

IV Jornada del Día Mundial del Suelo en Navarra



"Prácticas innovadoras de gestión del suelo en Europa: mitigación del cambio climático y mejora de la salud del suelo a partir de uso de enmiendas orgánicas"



Sonia Rodríguez Cruz

Grupo contaminación suelos y aguas: Diagnóstico, prevención y/o remediación



14 diciembre 2022

Grupo de investigación: Contaminación de suelos y aguas (por pesticidas): Diagnóstico, prevención y/o remediación

Integrantes: Sonia Rodríguez Cruz (IC), Jesús Marín Benito (CT), M^a Jesús Sánchez Martín (PI-Ad Honórem).

<https://www.irnasa.csic.es/grupo-de-contaminacion-de-suelos-y-aguas/>

Líneas de investigación:

- Dinámica de pesticidas en suelos agrícolas, modelización y predicción de la contaminación bajo prácticas de manejo sostenible y sistemas de cultivo más respetuosos con el medioambiente.
- Evaluación del impacto de las enmiendas orgánicas sobre la salud de suelo y en la dinámica de pesticidas en suelos en ensayos de laboratorio, invernadero y campo.
- Estudio del efecto de pesticidas y enmiendas orgánicas sobre las comunidades microbianas del suelo.
- Recuperación de suelos contaminados por pesticidas mediante métodos fisicoquímicos.
- Monitorización de la contaminación por pesticidas en suelos y aguas en áreas agrícolas.



Compost vegetal



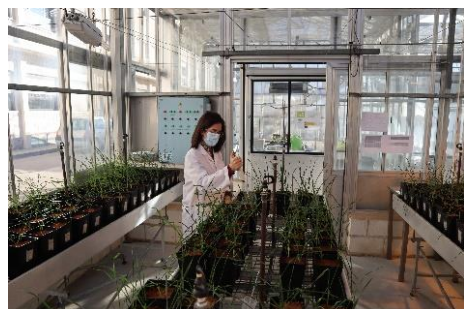
Orujo de uva



Lodo de depuradora



Sustrato postcultivo de hongos



Dinámica de pesticidas en suelos agrícolas, modelización y predicción de la contaminación bajo prácticas de manejo sostenible y sistemas de cultivo más respetuosos con el medioambiente

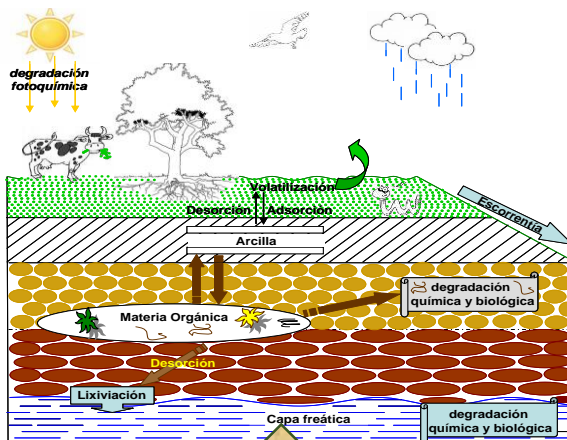
Agricultura de conservación



Estudios de laboratorio

- Adsorción
- Degradación
- Influencia de la MO, COD, Tª, Humedad...

Dinámica de pesticidas



EFEECTO

Evaluación Riesgos Medioambientales

Modelos FOCUS:

- Adaptación
- Modelización
- Predicción largo plazo

Estudios de campo

- Disipación
- Movilidad
- Efecto en Humedad suelo

1. Establecer medidas preventivas
2. Forzar su inclusión en la evaluación del registro de pesticidas
3. Optimización agricultura conservación

1. Innovative Soil Management Practices across Europe

Programa: EU-H2020 - EJP-SOIL-Grant Agreement 862696- Towards climate-smart sustainable management of agricultural soils. European Joint Project COFUND.

Coordinador: Frédéric Vanwindekens (CRAW, Belgium)

Participantes: CREA (Co-Lead, Italy), AGS (Co-Lead, Switzerland), **CSIC-IRNASA** (Spain), INRAE (France), WR (Netherlands), ILVO (Belgium), CULS (Czech Rep.), AU (Denmark), EMU (Estonia), LUKE (Finland), vTI (Germany), MTA ATK (Hungary), Teagasc (Ireland), UL (Latvia), LAMMC (Lithuania), NIBIO (Norway), IUNG-BIP (Poland), INIAV (Portugal), NPPC (Slovakia), ULBF (Slovenia), SLU (Sweden) TAGEM (Turkey), AFBI (UK), AGES (Austria)

Responsable IRNASA-CSIC: Sonia Rodríguez Cruz

Presupuesto: 460000,00 €

Duración: Febrero 2021- Marzo 2022 (14 meses)



EJP SOIL has received funding from the European Union's Horizon 2020 research and innovation programme: Grant agreement No 862695



1. Innovative Soil Management Practices across Europe

OBJETIVO:

Promover **prácticas innovadoras de manejo del suelo (SMP)** en los sistemas agrícolas para mejorar los servicios de los ecosistemas a fin de minimizar las amenazas al suelo y sostener la agricultura en un contexto de cambio climático.

- Elaborar un **inventario completo de 58 SMP y 51 IMP** y su capacidad para tener éxito en múltiples escenarios, producción agrícola, servicios ecosistémicos, ciclos biogeoquímicos.
- Utilizar un enfoque de **encuestas**, para **documentar estas prácticas agrícolas innovadoras**. Sintetizar los datos recopilados considerando las limitaciones técnicas y ecológicas y las barreras socioeconómicas.
- Proporcionar **mapas temáticos específicos** del contexto para guiar a los responsables de la formulación de políticas hacia las **SMPs innovadoras más eficientes**.

