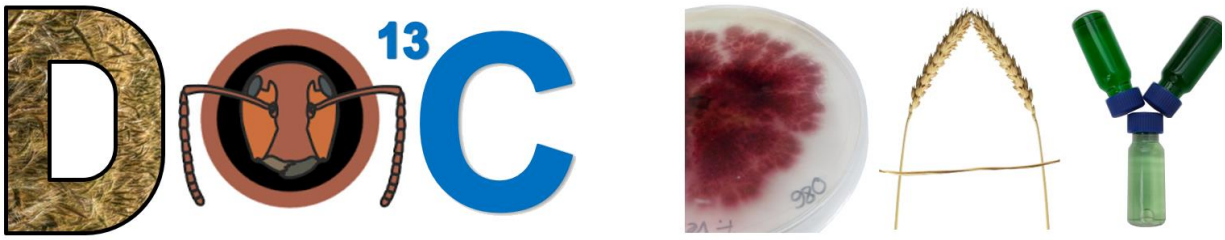
5th



PhD Conference

IFA-Tulln
Peter Ruckenbauer Lecture Hall
Tulln, Austria

17th & 18th October, 2017

BOKU BiRT BioResources & Technologies Tulln

AIT AUSTRIAN INSTITUTE OF TECHNOLOGY

5th DocDay- Book of Abstracts

Edited by

University of Natural Resources and Life Sciences, Vienna (BOKU)

Department of Agrobiotechnology (IFA-Tulln)

Konrad Lorenz Straße 20

3430 Tulln an der Donau, Austria

Organizing Committee

Jacqueline Meng-Reiterer

Asja Ceranic

Michaela Hönigsberger

Sponsored by

Table of Contents

Preface

BiRT is an acronym for Bio-Resources & Technologies Tulln, an organizational unit at BOKU which thematically integrates all BOKU departments which are fully or partially located at Tulln. BiRT integrates virtually all fields of research and teaching of BOKU´s research groups at Tulln and represents a highly interdisciplinary domain covering the process chains and cycles of sustainable production, processing and utilization of bio-resources for various human demands including food, feed, and renewable, bio-based materials, chemicals and energy. BiRT serves as a platform of discussion, exchange of ideas and development of joint projects in research and teaching and aims at enhancing BOKU´s profile and visibility at campus Tulln.

Since 2013, BiRT offers the annual DocDay aiming at providing a forum for all PhD students at campus Tulln who want to share their work with their colleagues and supervisors in a highly interdisciplinary environment, and to use the opportunity for networking activities. Moreover, this event is being organized by PhD students themselves, with rotation of the organizing committee among the working groups.

On behalf of the BiRT Steering Committee I wish to thank the organizers for the hard work and to welcome all of you to the DocDay 2017. I am looking forward to an interesting event with fruitful discussions across the disciplines. If you want to learn more about BiRT please visit our website at http://www.boku.ac.at/wissenschaftliche-initiativen/birt/.

Univ. Prof. DI. Dr. Walter W. Wenzel

Head of BiRT


Univ.Prof. Walter W. Wenzel
Universität für Bodenkultur Wien

Dear colleagues!

We warmly welcome you to the 5th DocDay in Tulln!

This year the conference is extended to a two days event and organized by the Metabolomics group of the Center for Analytical Chemistry at the IFA-Tulln.

The aim of the conference is to provide PhD students working at the Campus Tulln (IFA, UFT-BOKU and AIT) a platform to present their research and to facilitate the interdisciplinary exchange between research groups.

We thank the BiRT initiative for financing major parts of the DocDay conference, the companies SCIEX, Agilent Technologies and Shimadzu for their additional financial support, as well as all the organizational helpers, contributors and participants.

We wish you a great DocDay and looking forward to the numerous scientific presentations, lab tours, (hopefully very fruitful) discussions and of course to the 'PhD-Oktoberfest'!

Jacqueline Meng-Reiterer, Asja Ceranic and Michaela Hönigsberger

Jacqueline Meng-Reiterer

Michaela Hönigsberger (Fischer)

Asja Ceranic

5th DOC 13 DAY

17th of October – Talks and Posters

08:30	**Registration**
09:00	Opening – Welcome Words
	KEYNOTE LECTURE **PhD - what comes next? Academic Perspective/Industry Perspective**
09:15	**Georg Weingart**, Research team leader analytical chemistry at Biomin GmbH
09:45	**Elisabeth Varga**, PostDoc at Technical University of Denmark
10:15	Coffee Break
	BIORESOURCES **Chairs: Bernhard Wolf & Asja Ceranic**
10:45	**Oskar Haske-Cornelius (BOKU)** Enzymatic systems for cellulose acetate degradation
11:00	**Maximilian Schmid (BOKU)** Usage of an industrial by-product stream-for the production of polyhydroxyalkanoates
11:15	**Sven Plappert (BOKU)** Transparent moisture resistant CNF/PMMA nanocomposite aerogels
11:30	**Julien Jaxel (KPLUS)** Dyeing of solid wood using supercritical carbon dioxide as carrier

11:45	**Kwankao Karnpakdee (BOKU)** Flexible biogas production; the effect of three different feeding strategies to the biogas production under the semi-continuous experiment
12:00	**LUNCH BREAK & POSTER SESSION**
	BIOTECHNOLOGY **Chairs: Roland Hellinger & Michaela Hönigsberger**
13:30	**Pia Euteneuer (BOKU)** Apothecia production of *Sclerotinia sclerotiorum* and infection of soybean following catch crop cultivation
13:45	**Maria Doppler (BOKU)** Metabolomics of Fusarium Head Blight in wheat: Investigation of the phenylalanine-derived submetabolome
14:00	**Marine Ollier (BOKU)** Assessing *fusarium* damaged kernels by digital picture analysis
14:15	**Alejandro del Barrio Duque (AIT)** Bacterial helpers to make intimate association with the mycorrhiza-like *Serendipita indica* and to enhance plant resistance against plant pathogens
14:30	**Meysam Ebrahimi (BOKU)** Root traits and phosphorus acquisition efficiency in soybean *Glycine max* (L.)
14:45	**Susanne Reichert (BOKU)** Analysis of the role of galactinol in nematode induced syncytia
15:00	Coffee Break
	CONTAMINANTS AND HEALTH **Chairs: Maria Doppler & Christoph Büschl**
15:30	**Reinhard Beyer (BOKU)** *Candida glabrata* requires the Map kinase Hog1 to compete against *Lactobacillus*
15:45	**Nada Jurisic (BOKU)** Determination of aflatoxin biomarkers in chickens

16:00	**David Steiner (BOKU)** Development of a quantitative multi-class confirmation method based on LC-ESI-MS/MS for the determination of natural contaminants and anthropogenic residues in complex animal feed matrices
16:15	**David Stadler (BOKU)** Influence of the lot-to-lot variation on the measurement uncertainty of LC-ESI-MS/MS based determination of 70 mycotoxins in figs and maize.
16:30	**Roland Martzy (TU, IFA)** A loop-mediated isothermal amplification (LAMP) assay for the rapid detection of *Enterococcus* spp. in environmental waters
16:45	Short Break
17:15	Awards Ceremony
17:30	**PhD-Oktoberfest**

18th of October – Lab Tours

09:00	**Meeting Point at Peter Ruckenbauer lecture hall**
	Lab tours Part 1 **IFA** **Meeting Point: In front of Ersatzneubau**
09:15 – 11:45	**Oskar Haske-Cornelius** **Claudia Tallian** **Verena Braunschmid** Biomaterial- und Enzyme Technology (microorganisms, HPLC, GC, MS) **David Stadler** **David Steiner** Analytical methods for mycotoxin research (HPLC-MS,...) **Marine Ollier** PCR
11:45-12:45	**LUNCH BREAK – Soup will be served at IFA**
	Lab tours Part 2 **UFT (Wood KPlus)** **Meeting Point: In front of UFT**
12:45 – 14:15	**Elfriede Hogger** **Janae Kristin Köhnke** **Pia Solt** ABES, Sample Prep with Ultracut and Zeiss Microscope, Zwick Z020… **Sven Plappert** **Julien Jaxel** Supercritical fluids, supercritical CO_2 equipment,… **Christoph Winkler** Rheometer, synchron measurements,…
14:15	Short Break

	Lab tours Part 3 UFT/AIT Meeting Point: In front of UFT
14:30 – 16:00	**Meysam Ebrahimi** **Kwankao Karnpakdee** **Pia Euteneuer** Agricultural methods, continuous feeding experiment, Van Soest method… **Peter Stasnik** **Carolina Escobar** Influences on plant growth and development **Christina Roschitz** Soil research: Planar optodes, DGT
	Closing Words

Abstracts Session 1

BIORESOURCES

Oskar Haske-Cornelius

Institute of Environmental Biotechnology, University of Natural Resources and Life Sciences Vienna, Konrad-Lorenz-Strasse 20, 3430 Tulln an der Donau, Austria

oskar.haske-cornelius@boku.ac.at

Enzymatic systems for cellulose acetate degradation

O. Haske-Cornelius [1], A. Pellis [1],G. Tegl [1], S. Wurz [1], B. Saake [2], R. Ludwig [3], A. Sebastian [4], G. S. Nyanhongo [1], G. M. Guebitz [1]

