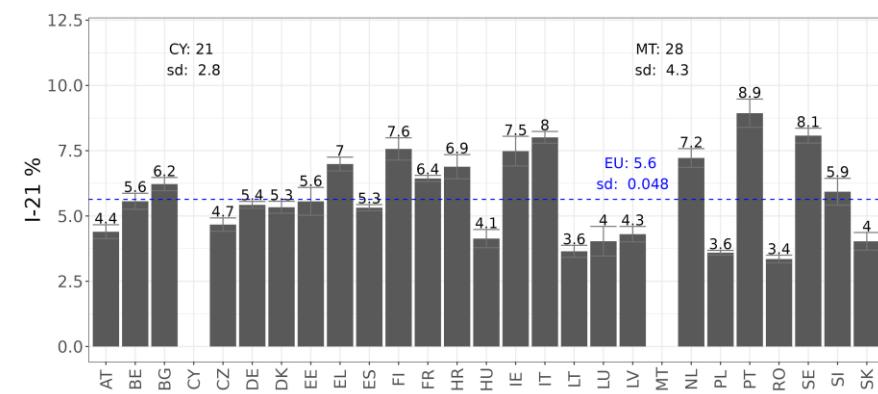


Strengthening EU monitoring schemes

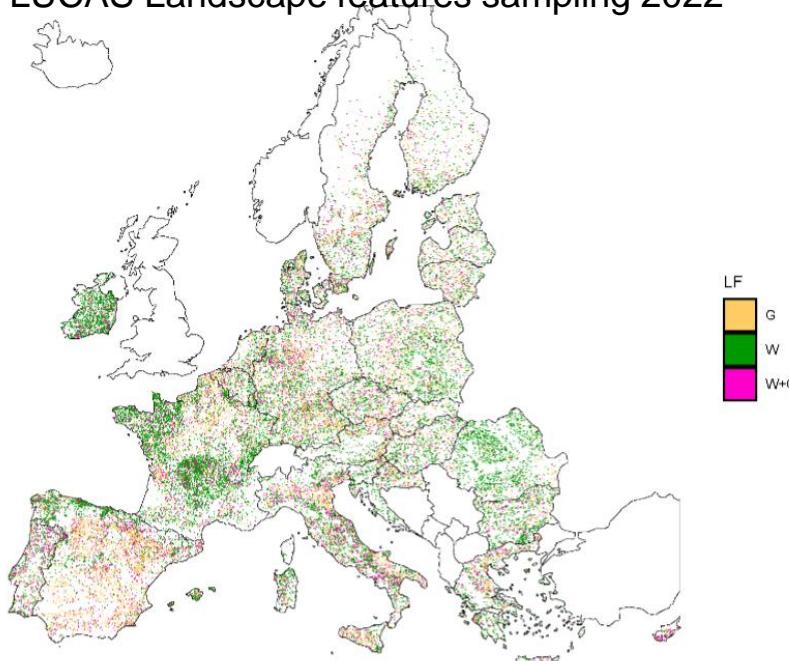
LUCAS: EU's Land Use/ Land Cover Survey

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: Textual Search 2023

Plot: 12

Ortho: 100% 1 2 3 4

Parcels: 100% IC1 Fill Stroke

Transect: 100% Arable Grassland

EMBAL plots: 3000

INDEX	FID	NUTS0	PLOT_O_DES	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, Stone walls in grass lands with faxinus.	
3	4	PT	Typical grassland from the north, with hight vineyards, many water	
4	5	PT	Stone elements	
5	6	PT	Grazed grassland and shrubland, many stone walls	
6	7	PT	Terraces, home vegetables, fruit trees, vineyards. Familiar agriculture. Water and forest	
7	8	PT	Grasslands irrigated, many caddle	
8	9	PT	Fruit tree plantation and vineyard with sheep grazing, family gardens, large shrubland	
9	10	PT		many_parcels_not_obs challenging_terrain
10	11	PT		
11	12	PT		
12	13	PT		
13	14	PT		
14	15	PT		
15	17	PT		
16	18	PT	Industrial zone	
17	19	PT	Typical coastal alentejo montado	
18	20	PT	Terraces, forest with chestnut tree, oaks and pines. Some agricultural approach to chestnut.	
19	21	PT	Quercus suber+ cypress+ scrubland	
20	22	PT	Many water, pasture on the grassland, but many scrub and forest also	
21	23	PT		landowner_problematic
22	24	PT	Forest, vineyards, olives, garden, small fields	
23	25	PT		
24	26	PT		
25	27	PT		
26	28	PT	Many Eucalyptus	challenging_terrain
27	29	PT	Almond+ olive+ vineyards. Abandoned almond trees dry place	challenging_terrain
28	30	PT		