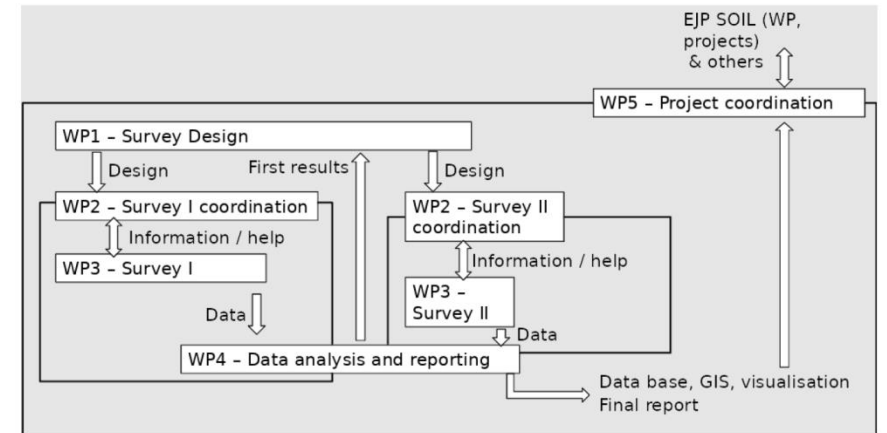


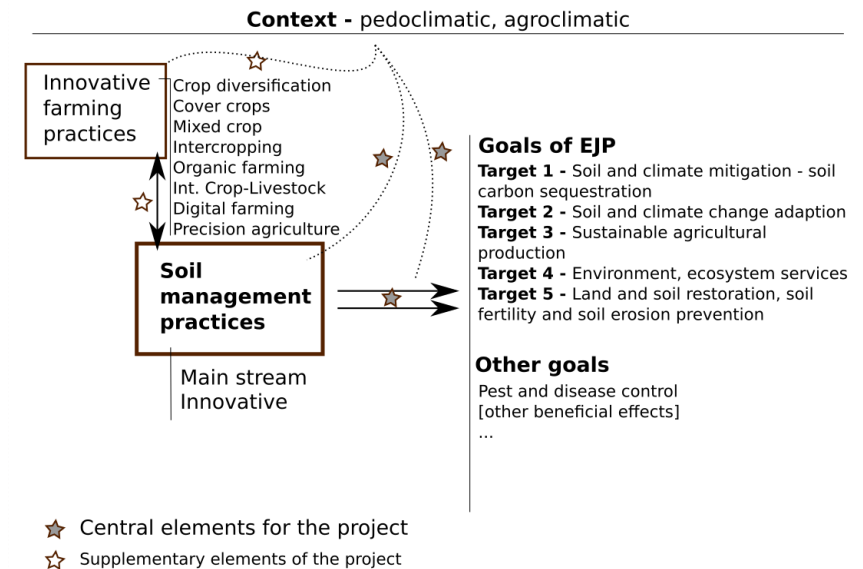
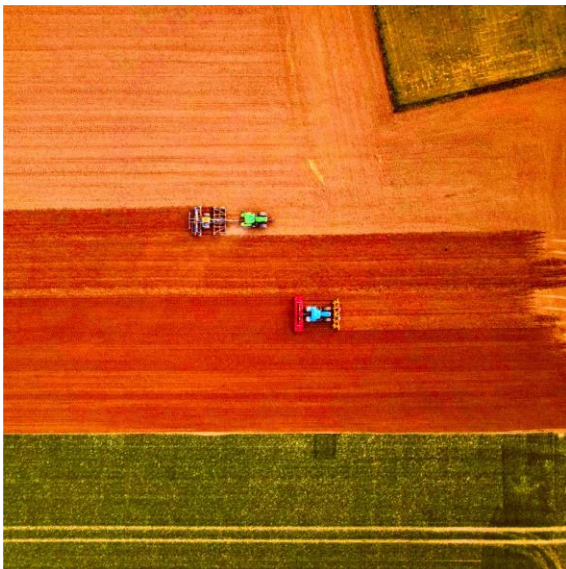
Figure 2 - General structure of the i-SoMPE project and interaction between work packages

1. Innovative Soil Management Practices across Europe

OBJETIVOS ESPECIFICOS:

i-SoMPE ha explorado cuatro ejes principales sobre las practicas de manejo del suelo:

1. Inventario completo de 58 SMP y 51 IMP.
2. Adopción actual de las 58 SMP por los agricultores en Europa.
3. Limitaciones bio-físicas en la adopción de las SMP.
4. Barreras y oportunidades.



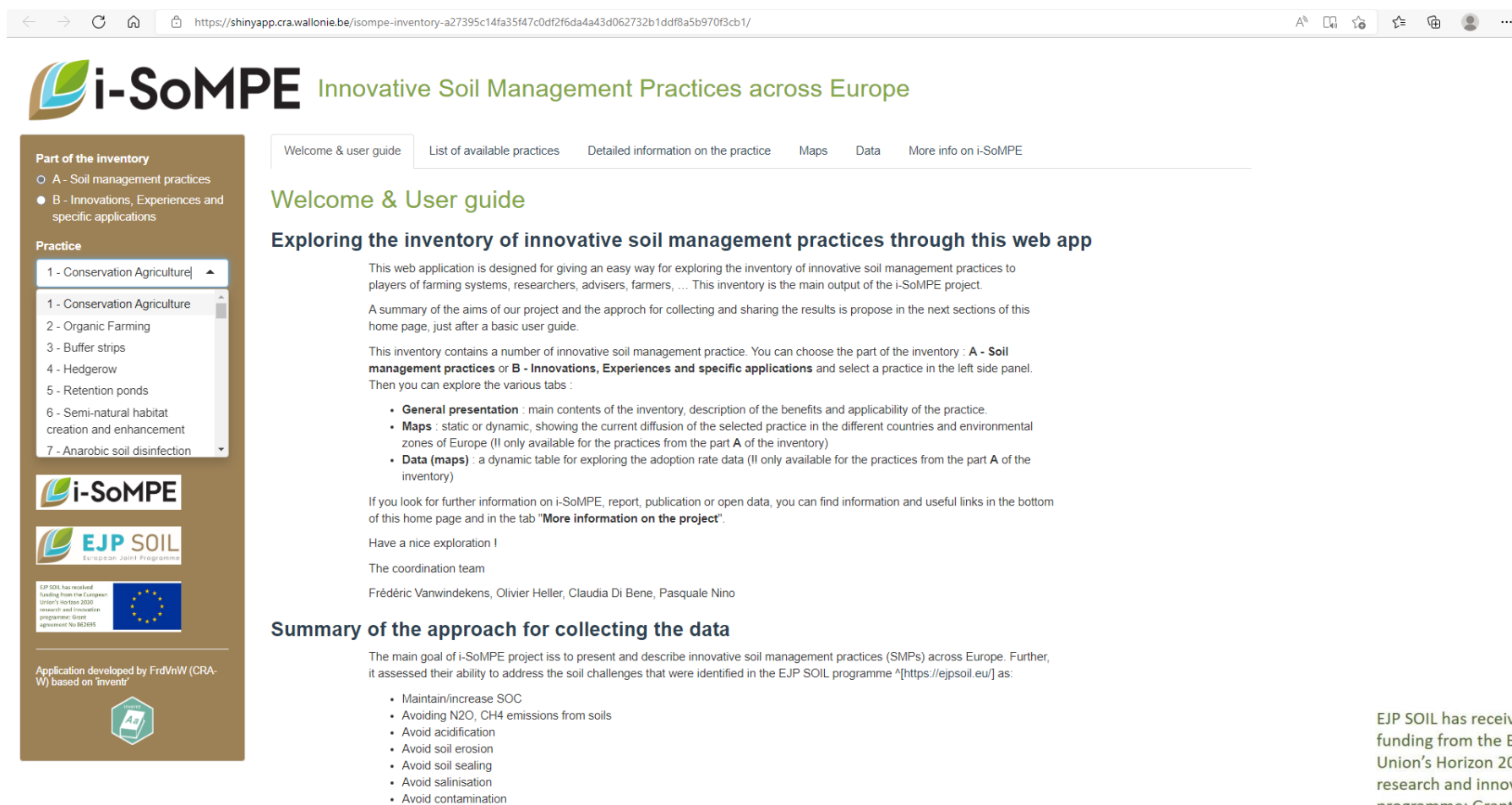
<https://ejpsoil.eu/soil-research/i-sompe/>