1 Institute of Environmental Biotechnology, University of Natural Resources and Life Sciences Vienna, Tulln, Austria
2 Chemical Wood Technology, Department of Wood Science, University of Hamburg, Hamburg, Germany
3 Department of Food Science and Technology, University of Natural Resources and Life Sciences, Vienna (BOKU), Austria
4 R. J. Reynolds Tobacco Company, Winston-Salem NC 27101, USA

Cellulose acetate (CA) based materials like cigarette filters contribute to landscape pollution challenging municipal authorities and manufacturers. This is particularly true for cigarette filters, which are inappropriately disposed. An investigation in the USA showed that 25-50% of all litter items collected were cigarette butts [1]. Thus, developing biodegradable cigarette filters may help to overcome pollution and reduce effort in litter cleanup activities. For some regions these issues already influenced legislation: in 2012 the state of New York had a law under consideration, that will promote sales of biodegradable cigarette filters [2].
We investigated the potential of enzymes to degrade CA and to be potentially incorporated into the respective materials enhancing biodegradation. Deacetylation studies based on chromatographic and spectrophotometric analysis showed that esterases were able to deacetylate triacetin (plasticizer in cigarette filters) and glucose pentaacetate (cellulose acetate model compound). Combination of esterases and cellulases showed synergistic effects, the absolute glucose recovery for CA 1.8 was increased from 15 to 28%, when an enzymatic deacetylation was performed. Lytic polysaccharide monooxygenase (LPMO), and cellobiohydrolase were able to cleave cellulose acetates with a degree of acetylation of up to 1.4 whereas chitinase showed no activity.
In general, the degree of substitution, chain length and acetyl group distribution affect CA degradation. This study shows that for successful enzyme based deacetylation systems, a cocktail of enzymes, which will randomly cleave and generates shorter CA fragments, is the most suitable.

References:
1 Novotny et al. (2009) Cigarettes Butts and the C..., Int. J. Env. Res. Pub. Health, 6, 1691-1705
2 Robertson et al. (2012) Accelerated Degradation of C..., Green Chem., 14, 2266-2272
Acknowledgements:
Federal Ministry of Science, Research and Economy (BMWFW),
Federal Ministry of Traffic, Innovation and Technology (bmvit)
R. J. Reynolds Tobacco Company (Winston-Salem, United States)

Maximilian Schmid

Institute of Environmental Biotechnology

maximilian.schmid@boku.ac.at

Usage of an industrial by-product stream-for the production of polyhydroxyalkanoates

Schmid Maximilian [1], Raschbauer Michaela [1], Kaćanski Miloš [1], Neureiter Markus [1]

1 Institute of Environmental Biotechnology, Department of Agrobiotechnology (IFA-Tulln), Vienna (BOKU)

Biodegradable plastics such as polyhydroxyalkanoates (PHA) have the potential to solve many environmental problems connected to the usage of conventional plastics. PHAs are linear polymers synthesized by various microorganisms in order to store carbon and energy for future use. However, high production costs, arising mainly from the price of the raw material, appear to be one of the biggest obstacles towards commercial success. Various industrial residues and by-products, like e.g. desugarized molasses, could serve as inexpensive substrates, but they often contain high salt concentrations and substances that may inhibit microbial growth. Due to their unique ability to prosper in harsh environments, halotolerant or halophilic organisms present an alternative to circumvent these problems.

Many Bacillus strains are described as halotolerant making them potential candidates for PHA production from industrial residues. Bacillus megaterium DSMZ 319 has been described to grow on various salt concentrations (0 to 15%) and it is able to synthesize and accumulate PHA under nutrient limitation. The aim of the present work is to study the effect of different nutrient limitations and their influence on PHA production. It could be demonstrated that B. megaterium is able to produce PHA under phosphorous limitation up to 39 g PHA /100 g Cell dry weight (CDW). Nitrogen limitation lead to 45 g PHA /100 g CDW and oxygen limitation conditions resulted in 20 g/ 100 g CDW.

Our aim is to evaluate Bacillus megaterium for the production of PHA from desugarized sugar beet molasses.

Sven Plappert

Division of Chemistry of Renewable Resources, University of Natural Resources and Life SciencesVienna, Konrad-Lorenz-Straße 24, 3430 Tulln, Austria

sven.plappert@boku.ac.at

Transparent moisture resistant CNF/PMMA nanocomposite aerogels

S. Plappert [1], J-M. Nedelec [2], H. Rennhofer [3], H. Lichtenegger [3], F. Liebner [1]

1 Division of Chemistry of Renewable Resources, University of Natural Resources and Life Sciences, Vienna (BOKU)
2 Université Clermont Auvergne, CNRS, SIGMA Clermont, ICCF, France
3 Institute of Physics and Material Sciences, University of Natural Resources and Life Sciences Vienna (BOKU)

Self-alignment and liquid-crystalline ordering of nanocellulosic materials including TEMPO-oxidized nanofibrillated wood cellulose (TO-CNF) accomplished by generation of surface charges is an intriguing approach towards functional bio-based materials. Conversion of nematic lc-CNF dispersions into transparent though super-insulating aerogels by consecutive acid-induced gelation, solvent exchange and supercritical CO2 (scCO2) drying affords ultra-lightweigth aerogels that feature good transparence and well-preserved nematic ordering inviting for a broad range of applications. However hydrophilicity is an obstacle in this respect as it renders the nanoporous matrices prone towards moisture adsorption and shrinkage. In an attempt to overcome this drawback at full preservation of the transparent nematic structure, coating of the lc-CNF aerogel's internal surface with a hydrophobic secondary polymer is proposed. ScCO2 antisolvent precipitation of poly(methyl methacrylate) (PMMA) from solution state using acetone as interstitial fluid proved to be a promising approach. The obtained nanocomposite aerogels exhibit a similarly high transparency (60-80 % transmission in the visible range), porosity (≥ 99 %), density dependent mechanical properties and high specific surface area (up to 530 m2 g1) compared to their PMMA-free counterparts. However, they feature additionally a remarkable moisture resistance as evident from high water contact angles (θ=119.4 ± 7.5) and the lack of moisture induced shrinkage after scCO2 drying. The preservation of the open porous nematic skeletal structure was demonstrated by means of cross-polarized light and field emission scanning electron microscopy.

Acknowledgements:
The financial support by the Austrian Science Fund (FWF: I848-N17) and the French Agence Nationale de la Recherche (ANR-11-IS08-0002; Austrian-French Project CAP-Bone) is gratefully acknowledged.

Julien Jaxel

Area Wood Materials Technologies, Kompetenzzentrum Holz GmbH, UFT

j.jaxel@kplus-wood.at

Dyeing of solid wood using supercritical carbon dioxide as carrier

J. Jaxel [1], T. Krenke [1], C. Hansmann [1], F. Liebner [1,2]

1 Area Wood Materials Technologies, Kompetenzzentrum Holz GmbH, UFT
2 Division of Chemistry of Natural Resources, Department of Chemistry, University of Natural Resources and Life Sciences Vienna (BOKU)

The colour gamut of wood is limited to a narrow range pegged by the shades whitish, yellowish and brownish depending on the wood species. Recent research efforts have been therefore made to tune the colour of wood aiming to give more choice to the manufacturers of furniture. The work presented here intends to investigate solvent-free green dyeing approaches using the carrier medium supercritical carbon dioxide (scCO2). The final goal is to provide bulk dyeing of a complete panel of colours.
Supercritical impregnation offers a series of advantages related to dyeing kinetics, removal of pollutants and energy demand for recovery. Carbon dioxide is particularly appealing as it is plentiful, non-flammable, chemically largely inert, and undergoes transition to supercritical state at mild conditions (7.38 MPa and 31.2°C) where it effuses through solids like a gas and dissolves compounds as liquids do (Cansell et al. 1999). These intriguing properties have been employed in a multitude of applications including dyeing of PET fibres with disperse dyes (Banchero 2013, Zheng et al. 2016).
Nevertheless, dyeing of synthetic fibres with disperse dyes – typically organic compounds of low molecular weight – cannot be directly applied to natural fibres or composite materials like cotton or wood. This is due to the weak affinity of the disperse dyes to polar hydrophilic interfaces formed by the mainly polysaccharide based materials which drastically limits the adsorption of dyes introduced by scCO2 impregnation (Banchero 2013).
This paper presents a bulk pre-treatment strategy capable of improving uptake of commercial disperse dyes for different European wood species.

References:
1 Banchero, M. (2013) Coloration Technology 129(1): 2-17.
2 Cansell, F.et al. (1999) Journal of Materials Chemistry 9(1): 67-75.
3 Zheng, H.et al. (2016) Journal of CO2 Utilization 16: 272-281.

Acknowledgements:
The financial support by FFG - The Austrian Research Funding Society through the BRIDGE project “Dyeing of massive wood mediated by supercritical CO2” (2016-2019) is thankfully acknowledged.