Legend

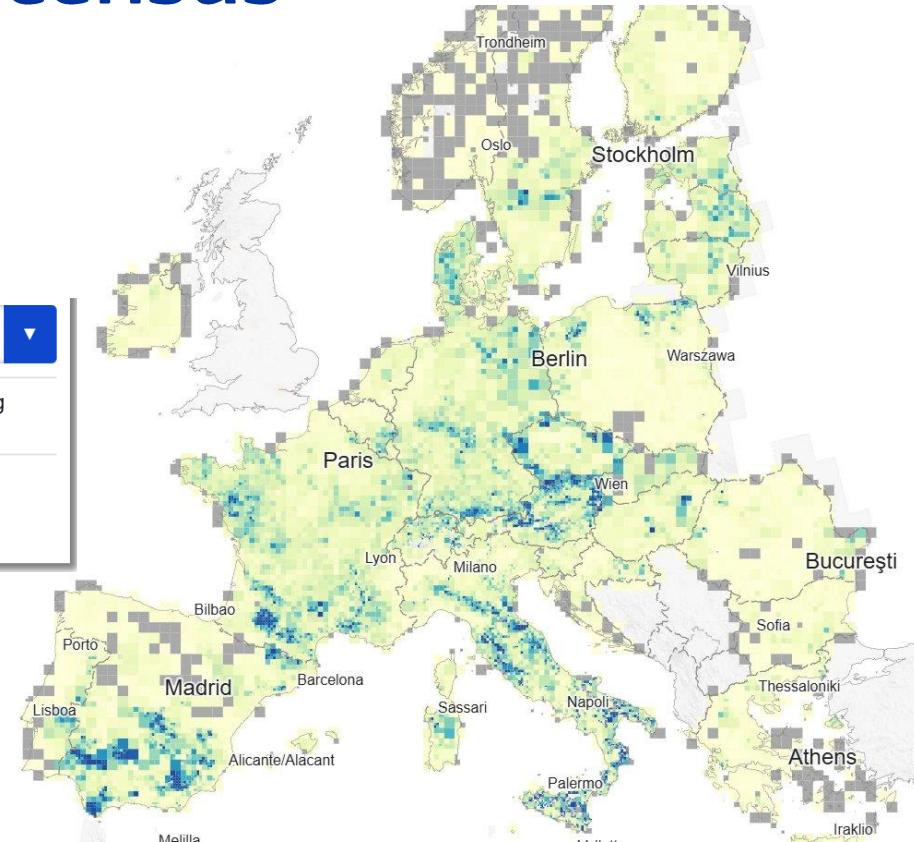
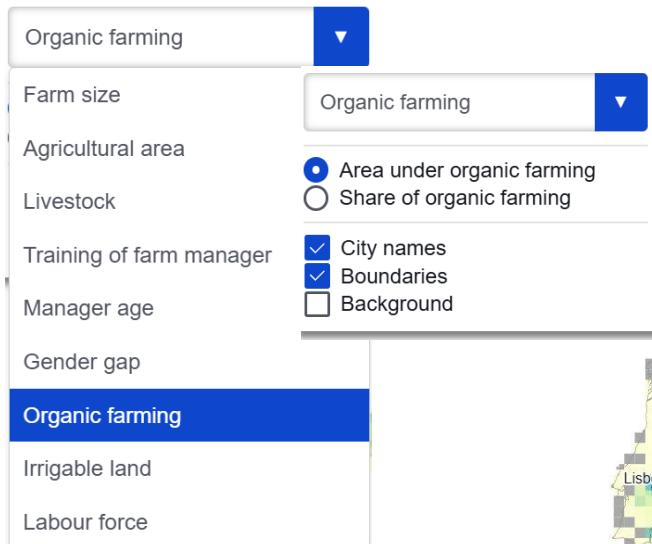
- Arable land
- Fallow
- Shrubland
- Woodly elements
- Grass-herb elements
- Water elements
- Stone, rock, raw soil
- Rocks and rocks
- Man-made structures
- Forest
- Open water
- Settlement and asphalt
- Other open, non-agr.
- Arable transects
- Grassland transects

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



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

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](#)

