

Euroleague

FOR LIFE SCIENCES

UNIVERSITY OF HOHENHEIM




PROGRAMME AND ABSTRACT BOOK

ELLS Scientific Student Conference

University of Hohenheim, Stuttgart, Germany

11-12 November 2016



**BIO-BASED ECONOMY
FOR A SUSTAINABLE
FUTURE**

Euroleague

F O R L I F E S C I E N C E S

Member Universities



University of Natural Resources
and Life Sciences, Vienna



CZECH
UNIVERSITY
OF LIFE SCIENCES PRAGUE



FACULTY OF SCIENCE
UNIVERSITY OF COPENHAGEN



Swedish University
of Agricultural Sciences

UNIVERSITY OF HOHENHEIM



WAGENINGEN UNIVERSITY
WAGENINGEN UR



Partner Universities



中國農業大學
China Agricultural University



Cornell University
College of Agriculture
and Life Sciences



האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM



Lincoln
University
Te Whare Wānaka o Aoraki
AOTEAROA • NEW ZEALAND

New Zealand's specialist land-based university

With the kind support of:

Universitätsbund Hohenheim e.V.
Freunde und Förderer der Universität Hohenheim

Die Oskar und Elisabeth Farny-Stiftung



ELLS Scientific Student Conference 2016

“Bio-Based Economy for a Sustainable Future”

Programme and Abstract Book

University of Hohenheim, Stuttgart, Germany

11-12 November 2016

Scientific Student Conference 2016
Euroleague for Life Sciences
Bio-Based Economy for a Sustainable Future
11 – 12 November 2016
University of Hohenheim
Stuttgart
Germany

Editors: Gabriele Klumpp, Traute Pott, Schirin Oeding

Quotation from or reference to any part of this book should be made with full reference to the information provided above

Layout: Claudia Preker, Ezgi Demir
Cover Illustration: Fotolia/ © basketman23

ISBN: 978-3-00-054755-3

Printing: University of Hohenheim

Organization and Acknowledgements

Organizing Committee at UHOH

Gabriele Klumpp
Lutz Graeve
Sabine Zikeli
Ingo Kneller
Susanne Wharton
Jonas Trenz
Johannes Freihart

Scientific Committee

Lutz Graeve (Chair)
Andreas Fangmeier
Ludwig Hölzle
Gabriele Klumpp
Melvin Lippe
Karl Schmid
Claus Zebitz
Sabine Zikeli

Video about Bioeconomy

Olga Boyarintseva, Jonas Scheyrer, Ricardo Vargas

External Support

Conference registration and online abstract submission: Warsaw University of Life Sciences

The organizing committee at the University of Hohenheim gratefully acknowledges the support of

University of Natural Resources and Life Sciences, Vienna
Czech University of Life Sciences Prague
University of Copenhagen, Faculty of SCIENCE
Swedish University of Agricultural Sciences
Wageningen University
Warsaw University of Life Sciences

The Session Chairs

The Student Presentation Prize Committee

The Scientific Committees at all ELLS universities

The ELLS International Relations Officer (IRO) group

ELSA members at all ELLS universities

All Subject Area and Support Team Representatives at UHOH

International Students Organisation Hohenheim e.V. (ISO)

The Office of International Affairs at UHOH

The Communication, Information, and Media Center (KIM) at UHOH

The Department of Media & Marketing at UHOH

And all student assistants and volunteers!

Table of Contents

Organization and Acknowledgments.....	3
Table of Contents.....	5
Welcome to the 8th Scientific Student Conference!	6
Welcome to the University of Hohenheim!	7
The Euroleague for Life Sciences	8
Practical Information	9
Programme	10
Campus Tours	12
Keynote Speakers.....	13
SSC Student Prize for Presentation.....	16
Vote for the best poster!.....	17
Overview Sessions	18
Oral Presentations	19
1.1 Managing Climate and Environment (1).....	20
1.2 Developing Renewable Resources Industrially	23
1.3 Social and Economic Dimensions of Bioeconomy	26
1.4 Other Aspects of Bioeconomy.....	29
2.1 Managing Climate and Environment (2).....	34
2.2 Improving Efficient and Sustainable Agricultural Production (1).....	37
2.3 Securing Worldwide Food Supply	40
2.4 Animal Genomics, Animal Health and Animal Welfare (1)	43
3.1 Managing Climate and Environment (3).....	48
3.2 Improving Efficient and Sustainable Agricultural Production (2).....	51
3.3 Producing Healthful and Safe Food (1).....	54
3.4 Animal Genomics, Animal Health and Animal Welfare (2)	57
4.1 Managing Climate and Environment (4).....	62
4.2 Improving Efficient and Sustainable Agricultural Production (3).....	65
4.3 Producing Healthful and Safe Food (2).....	68
4.4 Animal Genomics, Animal Health and Animal Welfare (3)	71
Poster Sessions	75
1.1 Managing Climate and Environment (1).....	76
1.2 Socioeconomic and other Aspects of Bioeconomy	87
2.1 Food Safety and Food Security; Developing Renewable Resources Industrially	100
2.2 Improving Efficient and Sustainable Agriculture	111
3.1 Managing Climate and Environment (2), Novel Energy Carriers Based on Biomass.	124
3.2 Animal Genomics, Animal Health and Animal Welfare.....	135
ELLS Prize for Excellent Master Theses.....	147
Index	154

Welcome to the 8th Scientific Student Conference!



Welcome to the Scientific Student Conference, focusing on the important and relevant theme “Bio-Based Economy for a Sustainable Future”!

The students are the main target group and the foundation of the Euroleague for Life Sciences (ELLS). The annual Scientific Student Conference (SSC), organized by the host of the ELLS Conference and the ELLS student association ELSA, is a central activity for the ELLS network. The SSC provides excellent opportunities for exchange of experiences and new ideas between students, teachers and administrative staff from ELLS member and partner universities.

As Chair of ELLS, I consider the SSC highly important as it gives undergraduate and graduate students an international forum to present research papers and posters relevant to their field of work and to receive constructive feedback from peers and experts. Moreover, the SSC is an opportunity for networking and I encourage you all to use networking as an essential tool for building up valuable connections for future success in the field of life sciences and the professional world.

I am very pleased to see how the SSC is growing and developing each year and the success of the SSC would not be what it is without the engagement of the students. It is also an appreciated conference for the teachers from all ELLS universities who consider the work of the students as holding very good quality. The teachers are contributing to the content of the conference by devoting much work on reviewing and evaluating the student abstracts and presentations, before and during the conference.

On behalf of ELLS Network, we would like to express our sincere thanks to last year’s host of the SSC, the Czech University of Life Sciences, Prague, for the organization of a successful programme and excellent venue. Our warm thanks to this year’s host the University of Hohenheim, Stuttgart that have prepared an exciting and fruitful event for all of us.

We look forward to sharing and exploring the 8th SCC with you all - enjoy the conference and thank you for coming!

Best wishes,
Professor Peter Högberg
ELLS Chair of the Board

Welcome to the University of Hohenheim!



UNIVERSITÄT HOHENHEIM



Welcome to the 8th ELLS Scientific Student Conference,

A warm welcome also from the University of Hohenheim. It was founded in 1818 in response to a severe famine as an agricultural research institution. It is located, quite beautifully, in the former palace of the Duke of Württemberg, Carl Eugen, and the surrounding park area.

Today, the University of Hohenheim is the leading University in agricultural research and food sciences in Germany. It also offers research and degrees of the highest quality in natural, social, and communication sciences. What is more, it is this particular combination of subjects and research areas that enables students and faculties at Hohenheim to develop solutions for many global challenges. This is why the University puts great importance on maintaining an international network with numerous strong partners.

In 2009, we hosted the first ELLS Scientific Student Conference here in Hohenheim. At the time, about 100 people participated. Since this first conference, SSC has become a true success story. Each year, about 250 to 300 students and scientific experts meet to discuss their research, to present their findings to a broad international audience and, above all, to learn from each other and to establish future collaborations and friendships.

We consider it a special honor to host the SSC Conference once more, when the conference focusses on the subject of “Bio-Based Economy for a Sustainable Future”. In 2014 the university made the issue of Bioeconomy a new research focus. It perfectly supplemented our existing research portfolio. A new Bioeconomy Research Centre was founded and the head office of the Baden-Württemberg Bioeconomy research programme has been established right here on campus. The special emphasis we place on this issue is also reflected by a new Master’s Program in Bioeconomy, which we are now offering.

There is no doubt that research on Bioeconomy will continue to be of outstanding importance. Therefore, I wish you challenging and fruitful discussions and hope you will be having a great time at the University of Hohenheim. Thank you very much for helping to make this 8th ELLS Scientific Student Conference a success.

Prof. Dr. Stephan Dabbert
President of the University of Hohenheim

What is the Euroleague for Life Sciences?

The Euroleague for Life Sciences (ELLS) is a network of leading universities cooperating in the fields of Bio-Based Economy, Natural Resource Management, Agricultural and Forest Sciences, Life Sciences, Animal Sciences, Nutrition and Food Sciences, and Environmental Sciences. ELLS has been founded as a network of leading European Life Science universities back in 2001. Currently, ELLS has seven regular members, and three years ago, the network was opened for international partnerships, including at the moment four universities based in Israel, North America, Asia, and New Zealand.

ELLS Member Universities:

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

Czech Republic: Czech University of Life Sciences, Prague (CULS)

Denmark: University of Copenhagen, Faculty of SCIENCE (SCIENCE)

Germany: University of Hohenheim, Stuttgart (UHOH)

The Netherlands: Wageningen University (WU)

Poland: Warsaw University of Life Sciences (WULS-SGGW)

Sweden: Swedish University of Agricultural Sciences (SLU)

ELLS Partner Universities

USA: Cornell University, College of Agriculture and Life Sciences, Ithaca, New York, USA (CALS)

China: China Agricultural University, Beijing (CAU)

Israel: Hebrew University of Jerusalem, Robert H. Smith Faculty of Agriculture, Food and Environment (HUJI)

New Zealand: Lincoln University, New Zealand (LU)

Why ELLS?

Students are the main target group and the foundation of ELLS. The focus of the network is on joint teaching and learning, student and staff mobility, and quality assurance. Graduating from ELLS you – the students – will be highly qualified and prepared for the demands of the European and international job market.

The specific objectives of ELLS are:

- to offer students additional values by expanding existing activities and by developing new joint programmes in the field of Life Sciences
- to support the high quality of education by the sharing of expertise and facilities
- to provide transparent and easily accessible information about joint ELLS study programmes
- to increase student mobility by simplifying the process of student exchange.

The Scientific Student Conference

Starting eight years ago, ELLS started to offer scientific student conferences (SSC) on timely topics suggested by ELSA. The first conference in this series was also organised in Hohenheim in 2009. The unique event was very well received by students and teachers, initiating the decision to annually organise SSC at changing locations. The overwhelming success is reflected in the ever increasing number of participating students and conference contributions reaching 300 in the 2015 conference in Prague.

Practical Information

Venue

The conference venue is the campus of the University of Hohenheim.

All parallel and poster sessions, as well as breaks, lunches and dinners will take place in those buildings:

- Biology Center, Garbenstr. 30 (Conference Office, Lecture halls B1, B2)
- Ecology Center, Garbenstr. 28 (Lecture halls Ö1, Ö2)
- Hohenheim Palace (Auditorium with poster exhibition) (Aula)
- University restaurant – Mensa, Garbenstr. 29 (Lunch and dinner)
- Thomas Müntzer-Scheuer, Emil-Wolff-Str. 20 (Student party)

Public Transport

All student participants receive a 3-day ticket for free when they register, if they requested one with their conference registration form.

This ticket can be used for all means of public transport (metro, bus) within the city of Stuttgart

Important: You will need an additional ticket (one zone) if you go to Stuttgart Airport

Conference Dinner

The conference dinner is served at the University restaurant directly opposite the conference building

Student Party

The student party will take place in the Thomas-Müntzer-Scheuer (TMS).

The Party will start after the Dinner at 21:00 and end at 23:30

Coffee, lunch and dinner are included in the conference registration, but we would like to ask you to wear your badge clearly visible.

Emergency Numbers

Police: 110

Fire department, ambulance: 112

Emergency physicians: +49711-19222

Surgical ambulance (Hospital): +49711-21 56 - 234

Dentist: +49711 243897

Hospital: AGAPLESION BETHESDA KRANKENHAUS

Hohenheimer Straße 21

70184 Stuttgart

Phone: +49711-21 56 - 0

Conference Office

In case of problems, please contact the conference organization immediately.

Conference emergency number: +49 (0) 1525 4399336

Wi-Fi

If you have used Eduroam at your home university before, please use the login from your home university.

For further information, please see <http://ells2016.uhoh.de/practical-information>

ELLS Scientific Student Conference
“Bio-Based Economy for a Sustainable Future”
Programme
Friday, 11 November 2016

Time	Programme	Chair/Venue
10:00 – 12:00	Campus Tours	See separate list
12:00 – 14:00	REGISTRATION	Foyer BIO I
12:30 – 13:30	LUNCH	Mensa
OPENING 14:00 – 14:20	Welcome and Official Opening of the ELLS SSC 2016 by Stephan Dabbert (President UHOH) and Peter Högberg (ELLS Chair of the Board) Welcome by ELSA	Lutz Graeve B1
14:20 – 14:30	What is Bioeconomy? Video by students of the MSc programme Bioeconomy	
KEYNOTE 14:30 – 15:15	Andreas Pyka: “Transformations of Economic Systems: The Bioeconomy Case”	
PARALLEL SESSIONS 15:15 – 16:15	1.1 Climate Change Managing Climate and Environment (1)	Nicholas Dickinson B1
	1.2 Sustainable Agriculture, Renewable Resources Developing Renewable Resources Industrially	Iris Lewandowski B2
	1.3 Food Safety, Food Security, Socioeconomics of Bioeconomy Social and Economic Dimensions of Bioeconomy	Michal Lošťák Ö1
	1.4 Animal Genomics, Animal Health and Animal Welfare, Bioeconomy Other Aspects of Bioeconomy	Nina Drejerska Ö2
16:15 – 16:45	COFFEE BREAK	Foyer BIO II
POSTER SESSIONS I 16:45 – 17:45	P 1.1 Managing Climate and Environment (1) Chairs: Markus Puschenreiter, Vojtech Rada	Auditorium (Aula)
	P 1.2 Socioeconomic and other Aspects of Bioeconomy Chairs: Gabrielle Lagerkvist, Walter Vetter	
PARALLEL SESSIONS 18:00 – 19:00	2.1 Climate Change Managing Climate and Environment (2)	Bjarne Strobel B1
	2.2 Sustainable Agriculture, Renewable Resources Improving Efficient and Sustainable Agricultural Production (1)	Claus Zebitz B2
	2.3 Food Safety, Food Security, Socioeconomics of Bioeconomy Securing Worldwide Food Supply	Tiny Boekel Ö1
	2.4 Animal Genomics, Animal Health and Animal Welfare, Bioeconomy Animal Genomics, Animal Health and Animal Welfare (1)	Gabrielle Lagerkvist Ö2

SOCIAL PROGRAMME

19:00 – 21:00	SSC Dinner	Mensa
21:00 – 23:30	Student Party	TMS

ELLS Scientific Student Conference
“Bio-Based Economy for a Sustainable Future”
Programme
Saturday, 12 November 2016

Time	Programme	Venue/Chair
POSTER SESSIONS II 8:45 – 9:45	P 2.1 Food Safety and Food Security; Developing Renewable Resources Industrially Chairs: Gabrielle Lagerkvist, Walter Vetter	Auditorium (Aula)
	P2.2 Improving Efficient and Sustainable Agriculture Chairs: Markus Puschenreiter, Lukáš Pospíšil	
KEYNOTES 10:00 – 11:00	Lilli Scheiterle Biomass-based Value Webs: Exploring Bioeconomy Potentials in Developing Countries Athena Birkenberg Applied Bioeconomy: The Case of Carbon Neutral Certified Coffee	Lutz Graeve B1
11:00 – 11:30	COFFEE BREAK	FOYER BIO II
PARALLEL SESSIONS 11:30 – 12:30	3.1 Climate Change Managing Climate and Environment (3)	Lukáš Pospíšil B1
	3.2 Sustainable Agriculture, Renewable Resources Improving Efficient and Sustainable Agricultural Production (2)	Hans-Peter Kaul B2
	3.3 Food Safety, Food Security, Socioeconomics of Bioeconomy Producing Healthful and Safe Food (1)	Bjarke Bak Christensen Ö1
	3.4 Animal Genomics, Animal Health and Animal Welfare, Bioeconomy Animal Genomics, Animal Health and Animal Welfare (2)	Ludwig Hölzle Ö2
12:30 – 13:30	LUNCH	Mensa
POSTER SESSIONS II 13:30 – 14:30	P 3.1 Managing Climate and Environment (2), Novel Energy Carriers Based on Biomass Chairs: Markus Puschenreiter, Lukáš Pospíšil	Auditorium (Aula)
	P 3.2 Animal Genomics, Animal Health and Animal Welfare Chairs: Gabrielle Lagerkvist, Walter Vetter	
PARALLEL SESSIONS 14:30 – 15:30	4.1 Climate Change Managing Climate and Environment (4)	Markus Puschenreiter B1
	4.2 Sustainable Agriculture, Renewable Resources Improving Efficient and Sustainable Agricultural Production (3)	Kirsten Jørgensen B2
	4.3 Food Safety, Food Security, Socioeconomics of Bioeconomy Producing Healthful and Safe Food (2)	Gerhard Schleining Ö1
	4.4 Animal Genomics, Animal Health and Animal Welfare, Bioeconomy Animal Genomics, Animal Health and Animal Welfare (3)	Krzysztof Klimaszewski Ö2
15:30 – 16:00	COFFEE BREAK	Foyer BIO II
CLOSING 16:00 17:00	Award Ceremony Acknowledgement of ELLS Joint Master Programme Graduates Wrap-up by ELSA Official closure	Lena Andersson- Eklund B1

Campus Tours

The University of Hohenheim's campus is built in and around the late baroque Palace built by Duke Carl Eugen at the end of the 18th century. The historical structure and modern research institutions, expansive parks with gardens and experimental areas as well as several interesting museums make the University one of the most beautiful campuses in Germany.

With a historical tour through the Hohenheim Palace, a horticultural-botanical tour through the Hohenheim Gardens, guided museum tours or guided tours through some research institutions we would like to provide the participants of the ELLS SSC new insights and interesting background information.

Tour 1: Historical tour of Hohenheim Palace

Tour 2: Botanical Garden, Exotic Garden and Palace Park

Tour 3: German Agricultural Museum

Tour 4: Museum of Zoology and Veterinary Medicine with the Hohenheim

Tour 5: Apicultural State Institute

Tour 6: Institute of Agricultural Engineering (maximum 15 persons)

Tour 7: Dairy for Research and Training (maximum 25 persons in two groups)

Tour 8: Viticulture and wine production in Hohenheim

Tour 9: Agricultural Experiment Station (Meiereihof) - Research on dairy cows - electronic data capture in cowshed (maximum 25 persons)

Tour 10: Energy Balance Center (maximum 15 persons)

Tour 11: Distillery for Research and Training

Meeting point for all tours is at 09:45 in front of the Biology Center (Biogebäude), Garbenstr. 30!

Transformations of Economic Systems: The Bioeconomy Case

Since the industrial revolution, the economic system is continuously exposed to change and development. Starting from an agriculture-based production system we are arriving now in, what is frequently called, knowledge-based economy. In between the economic production system has moved through transformation processes characterized as mechanization, mass production, electrification etc. None of these transformations appears regular and ordered. Instead, they were triggered by reaching the limits of the previous production system and by important innovations, which most often were the result of competence destroying technical change where old industries (and actors as well as economic dynamic regions) were replaced by new industries (and new actors and new regions) with outstanding economic dynamics. From this long-term view, therefore, there is nothing exceptional on economic transformations. However, this time, the development towards the knowledge-based economy seems not to be sufficient to solve all problems, which accumulate over the last 250 years of industrial production and many of them reached a threatening global dimension. The knowledge-based bioeconomy production system is conceptually reacting on this shortcoming of the so far undirected transformation. No longer is every innovation considered as contributing positively to the necessary developments and, not surprisingly, knowledge, which is the most important input into the development of new technologies, is considered to become an increasingly scarce resource. Concepts like responsible innovation, underlying e.g. the design of the Horizon 2020 program of the EU are clearly a consequence of these considerations.

The determination of goals in the current transformation towards the knowledge-based bioeconomy therefore is different compared to transformations in the past. Targets like protecting the climate, strong reduction of waste and pollution, a fair income distribution, etc. are superimposed to a development process, which in principle has to be an open process. Because of the openness and future-orientation there can be no strict and pre-determined formulation of well-specified goals. The challenge, therefore, has to be the design of a framework, which supports the development of the economic system within certain guide rails, which make sure that the production system transforms this time into a sustainable system. This can only be achieved by the enormous creativity of market-based economies, which have to involve all market actors, the firms, the households, the public sector and the financial markets to support the next and required transformation of the production system.

Prof. Dr. Andreas Pyka is Professor of Innovation Economics at the Economics Institute of the University of Hohenheim in Stuttgart, Germany. He also holds a research professorship at the Institut für Wirtschaftsforschung in Halle, Germany and is visiting researcher at CIRST at the University of Quebec in Montreal. Andreas Pyka studied economics and business administration at the University of Augsburg, Germany, where he completed his doctoral thesis on informal networks, absorptive capacities and collective innovation in 1999. His Post Doc period Andreas Pyka spent as a researcher employed for the European framework programme 5 project “Self-Organisation of Innovation Networks” at the INRA Institute in Grenoble, France. After his return to Augsburg, where he was habilitated in 2004 he was Visiting Professor at the Austrian Institute of Technology, Vienna and the Technical University Delft, the Netherlands. His first tenured Professorship for Economic Theory he got in 2006 at the University of Bremen, Germany. In 2009 he accepted a call for a Chair in Innovation Economics at the University of Hohenheim, Germany. Since 2011, Professor Andreas Pyka is Vice President for International Affairs.



Keynote Speakers

Lilli Scheiterle

Hans-Ruthenberg-Institute, University of Hohenheim
Social and Institutional Change in Agricultural Development (490c)
Email: Lilli.Scheiterle@uni-hohenheim.de

Knowledge and biomass as drivers of the bioeconomy, and Biomass-based value webs as a novel research approach

The growing demand for bio-based products will redefine the role of biomass-rich countries and transform the agricultural sector. Bioeconomy is transforming the perspective towards agricultural biomass production, is reshaping the role of basic science and technological targets are newly set. The adoption of a sustainable “greener economy” requires political commitment, technological and physical infrastructure, skilled labor, financial means and solidarity. New opportunities will open up for agrarian economies as well as for technology advantaged sectors, but also known challenges. Knowledge, therefore, is one of the pillars of the bioeconomy and needs to be increasingly supported, especially in developing countries, to enable an efficient use of the available resources. Given the critical role of biomass as a carbon source for the development of a large variety of products, there is the need for research methods able to capture the interwoven routes of the biomass. The “biomass-based value web” concept is an analytical approach to explore the links in and between value chains, and promote synergies among technologies to increase the efficiency of the transformed biomass. The new dimensions of the bioeconomy can be captured by the value web concept as it extends the commodity-oriented value chain approach and includes alternative use options of crop biomass and the potential by-products that arise during production and processing (e.g. use of waste products from the bio-chemical industry as raw material for manufacturing industry). The emerging bioeconomy demands for new approaches and solutions to reshape our current economic system and the science community will be confronted with new challenges and opportunities for a sustainable use of the available resources.

Lilli's Ph.D. thesis is part of the larger BiomassWeb Project based at the University of Hohenheim in collaboration with various other institutions based in Germany and Africa. The project applies the biomass-based value web as multidimensional framework to understand the interrelation and linkages between several value chains and how they are governed. The “web perspective” was applied in the analysis of the sugarcane sector in Brazil, biomass flows in combination with the national innovation system allowed to identify Brazil's strengths and weaknesses in the upcoming bioeconomy. Her work is primarily based in Ghana where besides analyzing the governance challenges of the national fertilizer subsidy program, she is researching on the challenges of the implantation of the emphasized “participatory approach” on the showcase of plantain technologies. A gender analysis of the role of women based market associations in Ghana, is also part of her research interest. She received her Master degree from the University of Hohenheim in the course “Agricultural Sciences in the Tropics and Subtropics” where she chose the curricula of natural resource management; previously she completed her Bachelor degree from the University of Florence. She has participated actively in international conferences and enjoys the exchanging ideas within multidisciplinary settings.



Keynote Speakers

Athena Birkenberg

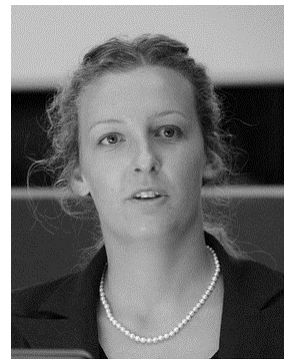
Hans-Ruthenberg-Institute, University of Hohenheim
Social and Institutional Change in Agricultural Development (490c)

Email: a.birkenberg@uni-hohenheim.de

Applied Bioeconomy - The case of carbon neutral certified coffee

There are many examples already from applied bioeconomy, especially in the industrialized sector. Carbon neutral certified coffee however represents a case of applied bioeconomy in the agricultural sector. The transition from a fossil-based to a bio-based economic system (bioeconomy) is a major challenge for the 21st century. This transition needs to become a sustainable strategy to overcome climate change and the problem of limited natural resources. Carbon neutral production systems are therefore an essential element of the bioeconomy. Carbon neutral certification has the potential to contribute to bioeconomy in many ways. It motivates for resource use efficiency and increasing biomass production on a limited area. To reach these resource use efficiencies, innovations are needed to find new potential uses of waste-products or by-products but also improve the efficiency of fossil-fuel based processes. Thereby knowledge exchange, research and collaboration between different actors involved in the social network of carbon neutral certification are essential for successful implementations. Nevertheless, it needs effective financing. Research shows that such effective financing can be reached if it is coupled with the provision of other services such as technical advice or collaboration. Looking at cases of applied bioeconomy and innovations offer therefore the opportunity to find solutions for the challenges bio-based systems are facing.

Athena started her PhD in 2014 at the Chair of Social and Institutional Change in Agricultural Development (490c), University of Hohenheim. As an agronomist, specializing in soil sciences, she continued her graduation and research in the field of tropical agriculture, in particular natural resource management and socio economics of rural development. Geographically, she has field work experience in Thailand, Greece and Croatia, where she focused on poverty alleviation, forestry, governance, social-ecological systems, medicinal plants, tropical soils, ecology and food security. More recently, she started combining socio-economic with ecological methodology for her research on carbon neutral coffee production in Latin America. Athena received her Bachelor and Master degrees from the University of Hohenheim. During her education she was a founding and active member of the student organization FRESH e.V., where she worked on issues like organic agriculture, food waste, the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD), and she created a module on ethics of food and nutrition security. Prior to university, she used her school holidays to work on a large organic farm near Lake Constance and to do an internship on a farm in Estonia.



SSC Student Prize for Presentation

One of the aims of the Euroleague for Life Sciences is to support and highlight the achievements of young scientists. At the Scientific Student Conference, the best oral presenters and poster presenters are therefore awarded the ELLS Student Prize for Presentation.

A Student Prize for Presentation Committee is asked to select outstanding oral presenters, based on their performance in the conference relative to the level of their study (bachelor, master or PhD). The selection may be based on the content of their work as well as on soft skills such as structure of presentation.

As regards the selection of the best posters, the committee will nominate them based on the structure of the poster and the poster presentation. The final selection of the best poster will also consider the results of a general vote among the conference participants (both students and staff).

The ELLS Student Prizes for Presentation are funded by the ELLS Fund for Incentives. In 2016 it has been decided to award 3 prizes for oral presenters per subtheme (1st prize: € 300, 2nd prize: € 200, 3rd prize: € 100) and one prize for the best poster in each poster session (€ 100). The Student Prize for Presentation Committee has the right to adjust the distribution of the prize money subject to the performances of the students.

The winner of the participants vote will receive a “bioeconomy present”.

Members of the ELLS Student Prize for Presentation Committee 2016:

Sabine Zikeli (Chair), UHOH
Walter Vetter (Chair), UHOH
Franz Grossauer, BOKU
Hermann Bürstmayr, BOKU
Markus Puschenreiter, BOKU
Michal Lošťák, CULS
Lukáš Pospíšil, CULS
Lena Andersson Eklund, SLU
Gabrielle Lagerkvist, SLU
Maria Parlińska, WULS-SGGW
Bjarke Bak Christensen, SCIENCE
Tiny Boekel, WUR

Vote for the best poster!

We invite all participants of the Scientific Student Conference 2016 to kindly vote for the best poster presentation!

How to vote:

1. In your name badge you will find a voting card.
2. Each poster has a number. Write the number of the best poster on your voting card

Criteria for voting can be:

- Originality: Does the poster succeed in attracting the viewer's attention?
 - Visualisation: Is the presentation clear and vivid?
 - Understanding of the problem: Are the problem statement, method description, and results understandable?
 - Is the poster and the presentation logically structured?
3. Leave the voting card at the Registration Desk, not later than 14:30, November 12th (the voting is of course anonymous).



Session numbers: The second number indicates the subtheme:

1 Climate Change - 2 Sustainable agriculture, Renewable resources - 3 Food safety, Food security, Socioeconomics of bioeconomy – 4 Animal genomics, animal health and animal welfare, bioeconomy

Date and Time	Nr.	Session Title	1st speaker (A)	2nd speaker (B)		3rd speaker (C)		
Parallel Session I Fri, 11.11.2016 15:15 – 16:15	1.1	Managing Climate and Environment(1) Chair: Nicholas Dickinson (LU)	Muhammad Arslan Ahmad	SLU	Moritz Laub	UHOH	Lisa Lea Jach	UHOH
	1.2	Developing Renewable Resources Industrially Chair: Iris Lewandowski (UHOH)	Markus Götz	UHOH	Štěpán Hýsek	CULS	Patrik Isacson	SLU
	1.3	Social and Economic Dimensions of Bioeconomy Chair: Michal Lošťák (CULS)	Peter Musinguzi	SCIENCE	Thomas Maximilian Weber	BOKU	Ioana-Cristina Musat	WUR
	1.4	Other Aspects of Bioeconomy Chair: Nina Drejerska (WULS-SGGW)	Florentyna Akus-Szylberg	WULS	Yorick de Vries	WUR	Oliver Schrot	BOKU
Parallel Session II Fri, 11.11.2016 18:00 – 19:00	2.1	Managing Climate and Environment (2) Chair: Bjarne Strobel (SCIENCE)	Hanna Frick	UHOH	Hannes Keck	SLU	Sarah Pienisch	LU
	2.2	Improving Efficient and Sustainable Agricultural Production (1) Chair: Claus Zebitz (UHOH)	Anna Seidel	UHOH	Rafaelle Reumaux	BOKU	Teowdroes Kassahun Teka	CULS
	2.3	Securing Worldwide Food Supply Chair: Tiny Boekel (WUR)	Solomon Mensah Brobbey	CULS	Aleksandra Mika	WULS	Rodrigo Valencia Cotera	BOKU
	2.4	Animal Genomics, Animal Health and Animal Welfare (1) Chair: Gabrielle Lagerkvist	Gauthier Konnert	WUR	Karl Wyne Abregana	UHOH	Bart van der Hee	WUR
Parallel Session III Sat, 12.11.2016 11:30 – 12:30	3.1	Managing Climate and Environment (3) Chair: Lukáš Pospíšil (CULS)	Gesa Pauer	SCIENCE	Josef Gallo	CULS	Kateřina Chaloupková	CULS
	3.2	Improving Efficient and Sustainable Agricultural Production (2) Chair: Hans-Peter Kaul (BOKU)	Kirsten Moore	UHOH	Kohji Nakasaka	WUR	Florian Stöckl	BOKU
	3.3	Producing Healthful and Safe Food (1) Chair: Bjarke Bak Christensen (SCIENCE)	Maria Maier	BOKU	Christian Wagner	BOKU	Esther Plattner	BOKU
	3.4	Animal Genomics, Animal Health and Animal Welfare (2) Ludwig Hölzle (UHOH)	Katarzyna Świdarska	WULS	Kristýna Kovaříková	CULS	Václav Silovský	CULS
Parallel Session IV Sat, 12.11.2016 14:30 – 15:30	4.1	Managing Climate and Environment (4) Chair: Markus Puschenreiter (BOKU)	Sigrun Wagner	UHOH	Eduardo García Bendito	UHOH	Hannah Lara Oliphant	UHOH
	4.2	Improving Efficient and Sustainable Agricultural Production (3) Chair: Kirsten Jørgensen (SCIENCE)	Rhys Thompson	SCIENCE	Julia von Chamier	BOKU	Shyam Provost	LU
	4.3	Producing Healthful and Safe Food (2) Chair: Gerhard Schleining (BOKU)	Hasitha Priyashantha	SCIENCE	Foteini Chrysanthopoulou	BOKU	Diego Claramount	CULS
	4.4	Animal Genomics, Animal Health and Animal Welfare (3) Chair: Krzysztof Klimaszewski (WULS)	Sofia Lindkvist	SLU	Lenna van Kollenburg	WUR	Agata Równy	WULS

Oral Presentations

Parallel Sessions I
Friday, 11 November 2016
15:15-16:15

1.1 Managing Climate and Environment (1)

Chair: Nicholas Dickinson, *Lincoln University*

Venue: B1

1.2 Developing Renewable Resources Industrially

Chair: Iris Lewandowski, *University of Hohenheim*

Venue: B2

1.3 Social and Economic Dimensions of Bioeconomy

Chair: Michal Lošťák, *Czech University of Life Sciences*

Venue: Ö1

1.4 Other Aspects of Bioeconomy

Chair: Nina Drejerska, *Warsaw University of Life Sciences*

Venue: Ö2

1.1 Managing Climate and Environment (1)

Friday, 15:15- 16:15 - Venue: B1

Quantifying relationships between X-ray imaged macropore structure and hydraulic conductivity

Muhammad Arslan Ahmad

Swedish University of Agricultural Sciences

Study Programme Level: MSc

Keywords:

X-ray, macropore, hydraulic conductivity, critical pore diameter, modelling, pedotransfer functions

Computer-based simulation models which estimate hydraulic properties of soil usually make use of statistical approaches such as multiple regressions that relate hydraulic properties to widely measured soil properties like textural fractions, organic matter content and bulk density. The problem is that hydraulic properties are usually only weakly correlated to these properties, because they are more strongly dependent on the characteristics of larger pores in the soil. The characteristics of macropores in soil can be determined by X-ray tomography. The aim of this study was to evaluate the predictive performance of X-ray CT-derived macropore characteristics for hydraulic properties of soil. Twenty undisturbed soil cores were sampled (6 cm high, 6.5 cm diameter) from a soil pit, with replicate cores taken at different depths from clay soil in Skuterud catchment, Norway. Hydraulic properties, including saturated hydraulic conductivity, was measured using constant head method and unsaturated hydraulic conductivity was measured using Mini-Disk Infiltrometer. Soil columns were scanned using X-ray CT scan at a voxel resolution of 40 microns. Minimum automatic threshold algorithm method was chosen to segment the images between pore space and soil matrix. The images were analysed for quantifying the macropore characteristics using ImageJ, SoilJ, BoneJ and GeoDict. Significant correlations were observed between hydraulic conductivity and most CT derived macropore characteristics. Many of the X-ray CT derived macropore characteristics were interrelated. Best multiple linear equations for predicting the saturated and unsaturated hydraulic conductivity were estimated from macropore characteristics. Among the macropore characteristics critical pore diameter largely contributed to the saturated hydraulic conductivity. Macroporosity and connected macroporosity mainly controlled the unsaturated hydraulic conductivity. Physics-based approaches like percolation models based on critical pore diameter serves better than statistical approaches for decision making in soil and water management.