Kwankao Karnpakdee

Institute of Agricultural Engineering, Department of Sustainable Agricultural Systems, University of Natural Resources and Life Sciences, Vienna (BOKU)

kwankao.film@gmail.com

Flexible biogas production; the effect of three different feeding strategies to the biogas production under the semi-continuous experiment.

K. Karnpakdee [1], J. Leber [1], J. Lizasoain Arteaga [1], A. Bauer [1], A. Gronauer [1]

1 Institute of Agricultural Engineering, Department of Sustainable Agricultural Systems, University of Natural Resources and Life Sciences, Vienna (BOKU)

The production of renewable energy in terms of biogas and methane yields can be established by using municipal biowaste as the substrate for methanogenic anaerobic digestion. In this study, we investigated the responses of the flexible feeding to biogas production under the semi-continuous experiment. Three flexible feeding strategies as one time, three times and nine times feeding were operated in order to compare the biogas and methane production under the laboratory condition. The feed materials used for this experiment were taken from the biogas plant located at Bruck an der Leitha (Lower Austria). The organic loading rate of 2.15 kg oTM / (m3 * d) had been fixed. The hourly biogas production as well as the gas composition were examined. The biomethane potential (BMP) test suggested the specific methane yield of 567.47 lN kg-1 oTM from the feed material. Among these three feeding strategies, the one time feeding strategy showed the highest hourly biogas production as 139.14 mlN, which was rapidly increased within the first hour after feed. The hourly biogas yields fluctuated between 87-139 mlN with the average methane content of 64.71%. In addition, the process stability of each fermenter had been analyzed, indicating the flexible feeding did not affect the condition of the fermentation process. This study suggested that the flexible feeding is able to provide an alternative approach for biogas production with the possibility of contributing the large scale for energy generation in the future.

References:
1 P Aichinger et al. (2015) BIORESOURCE TECHNOL, 194, 389-393
2 E Mauky et al. (2017) ANAEROBE, 1-10

Acknowledgements:
I wish to send my sincere appreciation to Dr. Alexander Bauer for his great supervision. I wish to thank my colleagues for helps and supports.

Abstracts Session 2

BIOTECHNOLOGY

Pia Euteneuer

Experimental farm, Department of Crop Sciences, University of Natural Resources and Life Sciences, Schloßhofer Straße 31, Groß-Enzersdorf

pia.euteneuer@boku.ac.at

Apothecia production of Sclerotinia sclerotiorum and infection of soybean following catch crop cultivation

P. Euteneuer [1,2], S. Pauer [1], S. Steinkellner [1]

1 Division of Plant Protection, Department of Crop Sciences, University of Natural Resources and Life Sciences, Vienna, Konrad Lorenz Strasse 24, Tulln
2 Experimental farm, Department of Crop Sciences, University of Natural Resources and Life Sciences, Schloßhofer Straße 31, Groß-Enzersdorf

Sclerotinia sclerotiorum is a harmful plant pathogen with a broad spectrum of host plants. This includes important crop plants such as soybean (Glycine max) and many catch crops. The fungus produces sclerotia which can germinate carpogenic and infect the host plants via the formation of apothecia and ascospores. Moreover myceliogenic germination can result in a direct attack of the roots of the host plant. In this study we elucidated the influence of catch crops on the degradation, germination and infection in soybean.
In summer 2015 fifteen different catch crops were cultivated in a field trial and inoculated with S. sclerotiorum. For inoculation the sclerotia were arranged in net tubes and buried into the soil. In spring 2016 the sclerotia were reisolated and counted, the catch crops were incorporated into the soil and the sclerotia were buried again. Subsequently, soybean was sown to show the effects of the catch crops on S. sclerotiorum and the main crop. The apothecia production, sclerotia degradation and infection rate of soybean plants were determined as well as the leaf area index, the yield and the thousand-seed weight. We found that different catch crop affect the apothecia development differently. Moreover, our study shows that carpogenic germination is decisively triggered by soil moisture and temperature and has a negative effect on the soybean yield and the thousand-seed weight. A consequence of this is a correlation of the leaf area index with carpogenic germination, since an increasing shading by the soybean plants influences the microclimate in the stock and affects the germination of sclerotia (Sun, P., & Yang, X. B. 2000; Matheron and Porchas 2005).

References:
ME Matheron & M Porchas (2005). Plant Disease, 89, 50–54
P Sun & XB Yang(2000) Plant Disease, 84, 1287–1293.

Maria Doppler

Center for Analytical Chemistry, Department of Agrobiotechnology (IFA-Tulln), University of Natural Resources and Life Sciences, Vienna (BOKU), Konrad-Lorenz-Strasse 20, 3430 Tulln, Austria

maria.doppler@boku.ac.at

Metabolomics of Fusarium Head Blight in wheat: Investigation of the Phenylalanine derived submetabolome

Maria Doppler [1], Christoph Bueschl [1], Bernhard Kluger [1], Barbara Steiner [2], Hermann Buerstmayr [2],
Marc Lemmens [2], Gerhard Adam [3], Rainer Schuhmacher [1]

1 Center for Analytical Chemistry, Department of Agrobiotechnology (IFA-Tulln), University of Natural Resources and Life Sciences
2 Institute for Biotechnology in Plant Production, Department of Agrobiotechnology (IFA-Tulln), University of Natural Resources and Life Sciences
3 University of Natural Resources and Life Sciences, Institute of Applied Genetics and Cell Biology (IAGZ)

The fungal disease Fusarium Head Blight (FHB) caused by Fusarium graminearum (Fg) leads to mycotoxin contamination and significant yield losses of small gain cereals such as wheat. To counteract the disease, breeding of resistant wheat cultivars is beside good agricultural practice (like crop rotation) or treatment with fungicides a promising strategy. Resistance of wheat against FHB is mediated by more than one hundred different quantitative trait loci (QTLs), with Fhb1 constituting one of the major resistance QTLs. Metabolomics in combination with stable isotope labelling allows the characterisation of plant secondary metabolites and further facilitates insights into the defence related metabolome of infected wheat.
In this study we combined tracer and global metabolome labelling to study the effect of Fusarium graminearum (Fg) and the virulence factor deoxynivalenol (DON) on the wheat metabolism. To this end, the endogenous tracer 13C labelled phenylalanine (Phe) which serves as metabolic precursor of phenylpropanoids and other phenolic secondary metabolites was used to study the Phe-submetabolome. Flowering wheat ears were treated with Fg, DON or water (as a control). After different time intervals, samples were harvested, milled, extracted and measured with LC-HRMS. Automated data processing allowed the detection of about 1000 plant metabolites including 179 metabolites belonging to the Phe-submetabolome.
The presentation will illustrate our isotope-assisted metabolomics approach and focus on the Phe-derived submetabolome, the behavior of those metabolites over time and their putative association with Fhb1 mediated resistance or susceptibility to FHB in wheat.

Marine Ollier

BOKU-University of Natural Resources and Life Sciences, IFA Tulln, Austria, Charles Viollette Research Institute, Université Lille1, Villeneuve dAscq, France, Florimond-Desprez, Cappelle-en-Pévèle, France

marine.ollier@boku.ac.at

Assessing fusarium damaged kernels by digital picture analysis

Marine Ollier [1,2,3], Simon Duerr [1], Zoe Le Bihan [1], Jacob Heillinger [1], Vincent Talle [1], Anne-Laure Brisset [1], Ellen Goudemand [3], Olivier Robert [3], Jean-Louis Hilbert [2], Hermann Buerstmayr [1]

1 BOKU-University of Natural Resources and Life Sciences, IFA Tulln, Austria
2 Charles Viollette Research Institute, Université Lille1, Villeneuve dAscq, France
3 Florimond-Desprez, Cappelle-en-Pévèle, France

Fusarium Head Blight (FHB) is a cereal disease that induces important yield losses and contaminates the kernels with mycotoxins. In order to determine the plants resistance level, the more accurate method is to evaluate the mycotoxin content in the kernel samples. The cost of this direct check remains prohibitive. As infected kernels are smaller, shriveled and whiter, another method widely used is to visually estimate the proportion of Fusarium Damaged Kernels (FDK). This method is an easy and efficient way to estimate the mycotoxin content but is time consuming and labor intensive. Digital picture analysis could be a very good option to simplify evaluation. With this new method, pictures are taken with a simple camera in controlled light conditions. We used RGB criteria to segregate the picture´s pixels in 3 categories: Background pixels, Healthy-grain pixels and Diseased-grain pixels. The Whitened Kernel Surface (WKS) is then calculated as the proportion of diseased-grain pixels. We tested this method on 150 infected bead wheat samples and 50 infected triticale samples. We showed a high Pearson correlation between FDK and WKS (ρ=0.7 for bread wheat and triticale), and between mycotoxin content and WKS (ρ=0.85 for bread wheat and ρ=0.6 for triticale). This new notation criterion based on pictures analysis is a promising tool for breeders and researchers. It is as efficient as the traditional visual notation and happens to be faster, easier and more stable. A very economical way to evaluate mycotoxin content and to enable the large scale scoring and ranking needed to select resistant cereal varieties for the future.

