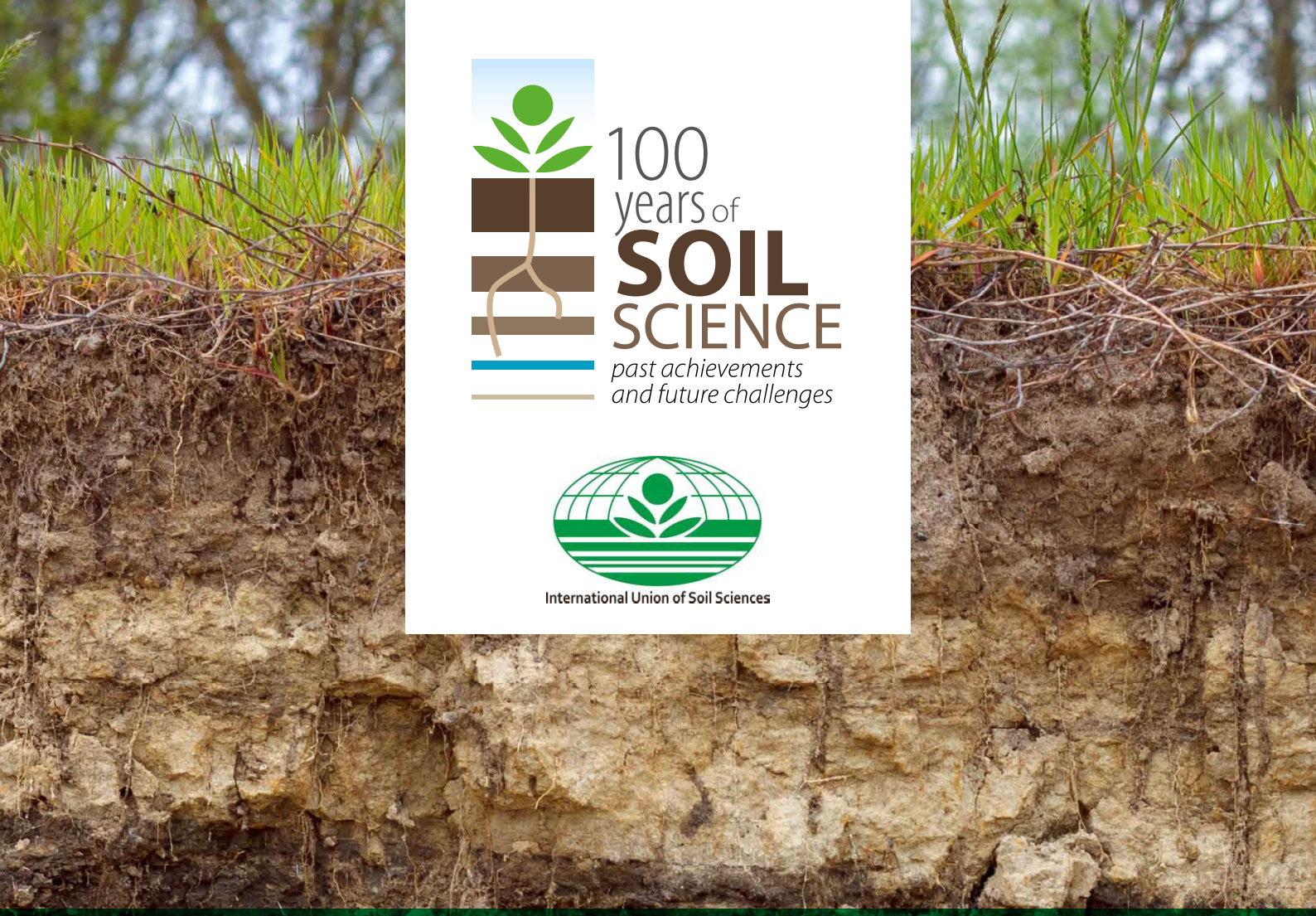

100 years of SOIL SCIENCE
past achievements and future challenges

International Union of Soil Sciences

Centennial Celebration and Congress of the International Union of Soil Sciences

Florence - Italy

May 19 - 21, 2024

ABSTRACT BOOK

Under the Auspices:

MINISTERO DELL'AGRICOLTURA DELLA SOVRANITÀ ALIMENTARE E DELLE FORESTE

REGIONE TOSCANA

COMUNE DI FIRENZE

ACCADEMIA DEI GEORGOFILI

ACCADEMIA ITALIANA DI SCIENZE FORESTALI

Accademie per le Scienze Agrarie UNASA

CA4SH COALITION OF ACTION 4 SOIL HEALTH

ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development

ESSC EUROPEAN SOCIETY for SOIL CONSERVATION

Federazione Italiana Dottori in Scienze Agrarie e Forestali

International Science Council The global voice for science

GLOBAL SOIL PARTNERSHIP

ITALIAN SOIL PARTNERSHIP

SICA

SIPe Società Italiana di Pedologia Italian Society of Pedology

SOCIETÀ GEOLOGICA ITALIANA

SOCIETÀ ITALIANA DI AGRONOMIA

WASWAC

SISEF

S.It.E. - Società Italiana di Ecologia

EJP SOIL European Joint Programme

ANA Accademia Nazionale di Agricoltura

CIHEAM BARI

SIN Società Italiana di Nematologia

Consiglio Nazionale delle Ricerche

SOIL HUB

anci toscana

crea Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria

SIA Società Italiana d'Arboricoltura - o.n.l.u.s.

RE SOIL FOUNDATION Regeneration for a clean and healthy soil

SUSTAINABLE SOILS ALLIANCE

COMMITTEES

Congress Presidents

Giuseppe Corti
Edoardo A.C. Costantini
Sara Marinari

Organising Committee

Alberto Agnelli
Filiberto Altobelli
Anna Benedetti
Annamaria Bevivino
Antonello Bonfante
Alessandro Buscaroli
Costanza Calzolari
Tommaso Chiti
Stefania Cocco
Luigi P. D'Acqui
Lorenzo D'Avino
Carmelo Dazzi
Mauro De Feudis
Claudia Fontana
Michele Freppaz
Vito Armando Laudicina
Giuseppe Lo Papa
Grazia Masciandaro
Giovanni Mastrolonardo
Stefano Mocali
Giacomo Pietramellara
Simone Priori
Claudio Zaccone
Claudio Zucca

Scientific Committee

Costanza Calzolari
Claire Chenu
Stefania Cocco
Giuseppe Corti
Edoardo A.C. Costantini
Paul Hallett
Richard Heck
Rainer Horn
Eugene F. Kelly
Giuseppe Lo Papa
Sara Marinari
Stefano Mocali
Cristine Morgan
Laura Bertha Reyes Sánchez
Natalia Rodriguez
Ren Fang Shen
Xin Song
Claudio Zaccone
Jiabao Zhang
Yongguan Zhu

GENERAL THEMES

Soil health in achieving the Sustainable Development Goals

Soil health is defined as "the ability to sustain productivity, diversity and environmental services of terrestrial ecosystems", extending the significance of soil health far beyond the historically concepts of soil fertility and soil quality, including human health and sustainability goals for planetary health. Thus, it will significantly contribute to reaching the targets of the following Sustainable Development Goals (SDGs): SDG 2 (zero hunger); SDG 3 (Health); SDG 6 (clean water and sanitisation); SDG 12 (sustainable consumption and production); SDG 13 (climate action) and SDG 15 (life on land).
However, several issues have to be addressed to achieve such goals. For example: Defining soil health indicators, Dynamics and functional role of soil biodiversity, Harmonizing soil monitoring strategies, Soil pedodiversity and biodiversity, Soil legacy effects.

Soil governance

Soil is a non-renewable resource. Its use requires policies, strategies, and processes of decision-making at the local, national and supra-national level.
Governing the soil requires international and national collaboration between governments, local authorities, industries, research institutions and citizens to ensure implementation of coherent policies that encourage practices and methodologies that regulate the soil's use to avoid conflict between users to promote and ensure soil security and sustainable land management. Coherent soil governance is the foundation for promoting sustainable agriculture and ensuring food security in addition to all essential ecosystem services.
Under this theme, different sessions could address issues like: Soil Security, Soil Policies, Soil Economy, Soil ecosystem Services, Soil and Education, Soil Awareness, Soils and Societal Development, Sustainable Soil Management, Sustainable Agriculture, Participatory processes in Soil Conservation, Soil Role in Food and Water Security, Soils as Cultural Heritage, Soils and Landscape Management, Soil Partnerships, Living Labs and Lighthouses.