EJP SOIL has received funding from the European Union's Horizon 2020 research and innovation programme: Grant agreement No 862695



1. Innovative Soil Management Practices across Europe

1. Inventario completo de 58 SMP: <https://shinyapp.cra.wallonie.be/isompe-inventory>



The screenshot shows the i-SoMPE web application interface. The browser address bar displays the URL: <https://shinyapp.cra.wallonie.be/isompe-inventory-a27395c14fa35f47c0df2f6da4a43d062732b1ddf8a5b970f3cb1/>. The page title is "i-SoMPE Innovative Soil Management Practices across Europe".

Part of the inventory

- A - Soil management practices
- B - Innovations, Experiences and specific applications

Practice

- 1 - Conservation Agriculture
- 2 - Organic Farming
- 3 - Buffer strips
- 4 - Hedgerow
- 5 - Retention ponds
- 6 - Semi-natural habitat creation and enhancement
- 7 - Anarobic soil disinfection

Welcome & User guide

Exploring the inventory of innovative soil management practices through this web app

This web application is designed for giving an easy way for exploring the inventory of innovative soil management practices to players of farming systems, researchers, advisers, farmers, ... This inventory is the main output of the i-SoMPE project.

A summary of the aims of our project and the approach for collecting and sharing the results is propose in the next sections of this home page, just after a basic user guide.

This inventory contains a number of innovative soil management practice. You can choose the part of the inventory : **A - Soil management practices** or **B - Innovations, Experiences and specific applications** and select a practice in the left side panel. Then you can explore the various tabs :

- General presentation** : main contents of the inventory, description of the benefits and applicability of the practice.
- Maps** : static or dynamic, showing the current diffusion of the selected practice in the different countries and environmental zones of Europe (!! only available for the practices from the part **A** of the inventory)
- Data (maps)** : a dynamic table for exploring the adoption rate data (!! only available for the practices from the part **A** of the inventory)

If you look for further information on i-SoMPE, report, publication or open data, you can find information and useful links in the bottom of this home page and in the tab "**More information on the project**".

Have a nice exploration !

The coordination team


Frédéric Vanwindekens, Olivier Heller, Claudia Di Bene, Pasquale Nino

Summary of the approach for collecting the data

The main goal of i-SoMPE project iss to present and describe innovative soil management practices (SMPs) across Europe. Further, it assessed their ability to address the soil challenges that were identified in the EJP SOIL programme "[<https://ejpsoil.eu/>] as:

- Maintain/increase SOC
- Avoiding N2O, CH4 emissions from soils
- Avoid acidification
- Avoid soil erosion
- Avoid soil sealing
- Avoid salinisation
- Avoid contamination

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1. Inventario completo de 58 SMP: <https://zenodo.org/communities/i-sompe/?page=1&size=20>

Agricultural systems	Buffer strips and small landscape elements	Crop protection	Crops and crop rotations	Organic matter and nutrient management	Other	Tillage and traffic	Water management
Conservation Agriculture	Buffer strips	Anarobic soil disinfection	Agroforestry	Biochar	Land reclamation	Conservation tillage	Drainage systems, water table management and flooding
Organic Farming	Hedgerow	Biofumigation	Cover crops	Cover crop grazing	Models for soil compaction risk assessment	Contour cropping	Drip irrigation
	Retention ponds	Integrated pest management	Cover crops in permanent crops	Inorganic fertilizers	Terrace Farming	Controlled traffic farming	Irrigation scheduling
	Semi-natural habitat creation and enhancement	Nematod protection	Crop rotation	Liming Mulching		Deep Ploughing	Monitor soil salinisation
		Precision of herbicide application	Deep rooting plants	Organic fertilizers		Dyker	Monitor the quality of irrigation water
		Push-Pull Methods	Establishment and maintenance of permanent grassland	Use of biofertilizers		Low pressure in tires	Paludiculture
		Soil solarization	Extensive use of permanent grassland	Variable rate fertilizer application		Mechanical weeding	Water harvesting practices
			Grassland with legumes			No till	
			Intercropping			On-Land ploughing	
			Legume integration			Reduced tillage in permanent crops	
			Diverse sward of permanent grasslands			Ridging	
			Perennial crops			Strip tillage	
			Strip cropping			Temporary ditches	
			Undersowing				

1. Innovative Soil Management Practices across Europe

1. Inventario completo de 51 IMP: <https://zenodo.org/communities/i-sompe/?page=1&size=20>

B. SMP innovadoras:

B.17-Added-value compost ;

B.25- Regenerative agriculture in almond farms;

B.42-Regenerative viticulture using spent mushroom substrates;

B.43- Regeneration of mine soils by grazing;

B.44- Rotational grazing in agrosilvopastoral system;

