

# EUROPEAN HEALTHY SOILS

## CONFERENCE SERIES

1ST EDITION: SOIL FERTILITY

Sept. 13-15, 2023 | Muttenz, Switzerland



## PROGRAM\*

### September 13, 2023 AM

|      |                  |
|------|------------------|
| 8.00 | Exhibitor set-up |
| 8.30 | Registration     |

|       |  |
|-------|--|
|       | <b>Pre-conference Workshop: Upscaling Regenerative Agriculture<br/>Chaired by Pascal Boivin, HEPIA</b>   |
| 9.00  | Welcome<br>Pascal Boivin, HEPIA  |
|       | <b>Stances on regenerative agriculture – Input talks</b>   |
| 9.10  | Soil health framework developed for Nestle<br><b>Pascal Boivin, HEPIA</b>  |
| 9.25  | Earthworm's living soils program<br><b>Bastien Sachet, Earthworm</b>   |
| 9.40  | Regenerative agriculture as part of climate roadmap<br><b>Thomas Peyrachon, Nestle</b>   |
| 9.55  | Regenerative agriculture from the farmers outlook - a welcome discussion that requires buy-in<br><b>Niall Curley, COPA Cogeca</b>  |
| 10.10 | Regenerative agriculture as part of the EU Mission A Soil Deal for Europe<br><b>Luis Sanchez Alvarez, Directorate-General for Agriculture and Rural Development, EU Commission</b>   |
| 10.30 | Coffee break   |
|       | <b>Round table discussion</b>  |
| 11.00 | <ul style="list-style-type: none"> <li>• What are the major limitations in upscaling regenerative agriculture?</li> <li>• What are the goals and expected achievements?</li> <li>• What is the relative importance of new technologies, systemic research, and management schemes?</li> <li>• What pain points and limitations are we facing?</li> <li>• What are the major expectations from research, what is the role of living labs?</li> <li>• What are the available frameworks, standards and labels, to what extent are they compatible?</li> <li>• What is the role of the value chains, and how can they collaborate?</li> </ul> |
| 12.00 | Lunch, networking, posters, exhibition   |



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### Main Conference – Opening Session

|       |  |
|-------|--|
| 13.00 | Welcome to the FHNW: <b>Sebastian Wendeborn</b> , Head, Institute for Chemistry and Bioanalytics<br>FHNW School of Life Sciences                                 |
| 13.05 | Swiss perspective: <b>Eva Reinhard</b> , Head, Agroscope   |
| 13.15 | Swiss perspective:<br><b>Kathrin Schweizer</b> , Councilor and Head of the Basel-Landschaft Security Department  |
| 13.25 | European perspective: The EU mission - A Soil Deal for Europe<br><b>Peter Wehrheim</b> , Directorate-General for Research and Innovation, EU Commission          |
| 13.45 | International perspective: <b>Dominique Bourgeon</b> , Director of the Geneva Liaison Office,<br>Food and Agriculture Organization of the United Nations (video) |

### Soil Diversity Chaired by Reto Meuli, Agroscope

|       |   |
|-------|---|
| 13.50 | <b>Opening keynote:</b> The soils of our planet – a fascinating resource<br><b>Peter Schad</b> , TU München   |
| 14.35 | <b>Keynote:</b> Accelerated soil development – a key process to understand future biogeochemical cycles<br>in arctic and alpine environments<br><b>Sebastian Dötterl</b> , ETHZ |
| 15.20 | 2930: Cropping practices and soil quality as drivers of soil microbial communities<br><b>Alyssa Deluz</b> , HEPIA   |
| 15.40 | Coffee break  |

### Chemistry and Microbiology in Agronomical Soils for Sustainable Crop Cultivation Chaired by Sebastian Wendeborn, FHNW

|       |   |
|-------|---|
| 16.00 | Current priorities and perspectives for soil health in the UK<br><b>Rich Stone</b> , Department for Environment, Food & Rural Affairs, UK   |
| 16.10 | <b>Plenary:</b> Climate and management impacts on mycorrhizal function in crops<br><b>Katie Field</b> , University of Sheffield   |
| 16.40 | 2998: Buried underpants as soil health indicator and awareness-raising tool using citizen science and<br>ways to harness soil biological functions for agriculture<br><b>Franz Bender</b> , Agroscope |
| 17.00 | 2929: Compost-based soil amendments for a sustainable agriculture: linking soil biochemistry and<br>microbiome responses<br><b>Elena Biagi</b> , University of Bologna                                |