Acknowledgements:

Nicholas Jarvis, *Swedish University of Agricultural Sciences*

Johannes Koestel, *University of Natural Resources and Life Sciences, Vienna*

1.1 Managing Climate and Environment (1)

Friday, 15:15- 16:15 - Venue: B1

Digital mapping of soil organic carbon stocks and soil properties in Southwest China

Moritz Laub

University of Hohenheim

Study Programme Level: MSc

Keywords:

Digital soil mapping; soil organic carbon stocks; continuous depth soil property models

Digital soil mapping can capture the most important drivers of various soil properties across the landscape. Two approaches of modelling can be distinguished, though mixed forms exist: firstly, there are regression-based models, linking soil properties to ancillary variables, such as digital elevation models or land use. Secondly, there are geo statistic models, based on the principle that points close in space are (auto-) correlated in soil properties. This study compares these two approaches for modelling soil organic carbon, nitrogen and pH. It was conducted as basic assessment of soil properties in a 43 km² area in a nature reserve in Yunnan - China, as part of the SURUMER project. To maximally distribute sampling points across the variety of the study area, a cost constrained conditioned Latin hypercube sampling was used. Using soil auger and profiles, 99 points for model creation, and 20 points for validation were sampled, based on natural horizons. Horizon wise modelling approaches (Cokriging and regression models) were compared to a mixed continuous depth model, which is able to predict soil properties across the whole soil depth. Significant interactions of observed horizon medium depth and elevation, slope and elevation and land use and elevation were found and could partially be used for modelling. For soil organic carbon, the mixed continuous depth model performed best in external validation with root mean square errors between 0.42 and 0.52 % SOC for different horizons. By modelling bulk density, soil organic carbon stocks down to a depth of 1 m were estimated for the study area. Predicted SOC densities to 1 m were between 5 and 30 kg m⁻², depending mostly on land use and elevation.

Acknowledgements:

Sergey Blagodatskiy, *University of Hohenheim*

Georg Cadisch, *University of Hohenheim*

1.1 Managing Climate and Environment (1)

Friday, 15:15- 16:15 - Venue: B1

Impact of sub-grid scale soil texture and land-use types on the simulation of latent and sensible heat fluxes with NOAH

Lisa Lea Jach
University of Hohenheim

Study Programme Level: MSc

Keywords:

Heterogeneity, aggregation approach, heat flux distribution, climate modelling

This study investigates the impact of heterogeneity in the land surface on the simulation of latent and sensible heat fluxes with NOAH. The land surface is represented by combinations of land-use types and soil texture types. The simulations were carried out for one growth period from April to September with the meteorological data of 2010 measured by an eddy covariance station within the study site. The study site is located on the Central Swabian Alb and has an extension of 63x42km² divided into grid cells of 3x3km² size. The temporal focus is on the monthly means of both heat fluxes at 12am. The simulation was carried out by the research group FOR 1695 "Agrarlandschaften unter dem Einfluss des globalen Klimawandels - Prozessverständnis und Wechselwirkungen auf der regionalen Skala" of the University of Hohenheim i.a. to investigate the effect of implementing detailed maps for the soil texture type and the land-use type on the precision of the predictions of the latent and the sensible heat flux. Considering that, four aggregation approaches that take into account the heterogeneity of the land-use and the soil texture within one grid cell differently are compared with regard to the resulting differences in the heat flux predictions and the calculation time. The results show that especially the heterogeneity in different land-use types mostly expressed by their evapotranspiration rate has a significant impact on the precision of the heat flux predictions of both the latent and the sensible heat flux. Effects of the soil texture types are also observable, but the differences are very low and not significant for both heat fluxes.

Acknowledgements:

Research group FOR 1695, *University of Hohenheim*
Volker Wulfmeyer, *University of Hohenheim*
Kirsten Warrach-Sagi, *University of Hohenheim*
Christian Troost, *University of Hohenheim*

Preparation of 5-Hydroxymethylfurfural (HMF) out of Chicory- Inulin - Optimization of operation conditions

Markus Götz

University of Hohenheim

Study Programme Level: MSc

Keywords:

Chicory roots; Inulin-type fructans; 5-Hydroxymethylfurfural; hydrothermal treatment

To optimize the operation conditions for the hydrolysis and dehydration of Itfs to HMF in a single-stage procedure, laboratory tests with 15 ml mini-batch autoclaves were conducted. Model Itf with a degree of polymerization (DP) of maximum 36 (Sigma-Aldrich Co. LLC.) was solved in deionized water, 0.08 molar nitric acid and sulfuric acid (10 wt%) and hydrothermally treated at 100 °C, 120 °C and 160 °C for 3, 20 and 60 minutes. The maximum HMF-yield in pure water was 11.8 mol%, or 10,092 mg/L (160 °C, 60 minutes). In acidic conditions the maximum yield decreased with longer reaction time in favour of saccharic acids, especially Levulinic acid (up to 29,86 mol%). Lower retention time, 3 minutes, and temperatures of 160 °C is preferable. There is no strong influence of type of mineral acid but the highest yields (45,8 mol% HMF or 31,894 mg/L) were determined in sulfuric acid (160 °C, 3 minutes). Concentrations of 5-HMF in aqueous solution were determined by high performance liquid chromatography (HPLC; column: Li Chrospher 100 RP-18; mobile phase: 90 : 10 water : acetonitrile at 20 °C). Further tests with D-(-)-fructose, ItF with lower DP (2-8) (BENEO GmbH) and nitric, sulfuric and phosphorus acid (0.1 M) at 160 °C for 3 minutes showed similar results. For fructose the best result was 41.09 mol% HMF with nitric acid, for the lower DP ItF 32.58 mol% with nitric acid and for the Sigma-Inulin the highest yield was 39.45 mol% with sulfuric acid. With phosphorus acid the lowest yields were gained. In a current project tests with powder of dried and crushed chicory root pulp will be done at a reaction temperature of 160 °C, a reaction time between 2 and 5 minutes and with several mineral acids in a turbulent flow reactor tube.

Acknowledgements:

Dominik Wüst, *University of Hohenheim*

Andrea Kruse, *University of Hohenheim*

Optimization process of natural-fibre nonwovens

Štěpán Hýsek

Czech University of Life Sciences Prague

Study Programme Level: PhD

Keywords:

Air-laying; flax; hemp; natural-fibre; nonwoven

Green fibres can be used as an alternative to glass fibres in many fields of applications, due to their lower density, easy handling, good acoustic properties, recycling capabilities and lower price. This research deals with the processing of air-laid nonwovens using the natural flax and hemp fibres. SPIKE® air-laying technology from Formfiber Denmark ApS Company was used. The technology is based on dry forming a fibre web in a forming box. Spike rollers are fibre-separating rollers employed to separate clumps of fibres. The spike rollers singularise fibres from fibre clumps and there are two kinds of machine setting parameters that affect web quality: velocity and direction parameters. The web-formation processes, as well as properties of the fibre-webs, were evaluated. After needle-punching, the properties of the reinforced fibre-mats were evaluated. The investigations have clearly revealed that the settings of the air-laying machine influence the web-formation process and nonwoven properties. On the basis of monitoring web-formation processes and evaluating of fibre-web, or fibre-mat quality, several machine settings were defined that can be used to enhance the productivity of the machine, or settings that should be used to fabricate nonwovens with high density or high quality tensile properties.

Acknowledgements:

Rupert Wimmer, *University of Natural Resources and Life Sciences, Vienna*

Martin Böhm, *Czech University of Life Sciences Prague*

Bark assortments for tall oil production

Patrik Isacsson

Swedish University of Agricultural Sciences

Study Programme Level: MSc

Keywords:

Bark; extractives; tall oil; TOFA; TOR

Fatty and resin acids in bark residues from forest industries can be used to produce high-value green chemicals. This work has focused on the potential of using softwood bark as a feedstock for industrial production of tall oil and its fractions tall oil fatty acids (TOFA) and tall oil rosin (TOR). Of the different assortments investigated, spruce pulpwood has bark with the highest amount of tall oil compounds. The average yield from spruce pulpwood bark was 0.9 kg per cubic meter of wood. The variations were found by analysing fresh bark and tree data from homogenous stands of Norway spruce (*Picea abies*) and Scots pine (*Pinus sylvestris*) in central Sweden. The concentrations of fatty and resin acids in Norway spruce bark showed positive relationships with annual ring increment. The compounds also showed negative relationships with both the tree diameter and the bark age. The best economical prerequisites for processing the bark were found at pulp mills which only use spruce. Some results support theories about a polymerisation of fatty and resin acids due to aging. Since the bark in this study was carefully treated and kept fresh, further research for industrial relevance should focus on non-fresh bark residues of spruce pulpwood at mill sites.

Acknowledgements:

Jörg Brücher, *Other*

Mehrdad Arshadi, *Swedish University of Agricultural Sciences*

Daniel Eriksson, *Swedish University of Agricultural Sciences*

Integrating Kenyan smallholder bee keepers in local bio-enterprise initiatives: Socio-economic hindrances to rural livelihoods improvement and sustainability of biobased economic solutions

Peter Musinguzi

University of Copenhagen, Faculty of Science

Study Programme Level: MSc

Keywords:

Bio-based enterprise, farmer cooperatives, local certified production, organic honey, rural livelihoods

Wide spread poverty and natural resources loss in arid and semi- arid lands (ASAL) necessitate pathways of poverty reduction and livelihood improvement that integrate due consideration of the environment and natural resource base. Bio-enterprises provide feasible options for livelihood diversification and natural resource conservation in ASAL. However, sustainability of such bio-enterprises greatly depends on local socio-economic and environmental benefits accrued to producers involved. This study investigates the contribution of local certified organic honey production (a rural bio-enterprise) to the livelihoods of Kenyan smallholder bee keepers organised in a producer cooperative. Data collection took place from December 2015 to February 2016 and included a survey of 303 bee keepers from 54 smallholder bee keeper groups, 38 organic certified and 16 non-certified, using stratified random sampling. Data were collected for 2015 and 2008 (retrospectively) for the investigation of the situation before and after certification. Data analysis was done using STATA and graphical presentations in excel. Results indicate no significant impact of certification on certified households' incomes, quantity, price of honey produced and migration incidence. The results further indicate that non-certified smallholders were more diversified, more food secure and sold fewer assets compared to the certified. Only 17% of the certified attributed their better wealth/welfare status to certification. In Mwingi from the foregoing, certified organic honey production does not pay off and therefore does not promote a bio-based development initiative because of: i) no continuous support to certified farmers, ii) low premiums for certified organic honey, iii) strong presence of middlemen, iv) lack of governmental support and iv) poorly managed cooperative where marketing of smallholders' organic honey is coordinated. Therefore, this calls for organic bee keeping policy formulation, technical and financial support to the organic cooperative to benefit smallholders for their continuous involvement and hence sustainability of the bio-based enterprise.

Acknowledgements:

Aske Skovmand Bosselmann, *University of Copenhagen, Faculty of Science*

Pouliot Mariève, *University of Copenhagen, Faculty of Science*

Intercommunal cooperation - a perspective for the future of rural regions

Thomas Maximilian Weber

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: MSc

Keywords:

Rural development; intercommunal cooperation; rural regions

Due to developments such as demographic change, increasing demands of businesses and inhabitants concerning the quality of municipal services as well as the scarcity of financial resources, rural regions are facing huge challenges. Nevertheless, rural municipalities have to update their offers constantly, otherwise they will lose their inhabitants even faster to urban municipalities. One way for rural municipalities to address these precarious developments is taking up an intercommunal cooperation. This means that two or more municipalities work together to fulfil municipal tasks more efficiently. Based on an exploratory case study of the nine municipalities of the Lavanttal (Carinthia, Austria) this master thesis tries to develop a better understanding of driving and inhibiting factors of intercommunal cooperation and the expectations of municipal representatives due to intercommunal cooperation. Furthermore, it tries to identify cases in which establishing an intercommunal cooperation is considered to be useful for the individual municipality. For this, the heads of office and the mayors of the nine municipalities of the Lavanttal were interviewed and the minutes of the council meetings for the period 2006-2015 were analysed. The analysis of the empirical data shows that at least in certain cases, such as the purchase of special equipment, public transport, child care, and back office, intercommunal cooperation is considered to be a future prospect for a more efficient provision of services than an individual approach. However, in cases where the daily business is affected or cases dealing with traditional institutions, intercommunal cooperation is not seen as a reasonable alternative. If intercommunal cooperation should be expanded, then not only the cooperation of the municipalities is important, but also the government needs to spring into action and adapt legal regulations that hinder the development of intercommunal cooperation.

Acknowledgements:

Hans Karl Wytrzens, *University of Natural Resources and Life Sciences, Vienna*

Boeletuin Amsterdam: Urban gardening, social practices and everyday urbanism

Ioana-Cristina Musat

Wageningen University and Research Centre

Study Programme Level: MSc

Keywords:

Food-planning, urban garden, social practices

While spatial planners have traditionally focused on the aesthetic and the physical functionality of their designs, giving less attention to the social context when dealing with social priority issues (e.g. climate change, food safety and public green spaces) may result in the planned urban spaces being underused and undervalued. Climate change, food safety, green public spaces, and public health are issues which broadly fall under the umbrella of sustainable food planning, a rapidly growing domain of spatial planning research. Analysis of social practices holds a key to understanding why and how these issues exist, as well as opportunities for the improvement of urban quality of life. Urban gardening practices raise awareness about these issues and influence the everyday life of garden members. At the same time, citizen-led gardening practices have the ability to create quality urban places and therefore hold key insights for spatial planning. Gardeners voluntarily offer time and labour resources to design and maintain urban gardens. This not only has positive effects on their own quality of life, but also on the spatial quality of the urban area itself and reduces the resources needed for the design and maintenance that are normally carried by the municipality. This study offers a sample of the flourishing urban gardening scene in Amsterdam, the Netherlands. It focuses on a garden case and thoroughly dismantles it by using the theoretical lens of social practice theory and the everyday urbanism approach. Although this study is focused on gardening practices, the analysis of any everyday practice with beneficial effects on urban quality of life plays a valuable role in implementing a corresponding design. The design will fit the profile of the place better, ensuring long lasting spatial quality, minimal maintenance from the municipality and the support of local actors.

Acknowledgements:

Arnold van der Valk, *Wageningen University and Research Centre*

Linseed oil influence on pine wood (*Pinus sylvestris* L.) bending strength

Florentyna Akus-Szylberg

Warsaw University of Life Sciences

Study Programme Level: MSc

Keywords:

Linseed oil, wood preservation, bending strength

Wood is aesthetically pleasing, biodegradable, CO₂-neutral, and a renewable resource and material with very good mechanical properties. Due to its unique characteristic, wood can be used in variety of ways but when it is aimed to be used outside it needs some additional treatment. To maximize durability of wood exposed to high levels of moisture and air it is usually treated with preservatives and paint. Conventionally, wood preservation is based on the use of poisonous substances such as creosote or arsenic. However, in times of growing environmental awareness and spread of government policies restricting usage of traditional biocides, it is crucial to find new ways of wood protection. One method is to use plant oils as hydrophobic agents. Oils create a mechanical barrier and decrease the amount of free water in the wood structure, helping to prevent deterioration of the wood. The oil which has been used for wood protection since the Middle Ages is linseed oil. The exact results of linseed oil impregnation still need better understanding. The aim of this study was to describe the influence of linseed oil on wood bending strength as one of most important wood mechanical properties. Oil retentions approximately from 100kg/m³ to 500kg/m³ were achieved and tested. The results indicated that linseed oil impregnation did not lowered the flexural strength of the samples.

Acknowledgements:

Krzysztof Krajewski, *Warsaw University of Life Sciences*

Steering plasmid copy numbers in lactic acid bacteria for more efficient cheese production

Yorick de Vries

Wageningen University and Research Centre

Study Programme Level: MSc

Keywords:

Food production, fermentation, aroma, plasmid copy numbers, lactic acid bacteria

Cheesemaking with lactic acid bacteria plays an important role in the production of human food as it is a way to make a product from milk which is more tasty, safe, digestible and less prone to spoilage. During ripening all kinds of nutrients are fermented by lactic acid bacteria to aroma compounds which each give their contribution to the cheese flavour. However, cheese ripening is a very costly process. Lactic acid bacteria contain mobile plasmids which encode genetic information. In contrast to their chromosome, plasmids can occur in high copy numbers within the cell, providing a way for the cell to transcribe from more gene-copies of a gene at the same time, yielding more activity for flavour production. The amount of plasmid copies per chromosome is often referred to as plasmid copy numbers (PCN). Bacteria with high PCN yield a way to produce more flavour in cheese, lowering the costly ripening time and providing more sustainable cheeses. In this thesis research, the lactic acid bacterium *Lactococcus lactis* subsp. *lactis* biovar *diacetylactis* is of particular interest as this biovar is able to metabolize citrate into butter/cheese flavours like acetoin and diacetyl. The required gene for transport of citrate into the cell (CitP) is located on a plasmid. It was observed that the PCN of the CitP-plasmid rises and remains high when the concentration of lactose and/or glucose in the medium is near zero. This may happen to enhance citrate transport into the cell to use it as less preferred carbon source, similar to how carbon catabolite repression (CCR) regulates expression. These lactose/glucose limiting conditions are similar to ripening cheese and explain how lactic acid bacteria are able to adapt to those conditions. This knowledge provides insight on how certain cell activities can be naturally up- or downregulated by steering these PCN.

Acknowledgements:

Oscar van Mastrigt, *Wageningen University and Research Centre*

Eddy Smid, *Wageningen University and Research Centre*

Economic sustainability in high-altitude tourism - Case study Mount Everest

Oliver Schrot

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: MSc

Keywords:

Economic sustainability, mountain tourism, socioeconomic development

After coastline tourism, mountain tourism counts the most number of visitors globally. Recreational and adventurous mountain tourism originated from the European Alps in the 18th century and finally reached the Himalaya in the last decades. In 2013, according to the Ministry of Tourism and Civil Aviation of Nepal, 798 000 tourists visited the country and 359 mountaineers successfully stood on top of Mount Everest. Trekking and expeditions annually travel into the Mt. Everest region and are responsible for several beneficial economic effects on-site, like the provision of jobs for local ethnic groups, empowerment of Sherpa people, encourage local entrepreneurs (tea houses and hotels) and contribute to the growth of regional economic centres like Namche Bazaar. However, there are also many negative effects, like waste generation, deforestation, or a shift in regional political power. A way to overcome those challenges is the principle of economic sustainability. The term economic sustainability has become prominent nowadays. The case study of Khumbu indicates that a subsistence-based economy also has incentives to start off a development leading to a situation which is understood as economically sustainable. Within the Khumbu region, a policy is driven that supports the protection of fragile mountainous environments, reduces the waste footprint of expedition tourism and trekking, builds up regional markets and maximizes the generation of foreign income. The government of Nepal has recognized the importance of linking economic development and the principles of a bio-economy under the idea of sustainable mountain tourism. This paper provides a descriptive analysis of existing achievements of economic sustainability in Khumbu region and names challenges to overcome and identifies threats to Himalayan mountain tourism. Additionally, the paper discusses, using expert interviews, if the concept of sustainable mountain tourism will be capable of guaranteeing beneficial socio-economic and ecological-oriented development.

Acknowledgements:

Matthias Jurek, *University of Natural Resources and Life Sciences, Vienna*



Oral Presentations

Parallel Sessions II
Friday, 11 November 2016
18:00-19:00

2.1 Managing Climate and Environment (2)

Chair: Bjarne Strobel, *University of Copenhagen, Faculty of Science*
Venue: B1

2.2 Improving Efficient and Sustainable Agricultural Production (1)

Chair: Claus Zebitz, *University of Hohenheim*
Venue: B2

2.3 Securing Worldwide Food Supply

Chair: Tiny Boekel, *Wageningen University and Research Centre*
Venue: Ö1

2.4 Animal Genomics, Animal Health and Animal Welfare (1)

Chair: Gabrielle Lagerkvist, *Swedish University of Agricultural Sciences*
Venue: Ö2

2.1 Managing Climate and Environment (2)

Friday, 18:00 – 19:00 - Venue: B1

Remediation of chromated copper arsenate-contaminated sites with biochar and zero-valent iron

Hanna Frick

University of Hohenheim

Study Programme Level: MSc

Keywords:

Chromated copper arsenates, remediation, biochar, zero valent iron, whole-cell biosensor

Chromated copper arsenates (CCA) are frequently used for wood impregnation and are of major concern as soil pollutants. Remediation of these sites is challenging since heavy metals and metalloids are not degradable and, furthermore, most of these sites are contaminated with multiple pollutants with different geochemical behaviour. One approach could be in-situ immobilization by adding (organic) soil amendments in order to prevent leaching and reduce bioavailability of the metals. In recent years, biochar has attracted attention as such an amendments, especially since it is cheap and efficient in remediating many different classes of contaminants. However, for arsenic this might not hold true and iron-rich material such as zero-valent iron might be a better amendment. This project aimed at assessing whether biochar and/or combinations of biochar and ZVI could help reduce bioavailable concentrations of Cu and As in a soil highly contaminated with CCA. Therefore, a microcosm experiment was established where soil from a former wood impregnation site, highly contaminated with CCA, was treated with 1 % (w/w) biochar (*Miscanthus x giganteus*; charring at 850°C for 30 min) and/or 5 % ZVI (w/w) in different combinations and kept in darkness at 15 °C for eight weeks. Subsamples from these microcosms were taken after 1 day, 1 week, 4 weeks and 8 weeks after start of the incubation period and analysed for bioavailable Cu and As by the use of specific whole-cell bioreporters. In addition, microbial activity (measured as [³H]-Leucin incorporation), total water-extractable metals and changes in arsenic speciation, assessed by the use of selective cartridges, were analysed. First results indicate that biochar was able to reduce the bioavailability of Cu, but increased the availability of As. ZVI could help to prevent this issue since it reduced bioavailable As, but did not have any substantial effect on Cu bioavailability.

Acknowledgements:

Kristian K. Brandt, *University of Copenhagen, Faculty of Science*

Ellen Kandeler, *University of Hohenheim*

Peter E. Holm, *University of Copenhagen, Faculty of Science*

2.1 Managing Climate and Environment (2)

Friday, 18:00 – 19:00 - Venue: B1

Is the cation exchange capacity homogeneously distributed in undisturbed soil?

Hannes Keck,¹⁾ Johannes Koestel¹⁾, Bjarne W. Strobel²⁾

¹⁾ *Swedish University of Agricultural Sciences*, ²⁾ *University of Copenhagen, Faculty of Science*

Study Programme Level: MSc

Keywords:

X-ray computer tomography, soil structure, 3D-imaging, staining

Most soil system models assume that cation adsorption sites in soils are accessible and homogeneously distributed in space. This assumption may not be valid and may have significant consequences on the performance of models describing nutrient retention, pollutant leaching, root growth, and other biogeochemical processes. The negatively charged surface functional groups of clay and organic matter are the main contributors to the cation exchange capacity (CEC). As a result, the CEC is usually positively correlated with the soil clay and organic matter content. Recently, several studies have given evidence of elevated soil organic matter contents in the walls of biopores. It is also known that the clay content and type can vary spatially on the small scale. This suggests that cation adsorption sites are not homogeneously distributed and not equally accessible. In order to investigate the 3-dimensional distribution of the CEC in undisturbed soils, seven small soil cores (approx. 30 cm³) sampled from different locations were subjected to a BaCl₂ treatment. Following this, the samples were scanned several times using an industrial X-ray scanner. 3-dimensional difference images of the cores were obtained from images taken before and after the BaCl₂ treatment, and interpreted as depicting the Ba²⁺ bound to cation adsorption sites only. Preliminary results of the difference image analyses show that the cation adsorption sites are not distributed homogeneously in most samples. Furthermore, we found evidence of an increase in cation adsorption sites around macropores that are likely of biological origin as compared to the soil matrix in a clay soil.

Acknowledgements:

Jon-Petter Gustafsson, *Swedish University of Agricultural Sciences*

2.1 Managing Climate and Environment (2)

Friday, 18:00 – 19:00 - Venue: B1

The hidden environmental impacts of copper in the Christchurch rebuild

Sarah Pienisch

Lincoln University, New Zealand

Study Programme Level: MSc

Keywords:

Heavy metals, copper, contamination, aquatic ecosystem

Copper has been embraced in the design of buildings for centuries. Its versatility, durability and aesthetic qualities make copper a highly valued material by architects. The 2010/2011 Christchurch earthquake sequence damaged infrastructure located in the Central Business District and in the city's suburbs. This led to opportunities for developers, including architects, to include alternative materials such as copper in the design of new buildings. Hence, the use of copper has recently become a trend within the Christchurch rebuild. However, despite its popularity, copper is a heavy metal that can become bio-available and harm aquatic ecosystems when it occurs in high concentrations. This presentation will show the adverse effects of copper cladding runoff on the Avon River in Christchurch and suggest mitigation practices. Both quantitative and qualitative methods were implemented in order to answer the research question "What adverse effects does runoff from copper cladding have on the Avon River in Christchurch, and how can these be mitigated?". 24 water samples were collected at two different sites, Knox Presbyterian Church and the Christchurch Courthouse, including new and old copper cladding. High copper concentrations were found in all samples at both sampling locations. In order to identify mitigation practices and raise awareness, online surveys were sent to 222 Christchurch architects asking for their knowledge about the effect of copper on the environment. It was found that even though most architects claim to include environmental effects into their design decision, there is little knowledge about the actual effect of the heavy metal on the environment. Furthermore, participants in the survey suggested mitigation solutions such as protective layers and restrictions to copper use.

Acknowledgements:

Di Lucas, *Other*

2.2. Improving Efficient and Sustainable Agricultural Production (1)

Friday, 18:00 – 19:00- Venue: B2

Penned cattle gained less weight during the rainy season than grazing cattle in Eastern Cambodia

Anna Seidel

University of Hohenheim

Study Programme Level: BSc

Keywords:

Cambodian smallholders, cattle productivity, cut-and-carry, improved forages

Smallholdings in Ratanakiri Province, Eastern Cambodia, face the challenge that grazing land is gradually becoming scarcer and their current cattle productivity is too low for effective commercialisation. Planting forages on small land parcels and cut-and-carrying these to feed the penned cattle can considerably increase animal productivity and associated income. This research aimed to evaluate whether such systems could be emulated on smallholdings in Cambodia, where an increasing beef demand is presenting cattle-keeping and resource-poor smallholders with an opportunity to enhance their livelihoods. Over a four-month period starting from the onset of the rainy season, live weights of 37 local cattle (~2 years, 126 ± 34 kg initial live weight) were recorded biweekly on five smallholdings in Pruok (E $106^{\circ}96'$, N $13^{\circ}57'$), Lumphat district. For this, 17 cattle were penned and fed a mix of farm-grown forages (*Brachiaria* hybrid Mulato II, *Brachiaria ruziziensis*, *Panicum maximum*, *Paspalum atratum*, *Stylosanthes guianensis*), whereas the remaining 20 cattle were grazing the surrounding pastures. Above-ground biomass yields of forages were determined monthly on 20 smallholdings during June and September 2015. Samples of forages were analysed for their nutrient and energy concentrations. On dry matter basis the crude protein concentrations in forages (0.3 ± 0.1 kg/m²) were 84 ± 32 g/kg. Average daily live weight gains of penned cattle (~68 g/day) were lower than those of grazing cattle (~208 g/day; $P < 0.001$). This can be explained by the sub-optimal management of forage stands by smallholders, resulting in decreases over time in both palatability and nutritional quality. Therefore, smallholders were feeding their penned cattle insufficient crude protein, while the grazed cattle consumed larger amounts of biomass. Consequently, to improve cattle productivity through forages, smallholders must either have sufficient knowledge, skill and resources to grow and feed adequate quality and quantity of forages to animals, or use forages to complement grazing.

Acknowledgements:

Adrian Bolliger, *Other*

Uta Dickhöfer, *University of Hohenheim*

2.2. Improving Efficient and Sustainable Agricultural Production (1)

Friday, 18:00 – 19:00- Venue: B2

Interplant competition and its consequences for a vining and creeping crop: The example of water yam (*Dioscorea alata*)

Rafaëlle Reumaux

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: MSc

Keywords:

Sustainable intensification, plant competition, cropping system improvement, food security

The key-process of plant-plant competition can either increase or decrease the inter individual plant variability (Damgaard and Weiner 2002) thereby influencing the final yield and its value. While many methods exist to assess the inter-individual competition in mixed or mono crops with an upright growth (e.g. maize and wheat) (Quin et al. 2013, Wang et al. 2014), to our knowledge, no method has ever been proposed to assess and analyse the level of inter individual competition for vining/ creeping stands like yam, sweet potato or many Curcubitaceae. This highlights a real limit to promote cropping systems, especially tuber cultivation in Western Africa and in the Caribbean. Yam represents the main food source for about 300 million people around the world (Degras 1993). Although, it has been poorly investigated – its production potential far exceeds current yields, e.g. 10 T/ha/year in the Caribbean, while it could be around 100 T/ha/year (Zinsou 1998). Thus, increased understanding of yam stand development is a prerequisite for improving the production of this neglected crop. Planting material heterogeneity is a primary source of inter-individual variability (Cornet et al. 2014), but competition also plays an important role. Here, we studied the effects of planting density on intraspecific competition and yield formation in water yam (*Dioscorea alata*). The study was conducted at the National Institute for Agronomy (Petit Bourg, Guadeloupe) with an experimental setup reflecting local agronomic practices. Four planting densities of supposedly gradual competitive effects were tested (isolated, traditional, optimized traditional and high density) in a complete randomized block design with four replications. Since the experiment used a non-destructive protocol, the selection of assessed variables included a series of foliar traits (e.g. LAI, N content) and growth indices throughout the different phenological stages in yam crop development. Therefore, a model measuring interplant competition for vining/creeping crops is presented whereby breeding ideotypes are identified and recommendations on density and spatial arrangements are proposed to the local agronomic context.

Acknowledgements:

Denis Cornet, *Other*

Pierre Chopin, *Other*

Jacob Weiner, *University of Copenhagen, Faculty of Science*

2.2. Improving Efficient and Sustainable Agricultural Production (1)

Friday, 18:00 – 19:00- Venue: B2

Seasonal dynamic of herbage biomass under longterm intensive and extensive grazing management

Teowdroes Kassahun Teka

Czech University of Life Sciences Prague

Study Programme Level: MSc

Keywords:

Grassland, biomass yield, exclosure-cages

The main role of grassland is to provide sufficient feed for livestock, and there has been huge push to understand and quantify available biomass from different management strategies that can meet livestock demand and landscape management. A fourteen year (2002–2015) study was conducted on upland grassland maintained under long-term experiment in the Jizerské hory (Oldrichov v Hájích village), Czech Republic. The study analysed the effect of intensive (IG) and extensive (EG) grazing on the dynamic of biomass production in the course of the grazing season. The sward height was maintained under 5 and 10 cm for IG and EG treatments respectively. Total biomass production in the grazing season was found to be higher under IG than EG and varied between (2.4 to 5 tDM ha⁻¹ year⁻¹) under IG and (2.3 to 4.7 tDM ha⁻¹ year⁻¹) under EG. Double peak (spring and summer) curves of biomass growth during the growing season was found nine times in the fourteen-year experiment which sets it apart from what is commonly found as a single peak curve in the spring in Czech uplands. Sward height was found to be a significant predictor of herbage biomass with strong relationship between sward height and herbage biomass under IG ($R^2 = 0.933$) and ($R^2 = 0.748$) in EG. Considering the number of herbivores in Czech Republic it is clear that EG is a better landscape management that can fulfil livestock needs and mitigate temporary or permanent abandonment of grasslands.

