Ecosystem services assessment in agricultural and peri-urban areas

ABIES and EGAAL doctoral schools

April 11-14th 2023

Organizers

David Montagne

Associate-professor, AgroParisTech,

Pedology

Detailed presentation on Hal

David.montagne@agroparistech.fr

Christian WALTER

Professor, Institut Agro

Agronomy, soil science, spatial analysis

Detailed presentation on Hal

christian.walter@institut-agro.fr

Introduction (1)

- A joint training of two doctoral schools: ABIES (AgroParistech) and EGAAL (Institut Agro)
- 3rd edition of this doctoral school (after 2019 and 2021) but with a much broader international audience and an extended format (4 days)
- Supported by EJP Soil task 5.3 with the expected impact to "*strengthen scientific capacities and cooperation across Europe by training of young soil scientists*"

Overall aim and learning outcomes

To present and discuss the conceptual and methodological basis for the assessment of ecosystem services in agricultural and peri-urban areas:

- master the concepts related to ecosystem services
- be familiar with biophysical and economic approaches to the valuation of ecosystem services
- Understand the ecosystem services provided in different agricultural and peri-urban contexts

Program of day 1

1. TUESDAY, APRIL 11 TH

10:00 – 10:30 - Introduction and mutual presentation of participants

- **D. Montagne, AgroParistech and C. Walter, Institut Agro**

10:30-12:30 - Soils and Ecosystem services in the context of the European Green Deal

- ***C. Chenu, INRAE, head of the EJP Soil program***

14:00 – 15:45 - Concepts of ecosystem services and classification

- ***D. Montagne – AgroParisTech, UMR Ecosys***

16:00 – 17:45 - Biodiversity and ecosystem services

- ***G.Peres, Institut Agro Rennes Angers, UMR SAS***

18:00-18:30 - Introduction to the objectives of the final discussion

- ***D. Montagne and C. Walter***

Lecturers (day 1)

Claire Chenu

Inrae

Soil Science, Organic Matter, Public policy

Head of EJP Program

Claire.chenu@inrae.fr

Guenola PERES

Associate-Professor Institut Agro

UMR SAS Rennes

Soil ecology

Guenola.peres@agrocampus-ouest.fr

David Montagne

Associate-professor, AgroParisTech,

UMR ECOSYS, Saclay

Pedology

Detailed presentation on Hal

David.montagne@agroparistech.fr

Program of day 2

WEDNESDAY, APRIL 12TH

8:30 – 10:15 - Ecosystem services provided by urban soils, a lever to enhance urban planning.

G. Seré, Lorraine University

10:30 – 12:30 - Economic valuation of ecosystem services

Jean-Michel Salles, CNRS Montpellier

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14:00 – 17:30 - Assessment of soil functions through an expert-based approach

Taru Sanden, Austrian Agency for Health and Food Safety

Lecturers (day 2)

Geoffroy SÉRÉ

Professor, University of Lorraine,

UMR LSE, Nancy

Urban soil and ecosystem services

geoffroy.sere@univ-lorraine.fr

Jean-Michel SALLES

Director of research, CNRS

UMR CEE-M, Montpellier

Environmental and ecological economics

jean-michel.salles@umontpellier.fr

Taru Sanden

Senior expert

AGES - Austrian Agency for Health and Food Safety

Soil Scientist – citizen science

taru.sanden@ages.at

Program of day 3

Thursday, April 13th

8:30 – 10:15 - Mapping of ecosystem services

C. Walter, Institut Agro Rennes Angers

10:30-12:15 – Soil ecosystem services bundles across European agricultural landscapes

I. Cousin, INRAE Orléans,

14:00-18:00 - Visit of an experiment of urban agriculture

S. Boulanger – Joimel, AgroParistech

Lecturers (day 3)

Christian WALTER

Professor, Institut Agro

UMR SAS, Rennes

Agronomy, soil science, spatial analysis

christian.walter@institut-agro.fr

Isabelle COUSIN

Director of research, INRAE

UR SOLS, Orléans

Soil physics, Ecosystem services

isabelle.cousin@inrae.fr

Sophie JOIMEL

Associate-Professor, AgroParisTech

UMR ECOSYS, Saclay

Ecology in urban ecosystem and agrosystems, vegetable green roofs of AgroParisTech

sophie.boulanger-joimel@agroparistech.fr

Program of day 4

Friday, April 14th

- **9:00 – 12:00 - ES assessment exercise**
  - ***D. Montagne and A. Vallet, AgroParistech***

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- **13:30 – 16:00 – Discussion roundtable on the Ecosystem Service concept**
  - ***Participants with D. Montagne, C. Walter, who else ?***

Lecturers (day 4)

Améline VALLET

Assistant professor, AgroParisTech,

UMR ESE, Saclay

Ecosystem services mapping, evaluation and governance

ameline.vallet@agroparistech.fr

David Montagne

Associate-professor, AgroParisTech,

UMR ECOSYS, Saclay

Pedology

Detailed presentation on Hal

David.montagne@agroparistech.fr

Christian WALTER

Professor, Institut Agro

UMR SAS, Rennes

Agronomy, soil science, spatial analysis

christian.walter@institut-agro.fr

General outline of the training

7 conferences by experts

2 practical sessions on ES assessment

1 field visit

1 round table

and as much discussion as possible to share your experiences.

Where? (1)

- **Willingness to organize training in the center of Paris despite the recent move of AgroParistech to the Saclay plateau south of Paris**