Acknowledgements:
We gratefully acknowledge financial support from the French Ministry of Higher Education and Research, through CIFRE funding (Conventions Industrielles de Formation par la Recherche).

Alejandro del Barrio Duque

Austrian Institute of Technology

alesuco7yo@hotmail.com

Bacterial helpers to make intimate association with the mycorrhiza-like Serendipita indica and to enhance plant resistance against plant pathogens

Alejandro del Barrio Duque [1], Livio Antonielli [1], Angela Sessitsch [1], Ole Nybroe [2], Stéphane Compant [1]

1 AIT Austrian Institute of Technology, Center for Health & Bioresources, Bioresources Unit, Konrad Lorenz Str. 24, 3430 Tulln, Austria
2 Department of Plant and Environmental Sciences, University of Copenhagen, Thorvaldsensvej 40, DK-1871 Frederiksberg C, Denmark

Some bacterial endophytes are known to increase plant growth and enhance plant fitness (tolerance to biotic and abiotic stresses). However, some fungi can do this as well. Serendipita indica (syn. Piriformospora indica) is, for instance, a root-colonizing endophytic fungus that boosts plant vigor and confers resistance against plant pathogens. This fungus is further known as having a bacterial endosymbiont living inside its hyphae. However, we aimed to boost effects of the fungus and its bacterial symbiont on plants by combining the fungus and its symbiont with some new bacterial helpers. A collection of bacteria from roots of potato and tomato plants were isolated in this way and combined them with the beneficial fungus Serendipita indica in order to study the type of interaction. Some endophytes belonging to Tardiphaga, Mycobacterium, Burkholderia or Methylobacterium can stimulate Serendipita growth, and colonize its hyphae. Some of these bacteria can further help to reduce tomato disease caused by Fusarium oxysporum, while others do not. Genomes of selected isolates have been sequenced and annotated to understand more the genomic contents of the bacterial helpers. The future transcriptomics analyses of tomato plants inoculated with these microorganisms will unravel the mechanisms behind these interactions, identifying genes up- and down-regulated during the interplay. The mechanisms of the bacterial helpers on the fungus and its symbiont will be further elucidated to understand better the multi-partite interactions between a fungus, bacterial symbiont, the helpers, and the plant.

Acknowledgements:
This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 676480.

Meysam Ebrahimi

Department of Crop Sciences (DNW), Division of Agronomy

meysam.ebrahimi@students.boku.ac.at

Root Traits and Phosphorus Acquisition Efficiency in Soybean (Glycine max L.)

M. Ebrahimi [1], A.M.Manschadi [2]

1 Department of Crop Sciences (DNW), Division of Agronomy

In order to satisfy the urges of reducing inorganic phosphorus (P) consumption; and as the excessive utilization of P fertilizers in agriculture has evolved into both serious environmental (e.g. severe reduction in water quality in freshwater ecosystems) and economic challenges; a research dissertation has been conducted to investigate genotypic variation in P-adaptive roots morphological and architectural traits in soybean. The focus has been on finding superior root architecture which can be identified in elite soybean genotypes. Five experiments have been conducted under controlled environment to quantify the plasticity of root traits in different developmental stages to different levels of P supply in order to identify the most P-efficient genotypes. The results indicate that some genotypes such as Zolta Przebedowska with gravitropic response of root axes (lower root growth angle), a specific root branching pattern and intensity, less root diameter, and lower metabolic cost show a better P acquisition efficiency under low soil bioavailable P.

Susanne Reichert

Divison of Plant Protection

susanne.reichert@boku.ac.at

Analysis of the Role of Galactinol in Nematode Induced Syncytia

Reichert, S. [1], Köhler, M. [2], Tenhaken, R. [2], Bohlmann, H. [1]

1 Division of Plant Protection – Department of Crop Sciences - University of Natural Resources and Life Sciences, Vienna, Konrad Lorenz Strasse 24, 3430 Tulln, Austria
2 Division of Plant Physiology - Department of Cell Biology & Physiology - University Salzburg, Salzburg

The cyst nematode Heterodera schachtii is a soil borne pest causing root deformation of its host plant sugar beet. Through its stylet the nematode injects cell wall degrading proteins and other effectors into a single cell within the central cylinder of the root initiating the development of a syncytium acting as the feeding site for the parasite.
Galactinol is a cycling metabolite in plants acting as a precursor for raffinose and as an osmoprotectant responding to abiotic stress. In Arabidopsis several genes code for galactinol synthase, four of them -AtGolS1, AtGolS2, AtGolS4; AtGolS8- are expressed in root tissues. Previous work has indicated that a higher galactinol level in syncytia might lead to resistance against cyst nematodes (Siddique et al., 2013).
To verify this hypothesis, we produced Arabidopsis lines with high and low levels of galactinol. All knockout mutants were significantly less susceptible to nematode infection than wild type plants whereas overexpression lines were more susceptible. RNAseq of roots and syncytia of atgols1,2,8 and rs4,5 mutants revealed strong upregulation of several genes coding for nitrate transporters, DEFLs, and PR1-like among others, in root tissues. These results have been confirmed by quantitative RT-PCR. In addition, the GUS reporter gene is being used to study the expression of these genes.
Based on these results GC/MS metabolome analysis will be performed to determine the content of metabolites in leaves, roots and syncytia of mutant and wild-type lines.

References:
S Siddique et al (2013). New Phytol 201, 476-485.

Abstracts Session 3

CONTAMINANTS AND HEALTH

Reinhard Beyer

DAGZ

reinhard.beyer@boku.ac.at

Candida glabrata requires the Map kinase Hog1 to compete against Lactobacillus

R. Beyer [1], C. Zutz [2], B. Willinger [3], J. Strauss [1], C. Schüller [1]

1 University of Natural Resources and Life Sciences, Vienna
2 University of Veterinary Medicine Vienna
3 Medical University of Vienna

Candida glabrata is a common human fungal commensal and occasional pathogen which ranks second behind Candida albicans. C. glabrata became notorious due to its ability to form biofilms on catheters and its intrinsic resistance against antifungals. C. glabrata is known for causing recurring vulvo-vaginal candidiasis (VVC), which afflicts 45% of all women and may cause life-threatening systemic infections, such as sepsis, predominantly occurring in immunocompromised patients. We set out to investigate whether its virulence is somehow determined by the prominent HOG-stress pathway. By applying reverse genetics using the MAPK Hog1p we were able to reveal phenotypes for a broad variety of conditions. We found that CgHog1 is essential for resistance against low pH, lactic acid and other weak carboxylic acids, as the mutant showed a quantifiable growth defect under those conditions. Co-culture with different Lactobacillus strains isolated from patients demonstrates the important role of CgHog1 in the confrontation with the common vaginal flora. Screening of a collection of clinical isolates showed a correlation between change of CgHog1 phosphorylation upon stress challenge and basic resistance against osmotic stress. Furthermore, the Cghog1Δ mutant was more readily killed by macrophages than the wild type. Examination of a population of clinical strains revealed that resistant strains produced a higher amount of phosphorylated CgHog1p than sensitive strains, indicating that a stronger Hog1-mediated response may be a mechanism for adaptation to osmostress. Our findings place this important stress pathway in C. glabrata in a central position for commensalism and stress resistance.

Nada Jurisic

BOKU, IFA-Tulln

nada.jurisic@boku.ac.at

DETERMINATION OF AFLATOXIN BIOMARKERS IN CHICKENS

N. Jurisic [1], H.E. Schwartz-Zimmermann [1], E. Kunz-Vekiru [1], D. Schatzmayr [2], W.D. Moll [2], W. Schweiger [2], J. Fowler [3] and F. Berthiller [1]

1 Christian Doppler Laboratory for Mycotoxin Metabolism and Center for Analytical Chemistry (IFA-Tulln), University of Natural Resources and Life Sciences, Vienna (BOKU), Austria
2 BIOMIN Research Center, BIOMIN Holding GmbH, Tulln, Austria
3 Department of Poultry Science, University of Georgia, Athens, GA, USA

Aflatoxin B1 is the most potent natural carcinogen known. The European Commission set a maximum levels of aflatoxin B1 (AfB1) in poultry feed to 20 µg/kg. The objective of our investigation was to identify reliable biomarkers of exposure in chickens. Therefore, we have conducted an experiment where chickens were fed with known concetrations of AfB1. During a 21 day animal trial chicks were assigned to different feeding diets: A) toxin-free diet; B) 20 µg of AfB1/kg of diet; C) 500 µg of AfB1/kg of diet. Ileal content and excreta were collected after 7, 14, and 21 days. We developed an analytical method for the determination of aflatoxin B1, B2, G1, G2, M1, P1, Q1 and aflatoxin B1-N7-guanine adduct in freeze-dried ileal content and excreta. This method is based on sample extraction with acidified aqueous acetonitrile, followed by solid phase extraction and concurrent determination by HPLC-MS/MS. We can also use this method to determine the bioavailability of AfB1 in gastro-intestinal tract and systemic circulation of chickens in the presence of aflatoxin deactivators. As birds excrete urine into the cloaca where it is mixed with solid excrements from the intestines, differences in the results determined between ileal content and excreta delivered insights on fecal and urinary excretion of AfB1 metabolites. Here we report that the aflatoxin B1-N7-guanine adduct, which is a urinary biomarker of aflatoxin exposure in humans, can be used as such also in chickens. Additionally, AfM1 commonly used as urinary biomarker of exposure in humans and pigs can be used as a biomarker in chickens. Detection of AfM1 also in ileal content suggests biliary excretion of this metabolite.