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

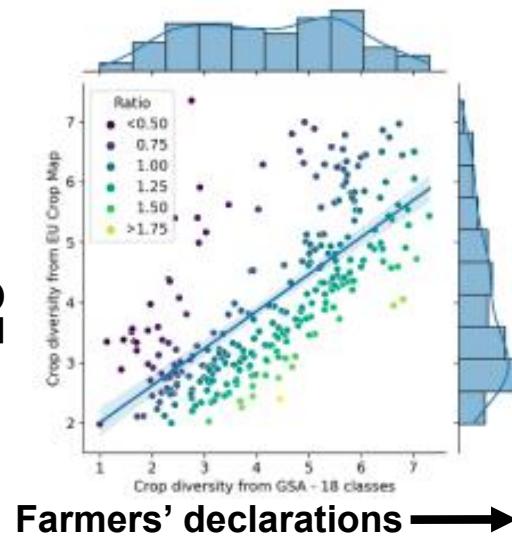
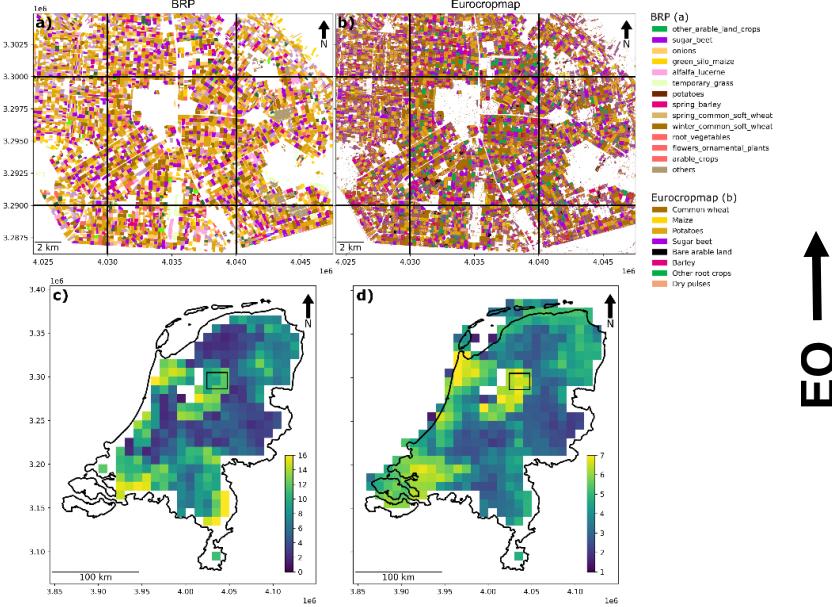


Innovative geospatial agri-environmental monitoring

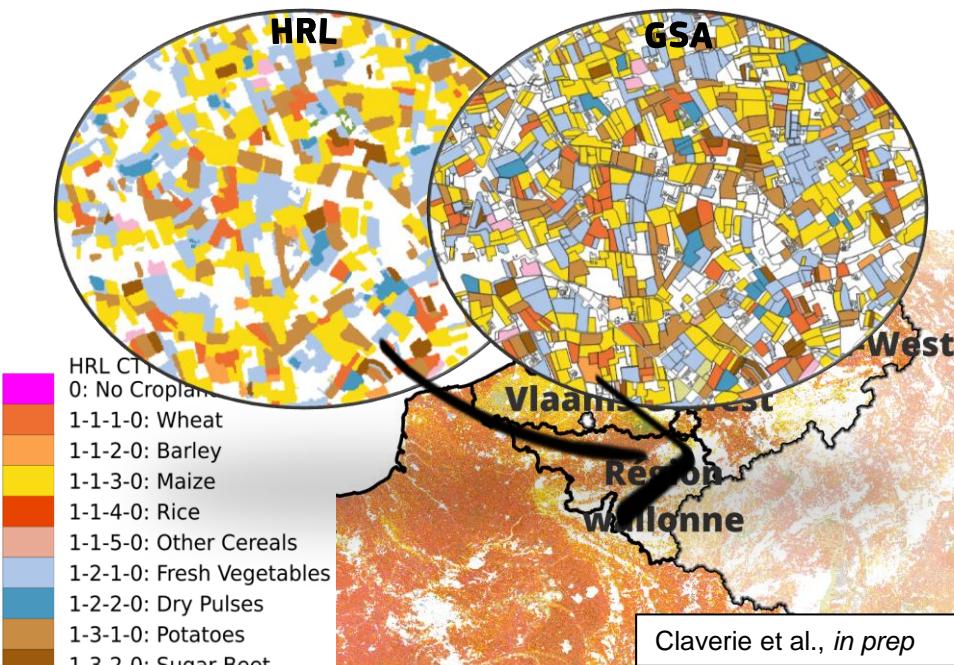
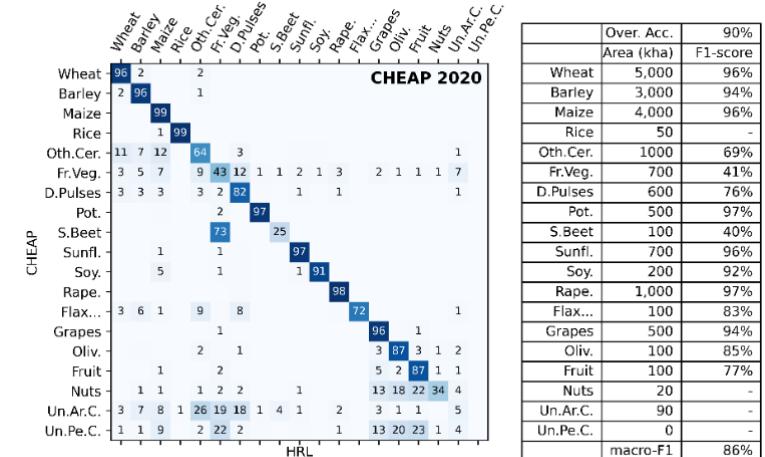
Integrating in-situ observations, statistics, and Earth Observation with advanced analytics