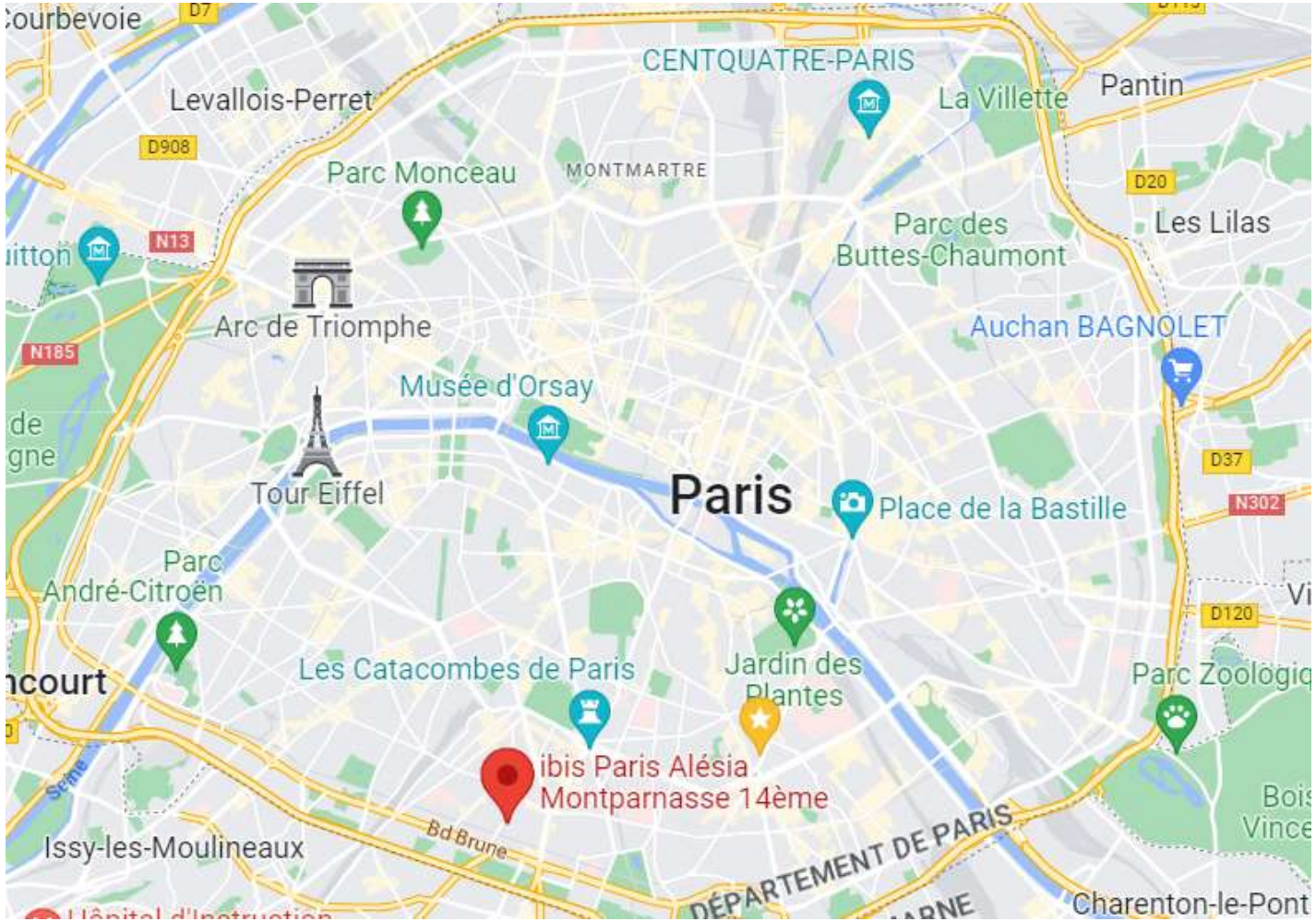
- **Willingness to facilitate exchanges between participants, including outside training hours**

- **Choice to organize the training in a hotel used to hosting seminars:**
  - Hotel Ibis Paris Alésia Montparnasse

  49 rue des Plantes 75014 Paris

Where? (2)

- **south of Paris near Alesia Metro station (500 m)**
- **25’ from City center**



Participants

- 26 from 14 countries

- 21 PhD students

- 3 post-docs

- 2 researchers

ID	Civility	Name	First Name	Email	Status	Research lab	University	Country
1	Mr	ESPARZA-ROBLES	Ulises	ulises.esparza-robles@boku.ac.at	PhD	Institute of Soil Research	University of Natural Resources and Life Sciences	Austria
2	Mrs	FOHRAFELLNER	Julia	julia.fohrafellner@boku.ac.at	PhD	Institute of Soil Research	University of Natural Resources and Life Sciences	Austria
3	Mrs	PANAGEA	Loana	loanna.Panagea@ilvo.vlaanderen.be	Researcher	Plant Sciences Unit	EV-ILVO Belgium	Belgium
4	Mrs	REYES ROJAS	Jessica	reyes_rojas@af.czu.cz	PhD	Department of Soil Science and Soil Protection	Czech University of Life Science Prague	Czech Republic
5	Mrs	RIEZNYK	Oleksandra	rieznyk@af.czu.cz	PhD	Department of Soil Science and Soil Protection	Czech University of Life Science Prague	Czech Republic
6	Mrs	SUTRI	Merit	merit.sutri@emu.ee	PhD	Chair of Soil Science	Estonian University of Life Sciences	Estonia
7	Mr	BHUYAN	Bikram	bpbhuyan@ddn.upes.ac.in	PhD	LISV Laboratory	Paris Saclay University	France
8	Mr	COBLINSKI	Joao	joao-augusto.coblinski@inrae.fr	Post-Doc	Info et Sol	INRAE	France
9	Mr	RUSSIAS	Robin	robin.russias@agrocampus-ouest.fr	PhD	UMR PEGASE	L'Institut Agro Rennes Angers	France
10	Mrs	NEHA	Begill	neha@thuenen.de	PhD	Soil organic matter working group	Johann Heinrich von Thûnen Institut Braunschweig	Germany
11	Mrs	SHAHROKH	Vajihe	vajihe.shahrokh@teagasc.ie	Post-Doc	Soil Science, digital soil mapping	TEAGASC	Ireland
12	Mrs	RASTELLI	Valentina	valentina.rastelli@isprambiente.it	PhD	Department for Environmental Monitoring and Protection and for	ISPRA	Italy
13	Mr	AYAZ	Muhammad	muhammad.ayaz@lammc.lt	PhD	Agroecology and Plant Nutrition	Lithuanian research center for Agriculture and Forestry	Lithuania
14	Mrs	STULPINAITE	Urté	urte.stulpinaite@lammc.lt	PhD	Agrobiology	Lithuanian research center for Agriculture and Forestry	Lithuania
15	Mrs	BARTOSIEWICZ	Beata	bbartosiewicz@iung.pulawy.pl	PhD	Department of Soil Erosion and Soil Protection	Institute of Soil Science and Plant Cultivation	Poland
16	Mrs	PINDRAL	Sylwia	spindral@iung.pulawy.pl	PhD	Soil Science	Institute of Soil Science and Plant Cultivation	Poland
17	Mrs	POREBA	Ludwika	lporeba@iung.pulawy.pl	PhD	Soil Science and Plant cultivation	Institute of Soil Science and Plant Cultivation	Poland
18	Mrs	ZAGORAC	Eva	eva.zagorac@kis.di	earch Assist	Agroecology and Natural Ressources	Kmetijski inštitut Slovenije (KIS)/Agricultural intitute of Slovenia (AIS)	Slovenia
19	Mr	BARRIO VAL	Asier	asier.barrio@irnasa.csic.es	PhD	INIA (CSIC)	Institute of Natural Resources and Agrobiology (IRNASA),	Spain
20	Mrs	DOUIBI	Marwa	marwa.douibi@irnasa.csic.es	PhD	INIA (CSIC)	Institute of Natural Resources and Agrobiology (IRNASA),	Spain
21	Mrs	LILLO	Paula	paula.lillo@inia.csic.es	PhD	INIA CSIC Department of Environment and Agronomy	Juan Carlos University	Spain
22	Mrs	MUINO BLANCO	Fatima	fatima.muino@mbg.csic.es	PhD	Soils, biosystems and ecology	University of Santiago de Compostel	Spain
23	Mr	DRENNING	Paul	drenning@chalmers.se	PhD	Department of Architecture and Civil Engineering	Chalmers University of Technology, Gothenburg	Sweden
24	Mrs	LI	Shoujiao	shoujiao.li@slu.se	PhD	Biosystems and Technology	Swedish University of Agricultural Sciences	Sweden
25	Mrs	LI	Yizan	yizan.li@wur.nl	PhD	Environmental Sciences Group, Wageningen University and Research	Wageningen University	The Netherlands
26	Mrs	WANG	Yan	yan2.wang@wur.nl	PhD	Soils Physics and Land Management Group	Wageningen University	The Netherlands

