PhD-Day at ATB Potsdam, Thursday, 19 March 2026, Hybrid-Conference; Room Z003 and Zoom

Time	Topic	Speaker	Supervisor ATB	Supervisor University
09:00	Welcome	Prof. Dr. Barbara Sturm Dr. Ulrike Praeger PhD representatives ATB		
09:15	Keynote Speech: Life at the Edge: Exploring the Microbial Diversity of Kenyan Soda Lakes	Prof. Dr. Romano Mwirichia Kachiuru	Professor Em. of Microbiology, Department of Biological Sciences, University of Embu, Kenya	
09:50	Coffee Break			
Healthy Foods / Diversified Crop Production				
10:20	Geographical Regions and Agricultural Management Systems Shape Apple Microbiome and its Resistome	Denis Kiplimo Gunia	Dr. Ahmed Abdelfattah	Prof. Dr. Gabriele Berg, Prof. Dr. Elke Dittmann, Uni Potsdam
10:40	The Global Flower Microbiome: Construction of a Harmonized Metadata Resource	Dinesh Kumar Ramakrishnan	Dr. Ahmed Abdelfattah	Prof. Dr. Gabriele Berg, Prof. Dr. Elke Dittmann Uni Potsdam
Multifunctional Biomaterials				
11:00	Platform Chemicals Production from Residual Biomass	Laís Portugal Rios da Costa Pereira	Dr. Agata Olszewska-Widdrat	Dr. Korbinian Kätzl, Uni Kassel
Cross-programme topics				
11:20	Hierarchical Sparse Autoencoders for Structured Feature Discovery	Pengfei Zhao	Prof. Dr. Marina Höhne	Prof. Dr. Marina Höhne, Uni Potsdam
11:40	Applying Human Factors Engineering Principles to EU's Common Agricultural Policy to Enhance Safety of Digital Agricultural Work Environment	Prathamesh Bachche	Dr. Martina Jakob	Prof. Dr. Markus Feufel, TU Berlin
12:00 12:05	Group photo Lunch Break			
13:00	Game	Doctoral researchers ATB		
14:00	Keynote Speech: Artificial Intelligence for Scientific Communication in Agriculture	Prof. Dr. Masahiro Ryo	Head of Working Group: Artificial Intelligence, Leibniz Centre for Agricultural Landscape Research (ZALF); Professor of Environmental Data Science, Brandenburg University of Technology Cottbus-Senftenberg	
Diversified Crop Production				
14:40	Integrating Multivariate Spatial Interpolation for Site-Specific Weed Management: Leveraging Abiotic Factors for Enhanced Mapping Accuracy	Hüseyin Ayaz	Dr. Michael Schirrmann	Prof. Dr. Cornelia Weltzien, TU Berlin
15:00	Modern Neural Networks for Field-scale Digital Soil Mapping	Viacheslav Barkov	Dr. Robin Gebbers	Prof. Dr. Martin Atzmüller, Uni Osnabrück
15:20	Coffee Break			
Individualized Livestock Production				
15:50	A Novel *in vitro* Method for Continuous Monitoring of Methane Emissions from Liquid Manure Storage Systems under Farm-like Conditions as a Basis for Modelling	Aditya Rawat	Prof. Dr. Thomas Amon	Prof. Dr. Cornelia Weltzien, TU Berlin
16:10	Break			
16:15	Discussion about career paths after doctorate	Dr. habil. Jan Mumme Prof. Dr. Masahiro Ryo	Alumnus ATB, Independent Consultant for Biochar & Biogas, Entrepreneur and Startup Coach (see above)	
17:00	Get together			

Abstracts of presentations of doctoral researchers

Geographical Regions and Agricultural Management Systems shape Apple Microbiome and its Resistome

Denis Kiplimo Gunia

Antimicrobial resistance (AMR) in plant microbiomes is increasingly recognized as food safety and One-Health concerns. Apples are widely consumed fresh, yet little is known how agricultural practices and geography shape their microbiome and resistome. Here, we compared the microbiome and their ARGs in apples from organic and conventional orchards in Israel and the USA. Analyses showed geographical regions was the strongest driver of community differences. Five genera were identified as carriers of ARGs, Pseudomonas being the predominant. Majority of ARGs encoded for multidrug resistance. Overall, our study highlights an integrated ecological framework linking microbiome and its resistome, providing critical insights into AMR management.

The Global Flower Microbiome: Construction of a Harmonized Metadata Resource

Dinesh Kumar Ramakrishnan

Flowers represent a critical but understudied microbial habitat at the intersection of plant reproduction, pollinators, and environmental exposure. Unlike roots and leaves, floral microbiomes remain fragmented across individual studies. Evidence indicates that flower-associated microbes influence nectar chemistry, pathogen suppression, pollinator behaviour, and seed development, with consequences for plant reproductive success and microbiome inheritance. However, global synthesis is hindered by heterogeneity in study design, host taxonomy, sampled organs, sequencing markers, and metadata reporting. Systematic metadata harmonization enables detection of large-scale patterns, biases, and knowledge gaps. Establishing a global flower microbiome framework is essential for integrating floral microbiomes into broader plant microbiome ecology and for informing agricultural research on plant reproduction, and microbiome-informed crop management.