Acknowledgements:

Vilém Pavlů, *Czech University of Life Sciences Prague*

Michal Hejzman, *Czech University of Life Sciences Prague*

2.3 Securing Worldwide Food Supply

Friday, 18:00 – 19:00- Venue: Ö1

Adults' and adolescents' perceptions of food security and local food systems: Implications for sustainable diets in rural South Africa

Solomon Mensah Brobbey

Czech University of Life Sciences Prague

Study Programme Level: PhD

Keywords:

Sustainable diet, food security, local foods, home garden, perceptions

South Africa is undergoing a health and nutrition transition; overweight and obesity commonly co-exist with under-nutrition. Here we explore community members' perceptions on food security, and the local food system in the context of sustainable diets in rural, resource-poor communities in South Africa. In 2013, 6 focus groups in two communities, Valspan and Ganspan, and key informant interviews were used to explore the perceptions on local foods, food security, dietary diversity, food quality, and opportunities and challenges in the local food system. Most participants perceived severe food insecurity and low dietary diversity. Financial constraint was perceived to limit food access leading to monotonous diets. The communities demonstrated knowledge of food products in the region and perceived it to be of better taste and fresh; interest in home gardening was high, however, home gardening and livestock keeping rarely exist. The use of supermarkets was prominent because of perceived quality and safety standards. Adolescent groups perceived packaged foods from the supermarket to be of a higher quality. Opportunities perceived in the local food system were employment, small-scale farming, and home gardening. However, limited access to productive lands, inputs, and access to market were perceived as barriers. Home garden and nutrition education when promoted in tandem could serve as a conduit for improving food security and dietary quality. Consumer awareness and regulations for local procurement by large supermarket chains may stimulate local production and economic activity for more sustainable diets. The current local food system makes these rural households vulnerable to food insecurity and unsustainable diets.

Acknowledgements:

Stefanie Lemke, *University of Hohenheim*

Nicole Claasen, *Other*

Vladimir Verner, *Czech University of Life Sciences Prague*

2.3 Securing Worldwide Food Supply

Friday, 18:00 – 19:00- Venue: Ö1

Seaweed - a future food?

Aleksandra Mika

Warsaw University of Life Sciences

Study Programme Level: BSc

Keywords:

Seaweed, market, sustainability, hunger

Nowadays, increasing numbers of consumers are realizing that sustainability also matters in food industry. The rising awareness of the amount of water used to produce meat coupled with a constantly growing population creates a high demand for new food product design. Those innovative products must fit the sensory preferences of consumers, price, and environmental aspects. One of the ideas to meet those demands is the wide introduction of seaweed into food products. The aim of this research was to analyse the seaweed market in Warsaw (Poland) and Amsterdam (The Netherlands) in similar, regular, supermarkets and to try to predict the future of seaweed within the framework of innovative food products. The research showed that on both markets there is a wide range of seaweed-containing products in several forms. Seaweed was used as a food additive (e.g. carrageen), the main part of products (snacks, sushi), one of the functional ingredient (energy bars), or as a low-content, but centrally advertised part of a product (noodles, energy bars). Using seaweed as a functional additive instead of an animal based option enables the product to be eaten by those who do not consume animal products. Seaweed could potentially be a great source of protein and fatty acids, and could be more effective and environmentally friendly than its animal-based counterparts. There are many technical aspects that should be studied in the future, but for now the question is, are we ready to eat seaweed on daily basis?



2.3 Securing Worldwide Food Supply

Friday, 18:00 – 19:00- Venue: Ö1

A study of exotic macrophytes for the phytoremediation of flooded agricultural land polluted with cadmium

Rodrigo Valencia Coterá

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: MSc

Keywords:

Cadmium, phytoremediation, macrophytes

Heavy metals are inorganic pollutants that are often found stored in the sediments of water bodies and soil. The origins of heavy metals are diverse: rooftop and street runoff, untreated industrial discharge, use of sewage sludge as fertilizers and coal mines among many others. Once polluted, the processes necessary to clean or dispose of soil and sediments are very expensive. Soil and sediments usually will end up being incinerated or disposed in a landfill. This study aimed at finding a feasible solution to remediate flooded soil polluted with Cadmium (Cd) using aquatic plants (macrophytes). The effect of aquatic macrophytes on the potential mobilization of Cd to the water body and plant uptake from flooded agricultural land is unknown. The study will consist of six different exotic macrophytes species in 1.5 litre containers. Each container will have ca. 0.5 litre of Cadmium polluted soil, 1 litre of water and 1 plant. Every species will have 10 replicas with Cd polluted soil plus a control with just polluted soil and no plant. Three times a week for approximately one month the Cd concentration in the water will be monitored using the urease inhibition test. At the end of the experiment the Cd concentrations in the leaves and in the roots will be measured using ICP. If the Cd concentration in the water decreases and we have a high accumulation of Cd in the plant tissue the species can be suitable for phytoremediation. If the concentration of Cd in the water increases due to mobilization of Cd in the root zone the species should be avoided.

Acknowledgements:

Hans Göransson, *University of Natural Resources and Life Sciences, Vienna*

Boris Rewald, *University of Natural Resources and Life Sciences, Vienna*

Klaus Schmieder, *University of Hohenheim*

Proximal delivery of dietary butyrate influences broilers' immunity by increasing specific antibody responses

Gauthier Konnert

Wageningen University and Research Centre

Study Programme Level: MSc

Keywords:

Butyrate, immunization, humoral immunity, specific antibodies

Dietary butyrate is known to alleviate the detrimental effects of acute immune responses on broiler's welfare and growth efficiency by reducing inflammation. This effect is conditioned by butyrate concentration along the digestive tract. Changes in cytokine profiles resulting from inflammation dampening might stimulate antibody production. A complete randomized block design with 6 dietary treatment groups in 5 blocks was employed on 240 male broilers to assess the effect of luminal butyrate concentration on natural and specific antibody titers. Diets contained either no (control) or 1 g/kg butyrate protected by different means (unprotected butyrate, tributyrin, fat-coated butyrate, wax-coated butyrate and cellulose-acetate-butyrate) to allow contrasts in luminal concentrations along the gastrointestinal tract. At day 21 and 22 post-hatching, 10 birds per treatment group received an immunological challenge consisting of intratracheally administered human serum albumin (HuSA; 0.5 mg/day). Blood was collected on day 0, 3, 7 and 18 post initial challenge for determination of natural and anti-HuSA antibodies of both M and G isotypes. After the last blood sampling, challenged birds were dissected. Contents of each gastrointestinal tract segment were analysed for butyrate concentration. Dietary intervention resulted in significant changes in butyrate contents in the different segments ($P < 0.05$) except for the ceca. Butyrate significantly increased anti-HuSA G antibodies titers ($P < 0.05$). Higher anti-HuSA antibodies titers were associated with butyrate presence in the proximal digestive tract ($P < 0.1$) but not in the ileum and colon. Bodyweights at dissection were positively correlated with anti-HuSA G antibody titers ($P < 0.0001$; Adjusted- $R^2 = 0.329$). In addition, natural antibodies titers increased significantly with time ($P < 0.05$) and were numerically higher for butyrate-supplemented birds compared to their control counterparts. Both specific and natural antibody titers are associated with improved robustness towards infectious challenges in poultry. This study therefore indicates that next to its anti-inflammatory properties, butyrate also supports broilers' health by stimulating humoral immunity.

Acknowledgements:

Pierre Moquet, *Wageningen University and Research Centre*

Aart Lammers, *Wageningen University and Research Centre*

Rene Kwakkel, *Wageningen University and Research Centre*

Natural disease resistance in chickens: A tool for controlling infections in organic production systems

Karl Wyne Abregana
University of Hohenheim

Study Programme Level: MSc

Keywords:

Collectins, organic chicken, disease resistance

The first part of the experiment involved the comparison of (col)lectin-based innate immunocompetence factors (collectin expression) of the three popular organic layer chicken lines Hellevad, Hisex, and Bovans. The second part assesses the constitutive and Infectious Bronchitis Virus (IBV)-induced expression of chicken (col)lectins in the lung of two inbred lines selected for high (L10H) or low (L10L) mannose-binding lectin (MBL) serum concentrations. The immunological status of all animals used was assessed through the measurement of the serum concentration of a haptoglobin-like acute phase protein (APP) known as PIT54. Hellevad and Hisex showed superiority in the mRNA expression of cCL-1, cCL-2 and cCL3 in the spleen and displayed a wide range of individual difference in collectin expression within each line. This indicates that collectin expression is affected by breeding genetics and genetic improvement can be made with Hellevad and Hisex. Results of the second part show 5 of the 6 (col)lectins are constitutively expressed in chicken lungs. Lung expression of both cLL and cSP-A show positive correlation to cMBL concentration in the serum as well as disease resistance, while IBV exposure downregulates them. We conclude that collectin expression is influenced by breeding genetics and that variations in constitutive expression may be of importance for disease resistance/robustness.

Acknowledgements:

Tina Dalgaard, *Other*

2.4 Animal Genomics, Animal Health and Animal Welfare (1)

Friday, 18:00 – 19:00- Venue: Ö2

Nicotinamide Riboside increases adipogenesis and could be a potential vitamin to counteract obesity related complications

Bart van der Hee

Wageningen University and Research Centre

Study Programme Level: MSc

Keywords:

Obesity, adipogenesis, inflammation, adipose tissue

According to the WHO, increasingly sedentary lifestyles, caloric intake, and diet composition has led to a significant increase in the number of obese individuals worldwide. Obesity could give rise to metabolic and adipose tissue disorders that lead to metabolic diseases, e.g. type II diabetes, cardiovascular diseases, and ultimately death. Beneficial therapeutic effects have been proven by dietary supplementation of Nicotinamide Riboside (NR) on metabolic complications induced by obesity, increasing muscle metabolic flexibility, oxidative capacity, and mitochondrial density with in vitro cell models. However, dose-dependent effects of NR in vivo have not been studied. Therefore, this study aimed to elucidate the dose-dependent effects of two concentrations of dietary NR in mice. 9-week old mice received a HFD with dietary supplementation of 5 or 30 mg NR/kg BW. Adipose tissue was histologically examined for inflammation and superoxide-dismutase 2 (SOD2) expression by immunohistochemical labelling of macrophages and adipocytes, functioning as markers for tissue health. There were no differences found between the two dietary groups in inflammation and SOD2 protein expression. Nevertheless, most SOD2 expression originated from activated macrophages within the adipose tissue. A shift in adipocyte surface area distribution was found between animals fed 5 or 30 mg NR in visceral WAT. Animals fed 30 mg had significantly smaller cells than animals fed 5 mg. This shift, however, was not very apparent, and needs to be elucidated further. Based on these observations, 30 mg NR/kg diet induces smaller adipocyte formation in visceral WAT, but has no effect on the other cellular health parameters measured. Strikingly, SOD2 expression in activated macrophages potentiates a positive relationship between inflammation and obesity. Nuances between these differences needs to be further investigated to provide conclusive evidence on the dose-responsive effects of NR. Also, higher amounts of dietary NR should be investigated to study the dose-response effect of NR.

Acknowledgements:

Wenbiao Shi, *Wageningen University and Research Centre*

Jessica Hegeman, *Wageningen University and Research Centre*

Jaap Keijer, *Wageningen University and Research Centre*



Oral Presentations

Parallel Sessions III
Saturday, 12 November 2016
11:30-12:30

3.1 Managing Climate and Environment (3)

Chair: Lukáš Pospíšil, *Czech University of Life Sciences Prague*

Venue: B1

3.2 Improving Efficient and Sustainable Agricultural Production (2)

Chair: Hans-Peter Kaul, *University of Natural Resources and Life Sciences, Vienna*

Venue: B2

3.3 Producing Healthful and Safe Food (1)

Chair: Bjarke Bak Christensen, *University of Copenhagen, Faculty of Science*

Venue: Ö1

3.4 Animal Genomics, Animal Health and Animal Welfare (2)

Chair: Ludwig Hölzle, *University of Hohenheim*

Venue: Ö2



3.1 Managing Climate and Environment (3)

Saturday, 11:30-12:30 - Venue: B1

Development of a carbon storage model for unmanaged forests with the aim of improving climate benefit assessments of forest harvest for fossil fuel substitution

Gesa Pauer

University of Copenhagen, Faculty of Science

Study Programme Level: MSc

Keywords:

Bioenergy; forest carbon storage; carbon parity time; unmanaged forest

A commonly used parameter for the assessment of the climate benefits of forest wood utilisation, to substitute energy or materials from fossil fuels, is time to carbon sequestration parity. It describes the point in time where fossil fuel substitution with forest wood starts to reduce GHG emissions relative to a baseline scenario. The forest carbon stock development of an unmanaged forest, in the absence of demand for fossil fuel substitution with forest wood, is often used as such a baseline scenario. There are, however, few investigations that use data-based evidence for carbon stocks in unmanaged forests, which is one of the factors for large variations in carbon parity times in literature. In this study, time-series of measured stored carbon in the living biomass of seven unmanaged beech forests in Denmark have been used to develop a model to estimate their carbon stock development. Subsequently these model estimations have been compared with carbon stock values in other temperate beech-dominated deciduous forests in Europe. Finally, carbon parity times for three thinned forest plots in stands also used for the model development, have been calculated. As a baseline scenario the data of the respective unmanaged plots as well as the developed model have been used. Results are forthcoming.

Acknowledgements:

Inge Stupak, *University of Copenhagen, Faculty of Science*

Karsten Raulund-Rasmussen, *University of Copenhagen, Faculty of Science*

Anders Tærø Nielsen, *University of Copenhagen, Faculty of Science*

Thilo Streck, *University of Hohenheim*

3.1 Managing Climate and Environment (3)

Saturday, 11:30-12:30 - Venue: B1

Uneven-aged silvicultural systems of Scots Pine in the Czech Republic and in the Community of Madrid, Spain: case study on available examples

Josef Gallo

Czech University of Life Sciences Prague

Study Programme Level: PhD

Keywords:

Selection, silvicultural systems, Scots pine, stand structure, increment cores

Four permanent research plots were established in Scots pine-dominated forest stands, of which two were placed in Western Bohemia, the Czech Republic (plots CZ-1 and CZ-2), and two were placed in Madrid, Spain (plots ES-1 and ES-2). The plots show the stages of transition from regular to irregular management – CZ-1: stand with regular DBH structure and lower stand complexity as result of less intensive harvest treatments in the past; CZ-2: stand in transition from even-aged to uneven-aged stand, recent selection harvest and complex stand structure; ES-1: regular stand with low intensity intervention in the past and low stand complexity; ES-2: irregular stand with high intensity intervention and high stand complexity. On those plots, growth parameters, horizontal and vertical structure were described. PCA was used to analyse relationships among plots attributes, stand parameters, climate data, and diversity of *Pinus sylvestris* and similarity of the plots. Core increment samples were extracted to investigate the core annual increment pattern, particularly for recent years in relation to silvicultural measures. All plots showed similar density characteristics, but different DBH structure, reached by different intensities of silvicultural interventions. Trees on ES plots showed lower H: DBH ratio. On even-aged plots (CZ-1, ES-1), the spatial distribution of trees was predominantly random (CZ-1), or random bound to regular (ES-1), while it was aggregated on the more irregular plots (CZ-2, ES-2) according to L-function. First three axes of PCA explained 100.0% of data variability. Stand volume, mean height and DBH positively correlated to each other, while these parameters were negatively correlated with canopy (crown closure, crown projection area), stand density and structural differentiation indices. Mean core increments in recent years were highest on the most intensively managed plot, as a result of selection cutting. The important increment reaction was apparent across a number of DBH classes.

Acknowledgements:

Lukas Bilek, *Czech University of Life Sciences Prague*

Sonia Roig, *Other*

3.1 Managing Climate and Environment (3)

Saturday, 11:30-12:30 - Venue: B1

The panmictic design based on optimal neighbourhood algorithm for clonal seed orchards of forest trees

Kateřina Chaloupková

Czech University of Life Sciences Prague

Study Programme Level: PhD

Keywords:

Tree improvement, random mating, seed orchards

Seed orchards represent the link between operational forestry and tree improvement. When a new orchard is established, factors such as the census of contributing genotypes and their physical allocation (design) must be considered. All these factors affect the realized response to selection and levels of gene diversity. Therefore, good design should promote random mating and minimize inbreeding. While the existing designs are primarily focused on minimizing levels of inbreeding, the objective of this design is to maximize panmixia. It is generally known that pollination efficiency is a function of distance and thus most frequent genetic exchange occurs among neighbouring clones. Because of this, panmixia in seed orchards was defined as a situation where close neighbourhoods of all possible combinations of clones occur with the same frequency within the orchard grid. To achieve this, original solution was developed where the variance is minimized as a criterial function. Subsequently, the heuristic optimal neighbourhood algorithm (ONA) has been developed and programmed in R. It was tested for different tasks including balanced and unbalanced scenarios, variable clonal sizes and different shapes of seed orchards. This algorithm excels in solving all of these specific tasks. To evaluate the relative quality of resulting schemes, a theoretical proxy to level of maximum panmixia was defined. Furthermore, equalization of close neighbourhoods leads to uniform allocation of ramets. Therefore, the risk of inbreeding is minimized as a co-product, meeting the second general objective in seed orchard design. In addition, optimal neighbourhood design can be used in combination with other designs without losing its efficiency. The case study was conducted where ONA was connected with predefined „Minimum Inbreeding“ design of clonal rows. This hybrid scheme will be used for the establishment of *Abies fraseri* seed orchard in North Carolina State University at CTG Program.

Acknowledgements:

Milan Lstibůrek, *Czech University of Life Sciences Prague*

3.2 Improving Efficient and Sustainable Agricultural Production (2)

Saturday, 11:30- 12:30 Venue: B2

Glyphosate use in Canada and the European Union: Status quo, concerns, and alternative practices

Kirsten Moore
University of Hohenheim

Study Programme Level: MSc

Keywords:

Glyphosate, controversies, European Union, Canada

Glyphosate is the most efficient and widely used herbicidal agent today, and is therefore both vital and irreplaceable in conventional agriculture. Its broad-spectrum ability works to reduce labour for farmers, lowering production costs, and maximizing the yield per hectare with optimum weed management abilities. However, glyphosate can be linked to negative effects on the environment and human health. Marking its 45 years of use as an herbicidal agent, glyphosate has been under public and private scrutiny this year after a study published by the International Agency for Research on Cancer (IARC) in March 2015 declared that glyphosate may cause cancer in humans and animals. The combination of public and private reports published in response to the IARC study have since clouded public understanding of glyphosate and the many benefits and risks it could pose. It is clear that governmental bodies, farmers, and the public recognize many risks, but the specific risks are often not clarified in the media or in governmental regulation reports, which has contributed to the increasing confusion around this crucial topic. Consumer attitudes and regulations vary by country and region, so Canada and the EU are highlighted here, as both are major agricultural production areas with similar major crop schemes. The main risks for the agro-environment include an increase in resistant weed varieties in agricultural production, leeching of glyphosate into surface and groundwater systems on a global scale, and an array of problems caused by the adoption of glyphosate-resistant seeds in conventional agriculture. The proven health concerns associated with the use of glyphosate include birth defects, cancer, kidney disease, digestive illnesses, and chronic neurological diseases. Based on the published literature, it is clear that glyphosate is hazardous to human health and the agro-environment. Measures must be taken to reduce or eliminate the use of this herbicidal agent, but this is not possible until a suitable alternative is available. Massive economic losses will be experienced if glyphosate is banned on national or global scales.

Acknowledgements:

Sabine Gruber, *University of Hohenheim*

3.2 Improving Efficient and Sustainable Agricultural Production (2)

Saturday, 11:30- 12:30 Venue: B2

Assessing the economic and environmental effects of land exchange on Dutch arable farming using a regional bio-economic model

Kohji Nakasaka

Wageningen University and Research Centre

Study Programme Level: MSc

Keywords:

Agriculture, bio-economic model, decision making

The agricultural sector has become increasingly complex over the last decades due to various exogenous driving factors such as climate change, technological development, market volatility, and stricter regulations. Consequently, it has become important for decision-makers in agricultural sectors to figure out the impacts, risk, and uncertainty of future agricultural activities. Bio-economic models (BEMs) have been widely used to simulate how farms respond to the exogenous changes. Interactions between farms and the exchange of available resources, such as a land, are often ignored in the studies with BEMs. The objective of this study is to develop a regional BEM to evaluate the impact of land exchange between different farming systems in the Netherlands. We developed a linear programming model to optimize land exchange decisions between arable farmers and dairy lands. This model was applied to the case of arable farming in Flevoland (the Netherlands). Such land exchange contributed to relaxing crop-rotation constraints and improving resource use efficiency in the region. We found that accounting for decision-making on individual farms using max-min techniques resulted in a more equal distribution of resources and provided interesting solutions that improve the current farm structure from both economic and environmental perspectives. This study can contribute to providing information on the efficient use of available resources for decision-makers in agricultural sectors, which leads to creating more sustainable agricultural production systems in the future.

Acknowledgements:

Argyris Kanellopoulos, *Wageningen University and Research Centre*

Pytrik Reidsma, *Wageningen University and Research Centre*

3.2 Improving Efficient and Sustainable Agricultural Production (2)

Saturday, 11:30- 12:30 Venue: B2

Adaption and diffusion of precision agriculture technologies: An empirical analysis for GPS-guidance systems in Lower Austria

Florian Stöckl

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: MSc

Keywords:

Precision agriculture, technology adoption, diffusion, Tobit model

The adoption of new technologies within the agricultural production sector has been a strong contributor to resource efficiency and productivity improvements. Past experiences have shown that the fast and comprehensive diffusion of new technologies in agriculture is quite rare. The adoption and diffusion of innovations has a strong socio-economic component. Therefore, understanding why some farms are adopting new technologies faster than others is important. This study focuses on the case of precision agriculture technologies, which have the potential to considerably contribute to the emerging challenges of food security issues. In particular, we studied the adoption and diffusion of GPS-guidance systems in Lower Austria. This technology is of particular interest, because adoption of a GPS-guidance system on a farm is often the first step towards applying precision agriculture methods. The empirical analysis is based on an online survey conducted between 4th and 30th of May 2016 among farmers in Lower Austria. The survey was sent to 5407 farmers, 757 usable answers were returned, of those 19 % are using a GPS-guidance system. Based on this data a Tobit analysis was utilized to identify the factors determining the time of GPS-guidance system adoption. The farm size, the farm's average field size and the percentage of rented land have a significantly positive impact on adoption speed. Significantly delayed in the adoption of a GPS-guidance system are feed crop farms. Amongst those farmers in Lower Austria who are not using a GPS-guidance system, the biggest obstacle for not adopting this system seems to be the small structure of their farm.

Acknowledgements:

Klaus Salhofer, *University of Natural Resources and Life Sciences, Vienna*

3.3 Producing Healthful and Safe Food (1)

Saturday, 11:30- 12:30 - Venue: Ö1

Evaluation of *Fusarium* head blight resistance in durum wheat accessions in a field trial

Maria König, Maria Maier, Lena Schlagitweit

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: BSc

Keywords:

Durum wheat, mycotoxins, QTL, *Fusarium*, resistance breeding

The demand for durum wheat (*T. durum*) is increasing and mainly used for pasta production. In Austria, durum wheat is cultivated in the Pannonian climate, where it is warm and relatively dry. In summers with frequent rainfalls, high humidity and warm temperatures, the infestation rate of FHB is especially high during anthesis. *Fusarium* spp. account for big losses in yield and grain quality, but also reduce seed quality and produce mycotoxins. The most eminent *Fusarium* species in wheat are *F. graminearum*, *F. culmorum*, *F. avenaceum* and *F. poae*. Deoxynivalenol, Nivalenol and Zearalenone are the most important mycotoxins in durum wheat. For example, Zearalenone causes fertility disorders and other reproductive problems, especially in pigs. *Fusarium* resistance in cereals is a quantitative trait, influenced by multiple genes and by the environment. Breeders have to consider correlated traits when developing new lines. Compared to common wheat, limited efforts have been dedicated to improving FHB resistance in durum wheat. Today, most durum cultivars are highly susceptible and breeding progress is limited by the narrow genetic variation available for FHB resistance in durum elite germplasm. In this research work, 750 durum lines from crosses with three different resistance sources were evaluated for FHB resistance. The resistance sources in our field trial come from wild emmer (*T. dicoccoides*), cultivated emmer (*T. dicoccum*), but also from the hexaploid Chinese spring wheat line Sumai-3. At anthesis the lines were spray-inoculated with *F. culmorum* and at five points in time after inoculation disease severity was evaluated. Additionally, plant height and date of anthesis were recorded for each plot. This project aims to improve the nutritional quality of durum wheat by reducing mycotoxin contaminations through the introgression of resistance alleles from wild and cultivated relatives. We expect to select FHB resistant and breeding relevant durum germplasm.

Acknowledgements:

Hermann Bürstmayr, University of Natural Resources and Life Sciences, Vienna

Barbara Steiner, University of Natural Resources and Life Sciences, Vienna

3.3 Producing Healthful and Safe Food (1)

Saturday, 11:30- 12:30 - Venue: Ö1

Association of the *Fusarium* resistance QTL Qfhs.ifa-5A with anther extrusion in wheat

Christian Wagner

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: MSc

Keywords:

Fusarium head blight ,Qfhs.ifa-5A FHB resistance QTL , anther extrusion in wheat

Fusarium Head Blight (FHB or scab, caused by *Fusarium* species) is a severe crop disease of small grain cereals with global concern, causing yield losses, quality losses (such as reduced baking and malting properties) and mycotoxin-contaminated grains. These mycotoxins (e.g. Deoxynivalenol, Zearalenone) are very harmful for humans and livestock. FHB resistance is a quantitative trait that is controlled by many genes/quantitative trait loci (QTL). A major resistance QTL is Qfhs.ifa-5A, which is located on the short arm of chromosome 5A near the centromere. Qfhs.ifa-5A protects plants against initial fungal infection (type 1 resistance). Previous studies show that QTL for anther extrusion overlap with the Qfhs.ifa-5A. It is also known that genotypes with a high number of retained anthers show higher FHB severity. To check the influence of anther extrusion (AE) on FHB resistance, following trial has been performed: heads from the cultivar Remus (susceptible, retaining anthers) and its near isogenic line NIL-C3 (resistant, extruding anthers, contain Qfhs.if-5A) were manipulated in three variants. These were (1) control: no anther manipulation; (2) compressed: anthers were compressed into florets; (3) removed: anthers were removed. One day after manipulation, heads were spray-inoculated with *Fusarium graminearum*. Phenotyping for FHB incidence and severity was done 6, 10, 14, 18 and 22 days after inoculation, giving the following results: (a) As expect, the cultivar Nil-C3 was more resistant than Remus. (b) Both genotypes heads with compressed anthers were about as susceptible as control heads. (c) Heads (both genotypes) with removed anthers had less symptoms than heads with compressed anthers or control heads. This trial confirmed that AE has an influence on FHB resistance. Breeding for cultivars which contain Qfhs.ifa-5A (and also other resistance QTL) is an effective method to control FHB and reduce mycotoxins levels in grain.

Acknowledgements:

Maria Bürstmayr, *University of Natural Resources and Life Sciences, Vienna*

Hermann Bürstmayr, *University of Natural Resources and Life Sciences, Vienna*

Barbara Steiner, *University of Natural Resources and Life Sciences, Vienna*

Petra Vukelic, *University of Natural Resources and Life Sciences, Vienna*

3.3 Producing Healthful and Safe Food (1)

Saturday, 11:30- 12:30 - Venue: Ö1

Constitutive protein expression and display on the cell surface of *Lactobacillus plantarum* WCFS1

Esther Plattner, Hoang-Minh Nguyen, Mai-Lan Pham, Dietmar Haltrich, Thu-Ha Nguyen
University of Natural Resources and Life Sciences, Vienna

Study Programme Level: MSc

Keywords:

Lactobacillus plantarum, beta-mannanase, surface display, constitutive expression

Lactobacillus plantarum has been known as a probiotic with GRAS (generally regarded as safe) status and it has been considered as a potential cell factory. It is of great interest to display different proteins on the surface of *L. plantarum* cells to be used as whole cell biocatalysts for the production of oligosaccharides. In this study, we aimed to constitutively express and display a beta-mannanase (ManB) from *Bacillus licheniformis* DSM13 on the cell surface of *L. plantarum* WCFS1. The promoter of the *slpA* gene encoding the S-layer protein from *L. acidophilus* ATCC 4356 was used to replace the inducible promoter of the pSIP lactobacillal expression vector. ManB was fused to an anchoring motif, which is a N-terminal lipoprotein- anchor (Lp1261), and the resulting fusion protein was expressed in *L. plantarum* WCFS1 using the pSIP expression vector with the constructed constitutive promoter of *slpA*. Immunofluorescence microscopy was used to confirm the localisation of the enzyme on the bacterial cell surface and the expression of beta-mannanase was also confirmed by Western Blot and checked by enzymatic activity assay. The highest mannanase activity obtained for displaying *L. plantarum* cells was 2500 U/g dry cell weight, which is 5-fold higher than the activity obtained with the inducible pSIP system using the same anchoring motif. Moreover, the enzyme retains 90% of its activity after two months at -20°C and it can be reused up to 4 times for the conversion of galactomannans to manno-oligosaccharides (MOS)

Acknowledgements:

Thu-Ha Nguyen, *University of Natural Resources and Life Sciences, Vienna*

Alariosis - new re-emerging disease in wild boars

Natalia Strokowska, Katarzyna Świdarska
Warsaw University of Life Sciences

Study Programme Level: BSc

Keywords:

Alariosis, wild boars, venison

Alaria alata is a fluke found in wild boar meat. We can observe living mesocercariae (AM) moving freely in examined meat samples. This parasite has a complex life cycle and its final hosts are canids, felines and mustelids. Intermediate hosts are freshwater snails, frogs and tadpoles. The final host could get infected by eating paratenic hosts such as wild boars, mice, polecats, rats. Wild boars are the most common paratenic hosts because they are omnivores and their eating habits include digging in the ground in search of food and consuming carcasses of possible intermediate and paratenic hosts. Predilection sites for *A. alata* mesocercariae are: peritoneum, visceral and omental fat, muscles of the diaphragm. Wide spread in wild boars in Poland is caused by large muddy areas in which intermediate hosts are present. There are few detection methods: compressor (trichinoscopic), pooled sample digestion, modified digestion (with Pankreatin and bile acids) and *A. alata* mesocercariae migration technique (AMT), which is the most sensitive and reliable. There is no reference method of detection for alariosis. Accidentally AM are encountered during official meat inspection for *Trichinella spiralis*. Alariosis is a potential zoonosis and venison is the most important source of infection in humans.

3.4 Animal Genomics, Animal Health and Animal Welfare (2)

Saturday, 11:30- 12:30 - Venue: Ö2

Flight activity of bats in habitats with different representation of human settlements

Kristýna Kovaříková¹⁾, Michal Andreas²⁾,

¹⁾ *Czech University of Life Sciences Prague*, ²⁾ *Other*

Study Programme Level: MSc

Keywords:

Bat activity, detecting, forest bats, habitat preferences, urbanization

Bats are an important part of diversity of mammal fauna and they are used as an indicator of environmental quality. One of the aims of my research was to compare the activity of bats in habitats with different representations of human settlements. Study localities were chosen with given criteria, throughout the whole territory of the Czech Republic. The influence of presence of human settlements on bat activity and structure of their communities was studied using ultrasound bat detectors. All records were evaluated using the programmes Sonochiro and Batsound. More than 3,664 call sequences of 17 – 21 bat species on 39 study sites were recorded during the summers of 2014 and 2015 in two types of forest localities. The first set of sites was located within 100 – 300 m from human settlements; the second was more than 1,000 m away from human settlements. Total recorded bat activity was almost twice as high at sites closer to human settlements and a significantly higher total presence of bat species closer to human settlements was proved using statistical tests. It seems that synanthropization of particular bat species is an ongoing process: many bat species are able to use manmade constructions and buildings and seem to prefer less dense forest habitats. Therefore, not all human impact on habitats can be interpreted as harmful for animal species.

Acknowledgements:

Radek Lučan, *Other*

3.4 Animal Genomics, Animal Health and Animal Welfare (2)

Saturday, 11:30- 12:30 - Venue: Ö2

Habitat preference of red deer and sika deer in the Doupov Mts.

Václav Silovský

Czech University of Life Sciences Prague

Study Programme Level: BSc

Keywords:

Red deer, sika deer, habitat preferences, GPS telemetry, home range

The bachelor thesis is focused on habitat preferences of red deer (*Cervus elaphus*) and sika deer (*Cervus nippon nippon*). The objective of study was to determine which types of landscape the red deer (*Cervus elaphus*) and sika deer (*Cervus nippon nippon*) prefer during the year. Study area is located in northwest Bohemia in the Doupov Mountains. Data were collected by GPS telemetry from 13 stags and 13 hinds of red deer, and 6 stags and 2 hinds of sika deer during the days between 19th September 2010 and 8th February 2015. We received a total of 176982 red deer positions and another 38932 sika deer positions from GPS telemetry. Analysed home ranges have shown that male and female red deer prefer shrubbery and natural grasses. Sika males' main preferences were shrubbery and mixed forest during the year. Sika females preferred shrubbery and natural grasses. The bachelor thesis results provided very interesting information on red and sika deer ecology and could be used in future game management or when creating legislation, especially in the area of minimum hunting grounds quantities.