Muhammad Ayaz

Muhammad Ayaz received a B.S. in Soil and Environmental Science from the University of Agriculture Peshawar in Pakistan (2014) and an M.S. in Soil Science from the Northwest Agriculture and Forestry University in China (2019). He is currently a Ph.D. candidate and junior researcher in the Department of Plant Nutrition and Agroecology at the Lithuanian Research Center for Agriculture and Forestry (LAMMC) in Lithuania, where he plans to graduate in Fall 2023. His PhD. thesis topic is 'SOIL AMENDMENT WITH BIOCHAR AND INORGANIC FERTILIZER TO IMPROVE SOIL ENVIRONMENT AND CROP PRODUCTION .

Asier Barrio Val 25 Years old
Salamanca, Spain

I have studied the degree of environmental sciences, a master's degree in agrobiotechnology and now I´m doing my first year of PhD at the IRNASA CSIC in the department of soil and water contamination.

My thesis deals with the behavior of fungicides of interest in different vineyard soils and in those same amended soils, studying adsorption/desorption, dissipation and leaching.

Beata Bartosiewicz

Institute of Soil Science and Plant Cultivation State Research Institute

Department of Soil Science Erosion and Land Conservation

Puławy, Poland

Research topic: agricultural drought, effect of drought stress on physiological indicators and yield of cereales, organic soils,

Bikram Pratim BHUYAN

PhD scholar, LISV Laboratory, Paris Saclay University

My thesis is on a topic of Artificial Intelligence (Knowledge Graphs) in Smart Urban Agriculture.

My work is mainly related to Neuro-Symbolic AI with application to Urban Agriculture with spatio temporal Characteristics and proper mathematical validation.

João Coblinski
Postdoctoral researcher
INRAE - France

Geographer, master and PhD in soil science. He is currently postdoctoral researcher at INRAE, Info&Sols unit in Orléans, France. He is involved in the SERENA project, where his role is to carry out EU-scale modeling and mapping of soil-based ecosystem services and soil threats under different scenarios (climate changes, land use changes), using digital soil mapping approaches.

My name is **MARWA DOUIBI**, I am a PhD student at the Institute of Natural Recourses and Agrobiology of Salamanca (IRNASA-CSIC).

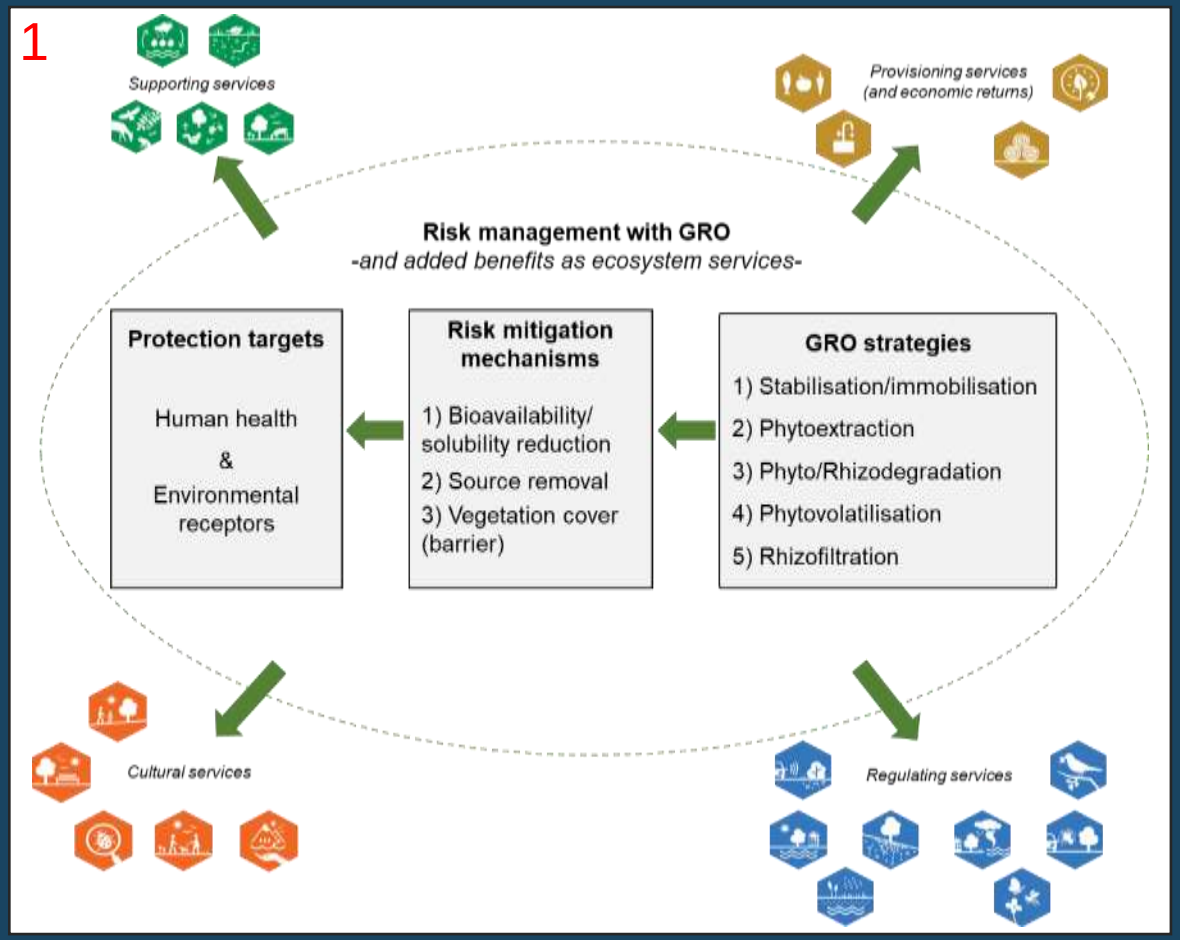
My thesis is about modeling the dynamics of three herbicides,

S-metolachlor, foramsulfuron and thiencarbazone-methyl under two types of agriculture, conservation and conventional tillage using FOCUS mathematical models PRZM and MACRO, parameterized and validated with data measured under real field conditions in a maize monoculture system, in order to predict the environmental effect of these herbicides on groundwater and soil quality under this type of scenarios in the long term.