Platform Chemicals Production from Residual Biomass

Laís Portugal Rios da Costa Pereira

This research develops innovative strategies to produce the platform chemicals lactic acid (LA) and succinic acid (SA) from underutilized biomass. It focuses on two feedstocks: residual apples and grassland biomass. The project will advance the valorization of residual apples through pilot-scale microbial fermentation, a critical step for industrial scale-up. For grassland biomass, it introduces a novel approach using both nutrient-rich press juice and sugar-rich press cake hydrolysate. Employing specialized microbes like *Heyndrickxia coagulans* and *Actinobacillus succinogenes*, this work aims to create new value chains for waste streams, advancing the circular bioeconomy.

Hierarchical Sparse Autoencoders for Structured Feature Discovery

Zhao Pengfei

Understanding what features are encoded by deep neural networks is central to interpretability research. Sparse Autoencoders (SAEs) have recently become the dominant tool for mapping hidden activations into a sparse, monosemantic feature space. While effective, SAEs remain flat: they treat features as isolated units, ignoring the natural hierarchical structure of concepts. In this work, we introduce Hierarchical Autoencoders (H-SAEs), a framework that uncovers tree-structured representations spanning multiple layers of a network. H-SAEs disentangle features at varying levels of granularity, linking fine-grained signals to broader conceptual categories, and offering a more faithful account of how representations are internally organized. Empirically, H-SAEs recover coherent hierarchies in large-scale vision models, outperform SAEs and other baselines in both interpretability and efficiency. Beyond quantitative improvements, H-SAEs enable practical analyses of spurious correlations and feature reuse across layers, pointing toward a richer and more structured understanding of learned representations.

Applying Human Factors Engineering Principles to EU's Common Agricultural Policy to Enhance Safety of Digital Agricultural Work Environment

Prathamesh Bachche

European farm workers continue to face high injury rates, poor working conditions, and weak enforcement of labour standards despite the introduction of CAP (Common Agricultural Policies) social conditionality. This research aims to strengthen the policy's effectiveness by integrating Occupational Safety and Health and Human Factors/Ergonomics principles into its implementation. The study will assess current OSH gaps, develop an HFE-informed intervention framework, and pilot practical solutions with farmers, inspectors, and advisory services. Mixed methods—data analysis, field studies, and stakeholder engagement—will guide the process. Expected outcomes include improved compliance, safer work environments, and evidence-based recommendations to enhance the CAP's capacity to deliver fairer, healthier farm work across the EU.

Integrating Multivariate Spatial Interpolation for Site-Specific Weed Management: Leveraging Abiotic Factors for Enhanced Mapping Accuracy

Hüseyin Ayaz

Site-specific weed management (SSWM) requires accurate information on the spatial distribution of weeds, however, traditional scouting and manual mapping are labor-intensive, time-consuming, and error-prone in large or spatially variable fields. This study addresses these challenges by integrating geospatial interpolation techniques with UAV-derived data to generate continuous weed distribution maps from limited observed data. In contrast to conventional univariate interpolation methods, the proposed framework incorporates data from UAV and soil sensors as well as soil pH measurements to improve spatial prediction accuracy. The resulting high-resolution weed maps enable more precise and

sustainable weed control, reducing herbicide use, minimizing environmental impact, and supporting data-driven decision-making in precision agriculture.

Modern Neural Networks for Field-Scale Digital Soil Mapping

Viacheslav Barkov

Pedometrics and digital soil mapping face a fundamental challenge of building accurate predictive models from datasets where sample sizes are limited by cost and labor constraints. Traditional machine learning methods like Random Forest have long dominated pedometrics, but recent advances in artificial neural networks challenge this status. We investigate the application of modern neural networks under realistic constraints of precision agriculture. We further propose strategies that integrate spatial information and address high-dimensional data challenges of soil spectroscopy. Our findings establish a new baseline for digital soil mapping, offering methodological insights applicable to any precision agriculture domain constrained by small datasets.

A Novel in vitro Method for Continuous Monitoring of Methane Emissions from Liquid Manure Storage Systems under Farm-like Conditions as a Basis for Modelling

Aditya Rawat

Introduction to a novel, continuously operating *in vitro* system for quantifying methane emissions under realistic farm-like liquid manure storage conditions. The laboratory setup consists of four tanks that enable daily substrate feeding, precise temperature control, and real-time gas measurement, thereby simulating long-term storage conditions with high reproducibility. For the first time, continuous methane emission monitoring was coupled with high-resolution bacterial and archaeal community profiling to elucidate the temporal dynamics of microbial activity underlying methane production. The methodological innovation of continuous, high-resolution monitoring under realistic conditions provides a robust platform for investigating emission drivers and refining predictive models of greenhouse gas emissions from liquid manure storage.