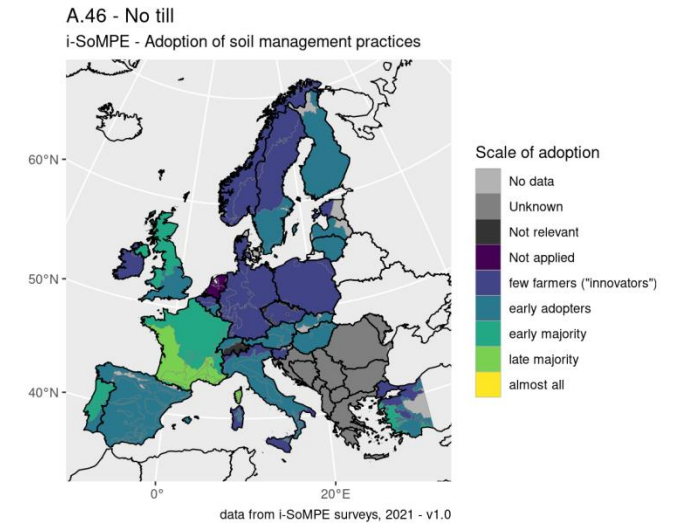
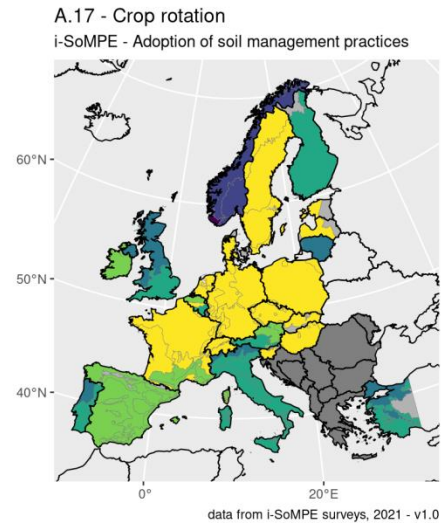
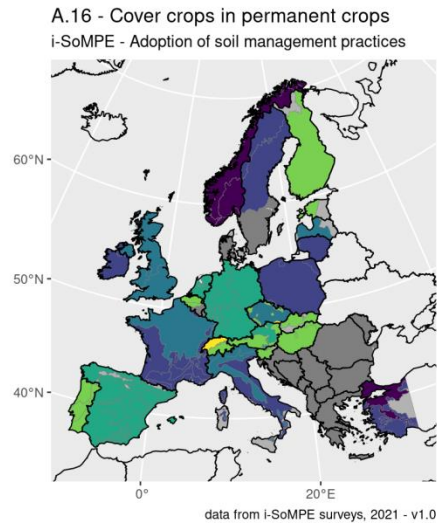
<p style="text-align: center;"></p> <hr/> <p style="text-align: center;">Inventory of soil management practices across Europe</p> <p style="text-align: center;">B.17 - Added-value compost</p> <hr/>	<p style="text-align: center;"></p> <hr/> <p style="text-align: center;">Inventory of soil management practices across Europe</p> <p style="text-align: center;">B.25 - Regenerative agriculture in almond farms</p> <hr/>	<p style="text-align: center;"></p> <hr/> <p style="text-align: center;">Inventory of soil management practices across Europe</p> <p style="text-align: center;">B.42 - Regenerative viticulture using spent mushroom substrate (SMS)</p> <hr/>																																	
<p style="text-align: center;"></p> <hr/> <p style="text-align: center;">Inventory of soil management practices across Europe</p> <p style="text-align: center;">B.43 - Regeneration of mine soils by grazing</p> <hr/> <p style="font-size: small;">GENERAL DESCRIPTION</p> <p style="font-size: x-small;">Mining activity leaves the landscape with no vegetation and very poor soil-forming material for subsequent ecosystem development. The restoration of areas affected is an urgent need being grazing an innovative practice suggested for application in post-mining land.</p> <p style="font-size: x-small;">Locally used names, synonyms or aliases</p> <table style="font-size: x-small; width: 100%;"> <tr><td>1</td><td>Green covers</td></tr> <tr><td>2</td><td>Grazing</td></tr> <tr><td>3</td><td></td></tr> <tr><td>4</td><td></td></tr> <tr><td>5</td><td></td></tr> </table> <hr/> <p style="font-size: x-small;">Land management category</p> <table style="font-size: x-small; width: 100%;"> <tr><td>Crops and Crop rotation</td><td>Not selected</td></tr> <tr><td>Organic matter and nutrient management</td><td>Yes</td></tr> <tr><td>Tillage and traffic</td><td>Not selected</td></tr> <tr><td>Crop protection</td><td>Not selected</td></tr> <tr><td>Water Management</td><td>Not selected</td></tr> </table>	1	Green covers	2	Grazing	3		4		5		Crops and Crop rotation	Not selected	Organic matter and nutrient management	Yes	Tillage and traffic	Not selected	Crop protection	Not selected	Water Management	Not selected	<p style="text-align: center;"></p> <hr/> <p style="text-align: center;">Inventory of soil management practices across Europe</p> <p style="text-align: center;">B.44 - Rotational grazing in agrosilvopastoral system</p> <hr/> <p style="font-size: small;">GENERAL DESCRIPTION</p> <p style="font-size: x-small;">Practice of rotational grazing (with mono- or multi-species like cattle, pigs, sheeps, goats or turkeys) to combat the loss of natural regeneration and soil degradation in degraded agrosilvopastoral areas, such as "Dehesa" in Spain, providing effective ecosystem management systems and improving soil quality.</p> <p style="font-size: x-small;">Locally used names, synonyms or aliases</p> <table style="font-size: x-small; width: 100%;"> <tr><td>1</td><td>Regenerative agriculture</td></tr> <tr><td>2</td><td>Regenerative grazing</td></tr> <tr><td>3</td><td>Multispecies rotational grazing</td></tr> <tr><td>4</td><td></td></tr> <tr><td>5</td><td></td></tr> </table> <hr/> <p style="font-size: x-small;">Land management category</p> <table style="font-size: x-small; width: 100%;"> <tr><td>Crops and Crop rotation</td><td>Yes</td></tr> <tr><td>Organic matter and nutrient management</td><td>Yes</td></tr> </table>	1	Regenerative agriculture	2	Regenerative grazing	3	Multispecies rotational grazing	4		5		Crops and Crop rotation	Yes	Organic matter and nutrient management	Yes
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Crops and Crop rotation	Yes																																		
Organic matter and nutrient management	Yes																																		

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1. Innovative Soil Management Practices across Europe

2. Adopción actual de las 58 SMP en Europa.



A.: A.16-Cover crops in permanent crops;