Email: marwa.douibi@irnasa.csic.es

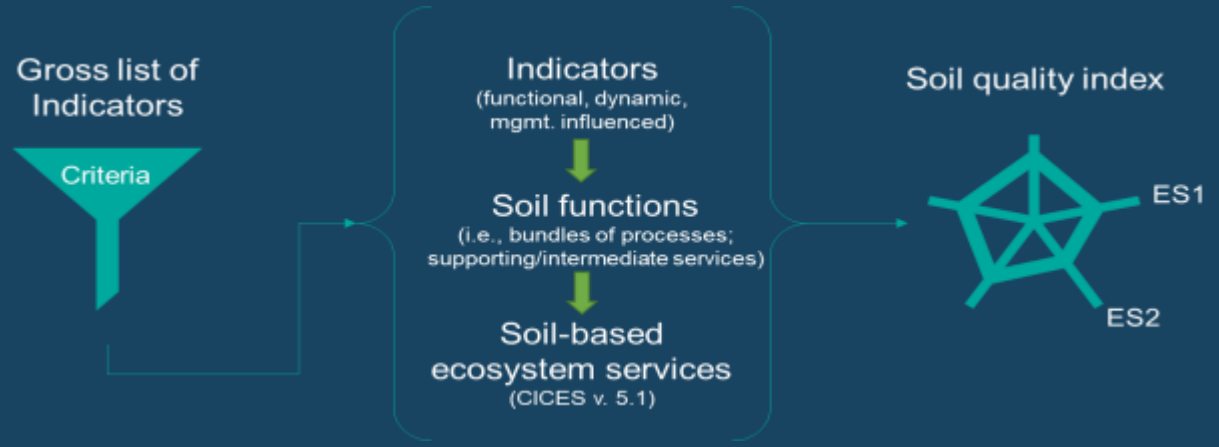
Managing risks and enhancing ecosystem services with gentle remediation options (GRO)

1



Pilot experiment: assessing and valuing ecosystem services

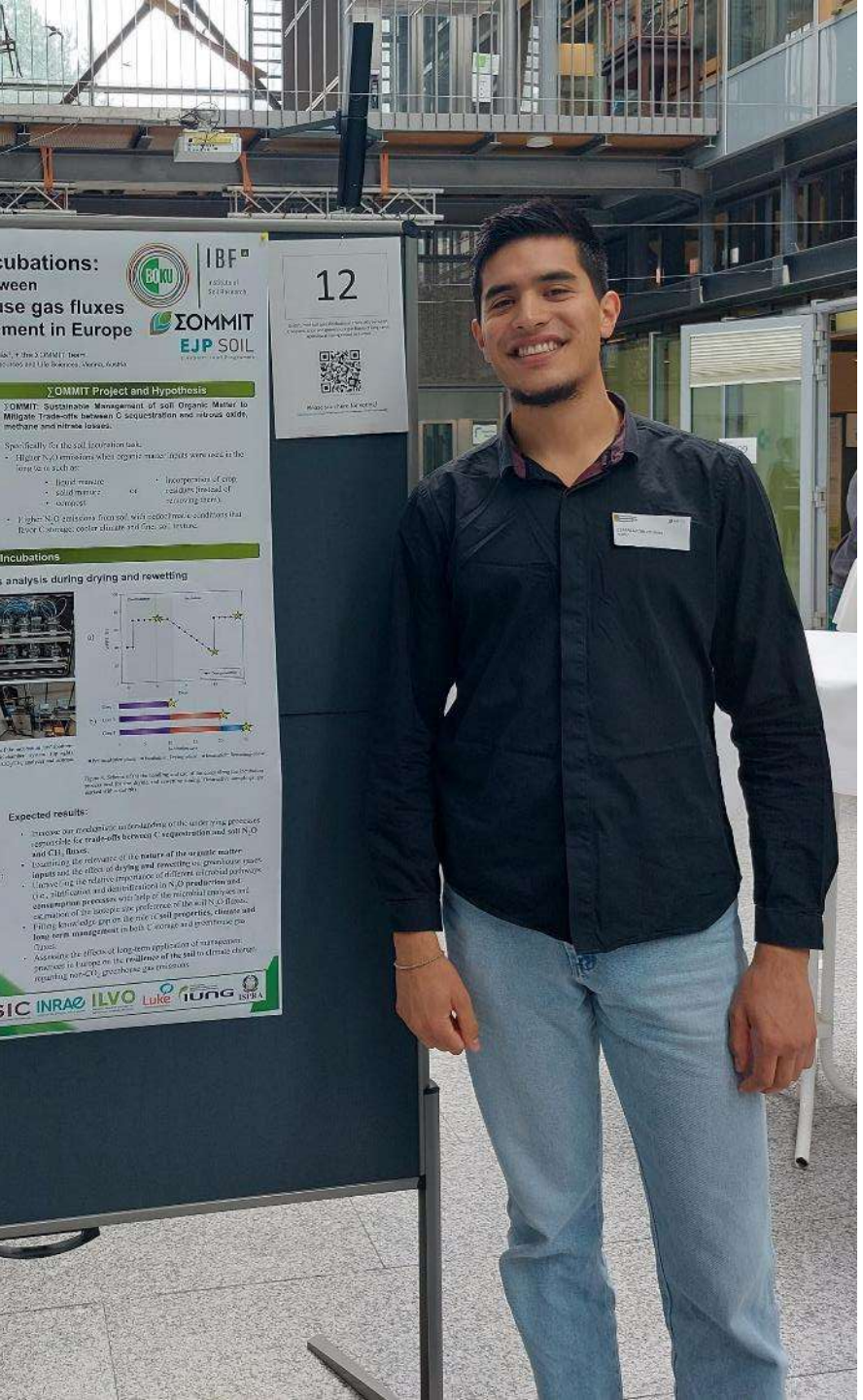
2



Cost-benefit analysis (CBA)

3

Paul Drenning
PhD student | Dept. Arch. and Civil Engineering
Chalmers University of Technology | Gothenburg, SE
Email: drenning@chalmers.se



Ulises Ramon Esparza-Robles

- **Institute of Soil Research**
  University of Natural Resources and Life Sciences, Vienna
- Research topic:
  - Trade-offs between soil C sequestration and fluxes of N2O and CH4 in European croplands
- Description:
  - We look at greenhouse gas fluxes from different long-term experimental trials in European countries where the main comparison practices are the incorporation (against removal) of crop residues and other organic matter inputs such as compost or manure.