Soil in the circular economy

Circular economy is an economic system focused on maximizing the reuse of natural resources and products, minimizing their depreciation. We consider the soil a natural resource as the water. As the formation of topsoil and the recovery of land and soil quality are extremely slow processes, they are considered as non-renewable resources. Therefore, the recovery and reuse of land and soil is necessary to secure future provision of natural resources and services for the growing world population.
Soil plays an important role in the circular economy as, for instance, the provider of space for societal activities to take place. It stores the stock of mineral resources and offers possibilities for producing biobased resources to replace the use of mineral resources.
Soil's role in the biogeochemical cycles is very important for closing the cycles of water and nutrients. The use of natural cycles as ecosystem services is efficient in reducing the implementation of resource-intense technical practices.

GENERAL THEMES

Soil sciences impact on basic knowledge

Soil consists of a three-phases system containing solids, liquids and gases that strongly interact with each other in the pedogenic processes. Mineral fragments, organic matter, and soil air evolve through a series of biological activities, chemical reactions, and physical forces that are influenced by different environmental factors.
Soil health refers to the capacity of soil to sustain or improve productivity, plant health, and higher trophic levels, as well as air and water quality in natural and managed ecosystems. Interdisciplinary knowledge of chemistry, physics, atmospheric science, soil science, biology, natural history, and ecology is needed to recognize the role of soil in regulating greenhouse gases, reducing nutrient export from agricultural land, controlling pests, and supporting biodiversity that provides many ecosystem services to society.

Soil in the digital era

Soil information technology supports many research fields including pedology, landscape modeling, natural resources management, land evaluation, land use planning, carbon storage, land use/land cover change, environmental risk assessment and modeling and smart/precision farming. There is increasing demand for soil information as it relates to: location, quality and quantity of soil properties, processes and interactions with various natural resources.
Under this theme, different sessions could address issues like: Digital Soil Mapping, Pedometrics, Geostatistics, Soil Spatial Variability, Soil Information Systems, Soil Spatial Infrastructures, Decision Support Systems, Soil Modeling, Environmental Modeling and risk assessment, Soil Proximal Sensing, Soil Remote Sensing, Soil Management in Smart Farming, Mapping and Modeling of Soil Ecosystem Services, Mapping and Modeling of Soil Threats, Soil use and climate change modelling.

Soil and humanity

Soils underpin, directly or indirectly, most of the ecosystem services defined as the benefits humanity obtains from ecosystems. Soil scientists have the responsibility to make clear to civil society, policy makers, scientists and experts in other disciplines the overwhelming importance of soil in their lives.
This implies the need for integrating soil sciences in education at all levels and for increasing soil awareness of general public. A well informed society will have the possibility to exploit the numerous functions soil provides while sustaining the continuous provision of ecosystem services. Under this theme, different sessions could address issues like: soil and humanistic disciplines – history, philosophy, sociology, art, religion; soil and human health, soil and sustainable and liveable cities, soil security and land grabbing, soil education and promotion, soil and human rights.

GENERAL THEMES

Equity, diversity, and inclusivity in soil sciences

Globally, women play a substantial role in agriculture and strong linkages between sustainable soil management (SSM) and gender equality have been demonstrated. However, a number of cultural and social constraints exist which hinder a full recognition of women's role in SSM. An insufficient soil education is one of them. Besides, local soil knowledge, often women driven, is nowadays considered a tool for a sustainable soil management. Despite some encouraging signals, women are still underrepresented in soil science, and in particular in leadership positions and in awards rates.

Supporting equity, diversity and inclusivity in soil science is a key issue for addressing fundamental scientific questions and societally relevant environmental challenges.

Under this theme, different sessions could address issues like: Women in soil science, Underrepresented minorities in soil sciences and soil-related scientific societies, Local knowledge and SSM, Soil education tailored on women and on local/indigenous communities, Ethnopedology.