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

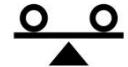
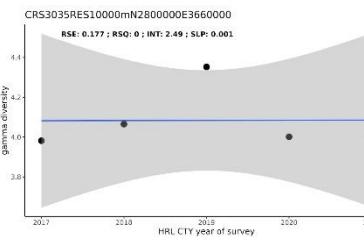
Farmers' declarations compared to Earth Observation



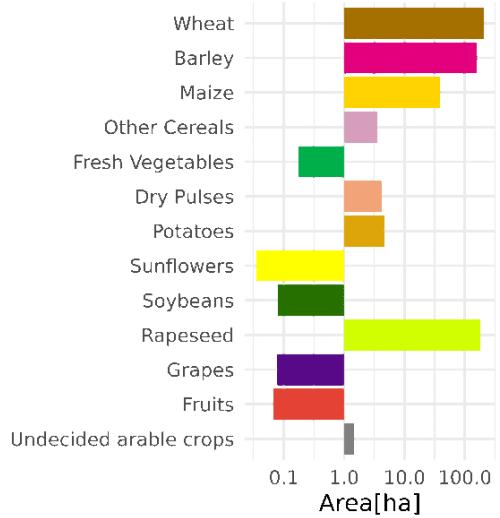
Van der Velde et al., 2025



Crop diversity as a time-series

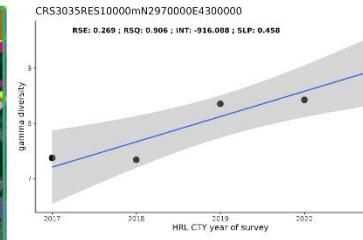


HRL CTY class

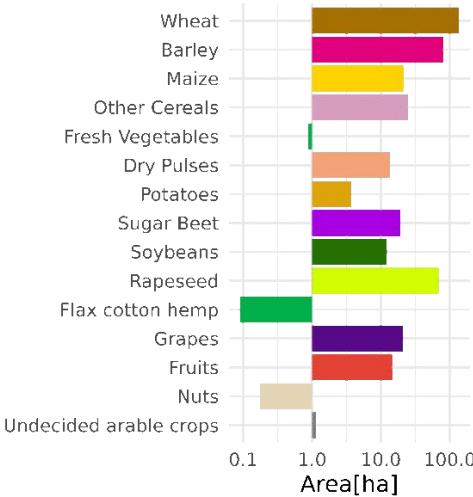


Centre-Val de Loire (FRB0),
France

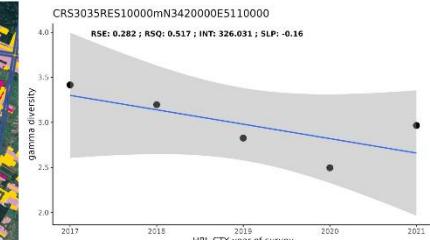
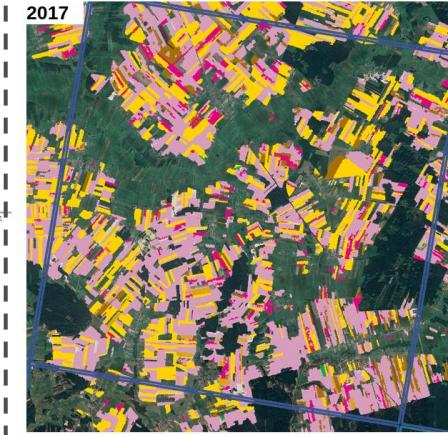
Iordanov et al., *in prep.*