Acknowledgements:

Miloš Ježek, *Czech University of Life Sciences Prague*



Oral Presentations

Parallel Sessions IV
Saturday, 12 November 2016
14:30-15:30

4.1 Managing Climate and Environment (4)

Chair: Markus Puschenreiter, *University of Natural Resources and Life Sciences, Vienna*
Venue: B1

4.2 Improving Efficient and Sustainable Agricultural Production (3)

Chair: Kirsten Jørgensen, *University of Copenhagen, Faculty of Science*
Venue: B2

4.3 Producing Healthful and Safe Food (2)

Chair: Gerhard Schleining, *University of Natural Resources and Life Sciences, Vienna*
Venue: Ö1

4.4 Animal Genomics, Animal Health and Animal Welfare (3)

Chair: Krzysztof Klimaszewski, *Warsaw University of Life Sciences*
Venue: Ö2

4.1 Managing Climate and Environment (4)

Saturday, 14:30- 15:30 - Venue: B1

Ecological comparison of carbon neutral certified and non-certified coffee farms in the Los Santos Valley, Costa Rica

Sigrun Wagner
University of Hohenheim

Study Programme Level: MSc

Keywords:

Carbon neutral, *Coffea arabica*, carbon stock, light transmission

Climate change is significantly driven by human activities, including agriculture, which is a major source of greenhouse gas (GHG) emissions and is also vulnerable to climate change. Costa Rica, a major exporter of coffee and other agricultural commodities, aims to achieve carbon neutrality by 2021. Coffee is not only a big driver of GHG emissions, but also has the potential to sequester carbon and mitigate climate change. This study investigated the ecological differences between carbon neutral certified and non-certified coffee farms in the mountainous Los Santos region of Costa Rica at an altitude of around 1700 m a.s.l.. Transects (10 m x 20 m) were selected within the eight investigated farms. Within these transects, transmission of photosynthetic active radiation (PAR) and leaf area index (LAI) measurements were done over the course of a day with AccuPAR LP80 and LAI2000, respectively. The biomass and carbon concentration of shade plants (trees and *Musa* sp.), coffee plants and of the roots were estimated using allometric equations and the species richness of the understory crops (bushes and weeds) was determined. No significant differences between the ecological parameters of carbon neutral certified and non-certified coffee farms of this region were found. The cooperative Coopedota R. L. gives similar recommendations to all their farmers. Field carbon sequestration is not considered in the certification and not all farmers, who carry out management practices worthy of the certification, are certified. This explains the ecological similarity of all farms studied. The PAR transmission of the trees varied between 45 and 95%. The carbon stock (above ground and roots) of the monitored transects varied between 25 and 70 Mg ha⁻¹. Therefore, some farms still have the potential to include more trees or *Musa* sp. in the field to sequester more carbon.

Acknowledgements:

Athena Birkenberg, *University of Hohenheim*
Thomas Hilger, *University of Hohenheim*

4.1 Managing Climate and Environment (4)

Saturday, 14:30- 15:30 - Venue: B1

Mapping land cover changes and inundation patterns in the outflows of the Okavango Delta

Kelebogile B Mfundisi¹⁾, Eduardo García Bendito²⁾, Anastacia Makati¹⁾, Masego Dhliwayo¹⁾

¹⁾ *Other*, ²⁾ *University of Hohenheim*

Study Programme Level: MSc

Keywords:

Land cover changes, NDVI, image classification, vegetation dynamics, Boteti River

Riverine systems are governed by water flows or inundation patterns, and form an important component of terrestrial landscapes. Land cover is a key element in understanding landscape dynamics, and is linked to many human and physical processes. Boteti River flows depend on the amount of discharge at the outlet of the Okavango Delta. Its flows occur during the dry season, from June to October, and is prone to cyclical droughts. Systematic mapping of land cover changes and inundation patterns in the upper-mid Boteti Riverine system has not been done. Therefore, the two main objectives of our study are to analyze the decadal spatial extent of inundation patterns in the upper Boteti riverine system from 1975-2015, and determine spatial and temporal variations of land cover using Landsat data series. Supervised classification followed by post classification method and NDVI were used to assess changes in land cover and inundation patterns over the specified time period. The results show fragmented vegetation along the river, where most human activities occur. Boteti River was inundated in the 1970s and 1980s decades, whereas 1990s and 2000s were dry. The river was inundated again in 2015. Our results from land cover assessment revealed marked shift from intermediate savanna to rangeland from 1975-1994, and rangeland to intermediate savanna from 1994 to 2014. Normalized difference vegetation index (NDVI) revealed temporal variation of vegetative cover, observing that the total area covered with vegetation steadily decreased from 1975 to 2004, as outflows from the wetlands stop, recovering again as hydrologic conditions improve in 2015. We conclude that land cover change over the past 40 years in our study area is linked to Boteti River flow patterns. This study provides a basis for long term monitoring of vegetation cover changes in the Okavango Delta outflows through remote sensing methods.

Acknowledgements:

Felipe Yunta Mezquita, *Other*

Lapologang Magole, *Other*

4.1 Managing Climate and Environment (4)

Saturday, 14:30- 15:30 - Venue: B1

Weather you like it or not: Climate drivers of butterfly abundance dynamics and species distribution.

Hannah Lara Oliphant
University of Hohenheim

Study Programme Level: MSc

Keywords:

Climate-change, *Lepidoptera*, distribution, abundance, biodiversity

Lepidoptera records are an invaluable resource for modelling the ecological effects of anthropogenic climate change. As short-lived ectotherms, *Lepidoptera* are sensitive to climatic variation and their popularity among the general public helped to create successful monitoring programmes such as the United Kingdom Butterfly Monitoring Scheme (UKBMS). These monitoring schemes have provided extensive datasets which can be used to develop species response and distribution models to climate change. The purpose of my study is to analyse whether climate variation is able to explain abundance and larger scale distribution of butterfly species in the United Kingdom. My climate variables will be chosen based on biological relevance to *Lepidoptera* phenology as well as extreme weather events. As land cover is an important factor in managing climate and environment, I will also analyse whether the interaction between variation in climate and habitat type may explain changes in *Lepidoptera* numbers and range. As a preliminary analysis, I developed a logistic linear regression model to test for significant associations between climate and abundances of *Pyronia tithonus* for the period of 1988-2004. I found that in general, warmer and drier summers were significantly linked to higher abundances and warmer winters to negative abundances. Within the framework of this study, I intend to improve model accuracy by using a dynamic model that includes quadratic effects of weather as well population growth rates. I expect extreme weather events such as drought and flood to negatively affect larger scale species abundance. Habitat generalist species should also expand their distribution under warmer weather conditions, as they are able to colonize a wider range of land cover types. A bio-based economy must therefore incorporate conservation areas into fields used for energy crops to increase the numbers of habitat specialists as a way to manage our environment under a changing climate.

Acknowledgements:

Jörn Pagel, *University of Hohenheim*

4.2 Improving Efficient and Sustainable Agricultural Production (3)

Saturday, 14:30- 15:30 - Venue: B2

Plant phosphorus availability of biochar and ashes from sewage sludge processed by different thermal conversion technologies

Rhys Thompson

University of Copenhagen, Faculty of Science

Study Programme Level: MSc

Keywords:

Biochar, sewage, sludge, phosphorus

Thermal conversion of the nutrient rich waste product sewage sludge offers several advantages including the potential for reduction or removal of organic pollutants and pathogens, an up-concentration of desired plant nutrients, and generation of bioenergy. Different thermal processes alter the chemical and physical structure of the chosen feedstock in various ways, which also influences the plant phosphorus availability of the resulting ashes or biochars. Although there are studies investigating the various processes, there are few that experimentally compare the phosphorus fertiliser value for plant growth from different materials converted from a single feedstock. This makes comparisons of the processes difficult. In this study, a representative sample of sewage sludge was converted using various thermal conversion technologies: incineration, pyrolysis, and two gasification processes. A secondary oxidation step was applied to the resulting pyrolysis and gasification materials to investigate the possibility of increasing phosphorus availability in this way. The particle size of all treatment materials were aligned and they were then applied to phosphorus-deficient soil in pots, in which spring wheat was subsequently grown and analysed. All materials significantly increased plant shoot biomass compared to the untreated control. The pyrolysis chars and one incineration ash had fertiliser values comparable to that of raw sludge and mineral fertiliser and higher than the gasification ashes. The secondary oxidation step significantly improved P availability in low-temperature gasification ash and increased plant biomass production by almost 50%. Under the conditions tested, incineration or pyrolysis of sewage sludge resulted in products with high phosphorus fertiliser values. Results also showed that secondary oxidation of pyrolysis- and gasification chars can increase soil phosphorus availability as well as plant growth. In general, the results of the study showed that changes in the design of the thermal conversion processes can significantly influence phosphorus availability in the residual material.

Acknowledgements:

Dorette Müller-Stöver, *University of Copenhagen, Faculty of Science*

Torsten Müller, *University of Hohenheim*

4.2 Improving Efficient and Sustainable Agricultural Production (3)

Saturday, 14:30- 15:30 - Venue: B2

Effects of biochar and compost amendments on the fluxes of copper in contaminated vineyard soils to leachate and plant tissues

Julia von Chamier

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: MSc

Keywords:

Biochar, phytotoxicity, remediation, copper

Extensive use of copper (Cu) based fungicides has resulted in an accumulation of this element in vineyard soils, often to concentrations that detrimentally affect soil function. Organic amendments such as biochar and compost may reduce Cu mobility and restore soil function. This study aimed to determine the effect of those additives on Cu translocation from soil to leachate and plant tissues. A pot experiment tested nine soil amendments and a comparative control with four replicates on two soil types, slightly acidic and calcareous soil and one *Vitis vinifera* plant per pot. Leachate analysis included pH, EC, Cutotal, DOC, cations, anions and free Cu²⁺-ions calculated with VISUAL MINTEQ® at two sampling dates. Results showed that additives had a higher potential to reduce Cu²⁺ in slightly acidic soils than in calcareous soils. Decreasing phytotoxic Cu²⁺ was predominantly attributed to increasing pH in leachate thus liming was as sufficient as tested amendments. Activation of biochar with tartaric or citric acid for artificial carboxylation did not show any effect on Cu solubility. On calcareous soil, amendments increased Cutotal in leachate but showed varying effects on Cu²⁺ concentration. Inconsistency between first and second leachate analysis, which only differed in the degree of plant growth, indicated that root exudates may change Cu fractionation. Cutotal and Soil-Plant Analysis Development (SPAD) values in *Vitis vinifera* leaves were not affected by amendments. A field experiment tested the effect of four soil amendments and a comparative control each with four replicates on Cu uptake of *Trifolium repens* roots in a calcareous vineyard soil in Lower Austria. Wood biochar significantly reduced Cu concentration in roots by 51% compared to the control, although values were still in range to be phytotoxic. Reduced Cu activity in leachate and reduced accumulation in plant tissues are promising results for sustainable agricultural management.

Acknowledgements:

Franz Zehetner, *University of Natural Resources and Life Sciences, Vienna*

Brett Robinson, *Lincoln University, New Zealand*

4.2 Improving Efficient and Sustainable Agricultural Production (3)

Saturday, 14:30- 15:30 - Venue: B2

The effects of riparian vegetation on sedimentation, phosphate enrichment, and benthic macroinvertebrates in waterways of the New Zealand High Country

Shyam Provost

Lincoln University, New Zealand

Study Programme Level: MSc

Keywords:

Freshwater biodiversity, soil management, sustainable farming

This Masters research project focuses on the freshwater resources of Mt. Grand, a high country station (farm) on the South Island of New Zealand. The station is 2136 ha of mountainous terrain. It is currently used to run fine wool Marino sheep and a small herd of beef cattle, but has a history of overgrazing by rabbits. Increased economic pressure presents risks of overgrazing, soil erosion and threats to cleanliness and biodiversity of waterways. Near the station, flatter land has been converted to dairy farms, whilst higher altitude areas have been converted to public conservation land. The remaining land situated between these conversions is placed under intensified agronomic pressures to remain economically viable, but intensification may pose a threat to the ecological quality of Mt. Grand's streams. This research seeks (i) to assess how benthic sediment deposited from soil erosion varies in relation to catchment vegetation cover, (ii) to establish the significance that vegetation cover has in influencing phosphate enrichment of streams, (iii) to investigate whether benthic macroinvertebrate diversity varies in relation to the immediate riparian vegetation, and (iv) to evaluate whether sediment deposition threatens benthic macroinvertebrate habitat. Suspended sediment samples will be taken at various sites, alongside measurements of deposited sediment depth. Streams will also be sampled for presence of phosphorus enrichment. These measurements will be coupled with catchment vegetation data, and used to ascertain the role that vegetation cover has in influencing sediment deposition and phosphate enrichment within the streams. At each sample site, benthic macroinvertebrate communities will be sampled to build a biodiversity index. Stream water will also be sampled for pH, conductivity, in situ temperature, and dissolved oxygen. The research will enable farm management to be better informed about their freshwater resources, and will be beneficial to future stream management programmes undertaken in similar upland environments.

Acknowledgements:

Nicholas Dickinson, *Lincoln University, New Zealand*

4.3 Producing Healthful and Safe Food (2)

Saturday, 14:30- 15:30 - Venue: Ö1

Separability of fermented milk during concentrated yogurt production: Influence of fermentation conditions

Hasitha Priyashantha¹⁾, Thilo H. A. Berg¹⁾, Patrizia Buldo²⁾, Christian Gilleladen²⁾, Richard Ipsen¹⁾

¹⁾ *University of Copenhagen, Faculty of Science*, ²⁾ *Other*

Study Programme Level: MSc

Keywords:

Greek-style yogurts, separability, microstructure, rheology and particle size

Stirred yogurts are concentrated to produce high-protein (~10%) Greek-style yogurts. The effect of starter culture, cutting pH and fermentation temperature, on particle size distribution, zeta potential, rheology and microstructure were investigated and related to separability. Milk (3.3% initial protein) was fermented with three commercial bacterial cultures (Chr Hansen, Denmark) at 39°C or 43°C, up to a pH of 4.45 or 4.60. Samples were manually stirred and all analyses were performed in the same order. Concentration of protein was achieved via centrifugation in order to compare separability. As expected, the three cultures influenced the microstructure and the different amount of exopolysaccharides (EPS) produced. The three cultures resulted in three types of microstructures: (A) absence or low level of EPS, (B) low association of EPS with protein and (C) high association of EPS with the surface of the protein. Microstructure (C) was shown to reduce the separability and to increase (i) particle size (ii) hysteresis loop area (iii) viscosity of yogurt and supernatant (iv) storage modulus and to decrease (i) zeta potential (ii) whey removal weights (iii) protein and total solid concentration in the white mass obtained from centrifugation. Higher fermentation temperature resulted in an increase in (i) particle size and (ii) zeta potential values for EPS-producing cultures. Higher fermentation temperature resulted in a decrease in the (i) hysteresis loop area (ii) viscosity of yogurt (ii) storage modulus and to enhance separability. The cutting pH only affected the zeta potential (higher values at lower pH) but did not significantly influence the separability. Separability is multidimensional, thus it can be manipulated with several conditions (e.g. bacterial culture and temperature). Presence of EPS and higher associations with protein increased the particle size, negative surface chargers and structural rigidity), therefore establishing more a stable system and reduced separability.

Acknowledgements:

Financial support by: Fermented Milk, Probiotic and Innovation Department , *Other*

4.3 Producing Healthful and Safe Food (2)

Saturday, 14:30- 15:30 - Venue: Ö1

Recontamination factors of heat-treated meat products and the role of lactic acid bacteria and *Listeria* spp.

Foteini Chrysanthopoulou, Marija Zunabovic-Pichler
University of Natural Resources and Life Sciences, Vienna

Study Programme Level: MSc

Keywords:

Food safety, recontamination, meat products, spoilage

The production of safe foods and thus the protection of consumers is a crucial issue today. To meet this demand, food products are being processed according to various principles and hygiene practices. In this field, Hazard Analysis and Critical Control Point (HACCP) is a very important management system used to prevent and reduce the risks associated with food production. However, in cases where the critical limits at the Critical Control Points are ignored or violated during processing, the quality of the final product can be inadequate, possibly leading to food-borne diseases. In meat processing in particular, the microbial recontamination after the cooking step of the final product may occur due to several factors, such as air, processing equipment, packaging material, improper handling practices, and inadequate cleaning procedures. The hygienic- and process design of work surfaces and equipment is a major factor contributing to cross- and recontamination during meat product processing. To investigate this effect, semi-standardized interviews in 9 meat manufacturing companies in Austria were carried out, and the critical recontamination factors were determined. By conducting environmental and final product sampling in these companies, the bacterial isolates of Lactic acid bacteria, *Enterobacteriaceae* and *Listeria* spp. were identified and characterized. The findings of the study can assist in creating documentation for both machine designers and practitioners in the field of food manufacturing.

Acknowledgements:

Konrad Domig, *University of Natural Resources and Life Sciences, Vienna*
Wolfgang Kneifel, *University of Natural Resources and Life Sciences, Vienna*
Michael Stelzl, *Other*
Egon Singer, *Other*

4.3 Producing Healthful and Safe Food (2)

Saturday, 14:30- 15:30 - Venue: Ö1

Analysis of influence of oregano essential oil blanching on drying kinetics of dehydrated meat

Diego Claramount, Helga Hernandez
Czech University of Life Sciences Prague

Study Programme Level: PhD

Keywords:

Essential oil, drying process, pre-treatment

Meat is one of the most valuable livestock products and for many people it serves as their primary source of protein. The rising demand for meat in developing countries, combined with poor access to the synthetic antioxidants necessary for proper food preservation and their potential side-effects, highlight the importance of feasible alternatives for rural populations. Among the most critical components that cause quality deterioration are lipids and proteins oxidation, which, if not treated properly in time, will cause off-odour and off-flavour production. For that reason this research focused on the application of Oregano Essential Oil (OEO) as an alternative to synthetic antioxidants like butyl hydroxyanisole (BHA) and butylhydroxytoluene (BHT) as a pre-treatment of dehydrated meat, and its further effects if any during the drying process. Beef samples were prepared, and three different types of pre-treatment were studied. The three types of pre-treatment used were: Steam Blanching (SB), Hot Air Blanching (HAB) and Oil Treatment (OT). These were combined with different concentrations of OEO: 1.5ml, 3ml, and 6ml. The approach was used to find if there was any correlation between the concentration of OEO and the pre-treatment used versus the speed of drying. It was found that depending on the pre-treatment applied, the concentration of OEO might influence the drying process by either speeding up or slowing down the drying process depending on the pre-treatment used. Moreover, for SB it was found that the effect on the drying process was a direct consequence of the pre-treatment and not because of the OEO. In conclusion, this study found that there was a difference in the speed of drying, but this is not always related to the OEO.

Acknowledgements:

Jan Banout, *Czech University of Life Sciences Prague*

4.4 Animal Genomics, Animal Health and Animal Welfare (3)

Saturday, 14:30- 15:30 - Venue: Ö2

The impact of β -agonists (ractopamine) on growth performance and carcass composition of finishing pigs

Sofia Lindkvist

Swedish University of Agricultural Sciences

Study Programme Level: BSc

Keywords:

Ractopamine, growth performance, carcass composition, behaviour, TTIP

Both authority and consumer demands require a high standard for today's food production. A product has to be of good quality, have an affordable price and be nutritious. A solution for pig production in the US is a feed additive that provides the opportunity to market heavier pigs with a high percentage of muscle and a low proportion of adipose tissue. The feed additive is marketed under the name Paylean® with the active substance called Ractopamine Hydrochloride (RAC), with similar characteristics to β -adrenergic agonists. The use of β -adrenergic agonists as feed additive for animals within the EU and a hundred other countries around the world has been banned. This report will summarize whether the addition of RAC in the diet has effects on pig's physiological effects (fattening), affecting their meat quality and if it leads to unwanted side effects. In the chemical group in which RAC is included, there are several known substances; for example epinephrine and amphetamine. There is very little research of possible health risks that RAC residues could have on humans. Some research has explained that pigs that are feed RAC show behavioural changes as a side effect. The pigs are more active and alert and in some cases more aggressive towards other individuals. An increased heart rate and elevated levels of the hormones norepinephrine and epinephrine have also been found. Several scientists highlight the positive effects of RAC on daily growth, increased feed efficiency and a better carcass grading. The EU and the US have been negotiating for a trade agreement since 2013. A trade agreement between the EU and the US could lead to that EU importing pork that is produced under conditions that are not approved within the EU.

Acknowledgements:

Nils Lundeheim, *Swedish University of Agricultural Sciences*

4.4 Animal Genomics, Animal Health and Animal Welfare (3)

Saturday, 14:30- 15:30 - Venue: Ö2

Should the mother cow and her calf be happy together? An analysis of the debate on cow-calf separation in Denmark

Lenna van Kollenburg

Wageningen University and Research Centre

Study Programme Level: MSc

Keywords:

Cow and calf separation; communication; framing

A growing global focus on animal welfare includes an increasing public awareness of farm animal welfare issues. Different understanding between groups (e.g. authorities, consumers and farmers) of what is good animal welfare has an influence on the future production of food. A current controversial issue in European countries like Denmark is separation of cow and calf immediately after giving birth. In Denmark, the government accepted a law which states that newborn calves on conventional dairy farms should stay with their mothers for at least 12 hours post-partum. This research explored how the communication with all stakeholders evolved in order to implement the law in Denmark. Therefore 20 semi-structured interviews were done with authorities, veterinarians, advisors, scientists, NGOs and farmers. Using dramaturgical analysis and framing, the communication process was analysed, to unravel evolving positions of the different stakeholders involved. Initial conclusions show that the cow calf legislation was a compromise, drawing in other legislation, whereby cows on pasture are framed as more important. Another important frame is the time frame, while farmers should implement this law before 2024, so there is time left for the authorities to see how they will control and enforce this law. The research gives a novel insight into the difference between drafting a law and how it will be implemented and complied within the practice. From a political point of view this might be successful because everyone is happy: farmers are happy since they are not forced to comply with the law and the public is happy since keeping cow and calf together is legally required. The happiness of mother cow and her calf being together could be seen in Denmark as just a trade-off instead of a discussion of different understanding of animal welfare.

Acknowledgements:

Inger Anneberg, *Other*

Hans Hopster, *Wageningen University and Research Centre*

Laurens Klerkx, *Wageningen University and Research Centre*

4.4 Animal Genomics, Animal Health and Animal Welfare (3)

Saturday, 14:30- 15:30 - Venue: Ö2

Knowledge vs prejudice: Does what we know about animals affect their welfare?

Agata Równy, Aleksandra Grabek
Warsaw University of Life Sciences

Study Programme Level: BSc

Keywords:

Bats, survey, welfare, wildlife, environmental awareness

Many species of animals were forced to escape their natural habitats and start living close to humans, due to fast deforestation and urbanization. Humans' actions became crucial to animal welfare and survival. However, in many regions of Poland that transition happened long before common education was widely available. As a result, people's attitude towards many species was based on prejudice and superstitions shaped by legends and popular culture. Especially nocturnal animals were often thought of as evil and violent. This study investigates the relationship between people's level of fact-based knowledge about bats (Chiroptera) and their attitude and general feelings towards this species. We examined groups of 50 student from several faculties of Warsaw University of Life Sciences: Veterinary Medicine, Forestry, Animal Science, Economic Science and Social Science. The tested group filled out the same survey twice – before and after being presented with basic facts about bats. Comparing the two surveys allowed us to conclude what was the person's attitude and feeling towards bats and how it was influenced by prejudices or superstitions as opposed to facts. In addition, we were able to verify if the field of education (biology-related or not) of the students or how long they studied affected their environmental awareness. We hypothesized that fact-based knowledge makes people less likely to have a negative attitude and behaviour towards animals and thus make their environment safer in the human-centric world. The results of the survey showed that the group with the highest level of education (students in final years of their biological studies) also had the most positive attitude towards bats. We conclude that common education helps animal welfare by raising people's environmental awareness and changing their perception.

Acknowledgements:

Krzysztof Klimaszewski, *Warsaw University of Life Sciences*



Poster Sessions

Parallel Sessions I

Friday 11 November

16:45 - 17:45

1.1 Managing Climate and Environment (1)

Chairs: Markus Puschenreiter, *University of Natural Resources and Life Sciences, Vienna*
Lukáš Pospíšil, *Czech University of Life Sciences*

Venue: Auditorium (Aula)

1.2 Socioeconomic and other Aspects of Bioeconomy

Chairs: Gabrielle Lagerkvist, *Swedish University of Agricultural Sciences*
Walter Vetter, *University of Hohenheim*

Venue: Auditorium (Aula)



1.1 Managing Climate and Environment (1)

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

Application of urban stormwater drainage design and modelling based on high-resolution satellite technology

Kashif Hussain

Czech University of Life Sciences Prague

Study Programme Level: MSc

Keywords:

GIS, Maximum Likelihood Classification, parameters, stormwater, SWMM

The urban watersheds hydrology is totally different when compared with natural environments and it requires advanced evaluation techniques. In the absence of high resolution rainfall data, empirical reduction formula is used for daily rainfall data conversion into short duration rainfall data sets. Extreme type-1 distribution method is used for frequency analysis, and derivation intensity duration frequency (IDF) curve. In this study the catchment delineation was performed by combining ArcGIS core application (including geo-processing surface modelling and Spatial Analyst extension), high resolution remote sensing data and field observations. Due to area extent limitation for Rational Method, the selected catchments were divided into sub-catchments of an area less than 80.9 ha or equal. The GIS and RS methodology was developed for determination of Rational Method and stormwater management model (SWMM) parameterization in a large urban catchment. The calculation of low resolution sub-catchment parameterization is the more challenging part and has many uncertainties involved. Few parameters such as runoff coefficient (C) Curve Number (CN) overland flow mannings roughness (n) and imperviousness are directly related to land use type. Thus, land use type classification was performed using Quick Bird satellite image adopting the Maximum Likelihood Classification (MLC) method and determined seven land use types of each catchment. For surface runoff modelling this study consisted of two models, first Rational Method is used to estimate the surface runoff of selected catchments. In the second part, Stormwater Management Model (SWMM) is also used to estimate the surface runoff. The SWMM model runoff results are compared to Rational Method. Comparatively surface runoff values calculated by Rational Method are much higher than calculated surface runoff values by SWMM.

Acknowledgements:

Jakub Štibinger, *Czech University of Life Sciences Prague*

1.1 Managing Climate and Environment (1)

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

Flood frequency analysis under climate change in Kabompo Basin, Zambia

William Nkomoki¹⁾, Jackson Nkomoki²⁾

¹⁾ *Czech University of Life Sciences Prague*, ²⁾ *Other*

Study Programme Level: PhD

Keywords:

HEC-HMS models, floods, climate change, Zambia

Southern Africa is faced with several challenges that are related to environment and climate change. The problem of floods can be categorized as both socioeconomic and environmental. These losses repeatedly impact poor people living in the Zambezi and surrounding floodplains, affecting infrastructure and agricultural production which serve as a major source of livelihood, and resulting in unsustainable cost repercussions. In view of climate change, the challenge for hydrologists and meteorologists is the improvement of models to predict flood frequency accurately. The study focuses on calibration of the Hydrological Engineering Centre's Hydrologic Modelling System (HEC-HMS) in combination with the Geospatial Hydrologic Modelling Extension (HEC-GeoHMS) for rainfall modelling to estimate maximum annual peak flows and flood frequency analysis of Kabompo catchment (72 000 km²) in Zambia, using historical 30 years (1983 to 2013) daily rainfall observed data in view of climate change. The computation in HEC-HMS model uses SCS curve number for infiltration, the SCS unit hydrograph and lag time for transform method and routing methods respectively with recurrence intervals of 2, 5, 10, 25 and 50-year events. In general flood frequency analysis, the software HEC-SSP 2.0 uses the Log Pearson type III, Pearson type III, Log Normal and Normal distribution at 5 % and 95 % confidence limits to determine its statistical parameters. Findings from the historical data show the flow trend for the events of 2009 to 2013 seem to be decreasing in comparisons to the peak flows in 1989. Estimation and flood frequency analysis with hydrological modelling is vital in implementation of flood protection measures for a sustainable future amidst climate change challenges.

Acknowledgements:

Jakub Štibinger, *Czech University of Life Sciences Prague*

1.1 Managing Climate and Environment (1)

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

Recovery of forest soil microbial activity after multi-year drought and heavy rainfall event simulations

Flavia Gonzalez Escolano

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: MSc

Keywords:

Climate change; microbiology; ecosystem research, resilience

Climate change research anticipates an increase in the frequency and intensity of extreme weather events like severe droughts and heavy rainfalls. Altered precipitation patterns can change microbial biomass and microbial community structures that produce and consume greenhouse gases. Within an ongoing project of the Institute of Soil Research (BOKU), the following research questions are investigated: i) what are the effects of increased drought-rewetting frequencies on soil nutrient cycling and the availability of forest soil organic carbon? ii) how do soil microbial communities respond to increased frequency and intensity of drying-rewetting cycles in a beech forest? iii) will the ecosystem recover after 1 year of natural precipitation? Drought and precipitation manipulations were carried out for three vegetation periods (between 2013-2015), where 12 plots were set-up with four replicates for control plots, moderate-stress plots (4 weeks of drought followed by 75 mm irrigation) and severe stress plots (8 weeks of drought followed by 150 mm of rain). Soil samples were taken and analysed for carbon, nitrogen, dissolvable organic carbon, microbial biomass, ammonia, nitrate, enzyme activities and PLFAs. Moreover, soil CO₂, CH₄, and N₂O effluxes of the 12 plots were determined with an automated gas flux measuring system. In 2016 no manipulative precipitation treatments were applied, but all the measurements were continued to monitor the resilience of the forest soil ecosystem. For this, soil samples were collected monthly from May to October and the above mentioned soil analysis conducted. Results will help us to understand how microbial communities react to extreme weather events and the consequences for the ecosystem dynamics.

Acknowledgements:

Michael Zimmermann, *University of Natural Resources and Life Sciences, Vienna*

Sophie Zechmeister-Boltenstern, *University of Natural Resources and Life Sciences, Vienna*

Ellen Kandeler, *University of Hohenheim*

1.1 Managing Climate and Environment (1)

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

Positive feedbacks of Land Use and Land Cover Change (LULCC) as a climate change mitigation strategy

Lisa Rummel, Maharunessa Munni
University of Hohenheim

Study Programme Level: MSc

Keywords:

Land use and land cover change, afforestation, climate change, mitigation

As of 20 May 2016, 176 countries have signed the Paris Agreement with the aim of keeping global average temperature increase below 2°C above pre-industrial levels. This requires a substantial reduction of greenhouse gas emissions by the member countries within the next decades. Anthropogenic land use and land cover change (LULCC) is considered an important climate force, influencing regional and global climate either via changes in the fluxes of greenhouse gases (biogeochemical effects) or via alteration of energy and moisture fluxes between Earth surface and atmosphere (biogeophysical effects). Hence, the positive effects of LULCC can be used as a measure to mitigate climate change. In our study, we investigate possible effects of LULLC on regional climate variables, focusing on afforestation and its potential to counteract global and local warming. Forests are able to reduce atmospheric CO₂-concentrations by capturing and storing atmospheric carbon in vegetation and soils for several decades up to centuries. Additionally, changing the land use from bare land or agriculture to forest leads to a modification of land surface properties, which influence regional weather and climate patterns. In general, climate model outcomes suggest a cooler and wetter climate over forests than over pasture, which is especially important for regions where climate change will lead to reduced precipitation and an increase in drought events. Another idea is to grow forest plantations on marginal sites or in dry regions, which are unsuitable for agriculture in order not to compete with food production. Thus, afforestation projects can be an important measure both to mitigate climate change and to contribute to global food security, paving the way to a sustainable future.

Acknowledgements:

Volker Wulfmeyer, *University of Hohenheim*

1.1 Managing Climate and Environment (1)

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

How to manage abandoned pasture land in the Brazilian Amazon to mitigate climate change?

Agnes Matuszak

University of Copenhagen, Faculty of Science

Study Programme Level: MSc

Keywords:

Brazilian Amazon biome, abandoned land, bioenergy, carbon emissions, forest carbon storage

Large deforested and abandoned land areas in the Brazilian Amazon region are left unmanaged and overgrow with secondary vegetation. Those could be alternatively managed for biofuel feedstocks to substitute fossil fuels. The current debate about land management for effective climate change mitigation is inconclusive and there is little knowledge about climate benefits from using abandoned land for biofuel production relative to natural forest recovery. This study compared the climate mitigation potential of three land use alternatives (LUAs) established on abandoned pasture over a 100-year projection period: a) naturally regenerating secondary vegetation (SV), b) short-rotation coppice (SRC) *Eucalyptus* plantation for wood pellet production, and c) oil palm plantation cultivated for biodiesel. A modelling framework was used to calculate the cumulative net carbon emissions (CCE) of the managed land for biofuel feedstock production relative to forest recovery including fossil fuel substitution effects. Preliminary results showed that SV performed best in the short-term due to its rapid growth rate in the first 40 years. However, the climate benefit of forest recovery decreased in the long-term, where SRC plantation resulted in the lowest CCE followed by oil palm plantation with coal as reference fossil fuel at the end of a 100-year time horizon. The outcome was different when natural gas was used as reference fossil fuel. Here, the SV showed negative CCE up to 45 years and lower CCE than both other LUAs for up to 80 years after pasture abandonment. However, its climate benefit was outperformed by SRC plantation for the last 20 years of the projected time, underlining the high sensitivity of the outcome to the timing. Further research is needed to investigate climate benefits of other LUAs to optimize land use for climate mitigation. It also emphasizes the need for work on social, economic, and ecological aspects to ensure sustainable feedstock production.

Acknowledgements:

Inge Stupak, *University of Copenhagen, Faculty of Science*

Georg Cadisch, *University of Hohenheim*

Anders Taerøe, *University of Copenhagen, Faculty of Science*

Karsten Raulund-Rasmussen, *University of Copenhagen, Faculty of Science*

Rodrigo Pinheiro Bastos, *University of Copenhagen, Faculty of Science*

1.1 Managing Climate and Environment (1)

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

Evaluation of filter materials for urban stormwater management: Green infrastructure in the city of Vienna

Lisa Beinlich

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: MSc

Keywords:

Urban stormwater management, green infrastructure, filter materials

Increase of extreme events, flooding, shortage of water in a long term perspective - those headings are used in our everyday life connected to climate change in urban areas. Therefore, innovative stormwater management using green infrastructure in combination with filter systems could be an effective strategy to increase water availability for plants and remove contaminants from roadway run-off. The aim of this project is to evaluate the effectiveness of mixed substrates for the removal of multiple contaminants from synthetic stormwater. Eleven different substrates, mixed out of various components, are tested according to the requirements of the Austrian standard for the certification of filter materials (ÖNORM B2506-3, 2016). The characteristics of materials are tested at laboratory and field scale. The experimental approach consists of five experimental steps with a focus on material characterisation, hydraulic behaviour, particle retention and pollutant removal capacity (for Pb, Cu, Zn) and the effect of de-icing salt on metal remobilisation. Column experimental results showed that the tested filter materials, fulfil the requirements regarding the pollutant removal capacity, except for one substrate. Due to the washout of fine particles, none of the substrates showed a low turbidity -the threshold value of 10 NTU could not be reached. This is reasonable for those substrates that allow both pollutant uptake and adequate tree root growth. After the first experiments, it can be summarised that the method used is suitable for characterising and comparing the different materials under study. At first glance, most of the materials fulfil the selected criteria to be used as plant substrate with a good removal capacity for contaminants. So far the "plant substrate granulite" can be classified as the best suitable one. In the future the remaining materials will be tested to perform the final evaluation and ranking. Furthermore the optimisation of the material composition, considering specific scopes of application, is the final goal of the project.