Julia FOHRAFELLNER

PhD student
Institute of Soil Research
BOKU Vienna, Austria

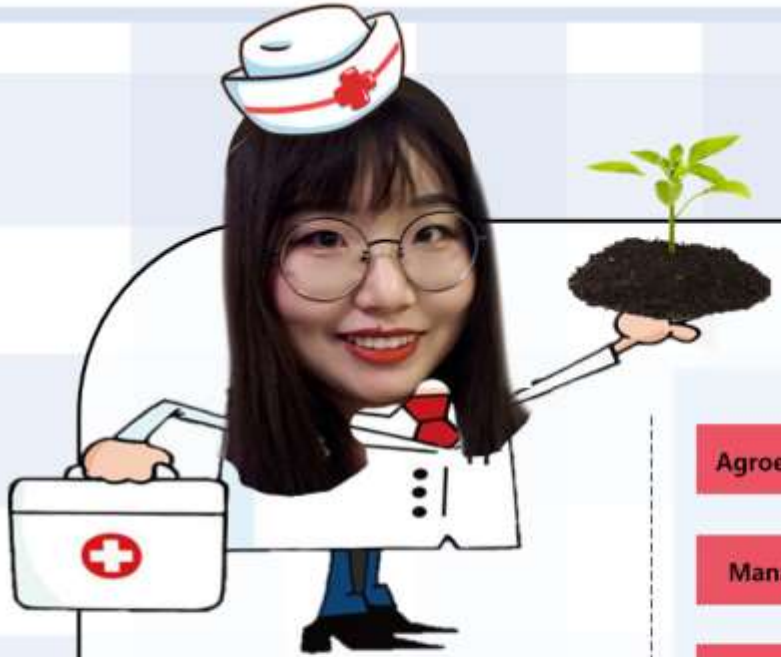
Sophie Zechmeister-Boltenstern

Research topics

- SOC in agricultural mineral soils
- Quality assessment of meta-analyses on SOC
- Meta-analysis of SOC and SOC fractions
- Cover crops and agroecological systems

EJP participation

- Framework program WP7 synthesis
- MIX-Root-C
- ARTEMIS
- EnergyLink



Welcome to Soil hospital !

Yizan Li

3rd year PhD candidate

Soil Biology Group,
Wageningen University

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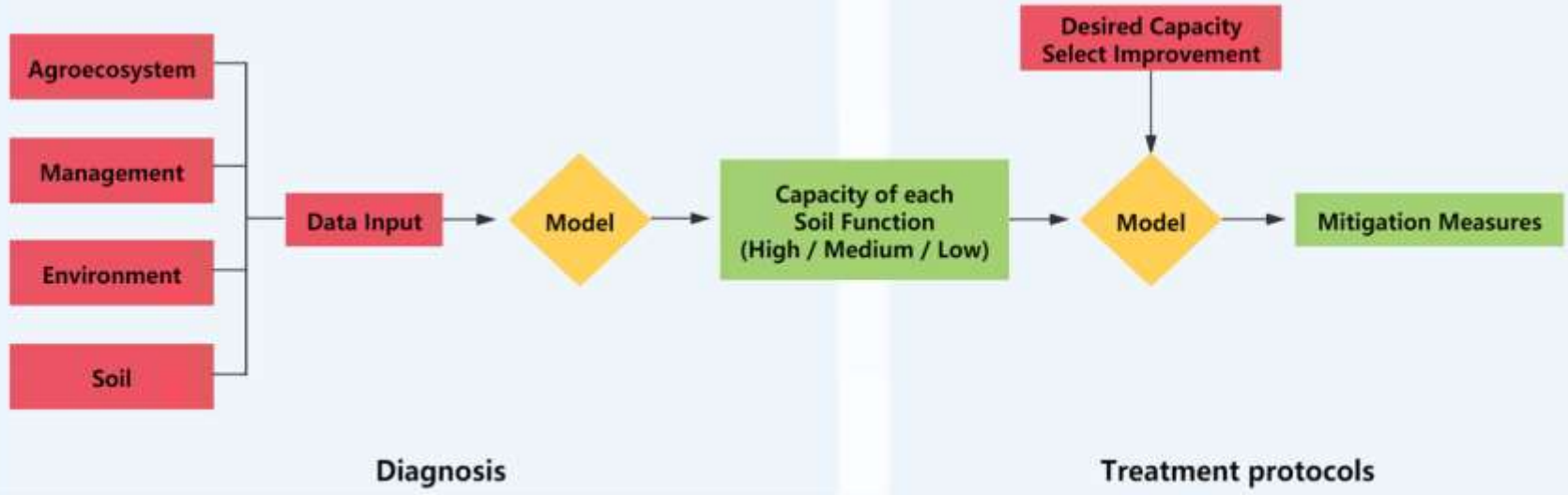
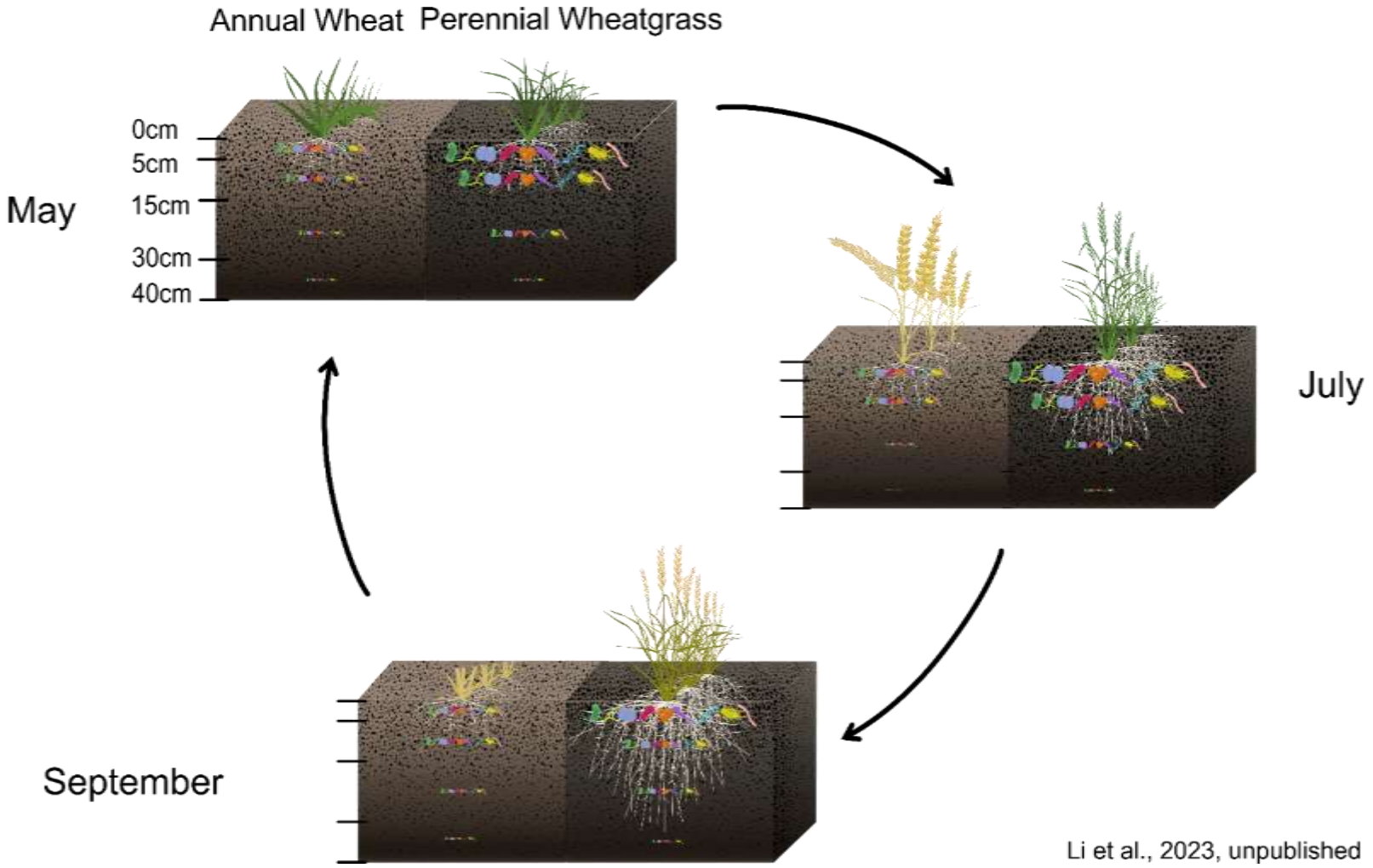