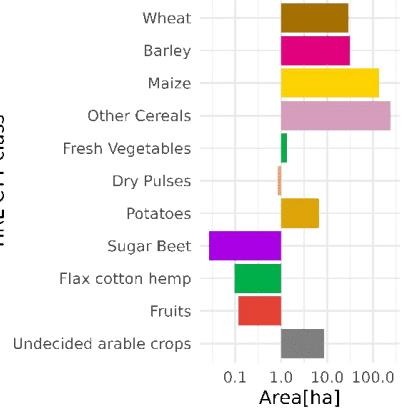
HRL CTY class



Unterfranken (DE26),
Germany



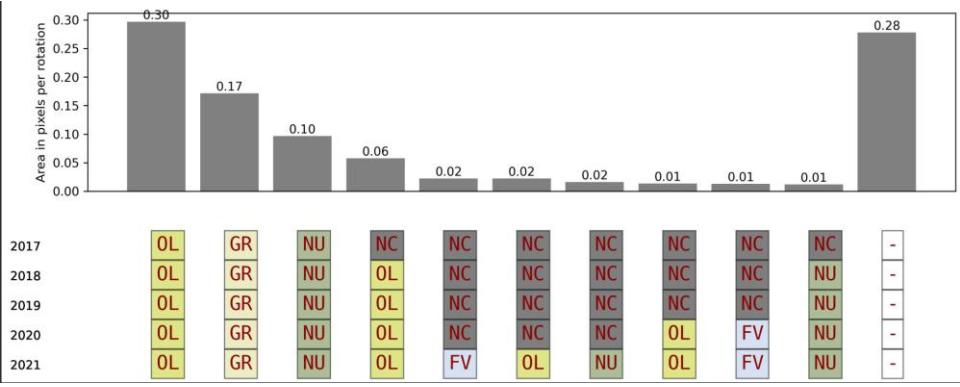
HRL CTY class



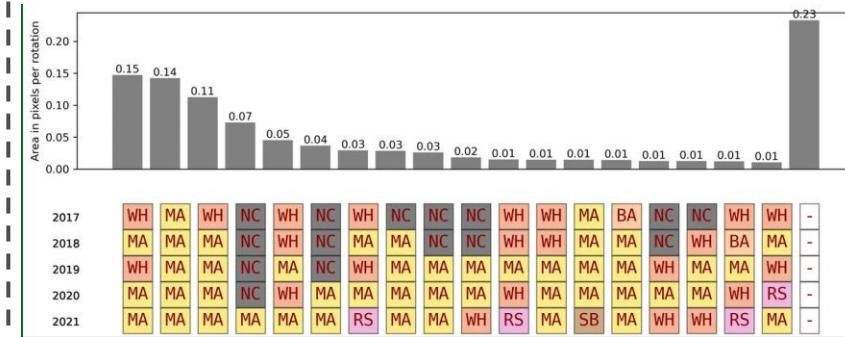
Podlaskie (PL84),
Poland



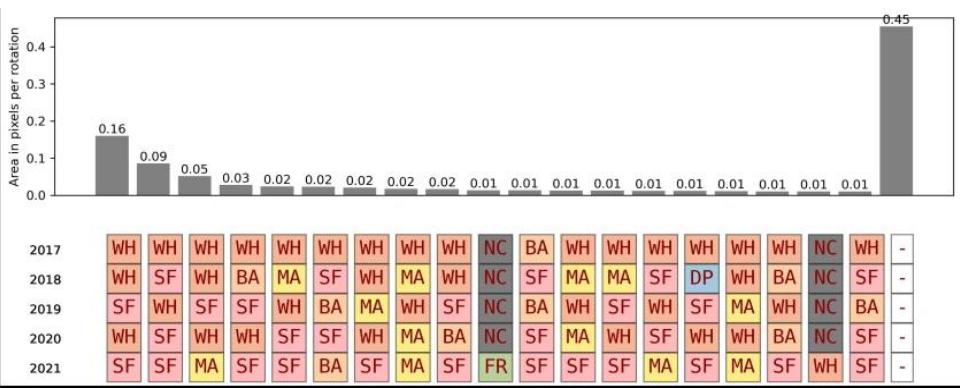
Examples of most common rotations at LAU4



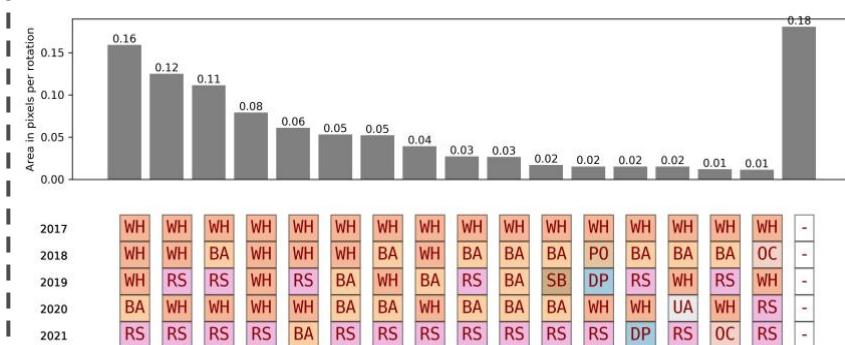
Mainly permanent crops: Olive trees, Grapes and nuts (south of Spain)



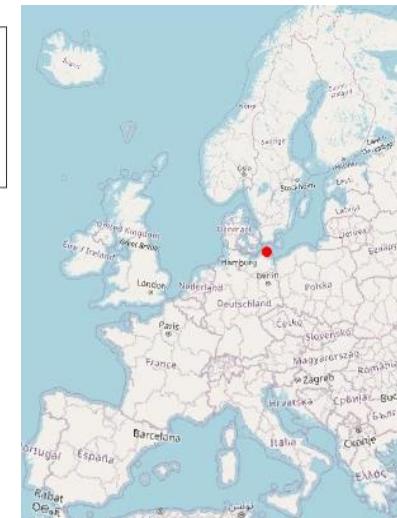
Cereals : Wheat- Maize – Rapeseed (West of France)