Acknowledgements:

Roza Allabashi, *University of Natural Resources and Life Sciences, Vienna*

Tadele Measho Haile, *University of Natural Resources and Life Sciences, Vienna*

1.1 Managing Climate and Environment (1)

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

Rainwater management measures in urban areas using the example of Vienna

Kerstin Weindl, Nina Hölscher, Laura Boldizsar, Johannes Ohler, Luisa Leitner
University of Natural Resources and Life Sciences, Vienna

Study Programme Level: BSc

Keywords:

Rainwater management, rain, Vienna, urban climate

Due to the high degree of sealing in urban areas like Vienna, severe precipitation events are getting more problematic. These problems are getting worse because of climatic changes. Rainwater has to be stored or purified to prevent floods and associated damages. Rainwater management deals with exactly these opportunities like expansion or improvement of the sewage system, as well as different methods, e.g. roof greening, façade greening and absorbing wells. Our paper focuses on the social acceptance of various solutions and alternative methods of rainwater management. To answer our research question, we started with literature research and surveyed 205 participants. We focused on demographic data, state of knowledge and willingness to participate in rainwater management in the surrounding area. The results were used to determine whether or not the Viennese population is in favour of changing the rainwater management in the city. The data shows that with increasing age there is more willingness to invest time and more knowledge of impacts of various measures. On average people are mostly devoted but not yet confronted with possible disadvantages since the issue is not the most present or urgent. On the one hand, people know about the impact the measures have on the environment and the advantages that come with them. On the other hand, they also see the costs and the time they have to invest and they are not fully convinced of the necessity.

Acknowledgements:

Florian Kretschmer, *University of Natural Resources and Life Sciences, Vienna*
Alexander Pressl, *University of Natural Resources and Life Sciences, Vienna*

1.1 Managing Climate and Environment (1)

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

Green-blue infrastructure as a tool to reduce flooding: The case in Beira, Mozambique

Cor Simon

Wageningen University and Research Centre

Study Programme Level: MSc

Keywords:

Climate change, green-blue infrastructure, flooding, multifunctional

Great parts of Beira, a delta city of Mozambique, flood during the rainy season. Especially in the district of Chota the flooding causes nuisance, (economic) damage and waterborne diseases. Chota has been urbanizing rapidly due to the expansion of Beira city, which increases flooding and hampers climate change adaptation. The goal of this thesis is to explore the potential of green-blue infrastructure to reduce flooding and improve liveability. A two-month field study, one week workshop, and a landscape based and –ecosystem services design was done for Chota. Results from the field study show that Chota is mainly a wetland where rainwater gathers from other parts of Beira. During heavy rain, the canal is not capable of draining the area well, so that water streams into the houses. From the participate workshop, a set of green-blue measures were selected including (fruit) trees along roads and improvement of the canal and retention ponds. Drawings and photos proved to be a great discussion tool. The green-blue measures are integrated into profiles that form the principle for each structure of Chota (road, canal, gardens, plots, dunes). Together, these profiles form an integrated green-blue infrastructure nested in different scales which absorb and drain the area and provide other ecosystem services (e.g. wind break, recreation, and food). Although the green-blue infrastructure design needs more in-depth research and has to be calculated, it seems to have great potential. The concept is favoured by the residents because it is natural, simple, and multifunctional. It is recommended to integrate green-blue infrastructure planning at the start of each new urban development before there is no space left anymore.

Acknowledgements:

Ingrid Duchhart, *Wageningen University and Research Centre*

Robbert Snep, *Other*

1.1 Managing Climate and Environment (1)

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

Social aspects of domestic waste disposal via the sewage system

Katharina Kearney, Hannah Berger, Ina Peschel, Lisa Kößlbacher, Agnes Hartl
University of Natural Resources and Life Sciences, Vienna

Study Programme Level: BSc

Keywords:

Domestic waste water; waste disposal; sewage system

Our day-to-day activities such as showering, bathing, washing dishes and using the toilet pollute clean water and produce wastewater. Our sewage systems, canals and wastewater treatment plants have the purpose to collect and purify domestic wastewater and ensure a safe reintroduction into the water-cycle. Many substances and items that are improperly disposed of in the toilet can cause disruptions within the canal and wastewater treatment plants, ultimately resulting in high costs. The objective of this research paper is to examine why domestic waste is disposed of in the toilet and which negative effects this can have on the sewage system and wastewater treatment plants. We researched the basic principles of wastewater systems, their mode of operation and their functions using scientific and technical literature including textbooks, articles and information from official websites. The first chapter gives an overview of the mechanical and biological steps in the purification of wastewater. We conducted an internet survey in order to research the social aspects of waste disposal, which was completed by participants from various social and academic backgrounds. The questions focused on the disposal of various items such as wet-wipes, expired medication and cooking oil. The collected data sheds light on the reasons behind the established waste disposal habits, which range from insufficient knowledge of the correct means of disposal to the lack of better and more convenient waste disposal alternatives. With the results of this paper we hope to raise awareness of the very preventable issue of improperly disposed-of waste, introduced into the sewage system, causing massive logistical and financial burdens on infrastructure. The unobstructed and proper operation of canals and wastewater treatment plants is of paramount importance for providing and securing environmentally safe and hygienic wastewater treatment.

Acknowledgements:

Florian Kretschmer , *University of Natural Resources and Life Sciences, Vienna*
Alexander Pressl , *University of Natural Resources and Life Sciences, Vienna*

1.1 Managing Climate and Environment (1)

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

Local Adaptation Plans of Action (LAPAs): An analysis of approaches to planning for climate change in Nepal

Pratigya Silwal¹⁾, Lin Roberts¹⁾, Hamish Rennie¹⁾, Manfred Josef Lexer²⁾

¹⁾ *Lincoln University, New Zealand*, ²⁾ *University of Natural Resources and Life Sciences, Vienna*

Study Programme Level: MSc

Keywords:

Local Adaptation Plan of Action (LAPA), planning approaches, bottom-up, forest, development

With a growing recognition of climate change impact and local adaptation needs, the Local Adaptation Plans of Action (LAPAs) has been promoted in Nepal. This paper explores the planning approaches of LAPAs under three different programmes in Nepal. 'Forest and biodiversity' being one major theme of the National Adaptation Programme of Action (NAPA) and LAPA, this research emphasizes the forest sector in particular to understand the complexity of bottom-up approach and the inter-linkage and overlap between adaptation, mitigation and development. The analysis of information drawn from 37 interviews from government, non-government and community representatives at national, district and local level, show that although the LAPAs in Nepal are prepared with limited external and scientific contribution, and they are rich with local information. However, the constrained knowledge and capacity of local people on climate change issues reverts the plan to regular development activities. Therefore, this article argues that co-production of knowledge can be an effective way to bring about new solutions and pathways to adapt. Integrating the climate change into the development planning process can avoid the risk of overlapping adaptation, mitigation and development, hence making development activities climate-smart.

Acknowledgements:

Lin Roberts, *Lincoln University, New Zealand*

Hamish Rennie, *Lincoln University, New Zealand*

1.1 Managing Climate and Environment (1)

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

Trace elements in flooding water of Vietnamese rice fields

Ann-Christin Struwe-Voscul

University of Copenhagen, Faculty of Science

Study Programme Level: MSc

Keywords:

Trace element, paddy rice field, storm flooding

The quality of surface water in Vietnam is poor and contains high amounts of trace elements (Thi Minh Hanh et al. 2011). This can be a threat to humans as it is used as drinking and irrigation water and for domestic purposes. In this study, As and Zn concentrations as well as general physicochemical factors of surface water from paddy rice fields and irrigation canals were determined before and during a four-day flooding event. The study site, a paddy rice field area in the Thanh Hoa province in Central Vietnam, experiences an average of 2.4 storms every year with high precipitation leading to an overflow of streams and low-order canals (Schmidt-Thomé et al. 2014). It has been found that storm events and flooding can increase the release and transport of trace elements into and within surface water (Matsunaga et al. 2013). The objectives of the study were to investigate: (1) if flooding events increase As and Zn water concentrations in a rice production area, (2) how the distribution between dissolved and suspended concentrations is affected by flooding and to assess (3) if water concentrations exceeded Vietnamese surface water quality standards and WHO drinking water guidelines. Concentrations of As showed a clear increase especially for dissolved As at the end of a four-day flooding event. Determined concentrations increased to 5.29 µg/l in the canal and to 7.41 µg/l in the fields. These concentrations did not exceed the guidelines, but were above the average reported background concentrations (WHO 2011). The Zn concentrations showed no significant trend over the four-day flooding event. Concentrations were maximal with 9.06 µg/l in the canal and 7.81 µg/l in the fields and did not exceed the guidelines.

Acknowledgements:

Bjarne W. Strobel, *University of Copenhagen, Faculty of Science*

Helle Marcussen, *University of Copenhagen, Faculty of Science*

1.2 Socioeconomics and other Aspects of Bioeconomy

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

MFI and rural development: The impact of microcredit on rice and chamkar-based agricultural systems in Northwest Cambodia

Touch Khiev¹⁾, Hes Tomas¹⁾, Kimchhin Sok²⁾

¹⁾ *Czech University of Life Sciences Prague*, ²⁾ *Other*

Study Programme Level: MSc

Keywords: Microcredit, Tonle Sap Lake, rice-based farming system

The absence of capital and the lack of access to credit is one of the keys financial challenges for Cambodian rice farmers who mainly count on rice and chamkar-based farming systems along Tonle Sap Lake. In the context of developing countries, sources of credit have been clearly identified as a mechanism to contribute greatly to improving agricultural production. The study aims to understand the impact of microcredit on rice-based cropping system in the floodplain area. Specific objectives of the research are: (1) to identify the sources of credit for household farmers; (2) to identify the main actors of the management of the credit within the households; (3) to study the impact of microcredit systems on the rice-based farming system and the local livelihoods; and (4) to analyse the situation of debt in the local economics and the sources of repayment. To achieve these objectives, a cluster sample random method will be applied to select study zone, while a simple purposive sampling method will be used to select 120 households from the list given by the chiefs of three villages. Structure-questionnaire, focus group discussion, and in-depth interviews will be carried out during field work. The Cobb-Douglas Production Function analysis will be employed to estimate the correlation between independent variables including loan amount, land size, the level of inputs used (seeds, fertilisers, pesticide, and herbicide) and the amount of output as the dependent variable. This study anticipates that the existing microcredit in the locality, the role of gender, the situation of debt, and sources of repayment are well identified, while the impact of microcredit on rice-based cropping systems will be revealed as statistical data in this research study. In conclusion, the availability of rural credit is an effective means of increasing agricultural productivity and sustainable agricultural production.

Acknowledgements:

Didier Pillot, *Other*

1.2 Socioeconomics and other Aspects of Bioeconomy

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

Physical-sensorial comparison: Quality of hard-boiled conventional/free-range, and organic eggs

Susanne Witt, Luis A. Polanco Medina
University of Hohenheim

Study Programme Level: MSc

Keywords:

Husbandry systems, physical-sensorial properties

The purpose of the study was to assess differences in the physical-sensorial properties of hard-boiled eggs managed under conventional/free range, and organic husbandry systems. Numerous studies reflect variance in the chemical composition of eggs managed under different husbandry systems; however, information on differences in hard-boiled is limited. Over a period of 3 weeks in April 2016 (08/04 – 22/08), a total of 360 eggs from Lohmann Brown (LB) and Lohmann White (LSL) hens were analysed, of which 180 were managed under a conventional/free range system, and 180 managed under an organic system. The layer hens were of the same age (36 weeks conventional, 35 weeks organic) in each system, and the collected eggs were of the same age. In the laboratory, all eggs were subjected to the same storage, cooking, and cooling procedures. The physical-sensorial properties measured were: ease of peeling (with factors of time and quality), yolk colour, and albumen texture. Each team member participated in peeling eggs, and ranking was determined collectively on a scale from 1 to 5 (1 being perfect, and 5 completely damaged). The yolk colour was measured with a Minolta Chroma Meter CR 300 by using the $L^*a^*b^*$ scale, and albumen texture was determined by using an Instron Universal Testing Machine, equipped with a Kramer-Lee shear tool. For ease of peeling, the results showed a meaningful variance in the time factor and peeler. Additionally, the rearing system affected the three attributes of yolk colour ($L^*a^*b^*$). This is attributable to synthetic carotenoid additives present in the feed of layer hens under the conventional system. Moreover, significant differences were observed in albumen texture. The albumen of the conventional free range eggs showed more resistance in the compression test than the albumen of organic eggs. In conclusion, the husbandry systems had a significant effect on physical-sensorial attributes.

Acknowledgements:

Sabine Zikeli, *University of Hohenheim*

Michael Grashorn, *University of Hohenheim*

Analysis of current and potential agricultural biomass cascading models in Colombia

Lina Mayorga-Duarte, Ricardo Vargas-Carpintero

University of Hohenheim

Study Programme Level: MSc

Keywords:

Cascading, biomass, agricultural by-products, Colombia, bioeconomy

Bioeconomy, also known as bio-based economy, demands a growing supply of biological renewable resources mainly from the agricultural sector to provide products to different industries such as pharma, food, feed, energy and others. Therefore, it is crucial to increase the resource efficiency of biomass and explore novel, sustainable and scalable productive alternatives through the implementation of concepts such as cascading, which aims at valorising the biomass residues and converting them into value-added sub-products through diverse processes. This strategy maximizes the use of agricultural by-products and creates innovative and productive business opportunities. Colombia is an agriculture-oriented country, where more than 2.9 million hectares is covered by multiple annual- and perennial-crop-based value chains; there are some specific cases that present cascading patterns, generating various economic, social and environmental benefits at regional level. At the same time there are other cases which have the potential to integrate cascading principles. Policy framework, research and institutional support are some of the drivers that foster the implementation and development of those cascading models. This study summarizes the main crop-based cascading models currently implemented in Colombia, describes and analyses them, identifies their key drivers and explores potential opportunities to improve the existing, developing and undeveloped biomass value chains under the cascading approach.

1.2 Socioeconomics and other Aspects of Bioeconomy

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

Institutional challenges in an emerging bio-economy: A case study of maize value-webs in Nigeria

Ayobami Adetoyinbo
University of Hohenheim

Study Programme Level: MSc

Keywords:

Maize, participatory net mapping, institutions, bioeconomy

Growing challenges of sustainable development require a shift in the conventional thinking which considers the agricultural sector as the only supplier of food. Traditionally, the analysis of the biomass sector has been dominated by value-chain studies. A more holistic “value-web” which entails many actors is suggested because the same crops find diverse usages in the biomass-based economy. To achieve a sustainable development, the Nigerian government seeks to grow the whole economy by diversifying the maize sector among others. Maize is particularly important for the poorer citizens and smallholders as a source of income and food security. However, maize small-scale farmers face difficulties in marketing their produce, and higher transaction cost as a result of challenges in its institutional structure. Thus, the study employs focus group discussion and uses an innovative participatory net-mapping tool to elicit information on the current institutional environment pertinent to a successful bioeconomy. The study concludes that an efficient institutional structure is important to ensure a successful shift into a bio-economy. However, inconsistent funding, as well as weak knowledge and information linkages in the institutional structure, hampers a successful shift to a biomass-based economy. The extensive means through which knowledge and information can be disseminated to smallholders (through ADP and MAAN) are plagued by these challenges. The study suggests that the state governments should consistently finance ADP (extension agents) and maize projects designed by the national research institutes. There should be more collaboration among state governments and national research institutes while efforts to link small-scale farmers and MAAN together should also be made.

Acknowledgements:

Saurabh Gupta, *University of Hohenheim*
Regina Birner, *University of Hohenheim*

1.2 Socioeconomics and other Aspects of Bioeconomy

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

Energy crops: Economic factor in the dynamic transformation of the rural landscape physiognomy using the example of the Mazowieckie Voivodship in Poland

Hanna Szumilas

Warsaw University of Life Sciences

Study Programme Level: PhD

Keywords:

Energy crops, energy production, landscape physiognomy, rural areas planning

Crops used for energy production are currently the dominant way of obtaining energy from renewable sources in the Mazovia region. It is estimated that nearly 90% of renewable energy produced in this region comes from biomass. In economic terms, energy crops are very profitable for many farmers. In addition, they improve the energy security of the region. High subsidies from the European Union for these types of crops mean that many farmers may decide to exchange their traditional, site-specific crops for energy plantations. It is important to note that energy plants are characterized by rapid growth, which allows for harvest after a fairly short time. However, changes in the choice of crop also becomes relevant to the landscape in which these changes appear. For some of the energy plants, growth is so significant that it involves major changes in these landscapes physiognomy. Because of this, energy crops on agricultural land can become the new landscape dominants due to the height of the plants and the surface area used for cultivation. Agricultural areas which were previously viewing foregrounds can also override the existing special value of both nature and culture. In addition, some of the energy plant species are considered invasive. Their uncontrolled development outside the cropped areas can result in the permanent transformation of a landscape. This research aimed to investigate whether and to what extent energy crops are regulated at the local level with regard to the protection of landscapes with unique physiognomies on a number of crops that are in this region. These studies were carried out with regard for the presence of local guidelines on the size of the crop, selection of plant material, and the limitations of these crops in areas of cultural and natural value. The results indicate that so far local governments do not pay sufficient attention to this problem.

Acknowledgements:

Renata Giedych, *Warsaw University of Life Sciences*

Carbon Quantum Dots: A novel and biologically derived group of materials providing promising technological applications

Bernhard Ungerer

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: BSc

Keywords:

Carbon quantum dots, biomaterials, bio-sensing, energy supply

Many of today's innovation-driven high-tech industries are characterized by the short development- and lifetime-cycles of their products. In this context, however, technical progress in many cases is achieved at the expense of negative environmental impact. In order to achieve both technical progress and environmental consciousness, an increased use of biomaterials has become a topic of interest for numerous fields of research aiming to substitute harmful and toxic materials with renewable resources and thereby open new possibilities of application. In this context Carbon quantum dots (CQDs) which constitute a novel group of nanoscale carbonaceous materials hold great potential in providing technical solutions based on sustainable resources. CQDs shortly can be described as graphite-type aggregates in the scale of single-digit nanometre size. There are several ways to obtain these particles from various organic precursor compounds (such as certain fruit juices). Among these the best proven and efficient ones are hydrothermal carbonization and acidic oxidation. Due to their unique properties which comprise size-dependent fluorescence, biocompatibility, chemical inertness as well as the possibility to be easily functionalized, several concepts for future application are currently in progress, all of them just on the level of basic research. This contribution shall give an insight to some of the most promising applications of CQDs. Taking the medical sector using CQDs attached to drug molecules via covalent modification could bring up a new bio-sensing technologies for instance in the field of cancer-diagnostics. Due to their strong photoluminescence CQDs could also be used for developing a new generation of carbon-based displays, even in volumetric shape together with other renewable materials such as cellulose. Eventually some researches focus on CQDs as possible substitutes for metal-based semiconductors in photovoltaic systems or for generation of hydrogen (H₂).

Acknowledgements:

Falk Liebner, *University of Natural Resources and Life Sciences, Vienna*

Sakeena Quraishi, *University of Natural Resources and Life Sciences, Vienna*

1.2 Socioeconomics and other Aspects of Bioeconomy

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

Manam canchu yaku – There is no water: Local analysis to investigate water security of the indigenous community Ccarhuancho in times of climate change and conflicts over the use of water

Astrid Max

Swedish University of Agricultural Sciences

Study Programme Level: MSc

Keywords:

Water Security, climate change perception, user conflict

Water is one of the most powerful and valuable resources in our world. Due to population growth, contamination, and unequal distribution, concern for water security is a steadily growing subject discussed by politicians. Previous studies pertaining to water security do not account for factors such as climate change and conflicts, especially in remote areas where data is scarce. This study analysed the vulnerability of water security, including factors specific to the indigenous community of Ccarhuancho, located in the southern Peruvian Andes. The study area is suitable for an exemplary study due to the prediction of high climate change impacts and an interregional, enduring conflict over the distribution of water resources. The conflict involves both the collector channel project, Tambo Ccaracocha, and its amplification, which impacts the yield increase of agricultural export products in the lowlands. Using empirical qualitative research, seven interviews were carried out with experts on the specific conflict context, in addition to a perception study in the locality of Ccarhuancho, in order to get to know the climatic changes and intrinsic conflict structures in the area that affect the local water resources. The questionnaire on climate change was further analysed with the statistical software SPSS, which was supported by an ArcGIS model analysis of digital climate data from the study area. The results reveal a perceived impact of climate change and an increase of meteorological variability, which stresses local economic systems and the quantity of water resources. Furthermore, if amplified, the disputed project Tambo Ccaracocha would affect the water security of the Ccarhuancho community. The aim of this study is to provide information about Ccarhuancho, by stressing the ecological and social importance of the case, and revealing the structures that prevent the conflict from being resolved. This enables local actors to take the necessary measures of adaption and water management.

Acknowledgements:

Bertil Mächtle, University of Heidelberg, DAAD Promos, CEPES

Development projects in the period 2007-2015 versus expectations of inhabitants in the Kadzidło municipality

Ewelina Sadłowska

Warsaw University of Life Sciences

Study Programme Level: BSc

Keywords:

Development, project, municipality

The main purpose of the study is to describe changes which appeared in Kadzidło municipality between 2007 and 2015, thanks to implementation of development projects co-financed by European Funds and try to assess their contribution to local sustainable development. The analysis area is rural and has a population of 11000. It is located in the Mazowieckie region of Poland. It was acknowledged that the local self-government forms conditions for local development and influences the population's quality of life. From 2007 to 2015, Kadzidło received approximately 34 million zlotys from the Regional Operational Program of Masovia Voivodeship. Kadzidło was the beneficiary of investments, e.g. sewage system, waterspouts, sport facilities, redevelopment of buildings based on the population's needs, improvement of the public space. The study presents their structure according to the subject, value and source of finance. For the purpose of the work, questionnaires were carried out among residents of the community and the mayor of Kadzidło. Inhabitants' opinion on the outcomes of these investments were not the same in comparison to the opinion of the mayor of Kadzidło, e.g. in terms of importance of completed projects - inhabitants considered road infrastructure as the most important, while the mayor emphasized the development of the sewage system.

Acknowledgements:

Nina Drejerska, *Warsaw University of Life Sciences*

1.2 Socioeconomics and other Aspects of Bioeconomy

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

Rainfall variability, electricity consumption and economic growth in Ethiopia: A co-integration analysis

Wondmagegn Tirkaso

Swedish University of Agricultural Sciences

Study Programme Level: PhD

Keywords:

Rainfall variability, electric power consumption, economic growth, causality, ARDL, Ethiopia

This paper examines the casual relationship between rainfall variability, electric power consumption and economic growth in Ethiopia based on bounds testing procedure for the period of 1981 and 2014. Estimated result indicated a unidirectional long-run Granger causality going from GDP to electric power consumption. Besides, there is evidence of unidirectional long-run Granger causality going from rainfall variability to electric power consumption. A policy for electric power conservation could not be recommended given the low rate of electric power access in Ethiopia. Instead, the government should promote urban and rural electrification programmes reinforced by better efficiency and power generation schemes. In addition, diversification of power generation sources should be considered in order to mitigate the potential adverse effects of rainfall inconsistency on electric power generation plants.

1.2 Socioeconomics and other Aspects of Bioeconomy

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

IBBESS: A case study to empower students for the Bioeconomy

Fons Janssen
Wageningen University

Study Programme Level: Msc

Keywords:

Empowering, students, innovation, challenge, SymbioSUM

Initiative Description

IBBESS has the mission to inspire and facilitate the ‘connection of (especially) students, companies, academia, institutions, politics, media and the general public to the biobased economy’ ultimately creating a biobased society. It is our vision to ‘catalyze growth in the BioBased Economy by engaging today’s students to become tomorrow’s experts’.

Event Description

The SymbioSUM is combining aspects of a Conference and a ThinkTank to achieve a richer experience than the sum of all parts. It features a one-day conference with expert talks from policy, economy and science discussing current obstacles, developments and possible solutions for a biobased economy. As IBBESS bridges the gap between an “uninspired” student life and a “purposeful” career life in building the biobased economy. A special feature of the SymbioSUM is the BioBased Economy ThinkTank. After inspiring talks, students from various disciplines join their efforts to create innovative approaches to three challenges of the biobased economy. The event is an environment where Conference plus ThinkTank combined address and involve every layer of society. Through the topic ‘rethink your oil-based day’ IBBESS challenges the status quo to implement biobased solutions in our daily life. Inter-disciplinarity and internationality are combined in the Students-meet-Students (SmS) Teams providing a casual environment to get to know each other for working on a ThinkTank challenge together. IBBESS is anticipated to be an annual event connecting its alumni members through a platform. This hub will provide access to spin-off events, networking, entrepreneurship and the biobased economy.

Acknowledgements:

Mario Beck, *Wageningen University*
Bart Emons, *Wageningen University*
Gerlinde van Vilsteren, *Centre for BioBased Economy*

1.2 Socioeconomics and other Aspects of Bioeconomy

Friday: 16:45- 17:45 - Venue: Auditorium (Aula)

The estimation of initial public offering efficiency (IPO) of agro-food sector in Poland

Nikolay Savvin

Warsaw University of Life Sciences

Study Programme Level: MSc

Keywords:

IPO, agro-food sector, Warsaw Stock Exchange

Initial public offering or stock market launch is a type of public offering in which shares of a company are sold, usually to institutional investors who in turn sell to the general public, on a securities exchange. This initial sale transforms the company into a public company. The advantages of going public are: capital attraction, gaining market capitalization, high credibility rating among credit institutions, and mobilization of cheap investment funds. Companies involved in agriculture and food productions are concerned with less interest compared to hi-tech or innovation enterprises. To understand why investors intend to buy agro-food company shares traded in Warsaw Stock Exchange and the efficiency of attracting financial resources, this research aims to analyse "underpricing" (Benveniste, Spindt; 1989) through a regression model and middle, long term periods (Loughran, Ritter; 1995) using an econometric approach. Moreover, research focuses on industrial aspects of the agro-food sector in order to reveal its peculiarities in comparison to other industry types.

Acknowledgements:

Mariusz Maciejczak, *Warsaw University of Life Sciences*

Poster Sessions

Parallel Sessions II
Saturday 12 November
08:45 - 09:45

2.1 Food Safety and Food Security; Developing Renewable Resources Industrially

Chairs: Gabrielle Lagerkvist, *Swedish University of Agricultural Sciences*
Walter Vetter, *University of Hohenheim*

Venue: Auditorium (Aula)

2.2 Improving Efficient and Sustainable Agriculture

Chairs: Markus Puschenreiter, *University of Natural Resources and Life Sciences, Vienna*
Lukáš Pospíšil, *Czech University of Life Sciences*

Venue: Auditorium (Aula)

2.1 Food Safety and Food Security; Developing Renewable Resources Industrially

Saturday, 08:45 - 09:45- Venue: Auditorium (Aula)

Advantages of densification process utilization in proper waste paper management

Anna Brunerová, Milan Brožek
Czech University of Life Sciences Prague

Study Programme Level: PhD

Keywords:

Mechanical durability, solid biofuel, quality testing, rupture force, paper briquettes

Waste paper represents one of the most frequently recycled material nowadays. But paper recycling technology may not always be accessible and paper degradation can produce waste paper that is not always suitable for recycling. Briquettes are considered an environmental friendly renewable energy resource and its possible disintegration which influences the final quality of the briquette is caused by handling, storage and transportation. During our research, a briquette samples produced from waste paper were subjected to direct destructive testing in an effort to simulate briquette degradation in reality. The experimental part was performed according to mandatory technical standards (EN 643:2014, EN 15234–1:2011, EN 15210–2:2011, EN ISO 17225-1:2015). Waste paper composed primarily of coloured leaflets was shredded to 4×50 mm stripes and its moisture content was stated equal to 4.99% in average. Subsequently a briquette samples were produced by hydraulic piston press and its density was found to be equal to 1126 kg/m³ on average. Mechanical durability (DU) and rupture force (RF) were chosen as briquette quality indicators. DU test was performed in a special rotating dustproof drum where samples were subjected to simulated impacts. During the RF determination briquette samples were tested by applying of loading force to stated maximal tolerated force before briquette disintegration. Resulting values proved extremely high mechanical durability (98.97% in average) which corresponded to its highest grade (DU≥95%) and an outstanding level of rupture force which was equal to 95.41 N/mm on average. Briquettes produced from wood residues disintegrate under the force of approximately 50-60 N/mm. In general, it can be concluded that waste paper briquettes exhibited a very high level of mechanical quality and their production is also suitable in conditions where is not possible to practice ideal handling, storage and transportation. Therefore, we found that that briquetting is a suitable technology for proper waste management.

Acknowledgements:

Milan Brožek, *Czech University of Life Sciences Prague*

2.1 Food Safety and Food Security; Developing Renewable Resources Industrially

Saturday, 08:45 - 09:45- Venue: Auditorium (Aula)

Phosphate recovery through acid-leaching of hydrothermally carbonized digestate

Nicholas Faweya
University of Hohenheim

Study Programme Level: MSc

Keywords:

Hydrochars, leaching, phosphates

While the depletion of the minable global phosphate reserves continues to threaten the sustainability of the global food supply on one hand, a size-able amount of this resource that is irreversibly lost from the agricultural systems poses serious environmental concerns e.g. eutrophication of water bodies on the other hand. Therefore, it is important to develop appropriate phosphate recovery processes which will not only mitigate the environmental problems but also minimize phosphate rock extraction, thereby extending the life span of the disproportionately distributed non-renewable resource. Hydrothermal carbonization (HTC) of digestate followed by an acid-leaching process was examined as a possible channel to capture and recover phosphate. HTC is a wet thermochemical conversion process carried out at elevated temperatures in a closed system under saturation pressures for several hours in order to produce a carbonaceous material usually called hydrochar. The HTC reactions for the digestate were conducted at temperatures of 190oC, 220oC and 250oC for a residence time of 3hrs with resulting hydrochar yields of about 70-80% in all the three reaction conditions. Phosphate recovery was achieved through the acid leaching of the hydrochars, using 1.5M sulphuric acid and 3.0M citric acid as the mineral and organic acids respectively. An extraction rate of about 80-95% was realized from both acids. The phosphorus fractionation of the hydrochar was also evaluated. The result indicated that about 70-80% of the trapped phosphorus in the hydrochar matrixes was in form of calcium phosphate. While the captured and recovered phosphate is used for agricultural purposes, thereby reducing the phosphate pollution impact, the leached hydrochar is suitable for other industrial applications, e.g. adsorbent agents, energy storage etc. HTC of digestate seems to be a promising technology for phosphate reclamation. However, the technical know-how and the costs involved are part of the challenges of the technology.

Acknowledgements:

Andrea Kruse, *University of Hohenheim*
Xueli Zhao , *University of Hohenheim*
Gero Becker, *University of Hohenheim*

2.1 Food Safety and Food Security; Developing Renewable Resources Industrially

Saturday, 08:45 - 09:45- Venue: Auditorium (Aula)

Evaluating greenhouse gas emission of integrated industrial chain for soybean biodiesel production in Brazil

Xin You¹⁾, Mauricio R. Cherubin²⁾, Cindy S. Moreira²⁾, Carlos E. P. Cerri²⁾

¹⁾ *University of Hohenheim*, ²⁾ *Other*

Study Programme Level: MSc

Keywords:

Greenhouse gas emission; integrated system; soybean biodiesel

Biodiesel has been playing an increasingly important role in the Brazilian energy matrix and promoting the national bio-based economy. Biodiesel production in Brazil has grown from 736 m³ in 2005 to approximately 4.4 million m³ in 2014. Among all the inputs, soybean predominates in biodiesel production in Brazil with a share of 77.2% in 2014 and made Brazil the 2nd largest biodiesel producer worldwide. Current models used in energy balance reports have shown a positive net energy ratio, indicating the renewability of soybean biodiesel. However, the environmental impacts and the fair use of this agricultural resource have debatably come to public attention. Consumers increasingly value the environmental sustainability of agricultural products, with a particular interest in the greenhouse gas (GHG) emissions as a sustainability indicator. For policy and decision-making processes, this sustainability indicator is also being demanded more often. To assess the GHG emission of soybean biodiesel production in Brazil, we used data from the Centre West region, which represent more than 70% of total soybean production in Brazil. A four-stage life cycle model from cradle to distribution is integrated into our calculation. GHG emissions through all stages were calculated and special interest was paid to the difference between integrated industrial chain and non-integrated industrial chain. Results show a significant improvement in the reduction of GHG emission in the integrated system, even considering various distribution routes. The study can help the Brazilian biodiesel industry to raise concern about the integration of industrial units and it also suggests a new GHG emission mitigation aspect for policy and decision making.

Acknowledgements:

Iris Lewandowski, *University of Hohenheim*

Moritz Wagner, *University of Hohenheim*

2.1 Food Safety and Food Security; Developing Renewable Resources Industrially

Saturday, 08:45 - 09:45- Venue: Auditorium (Aula)

Market chain analysis of fish products in Cambodia

Stanislav Flekač

Czech University of Life Sciences Prague

Study Programme Level: PhD

Keywords:

Value chain, fish products, fish storage, fish processing, added value, province comparison

Food security is one of the sustainable development goals. A key aspect of food security is an effective value chain for food commodities to ensure that food will come to consumers in a state adequate for consumption. Fish production in Cambodia supplies at least 82.1 % of the animal protein and 86 % of Cambodian land is in the catchment area of the Mekong River, the tenth biggest river in the world. Fish production in Cambodia has a long history and is the fastest growing segment in this country. The study analysed the value chain of fish products in Cambodia, specifically focusing on the following species: *Henicorhynchus/Cirrhinus siamensis*, *Henicorhynchus/Cirrhinus lobatus*, *Pangasius bocourti*, *Pangasius hypophthalmus*, *Oreochromis niloticus*, *Channa striata*, *Clarias batrachus* and *Anabas testudines*. The research is focused on identification the value chains of all the segments, the supply chains, and analysing their drawbacks and positives, comparing added value and price levels between provinces and rainy and dry seasons. The primary data collection was based on six different questionnaires for each actor in a value chain and interviews (n=117 respondents) from the following groups: fishermen, fish farmers, intermediaries, processors, retailers, and consumers. The research found significant statistical differences in price levels of the following species: Tilapia, Siamese Carp, and Common Carp and also for fish paste, depending on the province. We identified different added values from each value chain segment. The study also mapped the geographical channels of the supply chain for specified fish species and provided recommendations for improvements.