David Steiner

Center for Analytical Chemistry, Department of Agrobiotechnology (IFA-Tulln), University of Natural Resources and Life Sciences, Vienna (BOKU)

david.steiner@boku.ac.at

Development of a quantitative multi-class confirmation method based on LC-ESI-MS/MS for the determination of natural contaminants and anthropogenic residues in complex animal feed matrices

D. Steiner [1], M. Sulyok [1], R. Krska [1]

1 Center for Analytical Chemistry, Department of Agrobiotechnology (IFA-Tulln), University of Natural Resources and Life Sciences, Vienna (BOKU)

Due to several pre- and post-harvest conditions like climate impacts, processing or storage, a variety of contaminants as well as residues can enter the food chain. The treatment of animals with veterinary drugs against animal diseases and crops with pesticides against pests has steadily increased the last decades. This circumstance may leave residues in comestible goods of plant or animal origin. Additionally to the anthropogenic application of chemicals, natural occurring contaminants like plant toxins or mycotoxins may infest feed and food products, which endanger human and animal welfare.
In this work, a liquid chromatography-electrospray ionization tandem mass spectrometric method was developed to allow a simultaneous quantification of about 700 fungal metabolites, 500 pesticides, 100 veterinary drugs, 40 bacterial toxins and 30 plant toxins.
For chromatographic separation a reversed phase HPLC column (C18, 150 x 4.6 mm, 5 µm) was used with a binary gradient elution. The operation of the mass spectrometer was conducted in positive and negative ionization, using a scheduled selected reaction monitoring (sSRM) mode, containing two parent to fragment ion transitions for each analyte with optimized fragmentation and ion source parameters. A survey on animal feed products was processed to prove the methods applicability and give first insights about analytical identification data in this complex matrix model. Based on data deriving from spiking experiments of both, the compound feed formula as well as the individual ingredients, this work aims to discuss the applicability of the LC-ESI-MS/MS based dilute and shoot approach for the analysis of animal feed.

References:
1 A Malachová et al. (2014) JChromatogrA, 1362, 145–156
2 H Mol et al. (2008) AnalChem, 80, 9450–9459

Acknowledgements:
This project has received funding from the Austrian Competence Center for Feed and Food Quality Safety and Innovation (FFoQSI GmbH, Tulln, Austria)

David Stadler

Center of Analytical Chemistry, Department of Agrobiotechnology (IFA Tulln), University of Natural Resources and Life Sciences, Vienna (BOKU)

david.stadler@boku.ac.at

Influence of the lot-to-lot variation on the measurement uncertainty of LC-ESI-MS/MS based determination of 70 mycotoxins in figs and maize.

D. Stadler [1], R. Krska [1], M. Sulyok [1]

1 Center of Analytical Chemistry, Department of Agrobiotechnology (IFA Tulln), University of Natural Resources and Life Sciences, Vienna (BOKU)

In the recent years, the LC-ESI-MS/MS based multi-analyte approach has been demonstrated to be a powerful technique for the simultaneous determination of mycotoxins in food and feed.[1] Quantification of mycotoxins is increasingly based on the analysis of diluted crude extracts and external- or matrix-matched calibration. In everyday practice the extraction recovery (RE) and the degree of signal suppression/enhancement (SSE) are evaluated based on a single lot of a matrix. However, RE and SSE of an analyte may vary in different lots of the same matrix (lot-to-lot variation).

The influence of the lot-to-lot variation on the measurement uncertainty was evaluated for 70 mycotoxins in figs and maize. We used a simplified bottom-up approach to estimate the measurement uncertainty by evaluating the intermediate precision and the uncertainty associated with the method bias. The contribution of the lot-to-lot variation to the uncertainty of the method bias was evaluated by calculating the variation of the RE and SSE values of 7 different lots of the same matrix. In both matrices, the lot-to-lot variation contributed to the measurement uncertainty for the majority of the analytes. The dominating cause of the lot-to-lot variation were differences in RE for figs and SSE for maize. Our findings highlight the need to consider the influence of the lot-to-lot variation on the performance of LC-ESI-MS/MS based multi-mycotoxin determination.

References:

1 Malachova et al. (2014) J Chromatogr. A., 1362, 145-156

Acknowledgements:

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 678012.

Roland Martzy

Molecular Diagnostics Group, IFA-Tulln/TU Wien

roland.martzy@tuwien.ac.at

A loop-mediated isothermal amplification (LAMP) assay for the rapid detection of Enterococcus spp. in environmental waters

R. Martzy [1,6], C. Kolm [1,6], K. Brunner [1], R. L. Mach [2], R. Krska [3], H. Šinkovec [4], R. Sommer [4,6], A. H. Farnleitner [2,5,6], G. H. Reischer [1,2]

1 Center for Analytical Chemistry, Department of Agrobiotechnology (IFA-Tulln), Molecular Diagnostics Group, TU Wien
2 Institute of Chemical, Environmental and Biological Engineering (ICEBE), TU Wien
3 Center for Analytical Chemistry, Department of Agrobiotechnology (IFA-Tulln)
4 Medical University Vienna
5 Karl Landsteiner University of Health Sciences 6 ICC Water & Health

Microbiological pollution of water through faecal input is a predominant threat to public health not only in developing countries. To assess the microbiological quality of water, faecal indicators such as certain Enterococcus spp. are starting to be detected by molecular methods such as quantitative polymerase chain reaction (qPCR). To avoid the expensive instrumentation necessary for qPCR, isothermal amplification methods have recently become a useful alternative allowing molecular diagnostics with simple or no instrumentation. The aim of this study was the development of a novel method for the rapid molecular detection of Enterococcus spp. in water by loop-mediated isothermal amplification (LAMP) [2]. A simple heating block is all that is necessary for the implementation of the Enterococcus LAMP assay that can be completely performed in 45 minutes at 64°C. Assay sensitivity and specificity were evaluated using 30 bacterial reference strains, and the method showed a limit of detection of 130 DNA target copies per reaction. Additionally, enterococci isolated from surface waterbodies as well as DNA extracts from environmental waters were tested. Contingency analysis demonstrated a highly significant correlation between the results of the developed LAMP assay and the reference qPCR method [3]. The simple naked-eye identification of the LAMP products was achieved within one minute by the addition of a DNA-intercalating fluorescence dye. In conclusion, this method represents a promising tool for the screening of water samples in low-resource settings without sophisticated equipment and highly trained personnel.

References:

1 WHO (2015) Key Facts from JMP 2015 Report
2 T Notomi et al. (2000) Nucleic acids research, 28(12), E63
3 USEPA (2012) Method 1611

Acknowledgements:

This study was part of the Life Science Call 2013 project LSC13-020 funded by the NÖ Forschungs- und Bildungsges.m.b.H. (NFB) and supported by the Austrian Science Fund (FWF) project P23900

Poster

Presentations

Pamela Azevedo

Department of Biochemical and Pharmaceutical Technology, Faculty of Pharmaceutical Sciences, University of São Paulo (USP), São Paulo, Brazil

pam.o.souza@gmail.com

P01: Resistence of Lactobacillus paracasei LPC-37 and yogurt cultures to in vitro gastrointestinal stress in fermented soy powder

ACM. Piazentin [1], POS. Azevedo [1], RPS. Oliveira [1]

1 Department of Biochemical and Pharmaceutical Technology, Faculty of Pharmaceutical Sciences, University of São Paulo (USP), São Paulo, Brazil

The influence of two cooling conditions were tested to evaluate the survival of Lactobacillus paracasei and the co-culture in a fermented soymilk during in vitro simulated gastrointestinal test. Lactobacillus paracasei Lpc-37 (Lp) and a combination of microorganisms such as Streptococcus thermophilus TA040, Lactobacillus bulgaricus Lb340 and Lactobacillus paracasei Lpc-37 (St, Lb, Lp) were used to ferment the soymilks. The cooling stage was performed in two different ways: (a) direct way, in which the fermentation was stopped and the flasks were placed into ice bath and (b) two-phase cooling way, in which after the fermentation the flasks were first conditioned into water bath at 25ºC for 8 hours and then transferred to the ice bath. The resistance of St, Lb and Lp to the in vitro gastrointestinal test was performed after 28 days of storage at 4ºC and it was divided in three phases (2h, 4h, 6h). The analyses where carried out using different enzymatic solutions: pepsin (3 g/L), lipase (0,9 mg/L), bile (10 g/L) and pancreatin (1 g/L). The survival of Lp was bigger than the co-culture (St, Lb, Lp) in the 2h step once the monoculture decrease 2,1 log (CFU/mL) while the ternary cultures decreased 3,9 log (CFU/mL). The counts of Lb were in media 5 log (CFU/mL) and these bacteria did not survive during the gastrointestinal steps. Regarding the cooling procedure, it did not influence the survival of both Lp and co-culture, once during the entire analysis the counts were very close when comparing the cooling. In conclusion, the different types of cooling do not influence the survival of the microorganisms and both Lp and St can survive through the simulated digestion.