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 EU-wide 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)

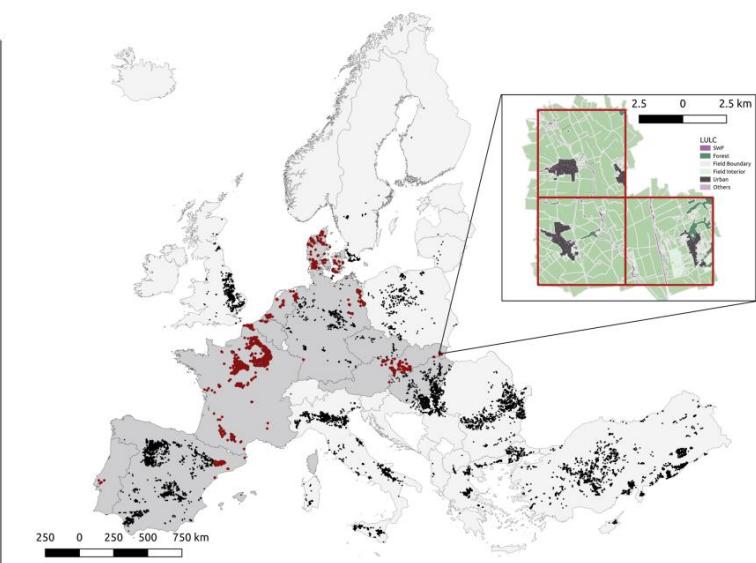
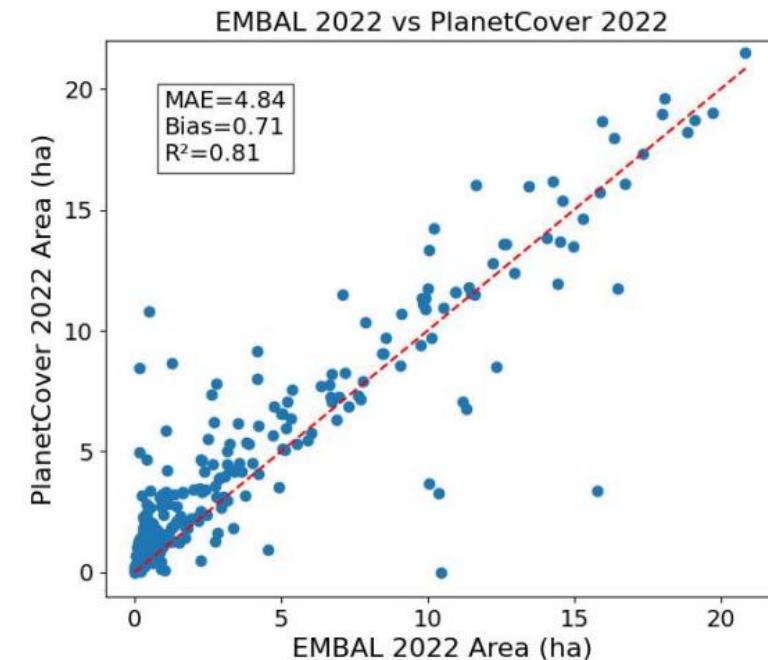


Fig. 1 Overview of the subset of 5×5 km grid cells for the 27 EU Member States selected for the simulations. Black cells represent cells with crop surface > 90%, red cells the subset of these cells with GSA parcel boundaries, which are shown