Acknowledgements:

Petra Chaloupkova, *Royal University of Agriculture Phnom Penh*

2.1 Food Safety and Food Security; Developing Renewable Resources Industrially

Saturday, 08:45 - 09:45- Venue: Auditorium (Aula)

Detection and minimization of atropine and scopolamine in contaminated millet with *Datura stramonium*

Saman Ostovar¹⁾, Christine Schwake-Anduschus²⁾, Jens Begemann²⁾, Petra Högy¹⁾

¹⁾ *University of Hohenheim*, ²⁾ *Other*

Study Programme Level: MSc

Keywords:

Atropine; Scopolamine; HPLC-MS/MS; *Datura stramonium*; minimization

Tropane alkaloids are secondary metabolites which naturally occur in plant families such as *Brassicaceae*, *Solanaceae* and *Erythroxylaceae*. The most studied tropane alkaloids are atropine and scopolamine. *Datura stramonium* is widely distributed in temperate and tropical regions and its seeds have been found as impurities in e.g. linseed, soybean, sorghum, millet, sunflower, buckwheat and their products. Seeds from *Datura* cannot be easily removed from sorghum, millet and buckwheat by sorting and cleaning. Hence these commodities and their derived products can be contaminated with tropane alkaloids. In order to detect atropine and scopolamine, a high-performance liquid chromatography-tandem mass spectrometry (HPLC-MS/MS) method was validated. The method relies on an extraction step, followed by dilution of the extract and direct injection into the LC-MS/MS system with an analysis time of 15 min. This method is simple, fast, easy to handle and cost-effective. The average concentrations of atropine and scopolamine in ten intact *Datura* seeds were 1529.3 ± 1087.6 and 153.1 ± 122.4 mg/kg, respectively. In order to mimic food contamination, two kilograms of millet were artificially mixed with 200 *Datura* seeds. After five minutes, the average concentration of atropine in millet samples was 0.72 ± 0.02 µg/kg whereas the average concentration of scopolamine was 0.31 ± 0.04 µg/kg. A cleaning procedure was implemented to reduce atropine and scopolamine in the artificially contaminated millet using mechanical devices. After the cleaning process, the average concentrations of atropine and scopolamine decreased to 0.41 ± 0.42 and 0.15 ± 0.04 µg/kg in peeled millet, respectively. The validated method was applied to some commercial millet-derived products (porridge, snacks and flakes). In all tested samples, the measured concentrations of atropine and scopolamine were less than 1.0 µg/kg, which is the threshold for atropine and scopolamine in processed cereal-based food and baby food for infants and young children, containing millet, sorghum, buckwheat or their derived products; according to the European Commission Regulation 2016/239.

Acknowledgements:

Christine Schwake-Anduschus, *Other*
Petra Högy, *University of Hohenheim*

2.1 Food Safety and Food Security; Developing Renewable Resources Industrially

Saturday, 08:45 - 09:45- Venue: Auditorium (Aula)

Evaluation of a mutant population of a highly *Fusarium* head blight resistant wheat line for resistance to the mycotoxin deoxynivalenol

Roman Polzer

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: MSc

Keywords:

Fusarium head blight, *triticum aestivum*, resistance breeding

Fusarium head blight (FHB) is an important and dangerous disease on small grain cereals caused by different *Fusarium* species worldwide. *Fusarium graminearum*, *Fusarium avenaceum*, and *Fusarium culmorum* are primarily responsible for FHB outbreaks in Europe. Beside yield loss and reduced seed quality a major threat is the contamination of the crop with *Fusarium* mycotoxins like deoxynivalenol (DON) or zeralenone. Breeding for resistance is an important method to gain high quality crops with low or even without mycotoxin contamination. Resistance to FHB is a quantitative trait controlled by several genes. Previous studies in wheat indicate that there are a few major quantitative trait loci (QTL) and several minor genes conferring FHB resistance. One major QTL is Fhb1 (Qfhs.ndsu-3BS) which also causes DON resistance. In this field experiment a forward genetic approach will be used to evaluate app. 1500 mutant lines of the highly FHB resistant line CM-82036. Therefore two spikelets (four florets) of three heads from each mutated CM-82036 line will be infiltrated with 20µl DON solution (12g/l) per floret at anthesis, covered with a wet plastic bag overnight (to ensure humidity), and followed by phenotypic evaluation at several points after the treatment. Genomic analysis will be done for lines showing DON sensitive phenotypes (premature bleaching of the heads, rough and shrivelled kernels) to identify common mutations and to localize a DON resistance gene in the Fhb1 QTL.

Acknowledgements:

Hermann Bürstmayr, *University of Natural Resources and Life Sciences, Vienna*

Barbara Steiner, *University of Natural Resources and Life Sciences, Vienna*

2.1 Food Safety and Food Security; Developing Renewable Resources Industrially

Saturday, 08:45 - 09:45- Venue: Auditorium (Aula)

Comparison of two methods detecting the contamination of honey by fungi and yeast

Klaudia Strucińska, Anna Tyszko, Zuzanna Nowak, Beata Madras-Majewska,
Maciej Ochnio
Warsaw University of Life Sciences

Study Programme Level: BSc

Keywords:

Honey, fungi, yeast, barcoding, DNA

Honey is a substance widely known for its antiseptic properties. Glucose oxidase contained in honey is its natural preservative, but poor storage conditions, fungus in the hive, and excessive dilution can lead to the development of undesirable microorganisms. In our research we have attempted to compare the detection of fungi and yeast in honey in two ways: classical, using cultures, and modern, with DNA barcoding. The examination group contained 25 Polish honeys, were collected directly from private apiaries in the summer 2015. All samples from the study group were examined by mycological analyses. Samples were plated on 3 differentiating solid media: Sabouraud dextrose agar with chloramphenicol, Dextrose Agar with potatoes, and DRBC Agar. To evaluate the fungi's morphology, we used microculture slide techniques and stained with the Gram method or with lactophenol cotton blue. Genetic assays was started from total DNA extraction using Plant & Fungi DNA Purification Kit. Thereafter for all DNA samples from the study group and from material gained from the microculture slide, the target sequence internal transcribed spacer region (ITS), using ITS1/ITS4 primers (White et al 1990), was amplified. Those primers are commonly used in fungi and yeast barcoding identification systems. To evaluate the results of PCR, the amplicons were separated by agarose electrophoresis followed by staining with ethidium bromide. Positive results classified the sample for sequencing the examined region and defined microorganism species, which dominate in the honey samples. Simultaneously we verified species defined in microculture slides. The results of both types of analysis showed the easiest detectable yeast, *Zygosaccharomyces melis*, to be the dominant type of "sugar dependent" yeast. We have found also the differences between the classification of organisms according to the identification method. Differences in the assay may be due to lower accuracy microscopic examination, but also the great similarity of some fungi within the ITS sequence.

Acknowledgements:

Wanda Olech-Piasecka, *Warsaw University of Life Sciences*

2.1 Food Safety and Food Security; Developing Renewable Resources Industrially

Saturday, 08:45 - 09:45- Venue: Auditorium (Aula)

Covert virus infections in reared lepidopteran species

Lucrezia Baiocco

Wageningen University and Research Centre

Study Programme Level: MSc

Keywords:

Edible insects, lepidopteran species, insect viruses, latency, persistency

Edible insects have been suggested as a valuable, sustainable, alternative protein-rich food and feed source because of their high nutritional value, high reproduction rate, low-tech rearing facilities required, and low environmental footprint associated with their production. In Western countries, the number of insect and lepidopteran producing companies is still limited, however, this number is expected to rapidly increase in the next years. Virus infections can have severe financial consequences for insect-producing companies especially when they are not detected on time. Latent and persistent viruses can cause covert infections which do not result in symptomatic viral infections. Therefore, the prevention of these virus forms cannot rely on the observation of symptoms of infection. Several DNA and RNA viruses are responsible for covertly infecting lepidopteran species. In this study, it was demonstrated that populations of *Spodoptera exigua* were covertly infected by baculovirus (SeMNPV). Furthermore, rearing parameters such as density and rearing temperature influence the transition from covert baculovirus infection into overt and lethal baculovirus infection. In particular, high density and low temperature seem to have the largest effect on the mortality of the larvae of *S. exigua*. Finally, for the first time *S. exigua* iflavivirus-2 was detected in asymptomatic larvae of *S. exigua* of the Laboratory of Virology of Wageningen University and in asymptomatic larvae of *Heliothis virescens* of the IBED centre of the University of Amsterdam. These results suggest that covert infections are a potential risk in insect rearing. To fully assess this risk, more studies are needed in order to identify proper strategies of prevention.

Acknowledgements:

Vera Ros, *Wageningen University and Research Centre*

2.1 Food Safety and Food Security; Developing Renewable Resources Industrially

Saturday, 08:45 - 09:45- Venue: Auditorium (Aula)

Social practices of urban agriculture in the metropolitan region of Thessaloniki, Greece

Georgios Kontothanasis

Wageningen University and Research Centre

Study Programme Level: MSc

Keywords:

Urban agriculture, holistic planning, sustainable transition, Thessaloniki

The master thesis utilizes the theories of Social Practice Theory (SPT) and the Multi-Level Framework (MLF) to study urban agriculture in three case studies in the metropolitan region of Thessaloniki. The thesis bridges the concepts of urban agriculture and alternative food networks with the concept of food provision. It excludes middlemen and merchants from urban agriculture by focusing on local food supply. The analysis focuses on urban agriculture practice for food provision, which is part of alternative food networks. More specifically the activities of acquisition, preparation, production, consumption and disposal of food implemented through urban agriculture are studied by SPT. SPT understands food provision activities by deconstructing them in materials, competences, and meanings for each case study separately. A comparison between the three case studies reveals the most popular activities for food provision related to urban agriculture. The most popular activities end up as practice and shape the form of urban agriculture. MLF is applied to understand the relationship between the socio-spatial context and the emergence and reproduction of urban agriculture. MLF seeks to understand the socio-spatial conditions that shape protected niches where urban agriculture practices emerge and reproduce as novelties. Thus, this thesis recognises those practices that persist as sustainable in certain socio-spatial characteristics. The analysis developed with these two tools allows a better understanding of the future expansion of a sustainable food provision system in Thessaloniki by identifying sustainable and unsustainable patterns of urban agriculture practice. The study concludes with policy and planning recommendations for urban agriculture in the metropolitan region of Thessaloniki. However, the analysis framework, SPT and MLF, can be applied in different areas as it corresponds to the different socio-spatial characteristics of each region by treating the data holistically.

Acknowledgements:

Arnold Van der Valk, *Wageningen University and Research Centre*

Jeroen Ouburg, *Wageningen University and Research Centre*

2.1 Food Safety and Food Security; Developing Renewable Resources Industrially

Saturday, 08:45 - 09:45- Venue: Auditorium (Aula)

Calibration of the soil-crop model Expert-N for soybean (*Glycine Max*), durum wheat (*Triticum Durum Desf*) and sunflower (*Helianthus Annuus*) in South Germany as a response to climate change

Luciana Chavez Rodriguez
University of Hohenheim

Study Programme Level: MSc

Keywords:

Package Expert-N, crop model, model parameters, GECROS model

Facing climate change, some new crops such as soybean, durum wheat and sunflower are being cultivated especially in southern Germany. Even though those crops are not new in other parts of the world, information about their behavior is still unknown in this region, and this data is important as a tool for agricultural decision making in the coming years. Therefore, the package Expert-N was used firstly to calibrate the GECROS model with field data of soybean, durum wheat and sunflower from the project P4 as part of the research group FOR 1695 ("Regional Climate Change"), Stuttgart, Germany for 2015, and different areas in Baden Württemberg were provided by the Landwirtschaftliches Technologiezentrum Augustenberg (LTZ) for 2013 for soybean. After the setting of the model, inverse estimation of model parameters was performed by coupling Expert-N with UCODE_2014, a universal tool to perform sensitivity analysis, calibration, and uncertainty evaluations. After a phenology optimization, the same process was performed for the rest of the parameters. Current results show that the parameters related to nitrogen uptake and nitrogen partitioning FCRSH, FNRSH, XVN and XJN, specific leaf area (Slao) and Initial leaf Nitrogen (Inci), were the most sensitive ones for the model, as well as genotype parameters such as seed weight (Seedw) and seed nitrogen content (Seednc). Optimized parameters simulated acceptably phenology for all crops, but biomass development and nitrogen content works better for sunflower. The results lead us to a better understanding of which parameters are important to be taken into account in coming field evaluations to optimize the model and validate it for the study region.

Acknowledgements:

Sebastian Gayler, *University of Hohenheim*
Arne Poyda, *University of Hohenheim*

2.1 Food Safety and Food Security; Developing Renewable Resources Industrially

Saturday, 08:45 - 09:45- Venue: Auditorium (Aula)

Quinoa - From the Andes to the world - A market analysis

Christian Stetter
University of Hohenheim

Study Programme Level: MSc

Keywords:

Quinoa, food security, market analysis, economic potential, niche crop

Due to its high nutritional value, the Andean niche crop quinoa is largely regarded as a “superfood”. Numerous authors have found that it has the potential to play a key role in fighting hunger, malnutrition and poverty. While most studies have looked at it from either a food scientist’s or an agronomist’s point of view, the economic perspective has widely been neglected. In view of the lack of knowledge about the economic potential of quinoa, the thesis aims to shed light on the current situation of the world quinoa market. By reviewing both international and national statistical data along with previous studies on quinoa, all components of the market can be identified. The specific features of supply and demand, including production, consumption and international trade as well as prices, are analysed. The numbers in production, trade flows and prices have been skyrocketing over the last decade. As the main driver of this development, an increased demand from high-income countries can be identified. Although the market has expanded from its region of origin to a global scale, it can be said that, from an economic viewpoint, quinoa does not appear to live up to the high expectations regarding its contribution to food security.

Acknowledgements:

Edda Thiele, *University of Hohenheim*

Exploring new approaches to identify host interactors of Tomato Spotted Wilt Virus-encoded NSs protein

Gijs Vincent van den Berg

Wageningen University and Research Centre

Study Programme Level: MSc

Keywords:

Tomato spotted wilt virus, TSWV, RNAi, RNA silencing suppressor, NSs

Tomato spotted wilt virus (TSWV) belongs to the *Tospovirus* genus, the only plant infecting genus within the *Bunyaviridae* family. It causes severe damage upon infection and has a broad host range, including worldwide economically important crops. The antiviral defence of the host consists of several mechanisms, including the RNA interference (RNAi) pathway which is triggered by viral double stranded RNA (dsRNA). These dsRNA molecules are processed into small interfering RNA's (siRNA). The siRNA is loaded in an effector complex which cleaves sequence-specific viral mRNA and subsequently inhibits viral replication. Alternatively, plants make use of resistance genes that are triggered upon viral infection and in general result in a hypersensitive response. To counteract the antiviral RNAi response of plants, viruses have developed RNA silencing suppressors (RSS). For TSWV the NSs protein has been identified as RSS. In addition, NSs has been shown to trigger the *Tsw* resistance gene. During these defence responses against TSWV, NSs plays a crucial role, however the exact mechanisms of actions are not yet unravelled. To obtain more understanding of the NSs action mechanisms, we aim to identify host interactors of NSs. To unravel these interactions, two methods, a co-IP and Octet Qke protein binding assay were chosen. Therefore, GFP tagged NSs constructs were transiently expressed in *N. Benthamiana* leaves. With both methods, GFP-NSs is captured by using anti-GFP antibodies. The goal is to identify the interaction partners with mass-spectrometry. Unfortunately, the co-IP and Octet Qke binding assay need to be further optimised before continuation with mass-spectrometry. Therefore, no interaction partners were identified. However, the co-IP and Octet Qke are promising methods, which can in combination with mass-spectrometry give more insight to the interaction partners of NSs and their importance in host defence.

Acknowledgements:

Corien Voorburg, *Wageningen University and Research Centre*

2.2 Improving Efficient and Sustainable Agricultural Production

Saturday, 08:45 - 09:45- Venue: Auditorium (Aula)

The German dispute over an agricultural turnaround: Disparities and overlaps in framing sustainable agriculture comparing the food movement 'Wir haben es satt!' to the countermovement 'Wir machen Euch satt!'

Kathrin Poetschki

Wageningen University and Research Centre

Study Programme Level: BSc

Keywords:

Sustainable agriculture, agricultural turnaround, food movements, framing

The modernization paradigm which calls for technological intensification, specialization and scale enlargement has dominated German agriculture since the 1950s. However, production-oriented agricultural policies are experiencing a lack of legitimacy. Present-day agriculture is framed as the cause of several problems: food scandals, environmental degradation, loss of biodiversity, animal abuse, and many more. The German food movement 'Wir haben es satt!' (We are fed up!) calls for a turnaround in agricultural policy and a shift from agroindustry to agroecology. Farmers felt unjustly accused by the network and initiated a countermovement under the slogan 'Wir machen Euch satt!' (We feed you!). The thesis provides insights into the two movements and their positions in this debate. It analyses whether the initiatives can be described as urban versus rural movements, and whether there are overlaps in the way they think about sustainable agriculture and an agricultural turnaround. The thesis reveals that multiple understandings and opinions can be traced back to framing: talking about the same concept but giving different meaning to it. This makes communication and collaboration between the groups difficult. Despite tensions and confrontations, in both networks there are members who show advocacy of the rural development approach and agroecological styles of farming. However, the attitudes towards the need for an agricultural turnaround and what both groups understand by 'sustainable agriculture' differ.

Acknowledgements:

Henk Oostindie, *Wageningen University and Research Centre*

The effect of methyl jasmonate on tomato plant (*Lycopersicum esculentum*) defense against armyworm (*Spodoptera litura*) herbivory

Nuraini Nuraini¹⁾, Rizkita R. Esyanti²⁾

¹⁾ Wageningen University and Research Centre, ²⁾ Other

Study Programme Level: MSc

Keywords:

Tomato plant; methyl jasmonate; armyworm; plant defence, plant growth

The objective of this research was to evaluate the effect of exogenous Methyl jasmonate application to enhance plant defence in tomato plants against armyworm herbivory. This research was conducted in 4 groups of treatment which were control (no treatment), MeJA treatment, armyworm treatment, and combination (MeJA application before armyworm treatment) in 3 replicates. Tomato plant age 5 weeks were acclimatized for 3 days before treatment. MeJA was applied by spraying 0.01% concentration on the plant (2-2.5 mL) one day and one hour before armyworm application. Armyworms used for these research were in the 3rd and 4th instar and fasted for 6 hours prior to the treatment, 10 armyworms were used per tomato plant. Some parameters were measured in this research, which were: herbivory index, dry weight, MeJA concentration, secondary metabolite, and protein analysis. Methanol was used to extract MeJA; extract was later used for analysis with High Performance Liquid Chromatography (HPLC). Ethanol (PA) was used as solvent in secondary metabolite extraction, which further analysed on gas chromatography–mass spectrometry (GC-MS). Protein was analysed by SDS Page method. This research showed that MeJA application did not reduce plant quality and tended to reduce the herbivory index, thus not interfering with plant growth. MeJA analysis showed that MeJA application prior to armyworm treatment produced the highest MeJA concentration compared to other treatments and reached the highest peak in 60 minutes. Secondary metabolite analysis showed a group of terpenoids that play a role in the plant's defence mechanism. Protein analysis showed a putative protein that might have role in the plant's defence mechanism, such as serpin family, lipoxygenase and jasmonic-induced protein 21 (JIP21).

Acknowledgements:

Rizkita R. Esyanti, *Other*

Evaluation of common bunt resistance in three winter wheat populations

Julia Hagenguth

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: MSc

Keywords:

Tilletia caries, organic, marker, *Bt*-genes

Common bunt (*Tilletia caries*, *T. laevis*) is one of the most destructive wheat diseases worldwide. Currently, most European winter wheat cultivars are susceptible, but bunt resistance was identified in exotic material, such as Turkish landraces. Integrating resistance genes from exotic material in agriculturally valuable genotypes is time-consuming and laborious and could be facilitated by marker assisted selection. Three winter wheat mapping populations derived from biparental crosses between three exotic sources of bunt resistance (M822123, PI178383, PI560841-bcl) and two susceptible Austrian cultivars (Rainer, Midas) each consisting of 100 to 130 genotypes were screened for common bunt resistance in an artificially seed-inoculated field trial in 2015. Furthermore, 20 cultivars currently adopted in organic winter wheat production in Austria and 57 organic breeding lines were tested for common bunt resistance. Aim of the study was to evaluate the mappings populations with regard to their type of resistance, number of resistance genes, and possible applications. 75% of the genotypes derived from M822123 and PI178383 were classified as resistant and only 17.65% from PI560841-bcl. Results therefore suggest that resistance of M822123 and PI178383 is mediated by two independently segregating major resistance genes. These findings are surprising, since they contradict earlier descriptions of M822123 being monogenic for the resistance gene *Bt11* and PI178383 carrying resistance genes *Bt8*, *Bt9*, and *Bt10*. Resistance of PI560841-bcl is of quantitative nature with several minor genes involved. Resistance genes of M822123 and PI178383 are effective in Austria and genotypes of both mapping populations are highly interesting for practical breeding programs. Genotyping of these mapping populations is recommended in order to map resistance genes and develop molecular markers for the application in organic wheat breeding programs. All tested cultivars were found to be highly susceptible. Resistant breeding lines could be identified and demonstrate the successful introgression of resistance genes into adapted lines.

Acknowledgements:

Almuth Müllner, *University of Natural Resources and Life Sciences, Vienna*

Hermann Bürstmayr, *University of Natural Resources and Life Sciences, Vienna*

Sucrose metabolism in *P. indica*-nematode-plant interaction

Michael Opitz, Krzysztof Wieczorek

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: MSc

Keywords:

Piriformospora indica, sucrose metabolism, *Heterodera schachtii*, root endophyte, plant-parasitic nematodes

The beneficial root endophyte *Piriformospora indica* is an orchid mycorrhiza, which forms mutualistic relationships with many different plants including the model plant *Arabidopsis thaliana*. During this interaction, the endophyte promotes host plant growth, biomass and seed production. Further, the resistance to abiotic (e.g. drought, salt stress, toxins and heavy metals) and biotic stresses (pathogenic organisms) is increased. It can be speculated that, similar to arbuscular mycorrhizal fungi, *P. indica* receives carbohydrates from the host in exchange for this service. To test this, qRT-PCR of several sucrose synthase (SUS) and invertase (INV) genes will be performed to reveal changes in their expression during different phases of plant-fungus interaction. Further, *A. thaliana* SUS and INV single and multiple mutant lines will be tested to verify the importance of these sucrose-modifying enzymes for successful colonization. Invertase activity assays will additionally shed light on the changes in enzyme activity triggered by *P. indica* in plant tissue. In contrast to the fungus, which most likely prefers simple sugars, the plant-parasitic nematodes favour unprocessed sugar. Hence, the impact of *P. indica* on nematodes will be tested. Nematode attraction and development assays will be carried out to assess the influence of *P. indica* on the attractiveness and development of cyst nematode *Heterodera schachtii*. This work will significantly increase our knowledge on *P. indica*-nematode-plant interaction. Further, obtained results could greatly contribute to a development of new agricultural strategies against plant-parasitic nematodes, in which *P. indica* is utilized as a biological agent controlling these important root parasites.

Acknowledgements:

Krzysztof Wieczorek, *University of Natural Resources and Life Sciences, Vienna*

Antibacterial effect of plant oils containing medium-chain fatty acids

Klára Laloučková

Czech University of Life Sciences Prague

Study Programme Level: PhD

Keywords:

Fatty acid, bacteria, inhibition, antibacterial, nutrition

The antibacterial effect of eight plant oils containing medium-chain fatty acids was tested by defining their minimum inhibitory concentration (MIC) to the 14 pathogenic and 6 beneficial intestinal strains of bacteria. Tested were coconut (*Cocos nucifera*), palm, red palm and palm kernel (*Elaeis guineensis*), Cuphea (*C. lanceolata* and *C. ignea*), babassu (*Attalea speciosa*, syn. *Orbignya speciosa*), tucuma (*Astrocaryum vulgare*), and murumuru (*Astrocaryum murumuru*) oil. Their antibacterial activity was examined against: *Bifidobacterium animalis*, *B. longum*, *Campylobacter jejuni*, *Clostridium perfringens*, *Enterococcus cecorum*, *Escherichia coli*, *Lactobacillus acidophilus*, *L. fermentum*, *Listeria monocytogenes*, *Salmonella enteritidis*, *S. infantis*, *S. typhimurium* and *Staphylococcus aureus*. The fatty acids composition of oils was identified using gas chromatography (GC/FID). MIC was determined by a broth microdilution test. None of tested oils exhibited any potential to inhibit the growth of Gramnegative bacterial strains. Palm and palm red oil did not exhibit any antibacterial action. MIC of active oils ranged from 0.14 to 4.5 mg/ml. The lowest measured MIC was found in tucuma oil to *C. perfringens* (0.14 mg/ml). Other oils inhibited the growth of *C. perfringens* in concentrations from 0.25 to 4.5 mg/ml. Strains of *E. cecorum* were inhibited by coconut, babassu, Cuphea, palm kernel, murumuru and tucuma oil in MIC range between 1.12 - 4.5 mg/ml. Among the tested compounds, only Cuphea oil showed inhibitory properties against *L. monocytogenes* (MIC 1.12 mg/ml). Oils inhibiting the growth of *S. aureus* strain showed MIC from 0.56 to 2.25 mg/ml (coconut, babassu, Cuphea, palm kernel, murumuru and tucuma oil). Undetected susceptibility of *B. animalis*, *B. longum*, *L. acidophilus* and *L. fermentum* bacterial strains to tested oils was evaluated as a positive effect. It can be concluded that the plant oils containing medium-chain fatty acids show antibacterial effect towards Grampositive strains of bacteria. Negative influence on beneficial intestinal microbiota can be promising.

Acknowledgements:

Eva Skřivanová, *Czech University of Life Sciences Prague*

Petra Hovorková, *Czech University of Life Sciences Prague*

Long live the wasp: Development thresholds and live span of parasitic wasps

Anna Jarzembowska

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: MSc

Keywords:

Developmental threshold, parasitic wasps, natural enemies, biological control

The duration of the immature stages (egg, first, second and third instar, pupa) and total development from oviposition to adult wasp emergence of three *Glyptapanteles* species in larvae of the gypsy moth were tested under constant temperatures. Additionally, adult wasp longevity was recorded at different temperatures. Host larvae were parasitized as either second (*G. porthetriae*) or third instars (*G. liparidis*, *G. fulvipes*), according to their preferred host stage in the field. The parasitized larvae were kept either individually or in small groups in glass Petri dishes in climate chambers at constant 15°C, 20°C and 25°C, respectively, under long day photoperiod, until the parasitoids emerged from their host or until dissected. Adult wasps of *G. liparidis* and *G. fulvipes* were kept in plastic boxes in climate chambers at 15°C and 20°C, respectively, under long day photoperiod and fed honey and water. Endoparasitic development (i.e. from oviposition until parasitoid emergence from the host) at 15°C was 37, 36 and 31 days for *G. liparidis*, *G. fulvipes* and *G. porthetriae*. At 20°C, it was 21 (*G. liparidis*, *G. fulvipes*) and 16 days (*G. porthetriae*) and at 25°C it was 13 (*G. liparidis*, *G. porthetriae*) and 14 days (*G. fulvipes*). The pupal stage at 15°C lasted 14 (*G. fulvipes*) and 15 days (*G. liparidis*, *G. porthetriae*), respectively. At 20°C it was 7 (*G. liparidis*) and 8 days (*G. fulvipes*, *G. porthetriae*) and at 25°C it was 5 (*G. liparidis*, *G. fulvipes*) and 6 days (*G. porthetriae*). The lower developmental thresholds (LDTs) calculated from linear regression equations for the combined immature stages were 9.6°C (*G. liparidis*), 8.9°C (*G. fulvipes*) and 7.6°C (*G. porthetriae*), respectively. For the endoparasitic stages, the LDTs were 9.9°C (*G. liparidis*), 8.8°C (*G. fulvipes*) and 6.9°C (*G. porthetriae*). Adult wasp longevity at 15°C was 32 days for *G. liparidis* males and 28 days for *G. fulvipes* males. *G. liparidis* females survived on average 29 days and *G. fulvipes* females 21 days. At 20°C, mean lifetime of *G. liparidis* males was 10 days and lifetime of *G. fulvipes* males was 5 days. *G. liparidis* females lived on average 8 days and *G. fulvipes* females 9 days.

Acknowledgements:

Christa Schafellner, *University of Natural Resources and Life Sciences, Vienna*

Phenotypic analysis of *Arabidopsis thaliana pdf1* mutants in response to abiotic stresses

Nguyet Anh Tran Ly

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: BSc

Keywords:

Heavy metal, plant defensin type 1, *Arabidopsis halleri*, *Arabidopsis Thaliana*, abiotic stresses, zinc (Zn) tolerance, T-DNA, miRNA, knock out mutant

Heavy metal pollution has become a severe environmental problem all over the world due to urbanization and industrialization. Almost all of the elements found in contaminated soil (mainly Zn, Cu,...), even essential ones, become toxic to organisms when present in excess. However, there are still plants surviving in those harsh conditions, which suggest a friendly innovative solution to the remediation of the environment. Therefore, understanding the mechanism and particular gene(s) underlying those precious characteristics are crucial for the implementation of such plants. Previous studies revealed the role of plant defensins type 1 (*PDF1s*) in zinc(Zn) tolerance of *Arabidopsis halleri*. Inspired by this, my works aimed at further characterizing the functional involvement of endogenous *PDF1* genes in response to Zn and some other abiotic stresses (mainly metals). To achieve that goal, several mutant accessions of both T-DNA and amiRNA insertion ones were involved in the tests. Tolerance assays were thus conducted by measuring the dry weight of shoots from *A. thaliana* seedlings germinated on control media and media containing different concentration of elements. The results showed no significant difference in Zn tolerance between single knock-out mutants and the wild type, however, with the tests on other metals, we found a remarkable sensitivity of miRNA constructs in the presence of Cooper and Cobalt. Our analysis suggests the potential role of *PDF1s* in response to other abiotic stresses besides Zn.

Acknowledgements:

Françoise Gosti, *Other*

Exploring potentials of the bamboo sector for natural resource enhancement in Ethiopia: An institutional and market analysis of bamboo-based value web

Jessie Lin

University of Hohenheim

Study Programme Level: MSc

Keywords:

Bamboo, Ethiopia, value-web

Effective management of natural resources and forest products is very important for enhancing the livelihoods of smallholders in resource rich but economically poor countries like Ethiopia. Bamboo is one of the more important natural resources in Ethiopia with potential usages in construction, furniture and handicrafts, floor boards, incense sticks, paper and energy supply (bamboo-based charcoal), among others. While the country is the largest producer of bamboo in Africa, the existing utilization of the bamboo-sector in Ethiopia remains under-developed with little value addition. As a result, Ethiopian bamboo-growers continue to suffer from food insecurity and seasonal vulnerabilities. What are the governance and institutional challenges in the development and growth of bamboo sector in the country? How can Ethiopian bamboo growers as well as traders and processors benefit from the development of the sector? These are the main analytical questions addressed in this paper. The main objective of thesis research presented in this paper is to provide insights into the current status and future potentials of the bamboo sector in order to enhance sustainable livelihoods and to improve food security for smallholders in Ethiopia. Owing to the multiple usages of the same crop, which limits the adoption of value chain study, this research adopts the “value web” approach to assess the potentials of different product lines that create the bamboo value web. The study utilizes qualitative data collection methods, in particular in-depth interviews, focus group discussions and participatory net-mapping with important stakeholders, including government officials, policy makers, development organisations, processing companies, traders and sub-traders, and bamboo growers. The output from this demand-driven research can be used as an input to update the future strategies to develop the sector; will bring together different stakeholders; and generate scientific work that has direct policy relevance for strengthening the potential of bamboo sector.

Acknowledgements:

Saurabh Gupta, *University of Hohenheim*

Tim Loos, *University of Hohenheim*

Development of mid-infrared spectroscopy-based soil microbial pool partition indexes for soil organic carbon turnover models

Hieu Linh Duong

University of Hohenheim

Study Programme Level: MSc

Keywords:

Mid-infrared spectroscopy; soil microbial pool partition indexes; soil organic carbon turnover models

Soil organic matter (SOM) is ecologically important and plays a vital role in agro-ecosystems. In order to improve agricultural production as well as soil quality for the future, it is necessary to understand the complicated dynamics of SOM at the regional scale. One of the approaches to satisfy this need is to use modelling of SOM such as the frequently used DAISY model. In this model, SOM is split into three main pools, including dead native soil organic matter (SOM), microbial biomass (SMB), and added organic matter (AOM). Each main pool is split into two sub-pools which are a slow turnover pool (e.g. SOM1, SMB1, and AOM1) and a faster turnover pool (e.g. SOM2, SMB2, and AOM2). The problem with the DAISY model is that it is difficult to partition the soil microbial pools and this is considered as a knowledge gap. Hence, this study aims at exploring the microbial pool partition index which is also helpful in assessing the validity of SMB pools. To achieve this objective, the first specific goal was to develop and calibrate diffuse reflectance Fourier transform mid-infrared spectroscopy (midDRIFTS) –based partial least squares regression (PLSR) models to predict the activities of soil enzymes such as β -D-glucosidase representing the fast turnover pool (SMB2) and phenoloxidase and/or xylanase representing the slow turnover pool (SMB1). This approach was tested at the regional scale, where the two study regions Kraichgau and Swabian Alb in Southwest Germany were considered. The analysis was tested for three cases: the Kraichgau case, the Swabian Alb case, and the generic case in which both study regions are taken into account. Under each case, the prediction models were developed based on cross-validation and test-set validation. After this step, microbial pool partition indexes (i.e., ratio of predicted enzyme activities) were calculated.