Key words: Soil health, Soil function, Multi-criteria decision model

Soil Microbial Biomass and Community Composition in Perennial and Annual Cereals Cropping



Li et al., 2023, unpublished

Shoujiao Li
Swedish University of Agricultural Sciences (SLU), Alnarp, Sweden
shoujiao.li@slu.se

My PhD project focus on quantifying soil microbial biomass and community composition, soil fertility, and economic feasibility delivered by perennial and annual cropping systems, and assessing the ecosystem services with focus on soil health preservation and food provision of perennial and annual cropping systems.

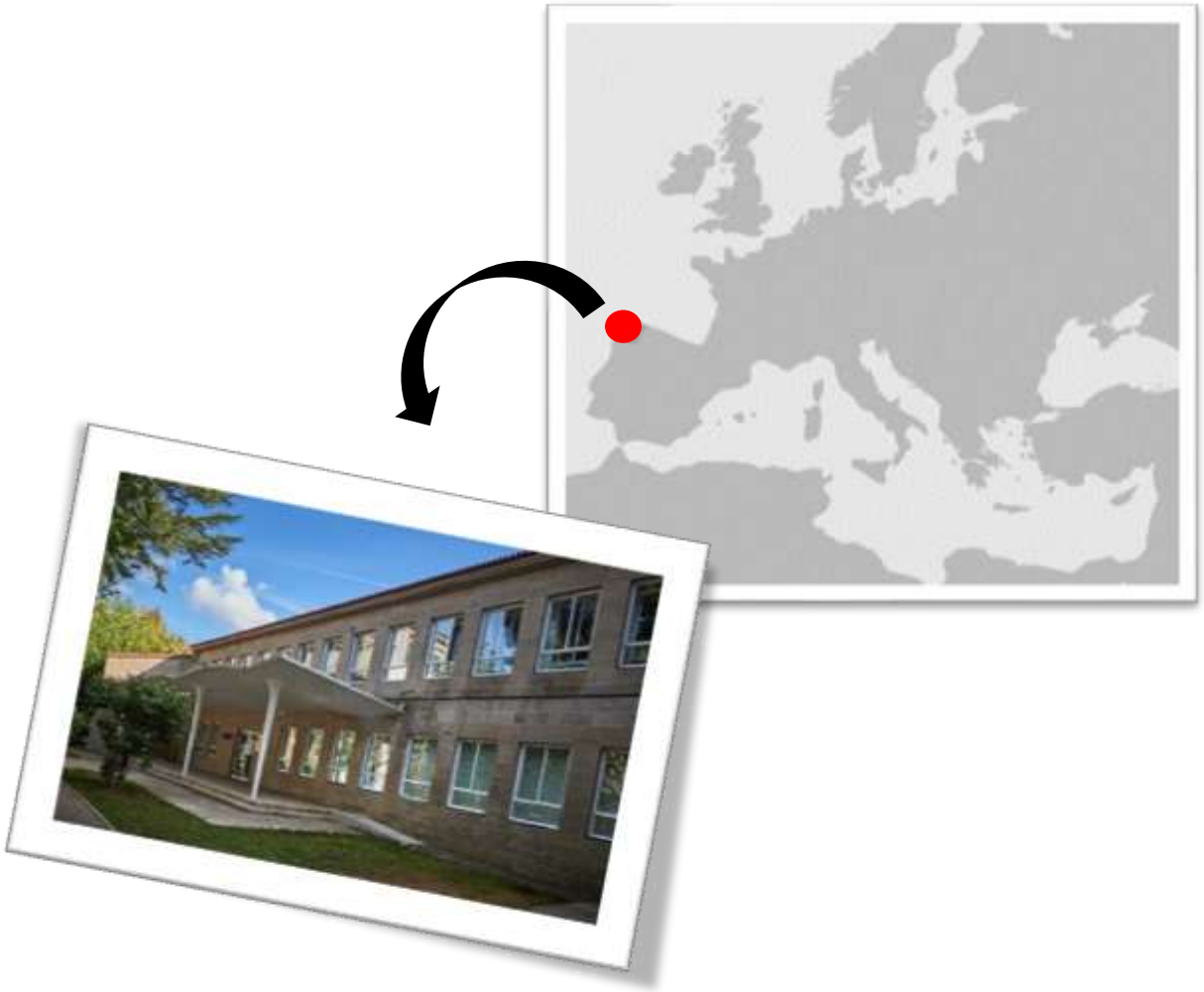
PAULA LILLO

paula.lillo@inia.csic.es

Department of Environment and Agronomy

National Institute for Agricultural and Food Research and Technology (INIA)

“I am training as a soil ecologist focused on exploring the effects of climate change on agricultural soil multifunctionality. Due to the key role that soil diversity plays in ecological processes and ecosystem services, I am interested in disentangling the functionality of soil food webs through metabarcoding and taxonomic approaches.”