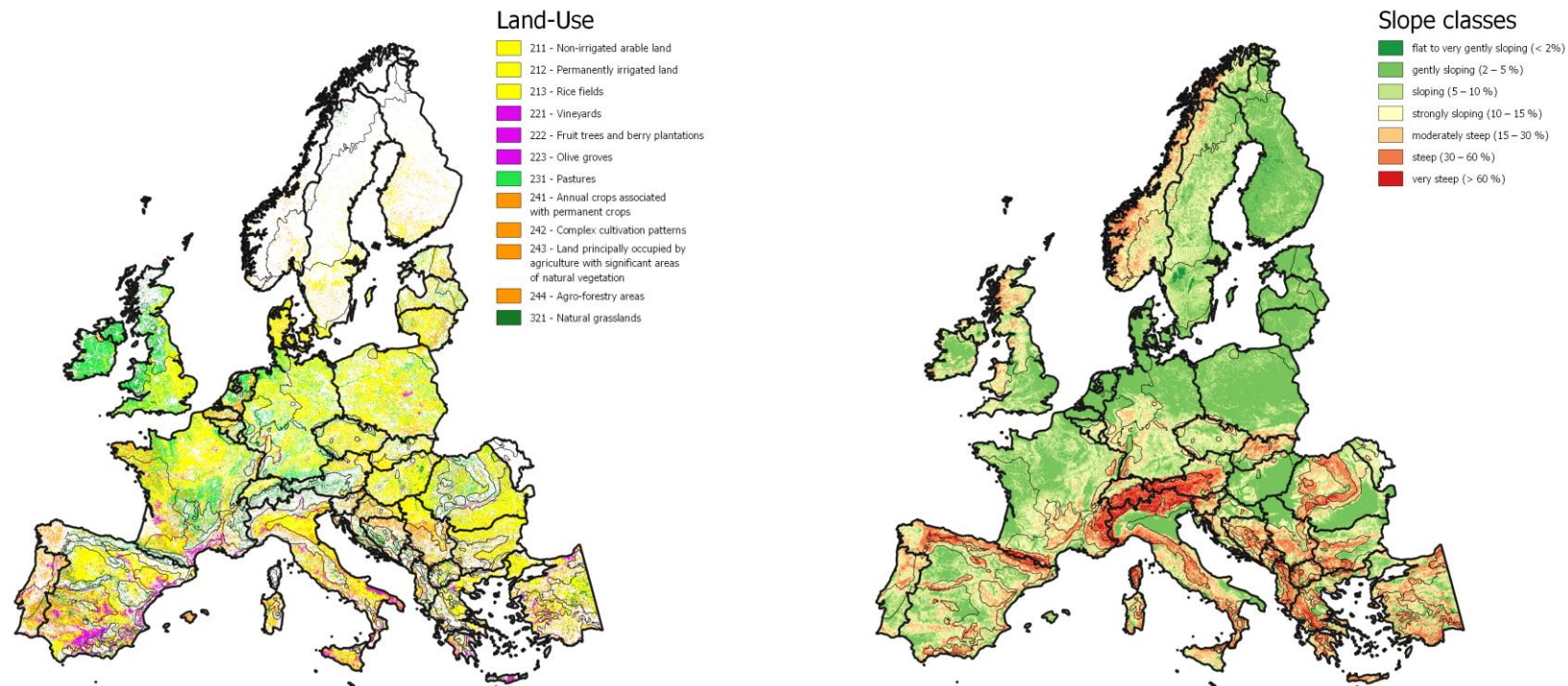
A.17-Crop rotation;

A.46-No till



1. Innovative Soil Management Practices across Europe

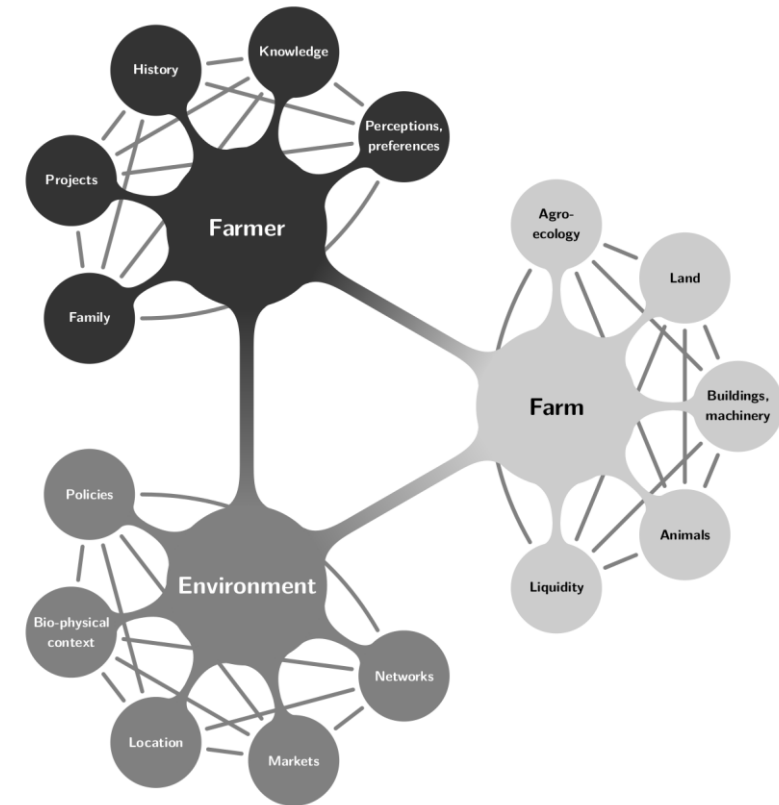
3. Limitaciones bio-físicas (uso de la tierra, clima (temperatura, precipitación), propiedades del suelo (tipo de suelo, textura), topografía, pendiente, sistemas agrarios, régimen de riego, etc.) en la adopción de las SMP.