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### Flash Poster Presentations - Moderated by Thomas Gross and Reto Meuli

|       |  |
|-------|--|
| 17.20 | <b>Sponsor introduction: Syngenta</b>  |
| 17.30 | 2951: Profiling the impact of crop protection products on mycorrhizae<br><b>Ben Oyserman</b> , Syngenta  |
| 17.35 | 2939: To inoculate or not to inoculate: predicting the effect of field inoculations with arbuscular mycorrhizal fungi on maize yield<br><b>Stephanie Lutz</b> , Agroscope                                      |
| 17.40 | 2952: Impacts of veterinary pharmaceuticals on plant-mycorrhizal symbioses in the environment<br><b>Emily Durant</b> , University of Sheffield   |
| 17.45 | 2962: Root traits explain multitrophic interactions of belowground microfauna on soil nitrogen mineralization and plant productivity<br><b>Junwei Hu</b> , University of Gent                                  |
| 17.50 | 2942: Siderophores-based biofertilizers as a valuable complement/alternative to chemical fertilizers, soil regenerators and plants' biostimulants<br><b>Klaudia Debiec-Andrzejewska</b> , University of Warsaw |
| 17.55 | 2947: Further Testing of the Fungicide Fluazinam – Effects on Three Non-Target Species<br><b>Micha Wehrli</b> , University of Gothenburg   |
| 18.00 | 2932: Regenerating soils through precision irrigation: a Swiss irrigation technology to manage salinity, restore soil health, and increase water efficiency<br><b>Javier Meyer</b> , Aqua4D                    |
| 18.05 | 3032: Autoencoder Neural Network to monitor soil status and analyze the change in soil water dynamics<br><b>Nedal A. T. Aqel</b> , ETH Zürich  |
| 18.10 | 2941: Soil and Climate Change: the role of soil organic amendments in carbon sequestration<br><b>Melania Fiore</b> , Politecnico di Torino   |
| 18.15 | 3037: Voluntary Carbon Standard program and methodology for soil carbon quantification<br><b>Carolina Cardoso Lisboa</b> , Verra   |
| 18.20 | 3055: Evaluation of New Anion Exchange and Synthetic Carbon Sorbents for the Determination of PFAS in Solid Samples Following EPA Method 1633<br><b>Sarah Hohlmann</b> , Agilent                               |
| 18.25 | 2945: Soil quality as driven by cropping practices under intensified agriculture in the north of France – large scale on-farm study<br><b>Pascal Boivin</b> , HEPIA  |
| 18.30 | Welcome Apéro – 12th floor   |



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|   |  |
|---|--|
| 8.00  | Registration   |
| 8.30  | Welcome Day 2  |
| <b>Chemistry and Microbiology in Agronomical Soils for Sustainable Crop Cultivation</b><br>Chaired by Sebastian Wendeborn, FHNW |  |
| 8.45  | <b>Plenary:</b> Effects of multiple threats on soil processes and biodiversity<br><b>Matthias Rillig</b> , Institute für Biologie, Freie Universität Berlin  |
| 9.20  | 2937: The ConSoil project - developing a biomonitoring approach to evaluate the risk of Plant Protection Product residues to soil fertility in agricultural soils<br><b>Mathieu Renaud</b> , EcoTox Center, EPFL |
| 9.40  | 2961: Remote sensing of cover crop legacies on soil health and main crop N-uptake dynamics<br><b>Nikolaos Christos Vavlas</b> , Wageningen University  |
| 10.00   | Coffee break   |
| <b>Today's Challenges to Soil Health</b><br>Chaired by Fabio Fava, FHNW   |  |
| 10.30   | <b>Plenary:</b> Soil regeneration and circular bioeconomy<br><b>Giulia Gregori</b> , Novamont  |
| 11.00   | <b>Plenary:</b> Living labs and soil needs assessments in support of EU Mission: A soil deal for Europe<br><b>Niels Halberg</b> , Danish Centre for Food and Agriculture   |
| 11.30   | 2959: Microplastic pollution in agricultural soil: application of hyperspectral imaging and artificial neural networks<br><b>Misato Toda</b> , FHNW  |
| 11.50   | 2964: The climate challenge of managing organic soils<br><b>Jens Leifeld</b> , Agroscope   |
| 12.10   | Lunch  |