Fátima Muiño Blanco

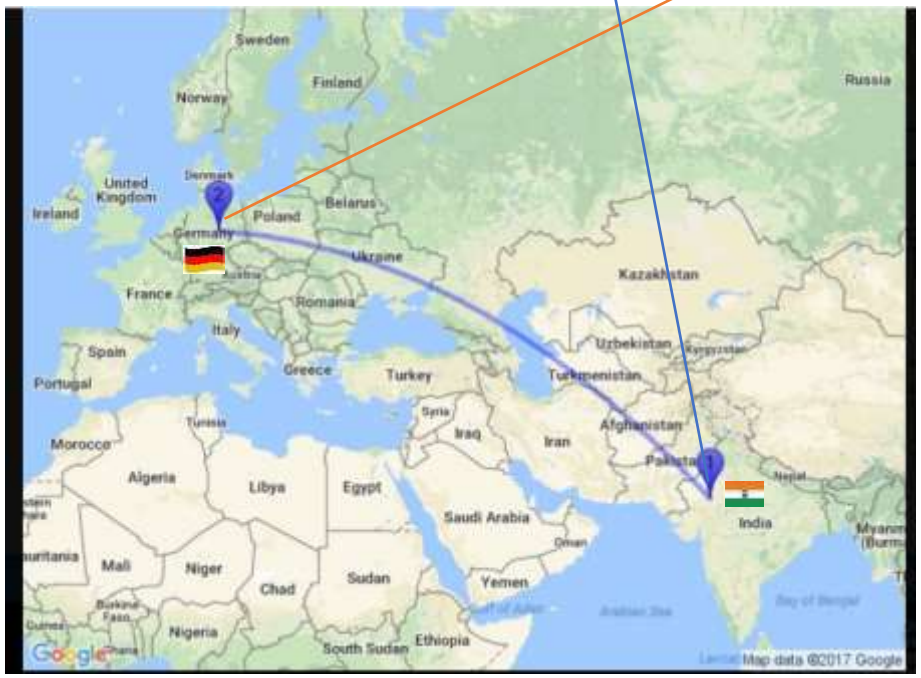
PhD student at Misión Biológica de Galicia (MBG-CSIC),
Sede Santiago de Compostela (Spain)

Research objectives

Study on the optimization of a foaming agent for the extinction of forest fires based on natural soaps and clays, and its effects on topsoils (0-5 cm) in areas of siliceous, limestone and clay lithological domains

- I am Neha Begill
- I am from India
- I did my Bachelors in **Agriculture** and Masters in **Soil Science** from Punjab, India

I came to **Germany** as a **PhD candidate** in November 2021 at **Thünen Institute of Climate Smart Agriculture, Braunschweig, Germany**



Research Objectives

No detectable upper limit of mineral associated organic carbon in temperate agricultural soils

Investigating soil organic matter dynamics in topsoil and subsoil by burying isotopically labelled litter substrate

Effect of litter concentration on turnover and stabilization

Ioanna S. Panagea, PhD

Researcher – Soil Data Analyst

ILVO – Flanders research institute for agriculture fisheries and food – Belgium

Background

- Climate change effects
- Land management/degradation of semi-arid environments
  - Desertification
  - Soil salinization
  - Grazing pressure
- Impact of cropping systems on soil physical quality
  - Soil structural stability
  - SOC fractions
  - Soil water retention

Currently

- EJP-Artemis
  - Framework for **on-farm monitoring** of the impact of **agroecological systems** on **soil related ecosystem services** and soil quality
  - (Lighthouse) network of agroecological farms in Europe
- SoilValues
  - Mapping scientific knowledge on indicators / models / technologies / tools to **define and verify soil health and soil-based ecosystem services and trade-offs** related to sustainable management practices in support of MRV and registration and valuation of soil health
- EJP-CarboSeq
  - Estimating **carbon sequestration potential** of crop rotations (increased part of legumes/cereals)
  - Cropping systems monitoring - databases

Flanders is agriculture and fisheries

ioanna.panagea@ilvo.vlaanderen.be

ILVO

ILVO

Sylwia Pindral

Institute of Soil Science and Plant Cultivation (IUNG), Pulawy, Poland

Ludwika Poręba

Institute of Soil Science
and Plant Cultivation
State Research Institute
Department of Soil Science Erosion and Land Conservation
Puławy, Poland

Research topic: urban soils, ecosystem services in urban areas, impact of urbanization on soils and environment

Valentina Rastelli

ISPRA (Italian Institute for Environmental Protection and Research) -

Department for Environmental Monitoring and Protection and for Biodiversity Conservation

Italy - Rome

PhD on cultural heritage sciences

Research topic: Integrating nature's contribution to people when choosing nature-based solutions for restoring degraded ecosystems in protected areas: case studies Alta Murgia and Palo Laziale

Jessica Reyes Rojas

PhD at Czech University of Life Sciences Prague

50.1300° N, 14.3736° E

Research topic:
Soil variability across scales: imaging spectroscopy and digital soil mapping approaches

This research aims to describe and disentangle the interaction of the main drivers contributing to the variability of soil properties and soil-based ecosystem services at different spatial scales. To meet this objective, modern methods of imaging spectroscopy and pedometrics has bee applied.