References:

Y, Wang et al. (2005) Cryobiology, 50, 294–307.
R, Bedani et al. (2013) Food Microbiology, 34, 382-389.

Acknowledgements:

To CAPES for the funding and fellowships.

Verena Braunschmid

Austrian Centre for Industrial Biotechnology (ACIB), Konrad Lorenz Strasse 22, 3430 Tulln an der Donau, Austria

verena.braunschmid@boku.ac.at

P02: Aromatic amino acids at the surface influence the hydrolytic activity of Thc-cutinase 2 on aromatic substrates

Verena Braunschmid [1], Antonino Buindo [1], Doris Ribitsch [1,2], Georg Gübitz [1,2]

1 Austrian Centre for Industrial Biotechnology (ACIB), Konrad Lorenz Strasse 22, 3430 Tulln an der Donau, Austria
2 Institute of Environmental Biotechnology, University of Natural Resources and Life Science (BOKU), Konrad Lorenz Strasse 22, 3430 Tulln an der Donau, Austria

Synthetic polymers are very abundant in everyday life, but difficult to functionalize. Cutinases are able to hydrolyze polyethyleneterephthalate (PET) (Ribitsch et al., 2017), but the mechanism is not deeply studied. Amino acid substitutions at the surface of the cutinase Thc_Cut2 from Thermobifida cellulosilytica in the vicinity of the active site have been previously shown to have a pronounced effect on its hydrolytic activity towards polyesters. This effect can be explained by an enhanced protein-substrate interaction. These mutations were designed to increase the similarity of Thc_Cut2 to Thc_Cut1, which has an increased activity on PET (Acero et al., 2013).
In this study, phenylalanine, an aromatic amino acid, was introduced at the same positions, to increase the activity on aromatic substrates. Interactions between phenylalanine and aromatic moieties of polyesters, such as terephthalic acid, are thought to increase the adsorption between enzyme and substrate. The hydrolytic activity of these variants on aliphatic polymeric substrates, such as polylactic acid (PLA) and polybutylene succinate (PBS), was compared to that on aromatic polymers, like polybutylene adipate-co- terephthalate (PBAT) and PET.
Results, so far, suggest that the hydrolytic activity differs for these variants on different substrates. One of the variants showed more activity on aromatic polymers than on aliphatic ones, while the other variant was shown to be more active on PBS and PLA, surprisingly also compared to Thc_Cut1. Aromatic amino acids can increase the hydrolytic activity on aromatic compounds, in regards to their position at the surface.

References:
Ribitsch et al. (2017) Biocatalysis and Biotransformation, 30(1): 2–9
Acero et al. (2013) Biotechnology and Bioengineering;110: 2581–2590

Acknowledgements:
This work has received further support from the Austrian Center of Biotechnology (ACIB).

Carolina Escobar Rodríguez

AIT Austrian Institute of Technology

carolina.escobar-rodriguez.fl@ait.ac.at

P03: Comparison of root and panicle microbiota of Setaria spp. suggest vertical transmission and the contribution of insects to endophytic assemblages

C. Escobar-Rodríguez [1], B. Mitter [2], L. Antonielli [3], F. Trognitz [4], S. Compant [5], A. Sessitsch [6]

1 Center of Heath & Bioresources, Bioresources Unit, Austrian Institute of Technology (AIT)

Virtually all studied plant tissues have been found to be internally inhabited by endophytes, which are investigated due to their implications in the growth, health and development of their hosts. While the drivers shaping root bacterial assemblages have been broadly described, communities colonizing plant reproductive organs still demand investigation. In this work, we dissected the bacterial assemblages of roots and ripe grain-harboring panicles of Setaria viridis and Setaria pumila collected from 15 different locations by 16S rRNA gene-based Illumina sequencing and furthermore genotyped plant populations. Bacterial assemblages were composed mainly by Gammaproteobacteria and were shaped primarily by the plant compartment, followed by the sampling site and lastly, by the plant species and genotype. Panicle-specific communities were governed by Enterobacteriaceae and included OTUs classified as insect endosymbionts (Buchnera and Sodalis), whereas root-specific assemblages showed higher diversity of bacterial taxa. Furthermore, 59 core OTUs were identified among roots and panicles of all sampling sites, from which 23 showed homologies to sequences described as uncultured seed microbiota members of rice, among other plant species. Altogether, these results suggest the contribution of plant-insect interactions to endophytic assemblages and point towards the existence of a highly conserved microbiota in Setaria, which persevere within individual plants irrespective of species and geographical location.

Elfriede Hogger

Wood K plus

e.hogger@kplus-wood.at

P04: Light Microscopic Detection Of Resin Distribution In Industrial Wood-Based Panels

E. Hogger [1], E. Mahrdt [2], W. Kantner [3], J. Moser [3], J. Konnerth [2], W. Gindl-Altmutter [2], U. Müller [2], HWG. van Herwijnen [1]

1 Competence Centre for Wood Composites and Wood Chemistry, Wood K plus, Austria
2 Institute of Wood Technology and Renewable Materials, Department of Material Sciences and Process Engineering, BOKU
3 Metadynea Austria GmbH, Austria

The resin distribution in wood-based panels has a major effect on the properties of wood-based panels. Knowledge of resin distribution can increase the efficient use of adhesives and safe material costs (1).
Based on the method we already proposed for particleboards and MDF, we further extended the method to be applied on OSB. With this method a prior staining of the resin for the panel production is not necessary anymore, it allows a resin detection of industrially produced panels (2, 3).
Thin section samples of particleboards, OSB and MDF boards were produced with an ultramicrotome. The specimens were dyed with suitable fluorescent dyes to display the hardened aminoplastic adhesives, which are colorless when cured. A visible dye was used to increase the contrast between the wooden cells and the stained adhesives. Rasterized microscopic images were taken of the sections in visible and fluorescence mode. Through the high contrast gained by the dyeing methods, it was possible to detect the resin parts and define the particles for OSB and particleboards, in corresponding sections. Image-editing programs were used to evaluate the adhesive distribution in a partly automatized way.
Therefore, it was possible to evaluate the resin size distribution in wood composites. Furthermore, other parameters like the penetrated adhesive in the cell lumens and the agglomerates of the resin, were examined for particleboard and OSB. Also additional information about particle coverage was given.

References:
1 C Xing et al. (2006) Holz als Roh- und Werkstoff, 64, 221-226
2 E Mahrdt et al. (2015) Wood Science and Technology, 49, 517-526
3 E Mahrdt et al. (2017) International Journal of Adhesion and Adhesives, 78, 23-27

Acknowledgements:
The authors gratefully acknowledge the Austrian COMET project (Competence Centre for Wood Composites and Wood Chemistry, Wood K plus, Austria) for their friendly support

Milos Kacanski

Institute of Environmental Biotechnology IFA Tulln

milos.kacanski@boku.ac.at

P05: Bioplastics from sugar industry side stream

Kacanski Milos [1], Schmid Maximilian [1], Neureiter Markus [1]

1 Institute of Environmental Biotechnology, IFA-Tulln, BOKU

Economical production of biocompatible materials is currently the bottleneck in creating sustainable society mainly because biobased plastic are still too expensive to compete with petrol based materials. Utilisation of waste streams and cheap commodities as raw materials can significantly decrease the price of final product. Pressed sugar beet pulp (PSBP) is promising candidate for conversion to plastic as it is abundantly available side product of the sugar industry. This material is prepared for plastic production by acidification, to produce volatile fatty acids which can subsequently be converted to polyhydroxyalkanoates (PHAs), well known type of bioplastic. In this project we screened several strains of the Pseudomonas family for their ability to produce medium chain length PHAs from acidified pressed sugar beet pulp.

Experiment was conducted in a parallel multi-reactor system. During growth, the process was characterised by pH and optical density. After cultivation we determined cell dry weight, PHA content by gas chromatography, as well as concentration of nitrogen (TKN) and VFAs (HPLC) in the substrate. Most notably, Pseudomonas citronellolis DSM 545 showed the most promising results, namely producing PHA content of up to 45% of dry weight from acidified sugar beet pulp. Produced polymer which consisted of hydroxyhexanoate, hydroxyoctanoate and hydroxydecanoate.