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| 13:15 | <b>Plenary:</b> Global fertilizer crisis: challenges and opportunities for boosting soil health<br><b>Natalia Rodriguez Eugenio</b> , Food and Agriculture Organization of the United Nations (FAO)   |
|       | <b>Workshop: Soil Health - From Practical Issues to Indicators</b>  |
|       | <b>Part A: Definition and Threats – moderated by Natalia Rodriguez Eugenio and Bettina Hitzfeld</b>   |
| 13:45 | <b>Workshop question 1: What are the biggest threats to soil health?</b><br>Mentimeter Ranking Exercise – 10 Global Soil Threats <ul style="list-style-type: none"> <li>• Soil erosion</li> <li>• Soil organic carbon loss</li> <li>• Soil nutrient imbalance</li> <li>• Soil salinization</li> <li>• Soil contamination</li> <li>• Soil acidification</li> <li>• Loss of soil biodiversity</li> <li>• Soil sealing</li> <li>• Soil compaction</li> <li>• Waterlogging</li> </ul> |
| 13:50 | <b>Workshop question 2: What is healthy soil for you? Your definition of a healthy soil?</b>  |
|       | <b>Part B: Input Talks – Threats, moderated by Alexander Wissemeier and Natalia Rodriguez Eugenio</b>   |
| 13:55 | 2935: NETmicroplastic in agricultural soil and its impact on soil properties<br><b>Claudia Preininger</b> , Austrian Institute of Technology  |
| 14:00 | 2954: Greenhouse cultivation practises affect soil health indicators<br><b>Beatrice Kulli</b> , ZHAW  |
| 14:05 | 2956: Monitoring carbon stocks in arable land: sources of errors, improvement of the one-layer equivalent soil mass method and minimum detectable change<br><b>Pascal Boivin</b> , HEPIA  |
| 14:10 | Discussion: Threats   |
| 14:30 | Coffee break  |



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|       | <b>Part C: Minimum indicators and metrics – moderated by Alexander Wissemeier and Bettina Hitzfeld</b>  |
| 15.00 | <b>Workshop question 3: What is the set of minimum indicators and metrics?</b>  |
| 15.05 | 2926: From science to applications: Global demonstration of microbiome properties as a bioindicator linked to differential management practices<br><b>Sam Röttjers, Biome Makers</b>  |
| 15.10 | 2933: Predicting soil fungal communities from chemical and physical properties<br><b>Natacha Bodenhausen, FiBL</b>  |
| 15.15 | 2938: Automatic soil biology analysis by computer vision<br><b>Tobias Heinrich, OTH Regensburg</b>  |
| 15.20 | 2940: Measuring soil quality indicators by means of visible and near-infrared spectroscopy<br><b>Konrad Metzger, Agroscope</b>  |
| 15.25 | 2944: Characteristic times of soil water partitioning as soil health indicators<br><b>Peter Lehman, ETH Zürich</b>  |
| 15.30 | Discussion: Minimum indicators and metrics  |
|       | <b>Part D: Thresholds for chemical, physical, and biological parameters – moderated by Natalia Rodriguez Eugenio and Alexander Wissemeier</b>   |
| 15.50 | 3054: Determination of Per- and Polyfluoroalkyl Substances in Soils Using Agilent Carbon S SPE by LC/MS/MS<br><b>Holger Stalz, Agilent</b>  |
| 15.55 | 3044: Soil quality and management evaluation of Swiss agricultural soils – the Bodencockpit project<br><b>Franziska Häfner, Agroscope</b>   |
| 16.00 | 2948: BENCHMARKS - Building a European Network for the Characterisation and Harmonisation of Monitoring Approaches for Research and Knowledge on Soils<br><b>Fabio Volkman, Climate Farmers and Wageningen University</b>   |
| 16.05 | 2960: Setting targets and thresholds for soil health indicators<br><b>Amanda Matson, Wageningen University</b>  |
| 16.10 | Discussion: Thresholds and parameters   |
| 16.30 | <b>Workshop Wrap-Up Discussion – All Participants</b><br>How do we define healthy soils? Vote on definitions.<br>What methods, tools, and indicators need to be developed?<br>How do we put indicators into practice?<br>What can we do after this workshop to keep our momentum going?<br><b>Each person submits quote for white paper</b> |



