

## PhD-Day at ATB Potsdam, Wednesday, 13 November 2024, Hybrid-Conference; Room Z003 and Zoom

Time	Topic	Speaker	Supervisor ATB	Supervisor University
9:30	Welcome	Prof. Dr. Barbara Sturm Dr. Ulrike Praeger PhD representatives		
9:45	<a href="#">Keynote-speech: Computational fluid dynamics based digital twins of different biosystems: challenges and opportunities</a>	Prof. Mulugeta Admasu Delele		
10:30	Break			
<b>Diversified Crop Production</b>				
11:00	<a href="#">Exploring the microbiome of wild flowering plants: A comparative study of leaves and flowers in alpine ecosystems</a>	Dinesh Kumar Ramakrishnan	Dr. Ahmed Abdelfattah	Prof. Dr. Gabriele Berg Prof. Dr. Elke Dittmann Uni Potsdam
11:20	<a href="#">Artificial humic acid diminishes the effect of drought on the soil microbiome</a>	Daniel Höfle	Dr. Ahmed Abdelfattah	Prof. Dr. Gabriele Berg Prof. Dr. Elke Dittmann Uni Potsdam
<b>Healthy Foods</b>				
11:40	<a href="#">The edible antibiotic resistome of Mandy apples and Golden Reinders apples</a>	Denis Gunia	Dr. Ahmed Abdelfattah	Prof. Dr. Gabriele Berg Prof. Dr. Elke Dittmann Uni Potsdam
12:00	<a href="#">Heat transfer dynamics in postharvest cold storage of apples</a>	Tuany Hoffmann	Dr. Pramod Mahajan	Prof. Dr. Barbara Sturm HU Berlin
12:20	Group Photo			
12:30	Lunch Break			
13:30	Panel Discussion (Only in person) Global topics	Aleksandra Atanasova Tuany Hoffmann Harsh Sahu		
<b>Individualized Livestock Production</b>				
14:15	<a href="#">From Pixels to Airflow: Exploring Image Similarity Methods for Barn Ventilation Analysis</a>	Ali Alaei	Dr. Sabrina Hempel	Prof. Dr. Cornelia Weltzien TU Berlin
14:35	<a href="#">Measuring and modeling of methane emissions from continuous storage of dairy and pig manure under year-round monitoring</a>	Zhenhua Song	Prof. Dr. Thomas Amon	Prof. Dr. Thomas Amon Prof. Dr. Marcus G. Doherr
14:55	Break			
<b>Multifunctional Biomaterials</b>				
15:30	<a href="#">Effect of wet preservation on characteristics and processing of lignocellulosic biomass of hop (<i>Humulus lupulus</i> L.) leftovers</a>	Saurav Nepal	Dr. Hans Gusovius	Prof. Dr. Carsten Mai Georg-August-Universität Göttingen
15:50	<a href="#">Tree digital twins - developing carbon monitoring methods for woody biomass stands</a>	Lisa Schulz-Nielsen	Dr. Ralf Pecenka	Prof. Dr. Michael Köhl Universität Hamburg
16:10	Discussion with Alumni about their career	Dr. Wiebke Jander	Scientist - Federal Environment Agency (Umweltbundesamt)	
16:45	Let's play: "Guess a researcher"	Aleksandra Atanasova Tuany Hoffmann Harsh Sahu		
17:15	Get together			

## **Keynote-Speech**

### **Computational fluid dynamics based digital twins of different biosystems: challenges and opportunities**

#### **Prof. Mulugeta Admasu Delele**

Mulugeta Admasu Delele is a scientist at The Leibniz Institute for Agricultural Engineering and Bioeconomy, and he is an Adjunct Professor at Faculty of Chemical and Food Engineering, Bahir Dar Institute of Technology, Bahir Dar University, Ethiopia. He got a B.Sc degree in chemical engineering from Addis Ababa University, M.Sc degree in postharvest and food preservation engineering from KU Leuven, Belgium and a PhD in Biosystems engineering from KU Leuven, Belgium. He has been actively working on experimental and model based analysis, design and optimization of different biosystems that include storage, drying, packaging, transportation, cooling, spraying and food processing. He has a vast international research, teaching, consultation, community engagement and supervision experiences; he has worked in Belgium, South Africa, Ethiopia and Germany. He has published over 120 peer-reviewed journal and conference proceeding papers and 1 Patent. He is fellow of Alexander von Humboldt foundation. He is an academic editor of international journal of chemical engineering.

## **Abstracts of presentations**

### **Diversified crop production**

#### **Exploring the Microbiome of Wild Flowering Plants: A Comparative Study of Leaves and Flowers in Alpine Ecosystems**

##### **Dinesh Kumar Ramakrishnan**

This study investigated the diversity and composition of bacterial and fungal communities in the leaves and flowers of 50 wild flowering plant species in the Austrian alpine ecosystem. We found distinct microbial communities on leaves and flowers, with higher diversity on leaves. Location and soil type significantly influenced microbial community composition, while altitude increased fungal diversity. Plant family identity also impacted microbial abundance and diversity. These findings highlight the influence of environmental factors and plant-microbe coevolution on shaping the microbiome of wild flowering plants, with implications for plant health and conservation in a changing climate.