ID ABS WEB: 136725

4. Soil health in achieving the Sustainable Development Goals
4.30 133622 - Soil Organic Matter Stability as Key Driver to Soil Carbon Sequestration

SOIL ORGANIC MATTER QUALITY AND STABILITY IN AN OLIVE ORCHARD SUSTAINABLY MANAGED FOR 21 YEARS: INSIGHTS INTO LAND USE STRATEGIES AND CLIMATE CHANGE MITIGATION

A SOFO [1], F ARANITI [2], A BLOISE [3], H S ELSHAFIE [1], R ELLERBROCK [4], L SCHNEE [5], R ADDESSO [1]

[1] University of Basilicata, Matera, ITALY
[2] University Statale of Milan, Milano, ITALY
[3] University of Calabria, Rende, ITALY
[4] Leibniz Centre for Agricultural Landscape Research (ZALF, Müncheberg, GERMANY
[5] Leibniz University of Hannover, Hannover, GERMANY

Among the current global challenges, the research of new practices aimed at mitigating soil impoverishment, exacerbated by the pressing climate changes, is the most urgent. Studying soil organic matter (SOM) dynamics and comparing the conventional intensive farming practices with the emerging alternative sustainable ones can represent a key indicator in soil health investigation, helping to find new guidelines for conservative agroecosystem management. In this study, the soil from a Mediterranean olive orchard, with both sustainable (Smng) and conventional (Cmng) land use for 21 years, was investigated for its physicochemical properties, with particular attention to OM from aggregates and its interaction and distribution in aggregates and depths. A higher amount of total carbon (+50.7%) and nitrogen (+74.9%), as well as of OM aromatic component (+76.0%), was detected in the first analyzed layer (0-5 cm) in the sustainably managed soils compared to the conventional one, a sign that the organic matter from surface deeply penetrates very slowly. This evidence was highlighted especially in micro-aggregates (<0.063 mm) (C = +59.3%; N = +86.7%; OM aromatic component = 87.7% in the Smng), likely due to their capacity to bond more easily the smaller colloidal particles with a higher specific surface. This trend is also reflected in an increase in bacterial abundance and in a different accumulation of organic compounds deriving from microbial fermentation processes in Smng soils, as highlighted by the OM qualitative characterization. The soil mineralogical analysis showed that minerals maintained a higher crystallinity in Smng than in Cmng, where soil tillage promoted their alteration. Moreover, Fourier-transform infrared (FTIR) spectroscopy analysis highlighted that soil disturbance due to the Cmng can affect SOM stability, also creating different spatial distributions in the particle aggregates and soil depths. Distinguishing SOM quality, stability and interaction with mineral components can help to understand its degradability and dynamics, both essential for mitigating the effects of climate change and promoting land protection.

This study was carried out within the Agritech National Research Center and received funding from the European Union Next-GenerationEU (PIANO NAZIONALE DI RIPRESA E RESILIENZA (PNRR) – MISSIONE 4 COMPONENTE 2, INVESTIMENTO 1.4 – D.D. 1032 17/06/2022, CN00000022). This manuscript reflects only the authors' views and opinions, neither the European Union nor the European Commission can be considered responsible for them.

Keywords: Carbon storage,Land use,Soil metabolomics,Soil mineralogy,Soil sustainable management

These abstracts have been produced electronically by AIM Group International and are available on the official Website of the "Centennial Celebration and Congress of the International Union of Soil Sciences".

Every effort has been made to faithfully reproduce the abstracts as submitted. However, abstracts have been reproduced as received by the Authors and no responsibility is assumed by the organizers of the congress as well as by AIM Group of any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the material herein.

Congress Presidents

Sara Marinari
Giuseppe Corti
Edoardo A.C. Costantini

Scientific Secretariat

Filiberto Altobelli

National Scientific Society
in charge in organizing

Italian Society of Soil Science

Organizing Secretariat

AIM GROUP ITALY

AIM Group International
Florence Office
Viale Giuseppe Mazzini, 70
50132 Florence (Italy)
Phone +39 055 233881
Fax +39 055 2480246
www.aimgroupinternational.com

GENERAL INFORMATION & SPONSORSHIPS
centennialiuss2024@aimgroup.eu

ABSTRACT SUBMISSIONS
centennialiuss2024.abstract@aimgroup.eu

REGISTRATIONS, TECHNICAL EXCURSIONS, INVOICING
centennialiuss2024.reg@aimgroup.eu

VISA SUPPORT
visa@aimgroup.eu

www.centennialiuss2024.org