(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

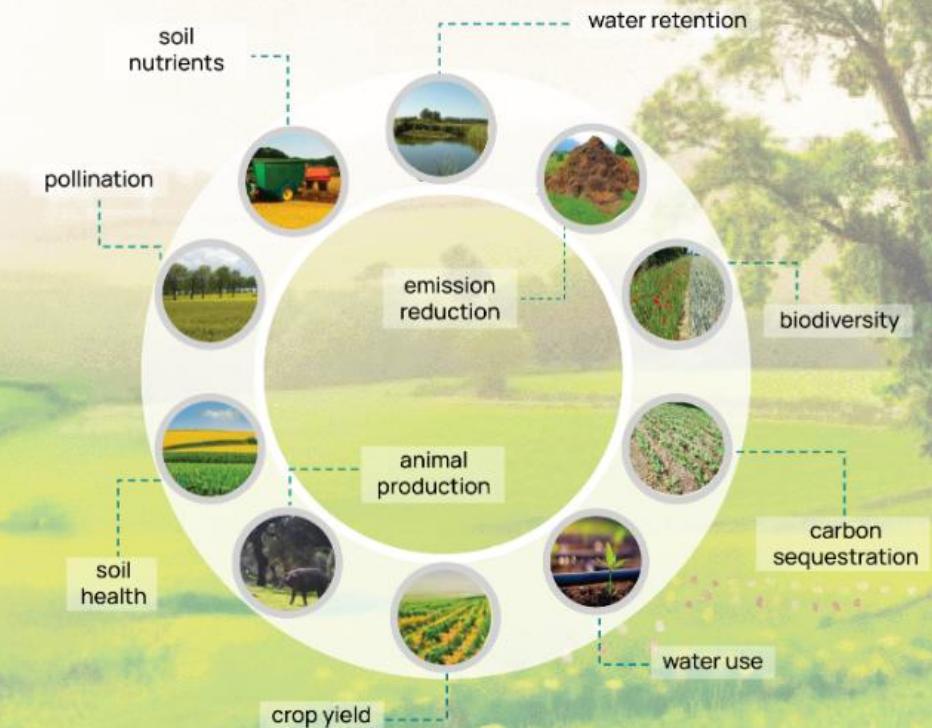


Welcome to the JRC Farming practices Evidence Library

This library synthesizes a large amount of scientific evidence to assess the **effects of farming practices on sustainability outcomes**, mainly regarding the environment, the climate, and agricultural productivity.

How to cite this library: [10.2760/9473570](https://doi.org/10.2760/9473570)

Explore the Library



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.



www.nature.com/scientificdata/

scientific data

Check for updates

OPEN

DATA DESCRIPTOR

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

Andrea Schievano¹, Marta Pérez-Soba¹, Simona Bosco¹, Ana Montero-Castaño¹, Rui Catarino¹, Mathilde Chen², Giovanni Tamburini³, Beatrice Landoni³, Otto Mantegazza⁴, Irene Guerrero¹, Maria Bielza⁵, Michael Assouline⁶, Renate Koeble⁶, Frank Dentener¹, Marijn Van der Velde⁶, Carlo Rega⁷, Andrea Furlan⁷, Maria Luisa Paracchini¹, Franz Weiss¹, Vincenzo Angileri¹, Jean-Michel Terres¹ & David Makowski²

https://data.jrc.ec.europa.eu/dataset/4e3c371a-be72-4ea0-aa0b-45f8cd2064

European Commission

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 evidence library of the effects of Farming Practices on the environment and the climate

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 >

Classification scheme of farming practices

ISSN 1331-9424



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



EUR 31896 EN

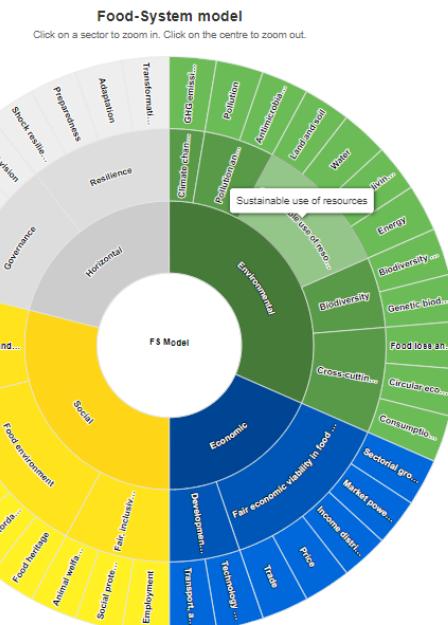
Comprehensive classification scheme to systematise interventions in CAP Strategic Plans



European Union Food System Monitoring



EU food system monitoring framework. From concepts to indicators

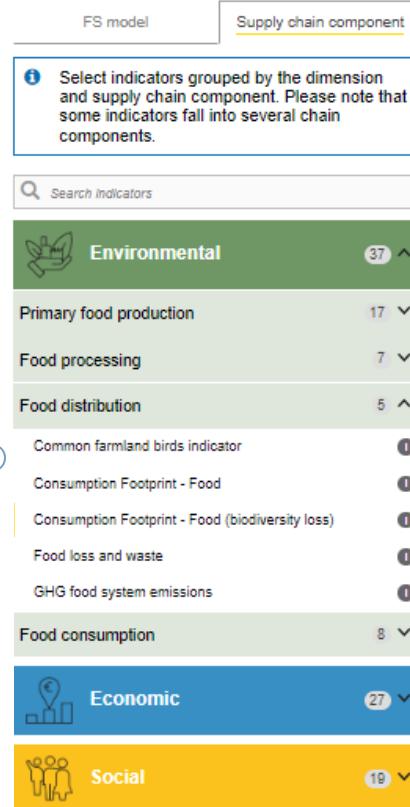


EU Food System Monitoring Dashboard

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.

Full screen



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.