#### **Artificial humic acid diminishes the effect of drought on the soil microbiome**

##### **Daniel Höfle**

Humic substances hold significant potential for enhancing regenerative agriculture. Hydrothermal humification technology has enabled the conversion of waste materials into artificial humic acids. However, there remains a limited understanding of how artificially produced humic acid affects the soil microbiome, particularly in drought-exposed soils. Therefore, we conducted an experiment examining the impact of drought stress and artificial humic acid on the soil microbiota. Under conditions of drought stress, artificial humic acid helped maintain bacterial diversity amid changes in community composition. We propose that artificial humic acid can enhance the soil bacterial community, mitigate drought stress, and offer considerable potential for carbon sequestration in the soil.

## **Healthy Foods**

### **The edible antibiotic resistome of Mandy apples and Golden Reinders apples**

**Denis Gunia**

Antibiotics are regarded as “endangered species” due to antimicrobial resistance (AMR). Nonetheless, antibiotic resistance continues to be little researched within the domain of food microbiomes. This study presents the analysis of antibiotic resistome in the microbiomes of two-apple cultivars using culturomics and whole genome sequencing. The evaluation of antibiotic susceptibility was tested using disc diffusion method. The discs were infused with seven antibiotics. A total of 298 of 526 bacterial isolates showed varied antibiotic resistance profiles. The results of our study demonstrated that apples possess distinct microbiomes with various resistance characteristics. In overall, this study offers novel insights into the dynamics and prevalence of antibiotic resistance in agricultural settings.

### **Heat transfer dynamics in postharvest cold storage of apples**

**Tuany Gabriela Hoffmann**

The preservation of apples in cold storage relies deeply on understanding the thermal dynamics governing their environment. Within packaging, apples engage in complex thermal interactions, between themselves and the environment, affecting convective and conductive heat transfer pathways. Challenges escalate in industrial cold storage facilities, manifesting as temperature stratification and non-uniform cooling. Postharvest cooling of apples was investigated in industrial-level cold rooms and findings can support the comprehensive understanding of heat transfer dynamics and air distribution, vital for optimizing cold storage equipment design and enhancing cooling system operation efficacy.

## **Individualized livestock production**

### **From Pixels to Airflow: Exploring Image Similarity Methods for Barn Ventilation Analysis**

**Ali Alaei**

This study aims to improve the accuracy of air exchange rate (AER) estimation in cattle housing by integrating computational fluid dynamics (CFD) and image similarity metrics. Traditional methods, such as tracer gas decay and pressure difference measurements, have limitations in capturing airflow complexities. The study compares CFD-generated airflow images using similarity metrics—Mean Squared Error (MSE), Normalized Cross-Correlation (NCC), and Structural Similarity Index (SSI). NCC performed best in maximizing similarity, while MSE detected fine differences. The findings suggest that combining CFD and image-similarity techniques can enhance ventilation analysis, contributing to better livestock housing design and management.

## **Measuring and modeling of methane emissions from continuous storage of dairy and pig manure under year-round monitoring**

**Zhenhua Song**

Current models of CH<sub>4</sub> emissions from dairy manure storage are based on batch fermentation, which is inconsistent with continuous manure storage on farms. This study set up lab-scale fermenters to simulate actual farm manure slurry storage conditions and monitored greenhouse gas emissions throughout the year. The current results show that NH<sub>4</sub>-N is the main factor affecting manure slurry pH, and the inoculum accelerates the rate of CH<sub>4</sub> emissions mainly in the first month.

## **Multifunctional Biomaterials**

**Effect of wet preservation on characteristics and processing of lignocellulosic biomass of Hop (*Humulus lupulus L.*) leftovers.**

**Saurav Nepal**

Hop (*Humulus lupulus L.*), a perennial climber with bast fiber containing stem is cultivated throughout Germany for brewing purpose. After cone extraction, leftover biomass sums up to 100,000 tons, which is barely utilized. In order to make it available for any further processing, wet preservation is effective for the storage of lignocellulosic hop leftovers. First experimental activities have shown that the pH of leftovers during wet preservation period is stable with minimal mass loss and change in dry content. Cellulose content of the biomass is not degraded. Moreover, duration of wet preservation results in varying particle size distribution when processed by defibration extruder.

## **Tree digital twins - developing carbon monitoring methods for woody biomass stands**

**Lisa Schulz-Nielsen**

Woody biomass crops can be a lucrative alternative to classic arable crops for farmers, and are an efficient solution for long-term carbon fixation on agricultural soils. Long-term experiments executed at ATB showed that poplar energy coppices can fixate up to 37.8 t/ha more belowground carbon on sandy soils than conventional farming. To find out how cultivation factors affect the distribution of carbon within poplar fields, four poplar plots were studied. Sequestered carbon was determined for all plots in the following fractions: crown biomass, stem biomass, coarse root biomass, fine root biomass, topsoil (0-30 cm depth) and subsoil (30-60 cm depth). Significant differences were found in aboveground as well as belowground stocks, going up to 7 t/ha biomass C between plots. The results could be an indicator for partial harvest system and combined use systems benefitting the purpose of belowground carbon sequestration, in comparison to conventional full harvest of the coppices.