VII EUROSOIL 2025
& X Congreso Ibérico
de la Ciencia del Suelo

SEVILLE-SPAIN 8-12 SEP

Advancing soil knowledge for a sustainable future

Book of abstracts

Advancing Soil Knowledge for a Sustainable Future

Book of Abstracts
of the Communications
presented to the
VII EUROSOIL Meeting
Seville – Spain
September 8 – 12, 2025

Título: Advancing Soil Knowledge for a Sustainable Future – EUROSOIL 2025 Book of Abstracts"
Editors: José A. González Pérez & José María de la Rosa Arranz

Published on-line in:
Digital.CSIC (http://digital.csic.es/), the Institutional Repository of "Consejo Superior de Investigaciones Científicas" (CSIC).

URI: http://hdl.handle.net/10261/398890

ISBN: 978-84-09-75471-7

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José A. González Pérez and **José María de la Rosa Arranz**

CONTENT

17:20 - 17:25	**FLASH GT10-3:**	**E. Pihlap *et al.*** *Swedish Univ. of Agric. Sci., Uppsala (Sweden)*
	#605.	
	SOIL STRUCTURE FORMATION MEDIATED BY ORGANIC MATTER AND SHORT-RANGE ORDER ALUMINUM PHASES.	
17:25 - 17:30	**FLASH GT10-04:**	**L. B. Martínez-García *et al.*** *EEAD-CSIC, Zaragoza (Spain)*
	#564.	
	LEGUME COVER CROPS AND NON-TILLAGE ENHANCE SOIL MICROBIAL FUNCTIONAL DIVERSITY IN A SEMI-ARID BARLEY SYSTEM UNDER SUMMER RAIN PULSES.	
17:30 - 17:35	**FLASH GT10-5:**	**M. Ilyas *et al.*** *CREA, Rome (Italy)*
	#313.	
	ENHANCING CARBON SEQUESTRATION IN ITALIAN SOILS THROUGH REGENERATIVE AGRICULTURE: A REGIONAL COMPARATIVE STUDY.	

19:00 - 21:00 **WELCOME CONCERT & SPANISH WINE**

TUESDAY 9th SEPTEMBER 2025

AL'ANDALUS Auditorium (Main Auditorium A, Ground floor)

09:00 - 09:45 **PLENARY CONFERENCE**

Beneath the Surface, Beyond the Targets: Soil Carbon Science for EU Policies Development

Dr. Claire Chenu *INRAE-AgroParisTech, France* **(Presented by Dr. Rafael López-Núñez)**

09:45 - 11:00 **SESSION: GT09. SOIL HEALTH**

Management and Climate Strategies I

Chair:
C. Chenu *(INRAE-AgroParis Tech.)*

09:45 - 10:00	**ORAL 13:**	**I. Vogeler *et al.*** *Aarhus Univ., Tjele (Denmark)*
	#382.	
	SET-ASIDE LAND: A TOOL FOR SUSTAINABLE AGROECOSYSTEMS.	
10:15 - 10:30	**ORAL 14:**	**S. El Farricha *et al.*** *Bouygues Travaux Publics Région France, Paris (France)*
	#33.	
	REUSING EXCAVATED SOILS AND CONSTRUCTION MATERIALS TO RESTORE SOIL FUNCTIONALITY AND ENHANCE SUSTAINABILITY: A CROSS-DISCIPLINARY EXPERIMENTAL APPROACH AT CHALLENGER.	
10:30 - 10:45	**ORAL 15:**	**P. Napoletano *et al.*** *Univ. Florence (Italy)*
	#680.	
	GRAZING PRESSURE MEETS FOREST INTEGRITY: SOIL RESPONSE TO WILD UNGULATES IN THE SASSO FRATINO UNESCO INTEGRAL OLD-GROWTH FOREST (ITALY).	
10:45 - 11:00	**ORAL 16:**	**V. G. Correia *et al.*** *NOVA Univ. Lisbon, Caparica (Portugal)*
	#814.	
	PESTICIDE-CONTAMINATED SOILS: A TRIAD-BASED STRATEGY FOR SOIL HEALTH AND LAND RESTORATION.	