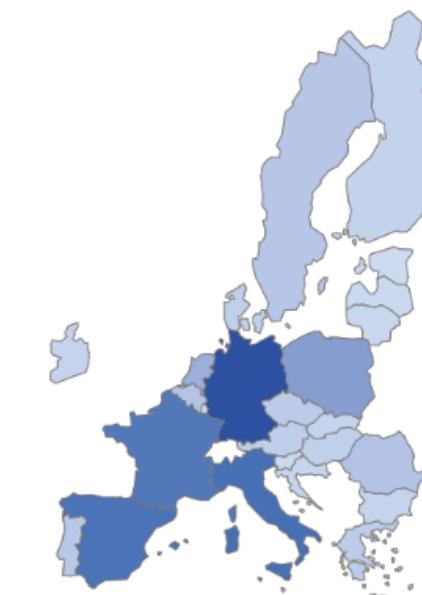
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 >

EU-27
14.78k
species.yr

Force denomination
OFF ON
Switch ON to divide by Population

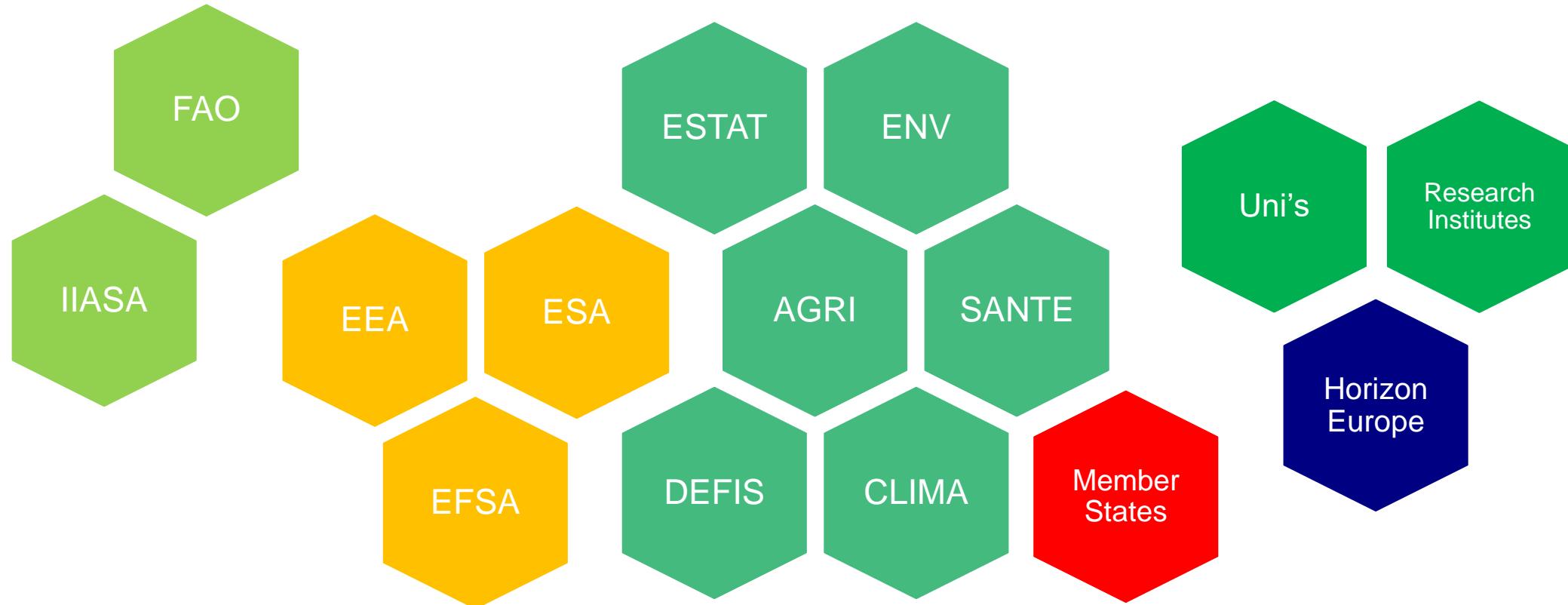
Consumption Footprint - Food (biodiversity loss)

2022



Map Bar chart Timeline Table

Network and collaboration essential for our work



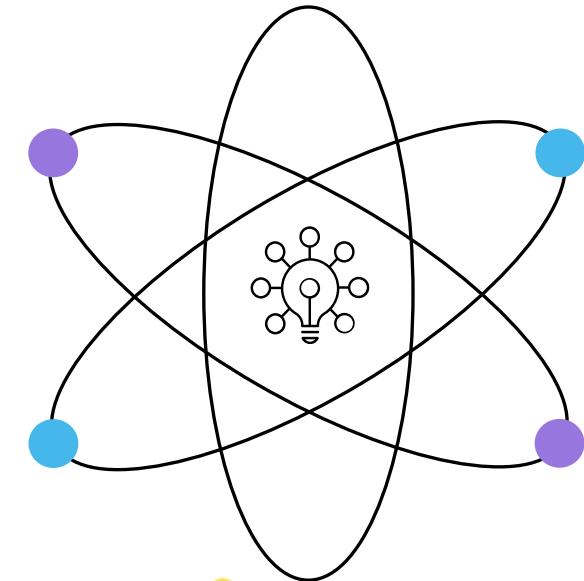
Cooperation with Horizon Europe projects



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



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