Industrial feasibility will have to be achieved by increasing productivity through further optimisation and development of all the steps in the process from the substrate acidification to the plastic production process

Janea Köhnke

University of Natural Ressources and Life Sciences, Vienna

janea.koehnke@boku.ac.at

P06: Straight carbonisation of spray dried spent liquors from wood pulping

J. Keckes [1], N. Gierlinger [2], H. Rennhofer [2], A. Mahendran [3], C. Unterweger [3], W. Gindl-Altmutter [2]

1 Montanuniversität Leoben
2 University of Natural Ressources and Life Sciences, Vienna
3 Wood K-Plus

Various types of spent liquor- paper industry waste materials, have been spray dried and carbonised at 2000 °C. Without complicated cleaning or processing stages, new possible applications were found for the inhomogeneous and impure spent liquors. However, there is no previous work, neither on spray drying nor on carbonising spent liquors. The spray dried and carbonised spent liquors were investigated by elemental analysis, thermogravimetric analysis (TGA), scanning electron microscopy (SEM), X-ray photoelectron spectroscopy (XPS), X-ray powder diffraction (XRD), Raman spectroscopy (RS) and electrical conductivity. The results showed big differences depending on the type of spent liquor. The impurities of the samples heavily shrank whilst processing. A highly graphitic structure was developed after carbonisation and the structure had different amounts of crystallinity and defects of the graphene layers. The graphitisation process led to high conductivities of the powders. Overall, the advantage of the developed materials (large availability, simple preparation, highly ordered carbon structures and good conductivity) could be efficient filler materials for polymers with wide applications in the industry.

Acknowledgements:
Financial support by the Austrian Research Promotion Agency FFG, project 846543 is gratefully acknowledged.

Julienne Küsters

Institute of Animal Nutrition, Livestock Products, and Nutrition Physiology, Department of Agrobiotechnology, University of Natural Resources and Life Sciences Vienna (BOKU), Muthgasse 11, A-1190 Vienna

julienne.kuesters@gmx.de

P07: The effect of variable temperature and CO2 air enrichment on changes in the nutritive value of orchard grass (Dactylis glomerata L.) in permanent grassland

J. Küsters [1], E.M. Pötsch [2], R. Resch [2], M. Gierus [1]

1 Institute of Animal Nutrition, Livestock Products, and Nutrition Physiology, Department of Agrobiotechnology, University of Natural Resources and Life Sciences Vienna (BOKU)
2 Federal Research and Education Centre Raumberg-Gumpenstein

Productive livestock is dependent on nutritive grassland for producing animal products. Climate change will influence grassland concerning growth, yield, water balance and plant health. Due to this shifting, climate change most likely affects nutrient contents of the plants as well. Especially water soluble carbohydrates and protein fractions might be affected by climate change, because they are dependent on the plant's development.
The aim of this project is to evaluate the influence of climate change on the nutrient contents in grassland as important feed in livestock production, using the example of orchard grass.
Therefore, an examination of orchard grass, being exposed to two different climate conditions, will be executed in three successive years. The experiment will take place at an experimental station which is installed and designed to simulate different climate scenarios in permanent grassland. Six plots represent the current climate conditions whereas another six plots are simulating climate conditions which are forecasted for the future. The plots are featured with Infrared heaters and a gassing ring, to provide the plants with higher temperatures and more CO2 than the current climate condition plots.
Three samplings a year will occur during the time of harvesting. The collected tillers will be surveyed on stage of vegetation and morphogenic measurements and will be analyzed on their nutritive value.
The results will deliver a comparison of quality and nutritive value between the two climate conditions. More important, they will present what livestock production in general will have to deal with in the future to prevent the productivity from decreasing.

Acknowledgements:
This project is financially supported by the H. Wilhelm Schaumann Stiftung.

Christina Roschitz

Institute for Soil Research, Department of Forest and Soil Science (UFT-Tulln), University of Natural Resources and ife Sciences, Vienna (BOKU)

christina.roschitz@boku.ac.at

P08: Chemical imaging of tungsten shot weathering in soil

C. Roschitz [1], E. Oburger [1,2], J. Santner [3], W. Wenzel [1]

1 Institute for Soil Research, Department of Forest and Soil Science (UFT-Tulln), University of Natural Resources and ife Sciences, Vienna (BOKU)
2 Terrestrial Ecosystem Research, Department of Microbial Ecology and Ecosystem Research, University of Vienna
3 Division of Agronomy, Department of Crop Sciences (UFT-Tulln), University of Natural Resources and Life Sciences, Vienna (BOKU)

Tungsten (W) gunshots are sold as “green” alternatives to toxic lead shots, especially for hunting in sensitive environments. Unlike lead, metallic W has been considered as non-toxic in soil. However, several studies demonstrated that W can be solubilized during corrosion of metallic W and W alloys and may even migrate to the groundwater. Knowledge on W speciation, mobility and bioavailability in soils is still limited and particularly the effect of soil pH on W biogeochemistry is often ignored. To reveal the soil pH dependent solubility dynamics of W derived from weathered gunshots, we incubated W shots with a sandy soil, with soil pH either kept naturally acidic or adjusted to the neutral or alkaline pH range by the addition of lime (CaCO3). After 10 weeks, we applied pH sensitive planar optodes to visualize possible changes in pH around the shots. In addition, we deployed a DGT-gel (diffusive gradients in thin films) capable of binding soluble cations and anions, which was then analysed by laser ablation ICP-MS to generate images of soluble element gradients around the bullets. Results will provide important insights into the pH dependent geochemical behaviour of weathered W gunshots in soil, a pre-requisite for accurate risk assessment.

Ramin Safaei Asadabadi

Division of Plant Protection, Department of Crop Sciences (UFT-Tulln), University of Natural Resources and Life Sciences, Vienna (BOKU)

ramin.safaei-asadabadi@boku.ac.at

P09: Effect of biochar and compost on the Sclerotinia sclerotiorum infectivity, root exudates alteration and growth of soybean and sunflower

R.Safaei-Asadabadi [1], K. Hage-Ahmed [1], S. Steinkellner [1]

1 Division of Plant Protection, Department of Crop Sciences (UFT-Tulln), University of Natural Resources and Life Sciences, Vienna (BOKU)

White mold caused by Sclerotinia sclerotiorum (Lib.) de Bary is a plant pathogenic fungus which infects a wide range of plant species (Boland and Hall, 1994). The use of organic matter inputs such as biochar and compost might be a promising approach to control the pathogen and a suppressive effect has been shown for a wide range of soil borne diseases (Coventry et al., 2005). The main focus of this study was on the development of Sclerotinia sclerotiorum as a soil borne disease in soybean (Glycine max L. cv. Gallec) and sunflower (Helianthus annuus L. cv. NK Delfi) and changes in root exudates of both plants grown in different potting mixes such as compost (Comp) 20% (v/v) alone or in combination with wood biochar (WB) 3% (v/v) or green waste biochar (GWB) 3% (v/v). Our study showed strong evidence that biochars decreased susceptibility of soybean and sunflower against Sclerotinia sclerotiorum as a soilborne disease. Moreover, application of biochars and compost in the soil affected the plant growth and quality of root exudates depending on the type of biochar and plant species.

References:

G J Boland and R. Hall (1994) canadian journal of plant pathology, v.16, 93-108
E Coventry et al. (2005) Eur. j. plant pathol. 111, 101-112

Pia Solt

Wood K plus - Kompetenzzentrum Holz GmbH

p.solt@kplus-wood.at

P10: How do some selected production parameters influence the mechanical properties of pMDI bonded wood strands?

P. Solt [1], S. Libowitzky [2], J. Konnerth [2]

1 Wood K plus - Kompetenzzentrum Holz GmbH
2 Institute of Wood Technology and Renewable Materialsm University of Natural Resources and Life Sciences, Vienna (BOKU)

Polymeric diphenylmethane diisocyanate (pMDI) is a versatile chemical which is rapidly growing as a valued thermosetting adhesive in the wood based panel industry – predominantly for the use in oriented strand boards (OSB). Fast cure, high durability, and zero formaldehyde emissions are among several characteristics of pMDI that enhance its market value in the industry. However, there is still an inconsistency about the degree various parameters may influence adhesion strength between wood particles. To overcome this challenge, numerous methods, which paid attention on the curing kinetics or on the development of the bonding strength, were applied in different studies.
The effect of moisture content, hot press time and temperature as well as resin load on the lap-shear strength of adhesively bonded veneer stripes has already been investigated and described in the literature.
The objective of this study is to examine the considerable differences between typically achievable higher tensile-shear strength results using e.g. urea-formaldehyde resins compared to the ones achieved with pMDI when using veneer based model systems. It could be shown that proper veneer species and geometry selection could result in comparable strength values for both adhesive types.