Acknowledgements:

Vietnamese-German University

Frank Rasche, *University of Hohenheim*

Reza Mirzaeitalarposhti, *University of Hohenheim*

Rana Shahbaz Ali, *University of Hohenheim*

Small-scale biogas plants in Thua Thien Hue province, Vietnam: A way to improve household budgets and reduce workload

Hynek Roubík, Jana Mazancová
Czech University of Life Sciences Prague

Study Programme Level: PhD

Keywords:

Biogas, biogas technology, poverty reduction, Vietnam

Biogas production by anaerobic fermentation is a promising method of producing energy while achieving multiple environmental benefits, e.g. fossil energy substitution, carbon emission reduction, pollution abatement, and welfare improvement. It was evaluated as one of the most energy-efficient and environmentally friendly forms and technologies for renewable energy production. The survey was conducted from July to September 2012 using focus group discussions with biogas owners from Thua Thien Hue province (n=41). As noted during the FGD, the biggest impact on workload reduction from biogas implementation is on women and children, who usually performs these activities. 62% of BGP owners were collecting firewood in target area before BGP construction. The average time spent collecting firewood per household per week was over 10 hours. After BGP construction the time was reduced to the less than 5 hours per week. Average time disparity through data is 5.67 (\pm 4.41) hours per week, which is showing significant workload reduction. The need of firewood depends mostly on number of household members, number of livestock or additive employment dependent on the consumption of firewood such as noodle or rice wine production. This data also corresponds with changes regarding the financial cost changes. Before BGP construction 34% of respondents were spending money on firewood: an average of 1.42 (\pm 1.04) million VND per month per household. This cost was reduced with usage of BGP technology to 0.41 (\pm 0.31) million VND per month per household and with average money disparity of 0.76 (\pm 0.25) million VND. These are important economic factors which also influence motivation of farmers and current benefits of biogas technology. Such improvements in the household budget and workload reduction are resulting in poverty reduction and economic development and have positive effects on reduction of deforestation and forest degradation.

Acknowledgements:

Jana Mazancová, *Czech University of Life Sciences Prague*



Poster Sessions

Parallel Sessions II
Saturday 12 November
13:30-14:30

3.1 Managing Climate and Environment (2), Novel Energy Carriers Based on Biomass

Chairs: Markus Puschenreiter, *University of Natural Resources and Life Sciences, Vienna*
Lukáš Pospíšil, *Czech University of Life Sciences*

Venue: Auditorium

3.2 Animal Genomics, Animal Health and Animal Welfare

Chairs: Gabrielle Lagerkvist, *Swedish University of Agricultural Sciences*
Walter Vetter, *University of Hohenheim*

Venue: Auditorium



3.1 Managing Climate and Environment (2), Novel Energy Carriers

Based on Biomass

Saturday, 13:30- 14:30 - Venue: Auditorium (Aula)

Optimisation of biochar and digestate doses in an acid contaminated soil treated by phytostabilization

Juan Carlos Galan Robles, Domingo Martinez Fernandez

Czech University of Life Sciences Prague

Study Programme Level: MSc

Keywords:

Phytostabilization, *Dittrichia viscosa*, biochar, digestate, polluted soil

Contamination due to trace pollutants compounds have become a serious problem in Cartagena, Spain, where mining activities have been carried out. The dispersion of these contaminants such as Iron, Nickel, Arsenic, Magnesium and Manganese, caused mainly by surface run-off, has an important environmental impact on the ecosystem and the high level of toxicity might be affecting nearby regions. Few studies proposing an adequate soil treatment have been done. In this context, to deal with this situation, phytoremediation with *Dittrichia viscosa* has been proposed. Due to the toxicity of the soil, plants cannot grow in such conditions. Therefore, in order to promote plant growth, biochar and digestate are used as substrates. The aim of this project is to find the optimal doses of biochar and digestate to be mixed with the polluted soil in order to obtain the best performance at stabilizing trace compounds in the soil. The experimental design compiles nine sets with different combinations of the substrates. In every set, plants are grown in polluted-mixed soil, harvested, and analysed to estimate the biomass content and the concentration of trace compounds by Inductively Coupled Plasma (ICP). Soil pore water is analysed as well. Results have shown that the biochar-digestate rapport plays an important role in the sorption phenomena (in the substrates and plant) moreover the influence of the digestate on plant growth has been confirmed.

Acknowledgements:

Domingo Martinez Fernandez, *Czech University of Life Sciences Prague*

3.1 Managing Climate and Environment (2), Novel Energy Carriers

Based on Biomass

Saturday, 13:30- 14:30 - Venue: Auditorium (Aula)

Crossbreeding and performance of two endoparasitic braconid wasps, *Glyptapanteles liparidis* and *Glyptapanteles fulvipes*, in their common host *Lymantria dispar*

Katharina Peschke

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: BSc

Keywords:

Glyptapanteles species, crossbreeding, courtship behaviour

Larvae of the gypsy moth, *Lymantria dispar*, are hosts for a large number of endoparasitic wasps. Specifically, braconid wasps of the genus *Glyptapanteles* are highly abundant and in Austria these wasps are among the most important natural enemies of the gypsy moth. This thesis aims to clarify whether the two closely related species *G. liparidis* (laboratory colony on gypsy moth, originating from field-collected parasitized gypsy moth larvae) and *G. fulvipes* (lab colony on gypsy moth, originating from field-collected larvae of *Xestia xanthographa*, where the wasps overwinter) mate and produce fertile offspring, i.e. whether they are separate species or not. Both adult males and virgin females of one *Glyptapanteles* species were put together with the opposite sex of the other species. Courtship behaviour and mating success were recorded and compared to those of pairs from the same species. Female wasps can determine the sex of their offspring by choosing whether or not to fertilize the eggs that are laid; fertilized, diploid eggs develop as females, unfertilized, haploid eggs become males (haplodiploid sex determination). Accordingly, crossings of the two *Glyptapanteles* species that produce female offspring indicate successful mating, sperm transfer and egg fertilization. If these females then produce fertile offspring chances are high that the species are not separate. If females from the crossing experiments produce only male offspring we assume that fertilization (mating, sperm transfer, ...) was not successful and it is likely that the two wasps are separate species. Additionally, CO1 barcode primers were used to identify differences in the CO1 gene between the pure *Glyptapanteles* breedings and the offspring wasps from the crossing experiments. In a second set of experiments, both the pure and the crossbreeding wasps were tested according to various fitness parameters (longevity, fecundity).

Acknowledgements:

Christa Schafellner, University of Natural Resources and Life Sciences, Vienna

3.1 Managing Climate and Environment (2), Novel Energy Carriers

Based on Biomass

Saturday, 13:30- 14:30 - Venue: Auditorium (Aula)

Climate response of Norway spruce (*Picea abies* L. (H.Karst.)) in Northern Velebit

Kresimir Begovic, Stipan Cupic

Czech University of Life Sciences Prague

Study Programme Level: PhD

Keywords:

Dendroclimatology, tree-rings, growth, climate change

As part of an international project on mixed severity disturbances as drivers of structural variability and carbon dynamics at the stand and landscape levels, this article describes the problematics of growth and development of Norway spruce (*Picea abies* L. (H.Karst.)) in virgin forests of Northern Velebit. The article focuses on describing connections between tree-ring growth and climate changes in the last few hundreds of years. The concept and history of dendrochronology is described as well. Using the methodology of dendroclimatology, tree-rings are compared to climate data to investigate their variability and mutual connection. Tree-rings are cross-dated to confirm the dating of each tree-ring and a 436-year-long master chronology is developed using the program CDendro. A secondary statistical check of cross-dating and measurements is done in COFECHA program. Concerning the time period of available climate data (CRU TS 1901.-2015.) and the replication issues (EPS and \bar{r}), mean residual reference chronology developed in ARSTAN program is compared to climate data (temperature and precipitation) in a time period of the last 115 years. Response function analysis shows a negative correlation of temperature response of tree-rings in July and August, while showing a positive correlation with precipitation in July, meaning the high summer temperatures of July and August are decreasing diameter growth, while high levels of precipitation in July increase it. In future, furthering the chronology even farther into the past might give us even more data about climate and growth variability in Norway spruce forests of Northern Velebit.

Acknowledgements:

Ernest Gorsic, *Other*

Miroslav Svoboda, *Czech University of Life Sciences Prague*

3.1 Managing Climate and Environment (2), Novel Energy Carriers

Based on Biomass

Saturday, 13:30- 14:30 - Venue: Auditorium (Aula)

Rhizo-degradation of PAHs by red clover in mixed-polluted soils with different metal availabilities

Christina Roschitz

University of Natural Resources and Life Sciences, Vienna

Study Programme Level: BSc

Keywords:

Mixed contaminated soil, rhizo-degradation, amendments

The potential of plants and associated microbes for immobilisation and degradation of pollutants can be used for environmentally friendly and economically feasible soil remediation. This study focuses on the degradation of polycyclic aromatic hydrocarbons (PAH) in a shooting range soil co-contaminated with lead (Pb). PAH degradation is expected to be enhanced if Pb toxicity is reduced by soil amendments. Furthermore, degradation may be stimulated in the rhizosphere of clover due to root exudates and nitrogen provided by its Rhizobia symbionts. A RHIZOtest was conducted comparing PAH degradation within 10 days in control and amended soils, as well as planted and unplanted treatments. The amendments (biochar + gravel sludge + iron oxides) could increase soil pH from 6.5 to 6.9 and Pb availability (assessed by diffusive gradients in thin films) could be reduced compared to controls. Although rhizosphere pH decreased within 10 days in controls as well as in amended soils, Pb availability was not significantly increased compared to bulk soil. This indicated effective Pb-immobilisation and rhizo-stabilisation due to adsorption and complexation of Pb on root surface and soil organic matter. A representative, easily available PAH, [¹³C¹⁴]-phenantrene biomarker, was added to observe PAH degradation after 0, 3, 6 and 10 days. Phenantrene was degraded in all treatments, but significant differences could not be observed. This may be because the experiment lasted only 10 days and biological nitrogen fixation was not yet fully developed. Although an increase of nitrogen in the rhizosphere was expected, nitrogen was depleted in rhizosphere and bulk soils after 10 days compared to day 0. By incorporating the biomarker into microbial membranes (PLFAs) differences in the degrading microbial communities will be assessed. The results will deliver deeper insights into the PAH degradation process and may provide information for improving natural attenuation of mixed-polluted sites.

Acknowledgements:

Markus Puschenreiter, *University of Natural Resources and Life Sciences, Vienna*

Anna Wawra, *University of Natural Resources and Life Sciences, Vienna*

3.1 Managing Climate and Environment (2), Novel Energy Carriers

Based on Biomass

Saturday, 13:30- 14:30 - Venue: Auditorium (Aula)

Morphological variability of the genus *Betula L.* in chosen regions of the Czech Republic

Rostislav Linda

Czech University of Life Sciences Prague

Study Programme Level: PhD

Keywords:

Betula carpatica; *B. pendula*; cytometry; morphometric traits

The aim of this work is to propose a reliable method for distinguishing between diploid (2n) and tetraploid (4n) taxa of the genus *Betula L.* based on leaf measurements. These measurements are realized with common tools, such as ruler or protractor. The main advantage of these methods is that they can be applied in the field. The further aim of work is to describe and evaluate genetic variability within tetraploid taxa, whose taxonomic relationships are still unclear and under discussions. For statistical analysis, 97 individuals from 6 localities within Šumava region (Czech Rep.) were selected and 4 leaves from every individual were analysed. In total, 20 parameters were measured on every leaf (16 quantitative and 4 qualitative). Each individual was also analysed by flow cytometry method to determine real genome size (ploidy). Differences in selected parameters between individuals with different ploidy were statistically tested. Significant results were observed in 12 of 16 quantitative and 2 of 4 qualitative parameters. For real ploidy prediction, the classification function was designed, whose reliability was 96 % for the primary data. The reliability of classification function was verified on samples from three different regions within the Czech Republic and compared with functions suggested by other authors. Function designed in this work was able to correctly determine real ploidy in 89 %, which is the most of all compared functions. Genetic variability, especially within tetraploid taxa is mentioned in relation to other author's previous studies. Distinguishing between *B. pubescens* and *B. carpatica* was not possible using selected genetic markers. Genetic conformity of these taxa is also mentioned in publications of many authors, as contrasted to e.g. Czech literature, which generally distinguishes between *B. pubescens* and *B. carpatica* as separate species.

Acknowledgements:

Ivan Kuneš, *Czech University of Life Sciences Prague*

3.1 Managing Climate and Environment (2), Novel Energy Carriers

Based on Biomass

Saturday, 13:30- 14:30 - Venue: Auditorium (Aula)

Uptake of per- and polyfluoroalkyl substances (PFASs) by plants

Laura Gobelius

Swedish University of Agricultural Sciences

Study Programme Level: MSc

Keywords:

PFASs, AFFFs, uptake, phytoremediation

The extensive use of per- and polyfluoroalkyl substances (PFASs) as surfactants in textiles (e.g. GORE-TEX®), cookware (e.g. Teflon®) and aqueous firefighting foams (AFFFs) during the last decades has resulted in widespread environmental contamination. Due to the persistent and particularly chemically stable characteristics of PFASs, they are now commonly found in the environment, human serum, as well as in the food chain. Currently, the knowledge of remediation techniques for PFAS-contaminated environments is very limited. Therefore, this study aims to evaluate the potential of plant uptake of 26 different PFASs from contaminated soils and groundwater. Arlanda airport, Sweden's biggest airport, has a fire training facility that is suffering from severe PFASs contamination due to regular practices with AFFFs for safety purposes. Samples from different plant species (from grasses to trees), ambient soil, and groundwater were taken there to assess the accumulation potentials and consequently the eligibility of particular species for (phyto-) remediation purposes. The samples were freeze-dried and analysed with LC-MS/MS after liquid- or solid phase extraction. All samples showed elevated concentrations of particular PFASs, with conifer needles showing the highest and most striking results of concentrations. The evaluation will continue until October, therefore no further results are currently available.

Acknowledgements:

Lutz Ahrens, *Swedish University of Agricultural Sciences*

3.1 Managing Climate and Environment (2), Novel Energy Carriers Based on Biomass

Saturday, 13:30- 14:30 - Venue: Auditorium (Aula)

Retention of sulfadiazine and copper contaminations from agricultural drainage water using shell-sand and Fe-oxide granulate filter materials

Fenella Metz

University of Copenhagen, Faculty of Science

Study Programme Level: MSc

Keywords:

Sulfadiazine, copper, agricultural drainage water, Fe-oxide granulates, shell-sand

Sulfadiazine and copper are used in high levels as preventative medication in intensive livestock production. Using manure from these animals as agricultural fertiliser results in these compounds reaching the aquatic environment with possibly harmful effects on ecosystems. As part of the SupremeTech strategic research project, the University of Copenhagen has developed a Fe-oxide granulate filter material and is assessing its retention capacity, as well as that of other filter materials for a variety of compounds including phosphate. The aim is to determine their preventative effectiveness in stopping harmful compounds from reaching aquatic ecosystems as well as considering the possible end of life disposal of used filter material as agricultural fertiliser. The objective of the current thesis project is to perform kinetic studies and equilibrium isotherm analyses of the antibiotic sulfadiazine and heavy metal copper with two filter materials (Fe oxide coated granulated and shell-sand) using batch testing. This will give insight into whether the filter materials can retain the compounds at the concentrations occurring in agricultural drainage water as well as higher concentration that may be present in other waste waters. In addition, the retention of the two aforementioned compounds is studied under flow-through column tests to simulate conditions closer to non-steady state field conditions. Results from these studies will show whether and to what capacity such filters could be used for the management of environmental contaminants from agriculture and give an indication of whether there may be risks in recycling the used filter materials as fertiliser.

Acknowledgements:

Bjarne W. Strobel, *University of Copenhagen, Faculty of Science*

3.1 Managing Climate and Environment (2), Novel Energy Carriers

Based on Biomass

Saturday, 13:30- 14:30 - Venue: Auditorium (Aula)

The influence of digestion conditions for the chemical composition of black liquors obtained from fast growing poplar wood (*Populus* sp.)

Olga Bytner, Michał Drożdżek, Tomasz Zielenkiewicz
Warsaw University of Life Sciences

Study Programme Level: MSc

Keywords:

Black liquors, alkaline pulping, chemical composition

Black liquors, obtained from Kraft process after digestion of wood chips from fast growing poplar wood (*Populus* sp.), were analysed in this work. Conditions of digestion were changed, mainly the concentration of compounds used for pulping, temperature and pulping duration. The main components of black liquor are organic compounds (extractives and lignin or polysaccharides decomposition products) and inorganic substances. In this work the content of inorganic and organic substances was estimated, while the attention was focused on organic substances of potential application in new technologies, e.g. carbohydrates for bio-fuels production. The separation of organic fractions and inorganic substances was the additional task. Acidification, precipitation, filtration, extraction with diethyl ether and ionite columns (cationite and anionite) were used to collect fractions. Different instrumental techniques were applied to the analysis of organic substances: spectrophotometric method (UV-VIS) and size-exclusion chromatography (SEC) for lignin content and molar mass, and gas chromatography with mass spectrometry (GC-MS) for phenolic substances and other volatile organics. Lignin content in black liquors is related to the concentration of the alkaline compounds used for pulping and lignin content in digested wood. Extract analysis indicates the presence of various phenolic compounds. After the separation of precipitates, organic-soluble and ionic fractions from black liquors, the analysis of sugars in the residual water solution was conducted by high performance liquid chromatography (HPLC).

Acknowledgements:

Michał Drożdżek, *Warsaw University of Life Sciences*

Jansz Zawadzki, *Warsaw University of Life Sciences*

3.1 Managing Climate and Environment (2), Novel Energy Carriers

Based on Biomass

Saturday, 13:30- 14:30 - Venue: Auditorium (Aula)

The potential of nyamplung (*Calophyllum inophyllum* L.) seed oil as biodiesel feedstock: Effect of seed moisture content and particle size on oil yield

Muhammad Fadhlullah¹⁾, Sri Nanan B. Widiyanto²⁾, Elvi Restiawaty²⁾

¹⁾ Wageningen University and Research Centre, ²⁾ Other

Study Programme Level: MSc

Keywords:

Calophyllum inophyllum seed oil; biodiesel feedstock; mechanical extraction; moisture content; particle size

Nyamplung (*Calophyllum inophyllum* L.) is one of the plants with the highest potential for use as a biodiesel feedstock because of its high oil content. Mechanical extraction using a screw press is one of the ways to obtain oil from nyamplung seed. The extraction yield is effected by the seed's condition, such as moisture content and particle size. This abstract presents experimental results that estimate the vegetable oil production potential of *C. inophyllum*. The results show the effect of *C. inophyllum* seed moisture content and particle size on oil yield and the characteristics of *C. inophyllum* oil. The seed moisture contents used in this experiment were 0%, 1.2%, and 20%; the seed particle size used were 0.81, 2.90, and 8.60 mm. The *C. inophyllum* fruits were obtained from Cipatujah Sub-district, Tasikmalaya Regency, Indonesia. The methods used were including fruit and seed preparation, seed moisture content, and particle size conditioning, mechanical extraction, oil characteristics analysis, and *C. inophyllum* oil production potential calculation. The optimum seed moisture content to achieve high oil yield is 1.2%, which generates 33.39% oil; the optimum seed particle size to achieve high oil yield is 8.60 mm, which generates 33.46% oil. From this research, it can be concluded that the *C. inophyllum* trees in Cipatujah have potential to produce up to 5.13 L oil/tree/year. *C. inophyllum* oil yield is indeed affected by seed moisture content and particle size, and it has characteristics that support its utilization as biodiesel feedstock.

Acknowledgements:

Sri Nanan B. Widiyanto, *Other*

Elvi Restiawaty, *Other*

3.1 Managing Climate and Environment (2), Novel Energy Carriers

Based on Biomass

Saturday, 13:30- 14:30 - Venue: Auditorium (Aula)

Biomass is the way

Nikita Ereemeev, Anastasia Puchkova

Czech University of Life Sciences Prague

Study Programme Level: BSc

Keywords:

Biomass, energy, biogas, biodiesel, environment, world

We can distinguish some trends, analysing the world trade statistics for the last ten years. One of them is the increasing importance of energy carriers for the stable world development. Most of us think about coal, oil, and other fuel, that is recycled in TPP, GES, NPP, to get energy, when we talk about energy carriers. But humans can also get energy from alternative sources, e.g. wind, tidal, geothermal, solar and wave power stations or TPP running on biomass. By alternative energy, sources such as biogas, bio-diesel and other hydrocarbons obtained from the processing of biomass are meant. But these resources are limited. So the alternative energy can satisfy human needs only if energy is conserved. For example, the Indian government provides subsidies for the implementation of the improved stove installation program. By the end of 2000, 32.6 million stoves had been put in place in the country. Using these improved stoves saved over 13 millions of tons of wood per year. Could you imagine if such improvements were available worldwide? Using biomass offers great opportunities, such as the use of agricultural waste (getting biogas from livestock, using crop waste in TPP), as well as to receive fuel (growing energy forests). Biomass as an energy carrier has a positive influence on the world because it can improve human quality of life, decreasing unemployment, and improving the environment: 1) Biomass fuel is accessible almost anywhere, except desert areas of Africa and permafrost, where there are no trees and agriculture. 2) Biomass is universal for all kinds of energy carriers - gas, liquid, heat, electricity. 3) No influence on climate 4) Economic benefits.

Acknowledgements:

Petr Prohazka, *Czech University of Life Sciences Prague*

3.1 Managing Climate and Environment (2), Novel Energy Carriers Based on Biomass

Saturday, 13:30- 14:30 - Venue: Auditorium (Aula)

History of active crayfish conservation in Poland

Anna Przeździak

Warsaw University of Life Sciences

Study Programme Level: BSc

Keywords:

Crayfish, active conservation, history

The purpose of this work is to present the measures taken to actively protect crayfish in Poland. The group consist of *Astacus astacus* and *Astacus leptodactylus*, whose habitats in Poland are endangered (Strużyński, Śmietana 1999, Strużyński, Krzywosz 2002). In 1860 in Europe there was an outbreak of of crayfish plague caused by the fungus *Aphanomyces astaci* (Holdich 1988, Arrignon 1991, Westman 1991). Its source, most likely, was ballast water dropped in an Italian port by ships arriving from North America. Rapid expansion of the disease has caused a mass extinction of the crustaceans (Kossakowski 1966 Holdich, 1988, Arrington 1991). *Orconectes limosus*, brought to Europe in 1890, has additionally contributed to the spread of plague (Strużyński 2007, Śmietana 2013). This species is resistant to the disease but at the same time it can be a carrier of the disease. The extinction of crayfish is also a result of agrotechnical procedures, intensive restocking of the European eel (*Anguilla anguilla*) population (Gielo 1975), and environmental pollution (Kossakowski 1966, 1972). Without appropriate action, native crayfish species will disappear in the next 50 years (Śmietana 2013). The gradual expansion of North American crayfish species (*Orconectes limosus*, *Pacifastacus leniusculus*, *Procambarus clarkii*, *Procambarus fallax f. virginialis*) is a constant threat to the continued existence of European crayfish. To save the native species, habitats should be monitored and the breeding of European crayfish for later restitution should be carried on (Strużyński 2015). Such activities started in Poland in 1999 (Śmietana 2004, Strużyński 2007). It is also important to educate the public on this matter to help minimize the anthropogenic causes of extinction of these invertebrates.

Acknowledgements:

Witold Strużyński, *Warsaw University of Life Sciences*

Exercise-induced acute phase response in horses introduced to 80 km endurance rides

Olga Witkowska¹⁾, Anna Cywińska¹⁾, Agnieszka Turło¹⁾, Ewa Szarska²⁾, Lucjan Witkowski¹⁾

¹⁾ *Warsaw University of Life Sciences* ²⁾ *Other*

Study Programme Level: MSc

Keywords:

Serum amyloid A (SAA), endurance, horse, acute phase proteins (APPs)

Exercise-induced acute phase response (APR) has been described in humans and horses after prolonged, strenuous exercise. It is species-specific and characterized by increases in acute phase proteins (APPs) levels in the blood. In horses, this reaction occurred after long distance (120 and 160km), but not shorter (up to 60 km) endurance competitions and was characterized by 10-fold or greater increase in serum amyloid A (SAA) but not other APPs levels. After 80km endurance rides, the reaction was slighter, with about 3-fold increase in SAA concentration and varied widely among individuals. We postulated that this can depend on the experience and fitness level of the horse. Thus, the aim of the present study was to characterize the exercise-induced APR in horses that competed in 80 km endurance rides for the first time and successfully completed more 80 km rides during the same season. Blood samples from 4 Arabian horses were tested before and after 80 km endurance rides in their first season of competing at this distance. Typical exercise-induced changes: increases in the activity of creatine phosphokinase (CPK), the numbers of total white blood cells (WBC) and neutrophil to lymphocyte ratio (N:L) were significant ($p \leq 0.01$, $p \leq 0.01$, $p \leq 0.05$, respectively) and occurred in all horses at a similar level. Exercise-induced APR was characterized by significant ($p \leq 0.001$) and sometimes very high (even 30-fold) increases in SAA concentrations after all competitions in the season. Exercise-induced APR in examined horses was similar or more pronounced than that observed previously after competitions at longest distances.

Acknowledgements:

Anna Winnicka, *Warsaw University of Life Sciences*

Desensitization: An alternative method of treatment for horses with allergies

Natalia Kozłowska, Aleksandra Krawczyk, Eliza Krawczyk
Warsaw University of Life Sciences

Study Programme Level: BSc

Keywords:

Allergy , desensitization, horses

An allergy is an exaggerated response from the immune system to the potential allergens. Equine allergies can manifest either through the skin or the respiratory system. Allergic response can severely impair horses, manifesting as a poor performance and discomfort. The most popular treatment is based on steroids and antihistamines, however, the side effects encourage the consideration of alternative methods instead. Our aim is the estimation of efficiency of specific immunotherapy (SIT) by creating tolerance to the allergens in the horses with Recurrent Airway Obstruction (RAO) and skin allergies. Materials and methods: Six horses were included in the study, divided in two groups. The first group contained three horses with skin allergies. The second one, three horses in different stages of RAO (from 1st to 3rd degree). Blood samples from all six horses were tested for most common allergens. Based on the blood results of each horse, sets of specific allergen extracts for each one of them were prepared in the laboratory. The solutions were administered subcutaneously in increasing concentrations until reaching a maintenance dose. Horses with skin allergies were examined twice a month during spring and summer season, while horses with RAO were clinically examined after every injection with detailed examinations of respiratory tract as well as cytological and endoscopy examination. In horses with skin allergies, in the following season after the desensitization, symptoms were significantly reduced compared to the symptoms which were observed before the desensitization. In horses with RAO, decrease of respiratory rate, amount of retained secretions and recurrent attacks of coughing were observed with improvement in exercise capacity. This preliminary result suggest that specific immunotherapy (SIT) might be helpful in treatment of horses with RAO and skin allergies

Acknowledgements:

Małgorzata Wielgosz, *Warsaw University of Life Sciences*
Przemysław Dziekan, *Warsaw University of Life Sciences*

Miscanthus as an alternative bedding material for horses

Benjamin Rauscher
University of Hohenheim

Study Programme Level: MSc

Keywords:

Miscanthus, bedding material, horse

First experiences with bedding horses on miscanthus were positive with regard to the reduction of allergic dust reactions in horses as well as the reduction of working time and manure production. Currently, straw and wood shavings are used conventionally for horse bedding. The objective of this study was to assess the overall performance of miscanthus bedding compared to bedding with straw and wood shavings. For this purpose horses were bedded on miscanthus pellets, de-dusted miscanthus chips, straw, and wood shavings over a period of 4 weeks. Input and output of bedding material, required frequency of dung clearing, time required for dung clearing, water and ammonium absorption capacity as well as the C/N ratio of different bedding materials were measured. Behavioural observation of the horses and a survey among the horse owners and visitors were performed. All variants were tested in four replicates, where one replicate is a stall with one horse. Although the costs of purchasing a ton of miscanthus bedding material are higher than the costs for the same amount of straw or wood shavings, economical benefits are expected for miscanthus bedding. The reduced amount of manure in terms of mass and volume leads to lower storage and disposal costs while the improved time management reduces personnel costs. Horses show no negative reactions when adjusted to miscanthus bedding. The colour of miscanthus bedding material is darker than straw or wood and sometimes appears to be dirtier because of the different frequency of cleaning and higher density. However, miscanthus bedding material was perceived positively by the horse owners and visitors.

Acknowledgements:

Iris Lewandowski, *University of Hohenheim*

Differential diagnosis of metabolic bone disease (MBD) in turtles (Testudines) and lizards (Lacertilia) based on the examples of selected species

Magdalena Przymusińska, Magdalena Supińska
Warsaw University of Life Sciences

Study Programme Level: BSc

Keywords:

Turtles, lizards, veterinary medicine, metabolic bone disease, differential diagnosis

The purpose of this work is to demonstrate the differential diagnosis of metabolic bone disease between selected reptile species, belonging to turtles and lizards, which will make the condition easier and faster to diagnose in everyday veterinary practice. This work was created based on the experience of veterinarians from Warsaw who work with reptiles in their everyday practice. MBD is one of the most common diseases that affects terrarium animals. It develops as a result of the owner not providing suitable conditions. MBD is a group of disorders that lead to bone lesions which is associated with incorrect ratio of calcium to phosphorus in the body. MBD symptoms can be very nonspecific, therefore, before starting the treatment, it's important to rule out other diseases such as e.g. helminthiasis in lizards and kidney failure in turtles. It might seem that the most helpful thing would be to examine the blood levels of calcium and phosphorus, however, in the course of MBD, both of these elements may remain in the blood at normal levels. It makes further differentiating tests necessary, e.g. the evaluation of hardness and the shape of the jaw in lizards, X-ray to evaluate bone density or an analysis of blood parameters to exclude kidney failure. Not long ago reptiles have been sporadic patients in veterinary clinics but in recent years the situation is drastically changing. As a result of this, the demand for veterinarians specializing in the treatment of this group of animals is rising and thus also the need for professional literature in the field.

Acknowledgements:

Monika Toborek, *Other*

Karolina Warchulska, *Other*

Dorota Wyka, *Other*

Dorota Cibor, *Other*

Przemysław Łuczak, *Other*

Estimating genetic parameters and responsible SNPs of plumage condition in crossbred layers

Lisette van der Zande

Wageningen University and Research Centre

Study Programme Level: MSc

Keywords:

GWAS, genome, layers, genetics, heritability

Cannibalism due to feather pecking is a growing problem in commercial laying hens. Since beak trimming may no longer be used in the future, genetic selection will play a vital role in eliminating feather pecking behaviour. The aim of this thesis was to gain insight in the genetic parameters and related SNPs for plumage condition in laying hens by analysing a dataset. In order to estimate the genetic parameters, 6 different models with and without the inclusion of mortality were fitted in ASReml. The multiple-trait model is likely to be the most accurate model, because the sire variance is calculated more accurately than the other models. However, it is not clear whether the inclusion of mortality improves this model. Body region total most often has the highest heritability. This means that this region has the highest genetic variance compared to the phenotypic variance. All body regions are found heritable. In the genome-wide association study, a univariate sire-dam model was fitted. From the genotyped individual, it was known which allele was inherited from the sire and which one from the mother. So one model was run twice with the alleles from the sire and from the dam. After genomic control, a false discovery rate was calculated. The false discovery rate reduces the false positives among all positives. Several significant SNPs were found for both alleles from the sire and the dam. Only the alleles of the dam, W1*WB on chromosome two, showed a clear peak in association with the belly. When the results are compared with other studies, other SNPs are found. More research needs to be done to indicate which genes may be responsible for plumage condition.

Acknowledgements:

Piter Bijma, *Wageningen University and Research Centre*

The effects of intermittent suckling on the reproductive performance of sows

Joanna Klaaborg

University of Copenhagen, Faculty of Science

Study Programme Level: BSc

Keywords:

Intermittent suckling, lactational oestrus

Intermittent suckling (IS) is the separation of sow and litter for a given period of hours a day during mid to late-lactation. Intermittent suckling causes stimulation of luteinizing hormone (LH) in lactating sows, resulting in lactational oestrus. An implementation of IS will thus make it possible to breed sows in lactation. This could decrease feed costs in the weaning to service interval and prolong lactation. However, before implementation, it is important to evaluate the effects of IS on the reproductive performance of sows. In order to do so, a literature review was carried out to study how IS affects the hormonal profile of sows as well as oestrus rate, occurrence of ovarian cysts, and embryo development and survival. In general, results from IS differ according to IS strategy. Initiation of IS further in lactation (day 21), longer separation of sow and litter (12 hours), and lastly performing IS for consecutive hours will give better results. However, even when the IS strategy is done in this manner, the level of LH and progesterone during IS is lower in IS sows. Moreover, intermittent suckling decreases the oestrus rate (by average 15%), increases the development of ovarian cysts, and reduces the embryo weight (by on average 9%). Intermittent suckling has also been shown to reduce or increase embryo survival depending upon IS strategy. Especially on the development of ovarian cysts and embryo development and survival, literature was scarce, influenced by the same writers, and some did not reveal significant differences. Further studies, investigating the effects of IS on the hormonal profile and the reproductive performance of sows need to be conducted in order to fully evaluate whether it would be beneficial to implement IS in pig production. Lastly, the expenses as well as the demanding work load following a possible implementation of IS also need to be taken in consideration.