1. Innovative Soil Management Practices across Europe

4. Barreras y oportunidades para las prácticas:

- **Conservation agriculture** - Systems of practices
- Drip irrigation - Water management
- **Conservation tillage** - Tillage and traffic
- Low emission slurry spreading - Organic matter and nutrient management
- Cover crop incorporation without herbicide application and ploughing - Crops and crop rotations, Tillage and traffic



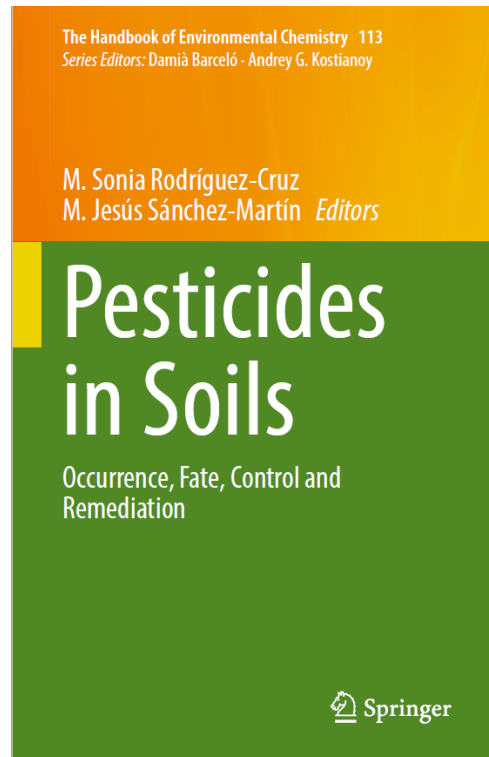
1. Innovative Soil Management Practices across Europe

Conclusiones:

- **i-SoMPE** revela la diversidad de las prácticas de manejo del suelo en Europa.
- La **adopción** de muchas prácticas entre los agricultores podría incrementarse.
- Las **limitaciones bio-físicas** juegan un papel importante en los lugares donde algunas prácticas son aplicables.
- Pero...hay que tener en cuenta el **contexto específico regional y socio-económico**.
- El análisis de las **barreras y oportunidades** de algunas prácticas muestran la importancia de:
 - 1) las asociaciones entre agricultores e investigadores para compartir experiencia y conocimiento;
 - 2) la liquidez para inversiones en maquinaria y el riesgo asumido en la adopción de innovaciones.



1. Innovative Soil Management Practices across Europe



Pesticide Fate in Soils Under Different Agricultural Management Practices



M. José Carpio, M. Sonia Rodríguez-Cruz, M. Jesús Sánchez-Martín, and
Jesús M. Marín-Benito

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Abstract Agricultural development and the sustainability of agrosystems are two topics of great current interest. The typical model of intensive or conventional agriculture provides highly productive agrosystems, but at an important environmental cost. Therefore, new cropping systems, soil management and/or agricultural practices are being put in place to ensure sustainable agricultural production and reduce the environmental impact, as a challenge facing agriculture both now and in the future. However, the use of pesticides remains necessary even in this new approach to agricultural management, as well as tracking their fate in these systems because it has generally been studied under conventional practices. Some laboratory-scale studies have reported the effects of these practices, but few studies have been conducted under field conditions. Accordingly, this chapter conducts a review of

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M. Sonia Rodríguez-Cruz and M. Jesús Sánchez-Martín (eds.),
Pesticides in Soils: Occurrence, Fate, Control and Remediation,
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2. External organic matters for climate mitigation and soil health

External organic matters for climate mitigation and soil health. **EOM4SOIL**

Programa: EU-H2020 - EJP-SOIL-Grant Agreement 862696- Towards climate-smart sustainable management of agricultural soils. European Joint Project COFUND

Coordinadora: Sabine Houot (INRAE, France).

Participantes: CRAW (Bélgica), AU (Dinamarca), LUKE (Finlandia), CREA (Italia), LAMMC (Lituania), SLU (Suecia), AGS (Suiza), TAGEM (Turquía), BOKU-AGES (Austria), UNIPA (Italia), AGRIS (Italia), **CSIC** (España)

Responsable CSIC: Sonia Rodríguez Cruz

Presupuesto: 2 M€

Duración: Noviembre 2021- Octubre 2024 (3 años) + extensión?



<https://ejpsoil.eu/soil-research/eom4soil>

EJP SOIL has received funding from the European Union's Horizon 2020 research and innovation programme: Grant agreement No 862695



2. External organic matters for climate mitigation and soil health

CSIC Research Institutes or Centers:

1. **CSIC-CEBAS** (Centro de Edafología y Biología Aplicada del Segura, Murcia).

Participants: José A. Pascual (joseantonio.pascua@csic.es); Margarita Ros (margaros@cebas.csic.es)



2. **CSIC-IRNASA** (Instituto de Recursos Naturales y Agrobiología de Salamanca, Salamanca).

Participants: M. Sonia Rodríguez-Cruz (msonia.rodriguez@irnasa.csic.es); Jesús M. Marín-Benito (jesusm.marin@irnasa.csic.es)



3. **CSIC-ICVV** (Instituto de Ciencias de la Vid y el Vino, La Rioja).

Participants: Fernanda Ruiz (fernanda.ruiz@icvv.es); Mar Vilanova (mar.vilanova@csic.es)



4. **CSIC-IRNAS** (Instituto de Recursos Naturales y Agrobiología de Sevilla, Sevilla).

Participants: José M. de la Rosa (jmrosa@irnase.csic.es); José A. González (jag@irnase.csic.es)



5. **CSIC-INIA** (Instituto Nacional de Investigación y Tecnología Agraria y Agroalimentaria, Madrid).

Participants: Antonio Martín (amartin@inia.es); Rosa Ana Pérez (perez.rosana@inia.es)



2. External organic matters for climate mitigation and soil health

OBJETIVO:

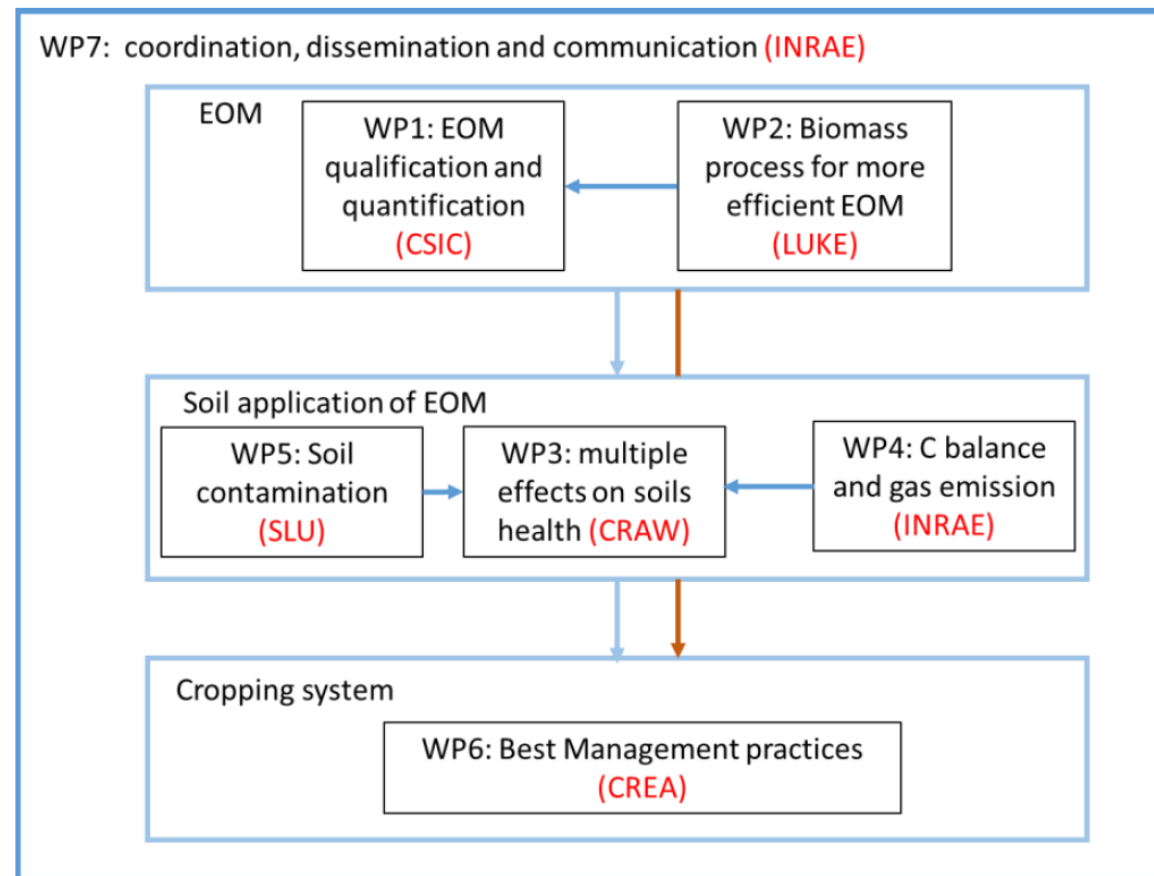
Proponer las mejores prácticas de manejo del pre-procesamiento y aplicación de materia orgánica externa (**residuos orgánicos**) al suelo para contribuir a la **mitigación del cambio climático** y mejorar la **salud del suelo**.

- Selección de sistemas agrícolas representativos en Europa (**cultivos herbáceos y viñedos**) teniendo en cuenta la diversidad de condiciones edafoclimáticas.
- Evaluación del **balance neto de almacenamiento de C** del suelo y la **emisión de gases de efecto invernadero**, incluido el **preprocesamiento** y la **aplicación en campo**, y cuantificación de los múltiples efectos de la aplicación de EOM en los suelos, incluidos los **contaminantes**.
- Definir las mejores prácticas de manejo mediante una herramienta de **simulación multicriterio**, parametrizada con datos obtenidos de **experimentos de larga duración** en campo.



2. External organic matters for climate mitigation and soil health

The proposal is structured into the following WPs (Figure 1)



2. External organic matters for climate mitigation and soil health

Participación del IRNASA-CSIC:

- Cuantificación de los múltiples efectos de la aplicación de EOM en **experimentos de larga duración** en campo (parcelas experimentales en la Finca Muñovela 2016-2022). Evaluación de parámetros fisicoquímicos, bioquímicos y microbiológicos (**Task 3.1.**).
- Evaluación de los efectos de la aplicación de nuevas EOM producidas a nivel local en suelos agrícolas en **experimentos de corta duración** (**Task 3.3.2.**).



Evaluación del impacto de las enmiendas orgánicas sobre la salud de suelo y en la dinámica de pesticidas en suelos en ensayos de campo

Reciclaje de **residuos orgánicos**:
Fertilizantes renovables o enmiendas

Promoción de cadenas de valor más cortas y **bioeconomía circular**

- Mejorar la **salud del suelo** y prevención de la degradación y erosión.
- **Mitigación y adaptación al cambio climático** (Aumento de la reserva de CO de los suelos agrícolas, manejo sostenible del suelo, Conservar la MO del suelo, sumidero de C).

Investigación sobre la dinámica de pesticidas en suelos enmendados desde el punto de vista **agronómico y ambiental**:

- Controlar la **eficacia de los pesticidas**
- **Prevenir la contaminación del suelo y agua** por estos compuestos



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2. External organic matters for climate mitigation and soil health

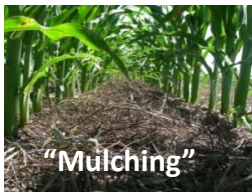
Task 3.1.: Medium-term Field experiment (2016-2022, 6 years) at Muñovela farm

- Soil:** Eutric-Chromic Cambisol soil, sandy loam texture
- Soil management and cropping systems**
 - Unamended soil
 - Soil amended with **spent mushroom substrate (SMS): 140 t residue/ha (Nov. 2016)**
 - Soil amended with **green compost (GC): 85 t residue/ha (Nov. 2016)**
 - Cropping systems: **2016-2018:** Winter wheat + fallow
2019-2022:
 - Fallow + maize + conventional tillage
 - Crop rotation: Winter wheat (cover crop) + maize + no tillage + mulching + direct seeding (2019-2022)
- Soil sampling and parameters** 0-10 cm depth (12 experimental plots, **twice per year**), soil water content, pH, OC, N, C/N, DOC, P, K, Ca, Mg, CEC, $N-NH_4^+$, $N-NO_3^-$, $N-NO_2^-$, soil respiration, soil DHA, PLFAs analysis

Sub-task 3.2.2. Additional information from Short Term Experiments (STEs) related to the new EOM