Peter Stasnik

Austrian Institute of Technology

Peter.Stasnik@ait.ac.at

P11: Importance of metabolic adjustments for plant stress tolerance and yield

P. Stasnik [1], HJ. Stampfl [1], J Vollmann [2], C. Jonak [1]

1 Austrian Institute of Technology AIT
2 University of Natural Resources and Life Sciences, Vienna BOKU

Plants frequently encounter adverse growth conditions. Climatic factors, such as extreme temperatures, drought and contamination of soils by high concentrations of salts, are major abiotic environmental stressors that delay growth and development, reduce productivity, and in extreme cases, cause plants to die. Environmental stresses are thus a major problem in agriculture.
Flexible adjustment of metabolism to prevailing environmental conditions is essential for plant growth and development. The oxidative pentose phosphate pathway (OPPP) is a central, highly flexible, evolutionarily conserved metabolic pathway (1). It is a major source of reducing power and metabolic intermediates for biosynthetic processes. The activity of glucose-6-phosphate-dehydrogenase (G6PD), the key enzyme of the OPPP, is altered in response to different environmental conditions. G6PD activity has been positively correlated with environmental (2, 3).
Based on this work, it is hypothesized that the evolutionarily conserved G6PD is a positive regulator of plant vigour and stress tolerance in crops. This project will mainly focus on the emerging oil seed crop Camelina sativa (false flax, gold-of-pleasure). Camelina is an ancient European, short-seasoned crop which is currently reemerging due to the unusual fatty acid composition of its seed oil and its low input requirements. The aim of this project is to explore the significance of G6PD function for crop resistance to environmental stress. Furthermore, the role of G6PD in seed development, grain quality and yield will be analyzed.

References:
1 Kruger and von Schaewen (2003) Curr Opin Plant Biol. 6:236-46
2 Dal Santo et al. (2012) Plant Cell 24:3380-92
3 Stampfl et al. (2016) Plant Physiol 171:1366-77

Acknowledgements:
AIT for funding

Claudia Tallian

Institute of Environmental Biotechnology, Department of Agrobiotechnology (IFA-Tulln), University of Natural Resources and Life Sciences, Vienna (BOKU), Austria

claudia.tallian@boku.ac.at

P12: Incorporation of anchor-peptides in liposomes for stimuli-responsive targeted drug release

C. Tallian [1], A. Herrero-Rollett [1], R. Vielnascher [1,3], E. Nogueira [2], D. Guimarães [2], A. Cavaco-Paulo [2], GM. Guebitz [1,3]

1 Institute of Environmental Biotechnology, Department of Agrobiotechnology (IFA-Tulln), University of Natural Resources and Life Sciences, Vienna (BOKU), Austria
2 IBB – Institute for Biotechnology and Bioengineering, Centre of Biological Engineering, University of Minho, Campus of Gualtar, Portugal
3 ACIB – Austrian Centre of Industrial Biotechnology,Tulln an der Donau, Austria

Rheumatoid arthritis (RA) as a chronic inflammatory disease can lead to serious joint damages and disabilities [1]. During the inflammatory state of the tissue, pH values significantly decrease to pH values between 5.4 and 6.4 [2]. In previous researches, liposomes with incorporated bifunctional peptides for drug delivery were produced. These peptides were designed in a way to simultaneously serve as an anchor to self-incorporate into the liposome and as a folate linker to provide targeting to FR-positive cells [3].
Based on this system the present study outlines the production of stimuli-responsive liposomes by the incorporation of pH-sensitive anchor-peptides. Different peptides were designed based on natural occurring peptide sequences. Liposomes were produced by the ethanol injection and extrusion method [4]. Structural analysis of the peptide location in the liposomes was carried out. The incorporation efficiency of the anchor-peptides was determined by HPLC analysis.
In addition, release studies were carried out by the incubation of the liposomes with incorporated fluorescent dyes in phosphate buffer solutions at various pH-values and a temperature of 37°C. Incorporation efficiency and released dye concentrations were determined by UV/Vis spectroscopy.
As a result, the incorporation of the peptides was successful, which was proven by a shift of the fluorescent maximum of tryptophan from 343 nm to 322 nm. With this experiment we could create a base for the design and production of new peptide-modified liposomes while further analysis will reveal the suitability to work as a pH-responsive drug delivery system.

References:
1 AA. Kalla et al. (2003) Best Pract. Res. Clin. Rheumatol., 17, 863-875
2 IF. Tannock et al. (1989) Cancer Res., 49, 4373-84.
3 E. Nogueria et al. (2015) Biomacromolecules, 16(9), 2904-2910

Acknowledgements:
This work has received funding from the European Union H2020 Programme (H2020-NMP-PILOTS-2015) under grant agreement 683356 FOLSMART.

Christoph Winkler

Eberswalde University of Sustainable Development

christoph.winkler@students.boku.ac.at

P13: Multifunctional adhesives for engineered timber

C. Winkler [1,2], J. Gibcke [1]

1 Eberswalde University of Sustainable Developement
2 University of Natural Resources and Life Sciences, Vienna (BOKU)

The poster will give an overview on research regarding electrical modified wood adhesives, which are used to measure different load states. Presenting different prelimery tests regarding the functionality, it will focus further on the storage properties of electrical modified wood adhesives. One relevant challenge for further interdisciplinary development regarding sensorical adhesive layers in wood is the reproducibility of the initial properties of the multifunctional glueline, which depends, as shown, mainly on the processing parameters. The presented research investigated the changes of rheological and electrical properties after production of unmodified and modified structural wood adhesives by a method of combined electro-rheological measurements, applying a flow curve. From the power law relevant application properties were extracted to evaluate the processibility.

References:

1 Winkler, C.; Schwarz, U.: WCTE 2016. Proceedings
2 Tannert, T.; Kasal, B.; Anthony, R.: In-situ assessment of structural timber (2010)

List of participants

Name	E-Mail
Azevedo Pamela	pam.o.souza@gmail.com
Bachleitner Simone	simone.bachleitner@boku.ac.at
Barrio Duque Alejandro del	alesuco7yo@hotmail.com
Beyer Reinhard	reinhard.beyer@boku.ac.at
Braunschmid Verena	verena.braunschmid@boku.ac.at
Bueschl Christoph	christoph.bueschl@boku.ac.at
Doppler Maria	maria.doppler@boku.ac.at
Ebrahimi Meysam	meysam.ebrahimi@students.boku.ac.at
Escobar Rodríguez Carolina	carolina.escobar-rodriguez.fl@ait.ac.at
Euteneuer Pia	pia.euteneuer@boku.ac.at
Fuchs Wolfgang	wolfgang.fuchs@boku.ac.at
Greimel Katrin	katrin.greimel@boku.ac.at
Hallasgo Anna Marie	annamarie.hallasgo@gmail.com
Haske-Cornelius Oskar	oskar.haske-cornelius@boku.ac.at
Hawamda AbdALmenem	abdalmenem.hawamda@boku.ac.at
Hogger Elfriede	e.hogger@kplus-wood.at
Iank Bueno Antonio Vinicius	antonio.iank.bueno@gmail.com
Jaxel Julien	j.jaxel@kplus-wood.at
Jurisic Nada	nada.jurisic@boku.ac.at
Kacanski Milos	milos.kacanski@boku.ac.at
Karnpakdee Kwankao	kwankao.film@gmail.com
Kaschubek Theresa	theresa.kaschubek@biomin.net
Köhnke Janea	janea.koehnke@boku.ac.at
Küsters Julienne	julienne.kuesters@gmx.de
Lucia Arianna	arianna.lucia@boku.ac.at

Martzy Roland	roland.martzy@tuwien.ac.at
Ollier Marine	marine.ollier@boku.ac.at
Plappert Sven	Sven.Plappert@boku.ac.at
Pöll Carina	c.poell@kplus-wood.at
Prohaska Thomas	thomas.prohaska@boku.ac.at
Reichert Susanne	susanne.reichert@boku.ac.at
Reischer Georg	georg.reischer@tuwien.ac.at
Roschitz Christina	christina.roschitz@boku.ac.at
Safaei Asadabadi Ramin	ramin.safaei-asadabadi@boku.ac.at
Schmid Maximilian	maximilian.schmid@boku.ac.at
Solt Pia	pia.solt@boku.ac.at
Stadler David	david.stadler@boku.ac.at
Stasnik Peter	Peter.Stasnik@ait.ac.at
Steiner David	david.steiner@boku.ac.at
Tallian Claudia	claudia.tallian@boku.ac.at
Turajlija Maja	majaturajlija@yahoo.com
Varga Elisabeth	elisabeth.varga@boku.ac.at
Winkler Christoph	christoph.winkler@students.boku.ac.at

NOTES

NOTES

NOTES

Seminar BINGO!

To play, simply print out this bingo sheet and attend a departmental seminar.

Mark over each square that occurs throughout the course of the lecture.

The first one to form a straight line (or all four corners) must yell out BINGO!! to win!

SEMINAR BINGO

Speaker bashes previous work	Repeated use of "um…"	Speaker sucks up to host professor	Host Professor falls asleep	Speaker wastes 5 minutes explaining outline
Laptop malfunction	Work ties in to Cancer/HIV or War on Terror	"…et al."	You're the only one in your lab that bothered to show up	Blatant typo
Entire slide filled with equations	"The data *clearly* shows…"	FREE Speaker runs out of time	Use of Powerpoint template with blue background	References Advisor (past or present)
There's a Grad Student wearing same clothes as yesterday	Bitter Post-doc asks question	"That's an interesting question"	"Beyond the scope of this work"	Master's student bobs head fighting sleep
Speaker forgets to thank collaborators	Cell phone goes off	You've no idea what's going on	"Future work will…"	Results conveniently show improvement

JORGE CHAM © 2007

WWW.PHDCOMICS.COM

THANK YOU FOR YOUR PARTICIPATION AT THE 5TH DOCDAY!