INDEX

11:00 - 12:00 **COFFEE + EXPO + POSTERS SESSION 1**
(IA - ground floor: GT9 & 11; IB- first floor: GT EUSO, 1, 2, 5, 8, 10 & 12)

12:00 - 13:00 **SESSION: GT09. SOIL HEALTH**

Management and Climate Strategies II

Chair:
D. Sauer *(Univ. of Goettingen; DBG President)*

12:00 - 12:15	**ORAL 17:**	**O. Heller *et al.*** *Agroscope, Zürich (Switzerland)*
	#234.	
	SOIL MANAGEMENT IMPACTS ON SOIL STRUCTURAL PROPERTIES IN TEN EUROPEAN LONG-TERM EXPERIMENTS.	
12:15 - 12:30	**ORAL 18:**	**A. C. Royer *et al.*** *CIMO, LA SusTEC, Inst. Politécnico Bragança (Portugal)*
	#157.	
	IMPROVING SOIL HEALTH THROUGH NATURE-BASED SOLUTIONS: THE EFFECTS OF OLIVE-POMACE-BASED COMPOSTS.	
12:30 - 12:45	**ORAL 19:**	**C. Chiodi *et al.*** *Univ. Padova (Italy)*
	#756.	
	AGRIVOLTAIC PANEL SHADING ALTERS SOIL NUTRIENT DYNAMICS AND MICROBIAL COMMUNITIES.	
12:45 - 13:00	**ORAL 20:**	**M. S. Sümmerer *et al.*** *Inst. Agroecol. & Org. Farming; Freising (Germany)*
	#405.	
	IS ORGANIC FARMING A PATHWAY TO CLIMATE-RESILIENT SOILS?	

13:00 - 14:30 **LUNCH + EXPO + POSTERS SESSION 1**
(IA - ground floor: GT9 & 11; IB- first floor: GT EUSO, 1, 2, 5, 8, 10 & 12)

14:30 - 16:00 **SESSION: GT09. SOIL HEALTH**

Monitoring Networks and Data Platforms

Chair:
J. Volungevičius *(LSSS President)* **/ A. McBratney** *(Univ, of Sydney)*

14:30 - 14:45	**ORAL 21:**	**L. R. Roder *et al.*** *Univ. degli Studi di Sassari (Italy)*
	#802	
	SOILS4MED SOIL MONITORING SYSTEM: DEVELOPING AN OPTIMIZED APPROACH FOR CAPTURING THE SOIL AND LANDSCAPE VARIABILITY OF THE MEDITERRANEAN REGION.	
14:45 - 15:00	**ORAL 22:**	**C. T. Omuto *et al.*** *Univ. Nairobi (Kenya)*
	#240.	
	THE AFRICA UNION SOIL OBSERVATORY (AUSO): A CONTINENTAL APPROACH TO SUPPORTING SOIL HEALTH AND AGRICULTURAL SUSTAINABILITY IN AFRICA.	
15:00 - 15:15	**ORAL 23:**	**F. J. Blanco-Velázquez *et al.*** *Evenor-Tech, Seville (Spain)*
	#712.	
	DIGITALISING SOIL HEALTH INVESTMENT BY DATA INTEGRATION FROM BUSINESS MODELS. THE CASE STUDY OF TAMARGUILLO PARK (SEVILLE, SPAIN) IN THE FRAMEWORK OF THE NOVASOIL PROJECT.	

GT 09 - 140 - O

SOIL HEALTH INDICATORS FOR CROPPING SYSTEMS IN MANITOBA, CANADA

GT 09. SOIL HEALTH / GT 10. SOIL CARBON DYNAMICS AND STABILIZATION

STEVE CRITTENDEN*[1], CURTIS CAVERS[1], OSCAR MOLINA[2], STEVE SAGER[2], ZISHENG XING[1]

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Soil health is the collective functioning of chemical, physical, and biological properties in soil. Soil management affects soil health and agronomic outcomes, but the magnitude and direction of these complex interactions needs further elucidation to increase relevance for farmers. We conducted two experiments to understand the interrelations of tillage systems and crop sequences on soil health properties and agronomy. Tillage systems at Portage la Prairie, MB, Canada were cultivation, deep tillage, raised beds, and vertical tillage. Soybean (Glycine max (L.) Merr), corn (Zea mays L.), and canola (Brassica napus L.) were grown in 2020, 2021, and 2022. Twenty five crop sequences were setup at Morden, MB, Canada over a two-year period. The crop sequences included alfalfa (Medicago sativa), canola, corn, soybean, and wheat (Triticum aestivum L.) grown north to south in 2021 and then east to west in 2022 creating 25 crop sequence combinations. Crop yield, seed protein content, and seed oil content were measured each year. Soil samples were analyzed for commercially available soil health indicators including nitrate-N, ammonium-N, total N, ACE protein, water extractable organic N, water extractable total N, water extractable ammonium N, soil organic matter, soil organic carbon, calcium carbonate equivalent, CO2 burst, permanganate oxidizable carbon, water extractable organic C, pH, salts, Olsen P, K, S, sand, silt, and clay. Soil health indicators and their interactions with agronomic outcomes including crop yield, seed protein content, and seed oil content differed between crops and growing seasons. Soil health indicators related to soybean agronomic properties more often than for corn and canola in the tillage trial. Soil health indicators were more likely to relate to agronomic outcomes in a dry year compared to a wet year in the crop sequence trial. In other words, soil health indicators were not consistent predictors of agronomic outcomes relevant to farmers. This suggests that the utility of soil health indicators may be crop and growing condition specific. Further research is needed to understand the mechanisms underpinning the ability of soil health indicators to predict agronomic outcomes and to benchmark soil health indicator values with time.