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| Poster display and beer |  |
|-------------------------|--|
| 17:30                   | <b>Sponsor introduction: Anglo American</b>  |
|                         | Poster 2916: Biogas residues in the battle for terrestrial carbon sequestration: An in sacco decomposition study in European grassland soils   |
|                         | Poster 2934: Balancing ground water quality and carbon storage in crop production: site-adapted approaches in Switzerland  |
|                         | Poster 2949: Assessment of soil quality after innovative fertilizer mixtures application based on enzymatic activity   |
|                         | Poster 2953: Influence zeolite composites from fly ashes mixed with exogenous organic matter and mineral salts on soil respiration and nitrifying bacteria activity in the contaminated soil |
|                         | Poster 2957: Are all arbuscular mycorrhizal fungi beneficial for crops and soils?  |
|                         | Poster 2963: the influence of the crop plant on the physical characteristics of the soil   |
|                         | Poster 2975: Diversity of The Subsoil Microbiome Under Organic and Conventional Farming  |
|                         | Poster 3029: Systematic variation of soil organic carbon reservoirs along a geoclimatic gradient of grassland soils  |
|                         | Poster 3030: The effects of enhanced weathering on soil health   |
|                         | Poster 3033: Integration of novel strains in resident soil microbiomes of differing complexity and growth phase  |
|                         | Poster 3034: Unravelling the interactions between the soil microbiome and mycorrhizal fungi to improve plant productivity  |
|                         | Poster 3035: Towards understanding and engineering of soil microbiome functioning  |
|                         | Poster 3036: CAPTURE - Evaluating Cover Cropping as a Climate Action Strategy in Norwegian Cereal Production: Impact on Soil Organic Matter Fractions and N <sub>2</sub> O Emissions         |
|                         | Poster 3038: Effects of multifunctional flowering corridors on soil arthropod abundance and biodiversity in olive and fruit orchards in Spain  |



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### Poster display and beer (continued)

|       |  |
|-------|--|
|       | Poster 3039: Sustainable Plant Protection Products and Application Approaches  |
|       | Poster 3040: Impact of plant breeding on mycorrhizal growth response   |
|       | Poster 3041: Effect of the LivinGro ecological project on the health and microbial biodiversity of the soil in different agricultural systems in Spain.  |
|       | Poster 3042: Supporting Chemical Design: a high-throughput method for the determination of KOC values at an early research stage in plant protection   |
|       | Poster 3043: Rapid bioassay in activated sludge for an agile assessment of persistence of plant protection products in early R&D stages  |
|       | Poster 3045: A cost-effective and accessible method to extract and quantify tire wear particles in the soil  |
|       | Poster 3048: Natural grown "Standard soils" of LUFA Speyer for experimental studies  |
|       | Poster 3049: The Effect of Pore Structures on Soil Hydraulic Properties Controlling Physical Soil Health   |
|       | Poster 3052: Rapid, Automated Analysis of Microplastics Direct On-Filter Using Laser Direct Infrared Imaging and Spectroscopy  |
|       | Poster 3056: Synergism between production and soil health through crop diversification, organic amendments and crop protection   |
|       | Poster 3058: Reference values for soil physical quality of mineral agricultural soils for environmental legislation and agricultural management  |
|       | Poster 3069: Assessing Nitrogen Emissions from Irish Temperate Grass Silage: Insights from the DNDC Model  |
|       | Poster 3075: Studying the Influence of Soil Biodiversity and Farming Innovations on the Mineral Nutrition and Stress Tolerance of Wheat Plants for Improved Resilience to Climate Change Impacts |
|       | Poster 3080: Influence of realistic pesticide application spray plan on the nitrogen cycle in bare soil systems  |
| 18.30 | End of the poster display session  |
| 19.30 | Dinner in Basel (additional fee applies)   |





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|   |  |
|---|--|
| 8.30  | Registration   |
| 9.00  | Welcome Day 3  |
| <b>Soil and Climate Change: Interaction of Soil with Water and Atmosphere</b><br>Chaired by Thomas Gross, Agroscope |  |
| 9.10  | <b>Keynote:</b> Soil organic carbon management in agriculture - potentials and limitations<br><b>Axel Don</b> , Thünen Institut  |
| 9.50  | 2931: Modified soil erodibility global map using saturated hydraulic conductivity<br><b>Surya Gupta</b> , University of Basel  |
| 10.10   | Coffee break   |
| 10.40   | 2936: 3D+T mapping in the Netherlands reveals soil organic matter changes between 1953 and 2022 at 25m resolution<br><b>Anatol Helfenstein</b> , Wageningen University   |
| 11.00   | 2958: Deep-rooting cover crop mixtures: Highways to subsoil water and nutrient resources<br><b>Sandra Spielvogel</b> , Christian-Albrechts-Universität zu Kiel   |
| <b>Conclusion</b>   |  |
| 11.20   | <b>Closing plenary:</b> How the EU Soil Observatory is providing solid science for healthy soils<br><b>Serenella Sala</b> , Directorate for Sustainable Resources of the European Commission's Joint Research Centre (JRC) |
| 12.00   | Poster award and announcement of next conference   |
| 12.30   | End of the event   |