Acknowledgements:

Christian Fink Hansen, *Other*

Janni Hales, *Other*

Effect of cattle breed and country of origin on milk yield and fertility traits in dairy cows

Aleksandra Kalińska

Warsaw University of Life Sciences

Study Programme Level: MSc

Keywords:

Cattle breed, origin, yield, reproduction

Dairy cattle breeding is one of the most important parts of Polish agricultural industry. The selection of dairy cows for milk yield had a negative influence on their reproduction. However, high fertility traits are necessary to achieve profitable production. During the last few years, the population of Polish cattle has been decreasing, but this tendency is compensated by increasing milk yield. The aim of the study was to evaluate the effect of cattle breed (Polish Holstein-Friesian – PHF; Simmental – SM; Polish Black and White - PBW) and country of origin (Poland, Netherlands, Denmark, Austria) on milk yield and fertility traits using a one-way analysis of variance (ANOVA). Results of cattle evaluation system were taken from 6 Polish farms. Analysed traits were: daily milk yield, milk fat and protein, somatic cell score (SCS), number of insemination (NI), calving interval (CA), days from calving to conception (DCC), days from first to last service (DFLS), dry period (DP) and age of first birth. PHF had the highest ($p < 0,01$) milk production and SCS. SM milk contained more protein ($p < 0,01$) than PBW. Cows imported from Netherlands had the highest ($p < 0,01$) production, but also milk protein and SCS. PBW had lower ($p < 0,05$) NI than PHF and the shortest CI and DCC (no statistical differences). At the same time PBW had the longest ($p < 0,01$) dry period. PHF had longer ($p < 0,05$) DFLS comparing to PBW. Native cows had shorter ($p < 0,05$) CI and DCC than animals from Denmark and Netherlands. Obtained results suggest that PBW cows had best fertility traits. Favourable proportions of milk protein to fat show that SM milk had the highest technological value. Several researches pointed out that in order to optimize the economic efficiency of dairy production, producers should consider using less intensive breeds than PHF, especially if they have appropriate conditions (i.e. pasture area), because SM cattle can bring similar profits in semi-intensive production system.

Acknowledgements:

Jan Slószarz, *Warsaw University of Life Sciences*

An attempt to develop a rapid genetic test for identifying selected species of the Bovidae family

Katarzyna R. Lipka, Wanda Olech, Zuzanna Nowak
Warsaw University of Life Sciences

Study Programme Level: PhD

Keywords:

16s rRNA, *Bison bison*, *Bison bonasus*, *Bos taurus*, *Bos primigenius*

The aim of the study was to find a test, which, in a quick and an unambiguous way, would allow the identification of selected species belonging to the genus *Bison* (*Bison bonasus* and *Bison* species), the genus *Bos* (*Bos taurus*, including *Bos primigenius*), as well as some hybrids. The material used were scrapings from bony cores and trabecular bones of right femurs of individuals living in the last hundred years. Additional information was taken from international database (Gene Bank - NCBI). As a result, the comparison of DNA of extinct species (*Bos primigenius*) and the present individuals was possible. The result of the research is mapping out the sequence in a conservative region of mitochondrial DNA in the subunit 16s rRNA, in which the changes between these species were preserved.

Acknowledgements:

State Darwin Museum in Moscow and all the people involved in the samples collection

Placental insufficiency and its importance for the development of IUGR piglets

Sofja Eklund Koziara

University of Copenhagen, Faculty of Science

Study Programme Level: BSc

Keywords:

Intrauterine growth restriction, placental insufficiency, umbilical cord, maternal nutrition

The intrauterine environment is essential for embryonic development and therefore placental insufficiency is most often the cause of the development of IUGR fetuses. Placental insufficiency is a term used for situations in which the placenta is unable to allocate the foetus with sufficient amount of nutrients and oxygen, therefore prioritizing the fetus' brain development in accordance with the brain-sparing effect, as part of a foetal adaptive reaction to an unfavourable intrauterine environment. Placenta development is heavily dominated by uterine capacity, which is especially affected by the number of foetuses implemented. The development of the placenta is limited with increasing number of implemented foetuses. In the case of inappropriate placental development, compensatory mechanisms in the placenta may, to some extent, make up for differences in foetal nutrient intake by reducing the size of the placental stroma. Foetal growth and development is limited when this is no longer an option. Furthermore, intrauterine growth restriction occurs if the foetus is exposed to elevated cortisol concentrations, which may be associated with maternal malnutrition. Over- or undernourishment of the sow has also been shown to reduce uterine blood flows, which limits foetal development due to impaired nutrient exchange. Placental insufficiency can also be induced by changes in the umbilical structure and function. The blood vessels of the umbilical cord are protected against expansion or compression by the Wharton's jelly, but it is observed that IUGR fetuses have a smaller cross-sectional area of their umbilical cord, due to a decrease in Wharton's jelly and a reduced total area of the umbilical vein. The function, formation, and deposition of the Wharton's jelly in the umbilical cord is largely unknown. However, less Wharton's jelly makes the blood vessels in the umbilical cord more vulnerable to foetal movements and uterine contractions and simultaneously reduces Wharton jelly's two-way transfer function of water and metabolites, while the reduced total vein area decreases how effectively the umbilical cord can carry away the foetal blood. In conclusion, many pathways can affect placental insufficiency and cause IUGR piglets and it is likely that interventions during pregnancy can alleviate this problem.

Acknowledgements:

Christian Fink Hansen, *University of Copenhagen, Faculty of Science*

The genetic variability and population structure of wolf- like dog breeds

Radka Stikarova, Jakub Vasek, Daniela Cilova, Martina Melounova, Pavel Vejl
Czech University of Life Sciences Prague

Study Programme Level: MSc

Keywords:

Canis lupus, microsatellite, population analysis

The domestic dog (*Canis lupus familiaris*) is an integral part of the lives of many people. Because of man, dogs were spread throughout the world and developed into more than 300 distinct breeds, which demonstrates their enormous genetic variability. They have a common ancestor, the wolf. The genetic diversity and variability of dogs and wolf genotypes were observed in 192 samples. We selected Czechoslovakian wolfdog (CSW; n= 96), German Shepherd (GS; n= 36), Saarloos wolfdog (SW; n= 30) as the control group to Eurasian wolf (W; n= 30). Analysis of 9 microsatellites markers was carried out. And more than 100 alleles were detected. The number of allele per locus varied between 3 and 24 (median was 6). Sequencing and standardization of detected alleles followed. After comparison with published data 35 new alleles and 4 microvariants were discovered. The highest genetic variability was detected in the CSW group (HO= 0.718) and the lowest in wolves (HO= 0.654). However, there were no significant differences between groups of dogs and wolves in heterozygosity observed, polymorphic information content or number of alleles per locus. On the contrary, we found a medium to high degree of genetic differentiation due to genetic drift between dogs groups and wolves (FST= 0.169, p= 0.000). Using multivariate statistical methods and Bayesian clustering methods four distinctly different groups corresponding to selected dog breeds and wolves were identified. Moreover, wolves were split into two groups in accordance with their site of origin. These findings indicate a surprisingly high resolving power of our selected microsatellite system. This microsatellite system could be used to modify the standard ISAG system for identification of subjects or for analysis and/or detection of potential wolfs hybrids.

Acknowledgements:

Petr Sedlak, *Czech University of Life Sciences Prague*

Towards understanding boar libido

Young Lim Lee

Wageningen University and Research Centre

Study Programme Level: MSc

Keywords:

Boar, libido, artificial insemination

In pig breeding, artificial insemination (A.I.) is a widely used method for reproduction. Typically, a small number of boars are selected based on growth related traits to produce semen which is used to inseminate a great number of sows. The frequencies of mounting a dummy and ejaculation are based on libido. Obviously, a constantly high libido is crucial for stable semen production. In spite of its important role, however, little knowledge exists on the factors that determine boar libido. A three-step approach was used to better understand the factors affecting boar libido: firstly, four A.I. stations were visited to collect information on station management and to gather information on possible determinants of boar libido. Secondly, an extensive dataset (~390.000 observations from 2009-2013) on semen ejaculate, including 5 boar lines from 11 A.I. stations, was used to identify the factors significantly affecting boar libido. Thirdly, a univariate animal model was used to estimate libido heritability (degree to which phenotypic variability is due to genetics) and repeatability (chance that a phenotype is shown repeatedly by the same individual). The factors related to environmental aspects, age, genetics, seasonal influence, and management seemed the most important determinants of boar libido, based on interviews that were initially conducted with A.I. technicians. These factors were further tested in the dataset: while age and environmental aspect were significant, surprisingly genetics and seasonal influence did not significantly influence boar libido. The heritability in the animal model was estimated to be 14%, while repeatability was 64%. These results indicate that boar libido is not strongly heritable, while environmental aspects can improve boar libido. It is therefore suggested that e.g. interaction between technician and boar prior to mounting or mount training for young boars could strongly improve boar libido. Breeding alone, on the other hand, seems to be an insufficient tool for improving boar libido.

Acknowledgements:

Marleen Broekhuijse, *Other*

ELLS Prize for Excellent Master Theses

The ELLS Prize for Excellent Master Theses, donated by the former president of the University of Hohenheim, Prof. Dr. Prof. h.c. Dr. h.c. Klaus Macharzina, honours excellent Master theses in the area of life sciences written in English language. Eligible are students who studied at the University of Hohenheim and another member or partner university of the Euroleague for Life Sciences. Students of the ELLS Double Degree Programmes EnvEuro and EUR-Organic choosing University of Hohenheim as home or host university are also eligible for the ELLS Prize.

In 2016, the awardees of the ELLS Prize for Excellent Master Theses are:

- **Bina Bhattarai**, MSc Organic Agriculture and Food Systems
Master thesis: Understanding G x E variation and prediction of artemisinin concentration in *Artemisia annua* L. based on trichome density and leaf characters
Universities: University of Hohenheim, Aarhus University
- **Hanna Margarete Frick**, MSc Environmental Science - Soil, Water and Biodiversity
Master thesis: Remediation of chromated copper arsenate (CCA) contaminated sites with biochar and zero-valent iron
Universities: University of Hohenheim, University of Copenhagen, Faculty of Science
- **Philipp Klöckner**, MSc Environmental Science - Soil, Water and Biodiversity
Master thesis: From Source to Tap - A Case Study of Organic Contaminants in Raw and Drinking Water in the Region of Uppsala, Sweden
Universities: University of Hohenheim, Swedish University of Agricultural Sciences
- **Dominik Schälling**, MSc Clinical Nutrition
Master thesis: The anticarcinogenic protein Ostreolysin: Its interaction with lipid rafts and its role in apoptosis
Universities: University of Hohenheim, Hebrew University of Jerusalem, Robert H. Smith Faculty of Agriculture, Food and Environment
- **Sarah Luisa Senz**, MSc Agricultural Economics
Master thesis: Adoption of Agro-Ecological Farming Practices– A Case Study from Burkina Faso
Universities: University of Hohenheim, University of Natural Resources and Life Sciences, Vienna

The abstracts of the awarded theses are published on the following pages

Understanding G x E variation and prediction of artemisinin concentration in *Artemisia annua* L. based on trichome density and leaf characters

Bina Bhattarai

University of Hohenheim; Aarhus University

Artemisinin (AN) is an anti-malarial compound produced by *Artemisia annua* which has saved millions of lives suffering from malaria. However, there are still millions of malaria cases in the world and demand of AN is high. The complexity of the molecule and the cost of the synthetic production makes the synthetic production difficult and expensive. To date, the production of AN is feasible only under field conditions. Cultivation of *A. annua* for AN is highly challenged by low concentration in the plant and variation in the AN concentration across different growing conditions. There is a need to increase the AN concentration in the plant and stabilize the achieved high AN concentration by reducing the factors responsible for the variation. The overall aim of this study was to better understand genetic and environmental variation in AN and to investigate to what extent AN could be predicted by trichome density (TD) and other leaf attributes. Eight different clones of *A. annua* were selected and transplanted with three replicates each in a greenhouse (inside environment) and container area (outside environment). The clones in both the environments were grown in Pindstrup 2 peat moss, where they received similar fertilizer treatment and drip irrigation. The plants grown in both environments were treated with stress elicitors chitosan oligosaccharide (COS, 1 g L⁻¹ in aqueous solution) and salicylic acid (SA, 1 g L⁻¹ in aqueous solution) twice weekly for eight weeks and harvested four months after the transplantation. Four upper axillary leaves were harvested and analysed for trichome density (TD) using fluorescence microscopy, leaf area (LA) using WIN RHIZO root scanner and leaf weight using precision balance. Around 20-30 middle axillary leaves were harvested and analysed for AN concentration using high performance liquid chromatography. The analyses were followed by the calculations of specific leaf weight (biomass per unit leaf area) and trichomes per gram dry leaf weight. All the data were analysed for main effect and interaction between the clones, environment and stress treatments using SAS statistical program and analysed for variance components using Restricted Maximum Likelihood (REML) Var. Comp procedure.

The results showed a significant ($p < 0.0001$) effect of genotype and environment on the AN concentration, TD, LA, and SLW, while stress treatment showed no significant effect on any of those parameters. Clones, overall, showed a similar rank in both growing environments. Correlation analysis showed a highly strong linear association between the clones grown in the greenhouse and clones grown in the container area for all the four parameters: AN, TD, LA and SLW. Similarly, strong linear correlations were found between AN and trichome per gram dry leaf weight, AN and TD, and TD and SLW in both growing environments. AN concentration per unit trichome was higher in the clones grown in the container area (0.037 ng) than in the greenhouse (0.027 ng), and highest in clone 1 (0.05 ng) and lowest in clone 6 (0.02 ng). The variance components analysis showed that the environment and genotype together accounted for over 75 % of the variation in the AN and TD, and over 60 % of the variation in the LA and SLW.

In conclusion, genotype and environment can largely explain and were responsible the most for the variation in the AN concentration, TD, LA and SLW. However, interaction effect of genotype and environment was not found in this experiment, which pointed towards the reduced interaction effect due to clones. Stress treatment had no effect on these parameters. The ranking of clones was usually similar between the different growing conditions indicating that clones for outdoor production could be screened by indoor production. SLW and TD can contribute to predict the AN concentration in the plants. AN concentration per unit of dry leaf weight can be anticipated by the number of trichomes present per unit of dry leaf weight. AN concentration per unit trichome can be predicted based on the leaf area because higher AN content was present in the clones and in the environment where the leaf area was relatively lower.

Remediation of chromated copper arsenate (CCA) contaminated sites with biochar and zero-valent iron

Hanna Margarete Frick

University of Hohenheim; University of Copenhagen

Chromated copper arsenates (CCA) have been widely used for wood impregnation and are a major source of metal pollution in soil. Being highly toxic and carcinogenic, CCAs threaten both human and environmental health, including groundwater due to possible leaching.

In-situ stabilization by application of immobilizing amendments is one approach by which bioavailability and mobility of the metal(loid)s can be reduced. A combination of zero-valent iron (ZVI) and biochar (BC), a product from pyrolyzing organic material, was previously discussed and investigated as promising amendment for addressing several metals with different geochemical behaviours at once.

The aims of the present project were to assess the effects of the biochar and ZVI i) on speciation and bioavailability of arsenic (As), ii) on the bioavailability of copper (Cu), and iii) on the bacterial growth rate as a proxy for metal toxicity.

In a microcosm experiment, soil samples from a former wood impregnation site, highly contaminated with CCA (1364 As, 1662 Cu, and 540 Cr $\mu\text{g/g}$, respectively), were treated with two different grain sizes of biochar (feedstock: *Miscanthus x giganteus*; 850 °C) (1 % w/w), ZVI (5 % w/w) or combinations of both, and incubated for 56 days at 15 °C. Subsamples were taken after one day, one week, four and eight weeks and analysed amongst other things, for changes in water-extractability and bioavailability of As and Cu, speciation of As, as well as bacterial growth.

The combined treatment with ZVI and fine biochar was the most efficient one and showed a significant effect in reducing water-extractable and bioavailable Cu and As (about 45 and 42 %, respectively, for water-extractable concentration at the last sampling; water-extractable Cr was reduced by 45 %) and in increasing bacterial growth rate in comparison to the unamended control. Biosensor analysis revealed that the water-extractable fraction generally reflected the bioavailable metal fraction, however, biochar only reduced bioavailable but not water-extractable Cu. This finding indicates that a combined approach with chemical analysis and bioassays was recommendable as bioavailable and water-extractable concentrations might differ. Further research should focus on field scale applicability and the long-term stability of the investigated amendments.

From Source to Tap - A Case Study of Organic Contaminants in Raw and Drinking Water in the Region of Uppsala, Sweden

Philipp Klöckner

Swedish University of Agricultural Sciences; University of Hohenheim

In this study, water samples from the surroundings of Uppsala were examined for residues of pesticides, pharmaceuticals and other contaminants characteristic for human fecal contamination. The aim was to perform a screening of water samples to investigate the level of pollution with the mentioned compound groups. Samples were taken from upstream and downstream river water, lake water, a drinking water treatment plant and treated drinking water. The contaminants were extracted from water samples with two different solid phase extraction (SPE) cartridges. Identification and quantification was achieved via separation with ultra-performance liquid chromatography (UPLC) followed by positive and negative electrospray ionization (ESI) coupled to a high-resolution time-of-flight (TOF) mass spectrometer. Out of 17 analyzed contaminants, 9 could be detected in environmental samples of which 5 were detected in finished drinking water. None of the targeted pesticides were found in environmental samples or drinking water. The average method recovery was 51% and 39% depending on the extraction method. The limit of quantification (LOQ) ranged from 0.07 ng L⁻¹ up to 74 ng L⁻¹. Contaminant concentrations in environmental samples ranged from 0.55 ng L⁻¹ to 40 ng L⁻¹ and in drinking water from 0.22 ng L⁻¹ to 8.0 ng L⁻¹. Compounds detected were atenolol, benzoylecgonine, bezafibrate, caffeine, carbamazepine, cotinine, diclofenac, metoprolol and nicotine. Compounds not detected were atrazine, cyanazine, isoproturon, ketoprofen, monensin, quinmerac and simazine. The results show that several of the target analytes were present in the environment and in drinking water at low but measurable concentrations, which shows that the drinking water treatment plant is not able to successfully remove the contaminants with conventional treatment techniques. A pilot plant with membrane technology is ineffective as well, except when coupled to granular activated carbon (GAC). Risk quotients were determined and revealed that no hazards for human health or aquatic organisms can be expected from the detected contaminant concentrations.

The anticarcinogenic protein Ostreolysin: Its interaction with lipid rafts and its role in apoptosis

Dominik Schälling

University of Hohenheim; Hebrew University of Jerusalem

Due to the complexity of mechanisms it is extremely challenging to find appropriate treatments for colorectal cancer, one of the most common tumors in Western countries. Cancer cells in general often show alterations in one or more pathways leading to uncontrolled proliferation and to resistance towards programmed cell death (apoptosis).

A putative suppressor of proliferating colon cancer cells is Ostreolysin, a 15 kDa protein expressed during fruiting body formation in the oyster mushroom *Pleurotus ostreatus*. It is able to exert haemolytic and cytotoxic activity specifically against cells rich in cholesterol and sphingolipid-rich domains of the plasma membrane. These so-called lipid rafts are specialized areas of eukaryotic membranes which are characterized by unique chemical composition and physical properties. Thus, they are essential in many cell signaling processes, in membrane trafficking and protein endocytosis. Ostreolysin initiates contact with the cell membrane via lipid rafts, but its direct partner of interaction and the underlying mechanism is still not found.

The general objective of the study is to gather more evidence about the anti-cancer properties of Ostreolysin. Hereby the putative mechanisms by which Ostreolysin is able to induce cell death in the colon cancer cell line HCT-116 is aimed to assess. Different Ostreolysin-induced changes in apoptosis-associated proteins firstly were determined. On the one hand, results showed that Ostreolysin promotes cleavage of PARP-1, leads to an activation of caspase-3 and caspase-7 and depresses the expression of the anti-apoptotic protein Bcl-2, but on the other hand Ostreolysin shows no significant effect on the pro-apoptotic protein Bax. However, it could have been shown that Ostreolysin significantly affects the fate of colon cancer cells by inducing apoptosis.

This study provides further evidence that Flot-1, associated with lipid rafts and involved in epidermal growth factor receptor (EGFR)/ mitogen-activated protein kinase (MAPK) signalling might be one of Ostreolysin's direct interaction partner, since Ostreolysin reduces Flot-1 expression level after 8 hours significantly. Albeit, in co-immunoprecipitation experiments Flot-1 could not be detected.

Immunofluorescence experiments were performed in order to prove Ostreolysin's properties as a lipid raft marker and to follow these domains when they are apparently internalized by the cell. Hereby I also assume that Ostreolysin is incorporated in cell's endosomal recycling system.

In addition, Ostreolysin is able to induce droplet formation in colon cancer cells, however the question is still outstanding, which type of droplet. I rather hypothesize that the entities might be apoptotic bodies or vesicles of endocytosed Ostreolysin instead of classical lipid droplets.

In conclusion, this study represents another effort to functionally characterize Ostreolysin as a potential anticarcinogenic agent with therapeutic effects, since it provides further evidence for its contribution in promoting death of colon cancer cells via apoptosis. Certainly, further investigations *in vitro* and *in vivo* are needed in order to understand the complete role of the fungal protein Ostreolysin.

Adoption of Agro-Ecological Farming Practices: A Case Study from Burkina Faso

Sarah Luisa Senz

University of Hohenheim; University of Natural Resources and Life Sciences, Vienna

Sorghum (*Sorghum bicolor* (L.) Moench) and pearl millet (*Pennisetum glaucum* L.) are main staple foods for the Burkinabe population. Due to degradation of soils, climate change and widespread striga (*Striga hermonthica* (Del.) Benth.) infestation, yields in sorghum and millet based farming systems are declining dramatically with few alternatives offered. In response, the project “Farmer led agro-ecological intensification in Burkina Faso” was established by the NGO “Groundswell International” in cooperation with local partners. The aim of the project was to promote innovative agroecological farming practices like Zai pits, half-moon pits, stone contour bunds, microdosing of non-organic fertilizer, application of organic fertilizer, crop rotation, intercropping and the use of new improved varieties. Such practices are expected to address urgent problems of smallholder agriculture and to promote more sustainable farming systems. This study uses a mixed-methods approach consisting of focus group discussions and a household survey to provide a socio-economic assessment of the adoption process among small-scale farmers in the project villages. Factors affecting adoption, challenges related to it, impacts of adoption for farmers and their households, as well as the influence of the project itself are the main focus of the assessment. Survey data were analyzed using descriptive analysis and logit regression. The results suggest that the dissemination of agro-ecological farming practices bears a great potential to enhance small-scale farm households’ food security. The influence of project participation on the adoption of agro-ecological techniques was found significant for most practices and farmer-to-farmer training helped to reach marginalized groups. Still, some techniques like half-moons and intercropping showed rather low adoption rates. A variety of challenges related to adoption faced by farmers was discovered at a technical, legal, social, infrastructural and monetary level and special obstacles for female farmers were found. Overall, the conclusion is drawn that spreading knowledge on agro-ecological techniques represents the heart and core of the dissemination process, but needs to be coupled with building up of farmer’s organizational capacity, a special support of women, an improved infrastructure network and a facilitating policy environment

Index

A	
Abregana, Karl Wyne	44
Adetoyinbo, Ayobami	90
Ahmad, Muhammad Arslan	20
Akus-Szylberg, Florentyna	29
Andreas, Michal	58
B	
Baiocco, Lucrezia	107
Begemann, Jens	104
Begovic, Kresimir	126
Beinlich, Lisa	81
Berg, Thilo H. A.	68
Berger, Hannah	84
Bhattarai, Bina	148
Boldizsar, Laura	82
Brobbey, Solomon Mensah	40
Brožek, Milan	100
Brunerová, Anna	100
Buldo, Patrizia	68
Bytner, Olga	131
C	
Cerri, Carlos E. P.	102
Chaloupková, Kateřina	50
Chavez Rodriguez, Luciana	109
Cherubin, Mauricio R.	102
Cilova, Daniela	144
Claramount, Diego	70
Chrysanthopoulou, Foteini	69
Cupic, Stipan	126
Cywińska, Anna	135
D	
de Vries, Yorick	30
Dhliwayo, Masego	63
Duong, Hieu Linh	120
E	
Eklund Koziara, Sofja	143
Eremeev, Nikita	133
Esyanti, Rizkita R.	113
F	
Fadhullah, Muhammad	132
Faweya, Nicholas	101
Flekač, Stanislav	103
Frick, Hanna	34,149
G	
Galan Robles, Juan Carlos	124
Gallo, Josef	49
García Bendito, Eduardo	63
Gilleladen, Christian	68
Gobelius, Laura	129
Gonzalez Escolano, Flavia	78
Götz, Markus	23
Grabek, Aleksandra	73
H	
Haltrich, Dietmar	56
Hartl, Agnes	84
Hernandez, Helga	70
Högy, Petra	104
Hölscher, Nina	82
Hussain, Kashif	76
Hýsek, Štěpán	24
I	
Ipsen, Richard	68
Isacsson, Patrik	25
J	
Jach, Lisa Lea	22
Janssen, Fons	96
Jarzebowska, Anna	117
K	
Kalińska, Aleksandra	141
Kearney, Katharina	84
Keck, Hannes	35
Khiev, Touch	87
Klaaborg, Joanna	140
Klöckner, Philipp	150
Koestel, Johannes	35
König, Maria	54
Konnert, Gauthier	43
Kontothanasis, Georgios	108

Index

Kölblbacher, Lisa	84	Nowak, Zuzanna	106,142
Kovářiková, Kristýna	58	Nuraini, Nuraini	113
Kozłowska, Natalia	136		
Krawczyk, Eliza	136	O	
Krawczyk, Aleksandra	136	Ochnio, Maciej	106
		Ohler, Johannes	82
L		Olech, Wanda	142
Laloučková, Klára	116	Oliphant, Hannah Lara	64
Laub, Moritz	21	Opitz, Michael	115
Lee, Young Lim	145	Ostovar, Saman	104
Leitner, Luisa	82		
Lexer, Manfred Josef	85	P	
Lin, Jessie	119	Pauer, Gesa	48
Linda, Rostislav	128	Peschel, Ina	84
Lindkvist, Sofia	71	Peschke, Katharina	125
Lipka, Katarzyna	142	Pham, Mai-Lan	56
Ly, Nguyet Anh Tran	118	Pienisch, Sarah	36
		Plattner, Esther	56
M		Poetschki, Kathrin	112
Madras-Majewska, Beata	106	Polanco Medina, Luis A.	88
Maier, Maria	54	Polzer, Roman	105
Makati, Anastacia	63	Priyashantha, Hasitha	68
Martinez Fernandez, Domingo	124	Provost, Shyam	67
Matuszak, Agnes	80	Przeździak, Anna	134
Max, Astrid	93	Przymusińska, Magdalena	138
Mayorga-Duarte, Lina	89	Puchkova, Anastasia	133
Mazancová, Jana	121		
Melounova, Martina	144	R	
Metz, Fenella	130	Rauscher, Benjamin	137
Mfundisi, Kelebogile	63	Rennie, Hamish	85
Michał Drożdżek,	131	Restiawaty, Elvi	132
Mika, Aleksandra	41	Reumaux, Rafaëlle	38
Moore, Kirsten	51	Roberts, Lin	85
Moreira, Cindy S.	102	Roschitz, Christina	127
Munni, Maharunessa	79	Roubík, Hynek	121
Musat, Ioana-Cristina	28	Równy, Agata	73
Musinguzi, Peter	26	Rummel, Lisa	79
N			
Nakasaka, Kohji	52		
Nguyen, Hoang-Minh	56		
Nguyen, Thu-Ha	56		
Nkomoki, Jackson	77		
Nkomoki, William	77		

Index

S		V	
Sadłowska, Ewelina	94	Valencia Coterá, Rodrigo	42
Savvin, Nikolay	97	van den Berg, Gijs Vincent	111
Schälling, Dominik	151	van der Hee, Bart	45
Schlagitweit, Lena	54	van der Zande, Lisette	139
Schrot, Oliver	31	van Kollenburg, Lenna	72
Schwake-Anduschus, Christine	104	Vargas-Carpintero, Ricardo	89
Seidel, Anna	37	Vasek, Jakub	144
Senz, Sarah Luisa	152	Vejl, Pavel	144
Silovský, Václav	59	von Chamier, Julia	66
Silwal, Pratigya	85		
Simon, Cor	83	W	
Sok, Kimchhin	87	Wagner, Christian	55
Stetter, Christian	110	Wagner, Sigrun	62
Stikarova, Radka	144	Weber, Thomas Maximilian	27
Stöckl, Florian	53	Weindl, Kerstin	82
Strobel, Bjarne W.	35	Widiyanto, Sri	132
Strokowska, Natalia	57	Wieczorek, Krzysztof	115
Strucińska, Klaudia	106	Witkowska, Olga	135
Struwe-Voscul, Ann-Christin	86	Witkowski, Lucjan	135
Supińska, Magdalena	138	Witt, Susanne	88
Świdarska, Katarzyna	57		
Szarska, Ewa	135	Y	
Szumilas, Hanna	91	You, Xin	102
T		Z	
Teka, Teowdroes Kassahun	39	Zielenkiewicz, Tomasz	131
Thompson, Rhys	65	Zunabovic-Pichler, Marija	69
Tirkaso, Wondmagegn	95		
Tomas, Hes	87		
Turło, Agnieszka	135		
Tyszko, Anna	106		
U			
Ungerer, Bernhard	92		

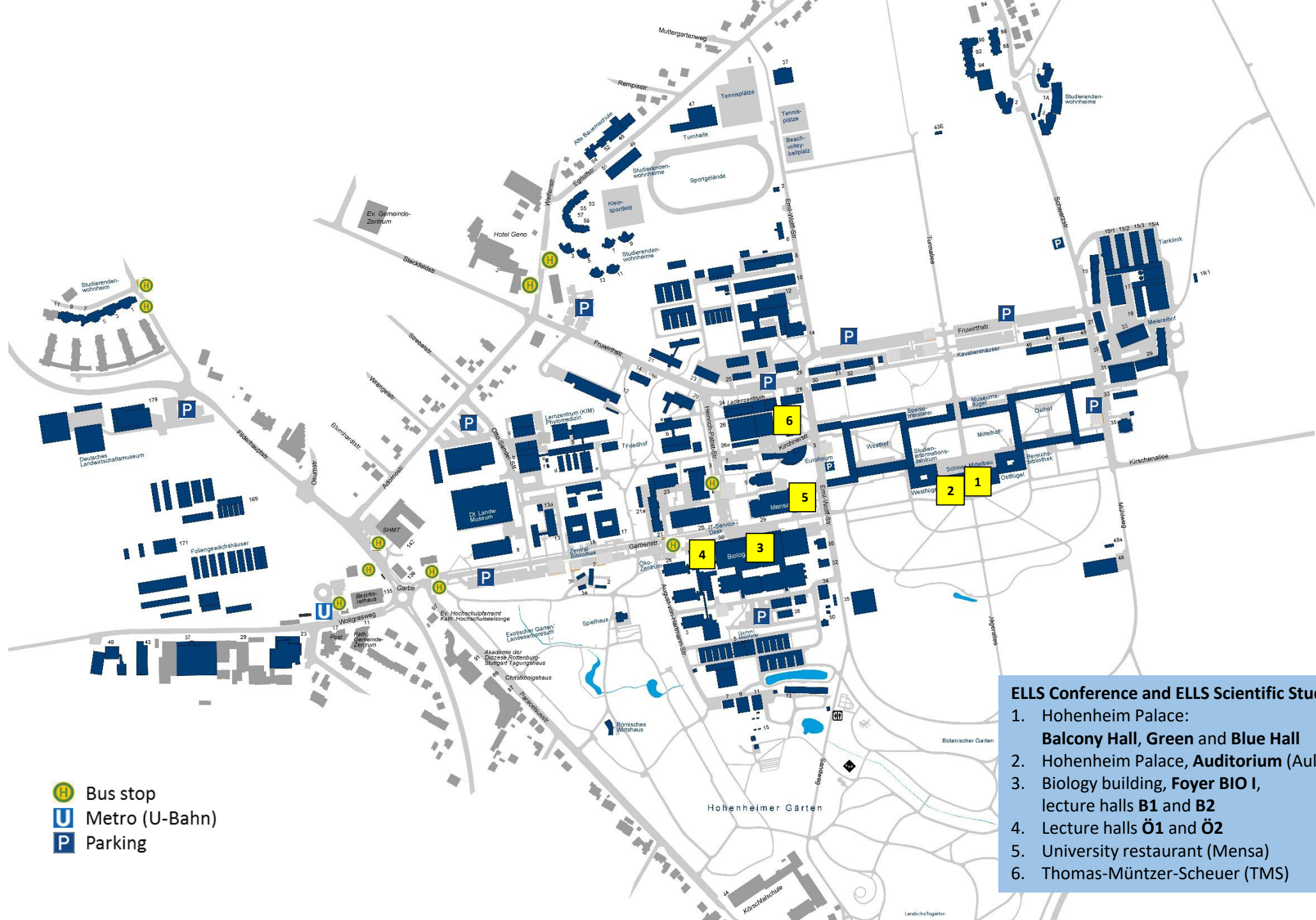
Notes

Notes

Notes



Notes



- Bus stop
- Metro (U-Bahn)
- Parking

- ELLS Conference and ELLS Scientific Student Conference:**
1. Hohenheim Palace: **Balcony Hall, Green and Blue Hall**
 2. Hohenheim Palace, **Auditorium (Aula)**
 3. Biology building, **Foyer BIO I, lecture halls B1 and B2**
 4. Lecture halls **Ö1 and Ö2**
 5. University restaurant (**Mensa**)
 6. **Thomas-Müntzer-Scheuer (TMS)**

Contact

Dr. Gabriele Klumpp | University of Hohenheim | Euroleague for Life Sciences

70593 Stuttgart | Deutschland

Tel. +49 (0)711 459 - 24012 | Fax +49 (0)711 459 - 23668

gabriele.klumpp@uni-hohenheim.de | www.euroleague.uni-hohenheim.de/

ells2016.uhoh.de



ISBN: 978-3-00-054755-3