Oleksandra Rieznyk

PhD at the Czech University of Life Sciences Prague

PhD thesis: "Contamination of soil and crops with micropollutants contained in treated wastewater and sludge from wastewater treatment plants"

- sorption of micropollutants in soil
- plants uptake of micropollutants
- biodegradation and dissipation of micropollutants
- accumulation of micropollutants in different parts of plants
- mathematical model which predicts the behaviour of micropollutants in soil and in plants

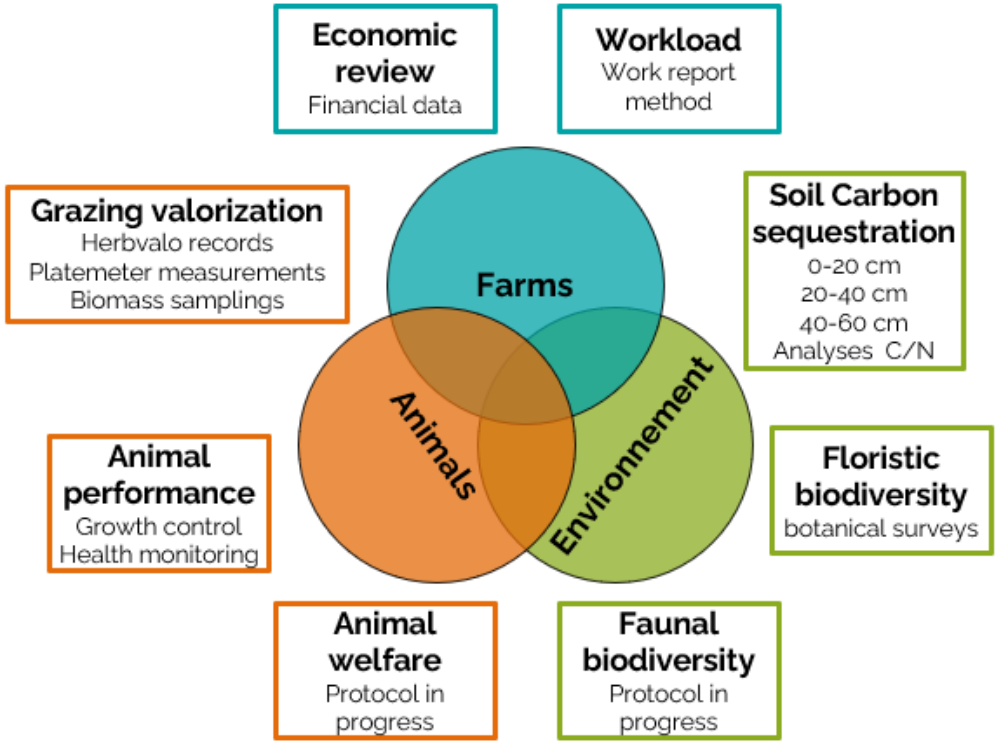
The Czech Republic
Prague

Robin Russias
VetAgro Sup
89 Avenue de l'Europe, 63370 Lempdes, France
robin.russias@moypark.com
06 07 54 39 70

Private-public parternship thesis
Employer : MoyPark Beef Orléans, Fleury-les-Aubrais, France / McDonald's France
Laboratories : VetAgro Sup and INRAE (UMR UREP), Clermont Ferrand, France

Title of the thesis : Effects of three grazing methods on a bouquet of services provided by grassland, under French conditions of suckler or dairy cattle breeding.

Start of experiment in **spring of 2022**, for **3 grazing seasons**. At each of the **17 partner farms**, we followed 1 batch of **heifers** (milk or meat) on a selection of **paddocks**, according to one of the **3 grazing modalities** (continuous grazing, rotational grazing and adaptative multi paddocks grazing). Various measures are carried out to characterize different **services identified** :



A multi-service approach built on field measures

Vajihe Shahrokh

Current position:

Postdoctoral researcher at Teagasc, Ireland working on the SERENA project. My position is focused on the assessment of soil threats, functions and bundles of ecosystem services using a modelling and mapping approach at national scale

Research history:

Postdoctoral researcher at the Polytechnic University of Cartagena, Spain (2020-2022), working on soil greenhouse gas emissions, organic matter stabilization and carbon sequestration, as well as phytoremediation of tailings ponds contaminated with heavy metals.

Ph.D. degree included soil science, soil genesis and classification, especially clay mineralogical changes, bio-geochemistry and nutrient release in the rhizosphere of citrus trees.

The influence of growing hemp on soil quality and effective utilization of their straw

Urtė Stulpinaitė
Lithuanian

The aim of the study is to determine the productivity of hemp residues and to evaluate the possibilities of using their residues for bioenergy and soil improvement.

LAMMC
LITHUANIAN RESEARCH CENTRE FOR AGRICULTURE AND FORESTRY

Soil degradation, caused among other things by unsustainable farming methods and subsequent deforestation in search of new arable land, also poses a direct threat to global biodiversity. One of the ways to preserve the quality of the soil is to grow hemp and then apply its residues to the soil.

Hemp growing advantages:

- Hemp loosens and softens the soil, and the fallen leaves form mulch, which preserves the substances and bacteria in the soil.
- If hemp is grown outdoors, up to two-thirds of the organic matter returns to the soil.
- Hemp plants reduce the population of nematodes and pathogenic fungi in the soil.
- Hemp can be grown without the use of pesticides, herbicides or fungicides.

XY: 6475604.85, 657446.32

Merit Sutri

Chair of Soil Science

Estonian University of Life Sciences

I am investigating the impact of agricultural management on soil quality with the focus on earthworms and soil physical properties. We assess the impact of cropping and tillage system effect on earthworm community by compiling data collected in soil survey programs and research projects in Estonia. By compiling site-level earthworm data we aim to collect information on how different agricultural management impacts earthworm community at varying soil conditions.

Yan Wang

Postdoc

Soil Physics and Land Management Group, Wageningen University

yan2.wang@wur.nl

PhD research topic: Response of soil phosphorus to fumigation in ginger production

Soil pre-treatment with chemical fumigants is one of the most effective and popular methods to prevent soil-borne diseases of ginger. However, due to the broad spectrum of killing, fumigants may also have detrimental effects on soil beneficial microorganisms that play critical roles in soil functions such as soil nutrient cycling. Therefore, our thesis focused on the knowledge gaps regarding the side effects of soil fumigation on soil phosphorus availability in different agroecosystems including real farmlands with different fumigation histories, and soils where fumigants and fungicides are applied in combination.

We found that chloropicrin fumigation increased the soil available P content in the short term, but soil fumigation is not a sustainable way to improve the soil P availability due to the inhibitory effects on related soil phosphatase activity and soil phosphorus solubilizing genes and microorganisms. Therefore, integrated agroecosystem management practice should be developed to promote the soil health and maximize crop production

- **Eva Zagorac**, Research assistant
- Agricultural institute of Slovenia, Department of Agricultural Ecology and Natural Resources
- Coordinates: 46.060544, 14.518493
- Planning on applying for PhD in October 2023.

Topics:

- Soil quality, carbon monitoring, soil ecosystem services in Alps,
- EJP Soil WP3 – project SCALE - Managing sediment connectivity in agricultural landscapes for reducing water erosion impacts,
- National expert tasks (Comparison of LUCAS agricultural soil analysis data with the national method of monitoring agricultural soils, Monitoring carbon in forest soils, wetlands and urban soils).

Introductory question to the training

- **What is your definition of "ecosystem service"?**