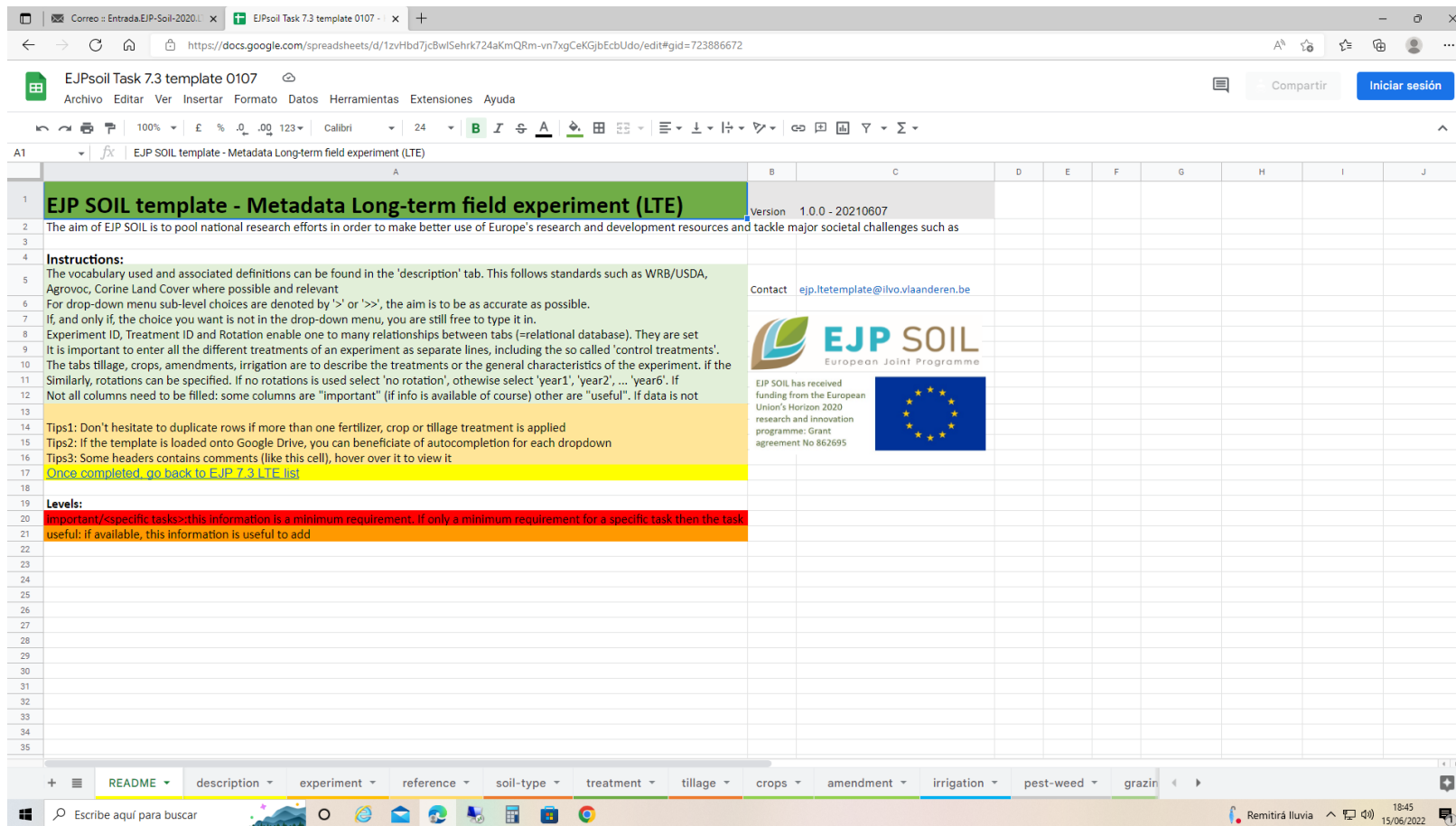
New Short Term Experiments established in Spain by CSIC-IRNASA, (2022-2023) at Muñovela farm

- Soil:** Eutric-Chromic Cambisol soil, sandy loam texture
- Arable Crop:** pea
- Soil management:**
 - Unamended soil
 - Soil amended with **green compost (GC)** produced locally (Salamanca): 50 t residue/ha (~ 10 t C ha⁻¹)
- Soil sampling** from 0 to 50 cm depth at different times (4 plots/treatment)
- Parameters to analyze:** Soil physicochemical and biological parameters, parameters of the pea crop (EPPO Standard PP 1/135 Phytotoxicity assessment, 2014).



2. External organic matters for climate mitigation and soil health

Task 3.1.: Efectos de la aplicación de EOM en **experimentos de larga duración** en campo (parcelas experimentales en la Finca Muñovela 2016-2022). (Task 7.3. EJP-Soil project. LTE list)



EJP SOIL template - Metadata Long-term field experiment (LTE)

Version 1.0.0 - 20210607

The aim of EJP SOIL is to pool national research efforts in order to make better use of Europe's research and development resources and tackle major societal challenges such as

Instructions:
 The vocabulary used and associated definitions can be found in the 'description' tab. This follows standards such as WRB/USDA, Agrovc, Corine Land Cover where possible and relevant.
 For drop-down menu sub-level choices are denoted by '<' or '>', the aim is to be as accurate as possible.
 If, and only if, the choice you want is not in the drop-down menu, you are still free to type it in.
 Experiment ID, Treatment ID and Rotation enable one to many relationships between tabs (=relational database). They are set. It is important to enter all the different treatments of an experiment as separate lines, including the so called 'control treatments'.
 The tabs tillage, crops, amendments, irrigation are to describe the treatments or the general characteristics of the experiment. If the Similarly, rotations can be specified. If no rotations is used select 'no rotation', otherwise select 'year1', 'year2', ... 'year6'.
 Not all columns need to be filled: some columns are "important" (if info is available of course) other are "useful". If data is not

Tips:
 Tips1: Don't hesitate to duplicate rows if more than one fertilizer, crop or tillage treatment is applied
 Tips2: If the template is loaded onto Google Drive, you can benefit of autocompletion for each dropdown
 Tips3: Some headers contains comments (like this cell), hover over it to view it
 Once completed, go back to EJP 7.3 LTE list

Levels:
 important/specific tasks: this information is a minimum requirement. If only a minimum requirement for a specific task then the task useful: if available, this information is useful to add

Contact: ejp.lttemplate@ilvo.vlaanderen.be

EJP SOIL
 European Joint Programme

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Navigation tabs: README, description, experiment, reference, soil-type, treatment, tillage, crops, amendment, irrigation, pest-weed, grazin



IV Jornada del Día Mundial del Suelo en Navarra



*"Prácticas innovadoras de gestión del suelo en Europa:
mitigación del cambio climático y mejora de la salud del
suelo a partir de uso de enmiendas orgánicas"*



Sonia Rodríguez Cruz

Grupo contaminación suelos y aguas: Diagnóstico, prevención y/o remediación

MUCHAS GRACIAS

14 diciembre 2022