ACKNOWLEDGEMENTS

This project was made possible through funding from the Manitoba Pulse and Soybean Growers, Manitoba Corn Growers Association, the Governments of Manitoba and Canada through the Canadian Agricultural Partnership, and the Canola Agronomic Research Program of the Canola Council of Canada. We would like to acknowledge the technical assistance of Lindsey Andronak, Autumn Wiebe, and Loni Powell.

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Stephen Crittenden, Curtis Cavers, and Zisheng Xing. 2024. The effect of four tillage systems on agronomic properties and soil health indicators in southern Manitoba. Canadian Journal of Soil Science. 104(3): 273-282. https://doi.org/10.1139/cjss-2023-0100

GT 09 - 157 - O

IMPROVING SOIL HEALTH THROUGH NATURE-BASED SOLUTIONS: THE EFFECTS OF OLIVE-POMACE-BASED COMPOSTS

GT 09. SOIL HEALTH / GT 07. SOIL AMENDMENTS & FERTILIZERS

ANA CAROLINE ROYER*[1,2], MARCOS LADO[2], FELÍCIA FONSECA[1], ZULIMAR HERNÁNDEZ[1], TOMÁS DE FIGUEIREDO[1]

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Loss of soil organic matter (SOM) is a major issue in Mediterranean regions, especially in NE Portugal, where about 70% of soils are classified as Leptosols. On the other hand, olive groves dominate the region's farmland, and the olive oil industry generates large quantities of by-products. Two-phase olive pomace (OP) has a high organic load and is phytotoxic due to its high phenolic content. Composting OP with other agri-residues offers a nature-based solution that addresses untreated OP disposal challenges while recycling nutrients and supporting the circular economy.

This study evaluates the effects of olive pomace-based composts (OPC) on soil physical and chemical properties. OPC was produced by composting OP with sheep manure and almond shells. In a pot trial, 3 OPCs produced with different %OP (OPC44, OPC31 and OPC25) and a commercial organic corrective (HMC) were incorporated in the 0-5cm layer of an eutric Leptosol (2.1% OM) at three doses (10, 20, 40 t.ha-1) + control. Pots were seeded with Italian ryegrass (Lolium multiflorum) and watered to keep soil moisture above 70% field capacity. After 138 days trial, soil properties were analysed for SOM and its physical fractionation, total C and N, extractable K, P Olsen, pH, effective cation exchange capacity (CEC), bulk density, porosity, field capacity, and aggregate stability.

Multivariate analysis showed that compost dose had a stronger influence on soil properties than compost type. Linear regression revealed that SOM, total C, extractable K, pH and effective CEC increased proportionally with dose. The highest dose led to SOM and total C increases of 13.3 and 8.4 $g \cdot kg^{-1}$, respectively. Compared to HMC, OPCs were better K sources. Organic amendment decreased bulk density (by 8-15%) and increased soil porosity, field capacity, and improved aggregate stability by ~20% (particularly with OPC31 and OPC44).

OPC application also enhanced both physical and chemical protection of SOM. C content was highest in macroaggregates, stored as unprotected and coarse particulate OM. Higher doses — especially of OPC31 and OPC44 — promoted larger C accumulation in strongly physically and chemically protected pools, as compared to control and HMC. OPCs application increased mineral-associated OM, likely due to their colloidal nature, supporting long-term SOM stabilization.

This study highlights the potential of OPC to improve SOM content, fertility, and soil structure in degraded Mediterranean soils. Composting OP provides a sustainable approach to valorise agri-waste, enhance soil functions, and support climate-smart agriculture.

ACKNOWLEDGEMENTS

Portuguese Foundation for Science and Technology (FCT, PT): FCT/MCTES (PIDDAC) to CIMO (UIDB/00690/2020 and UIDP/00690/2020) and SusTEC (LA/P/0007/2020). CICA, CIGUS Network, FEDER Galicia 2021-27 operational program (Ref. ED431G 2023/09). A. C. Royer acknowledges FCT individual research grant 2022.11024.BD.

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