ELLS Scientific Student Conference

Wageningen University & Research, November 9th - 10th, 2018

BOOK OF ABSTRACTS

LIFE SCIENCES: LOOKING ACROSS DISCIPLINES

Euroleague FOR LIFE SCIENCES

WAGENINGEN UNIVERSITY & RESEARCH

100years 1918 — 2018

Euroleague
FOR LIFE SCIENCES

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ELLS Scientific Student Conference 2018

Euroleague for Life Sciences

LIFE SCIENCES: LOOKING ACROSS DISCIPLINES

Editors:

Ida Sinke

Mirjam Troost

Wageningen University & Research, The Netherlands

9 – 10 November 2018

Scientific Student Conference 2018

Euroleague for Life Sciences
Life Sciences: looking across disciplines
9 – 10 November 2018
Wageningen University & Research
Wageningen
The Netherlands

Editors Ida Sinke, Mirjam Troost

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DOI https://doi.org/10.18174/461057
ISBN 978-94-6343-363-1
Printing Zalsman Innovative Print

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Organization and Acknowledgements

The organizing committee gratefully acknowledges the support of the member universities and overseas partner universities in the network Euroleague for Life Sciences:

BOKU	University of Natural Resources and Life Sciences, Vienna, Austria
CULS	Czech University of Life Sciences, Prague, Czech Republic
SCIENCE	University of Copenhagen, Faculty of Science, Copenhagen, Denmark
SLU	Swedish University of Agricultural Sciences, Uppsala, Sweden
UHOH	University of Hohenheim, Stuttgart, Germany
WULS-SGGW	Warsaw University of Life Sciences, Warsaw, Poland
WUR	Wageningen University and Research, Wageningen, The Netherlands
CAU	China Agricultural University, Beijing, China
HUJI	Hebrew University Jerusalem, Jerusalem, Israel
LU	Lincoln University, Lincoln, New Zealand

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Foreword of Chair of the Board, Euroleague for Life Sciences (ELLS)

On behalf of the ELLS Board, I am highly delighted to extend a warm welcome to all presenters and participants of the 10th Scientific Student Conference (SSC). In the following days, the theme "Life Sciences: Looking Across Disciplines" will be explored from different perspectives with an aim to seek for the answers and solutions to world challenges related to life sciences. We are concerned about sustainability and safety of food supply as well as how to enable innovation and entrepreneurship in our fields to work better. The agenda of the conference combines discussion panels related to oral and poster presentations, keynote speeches and networking in order to keep you engaged and give you an opportunity to express yourself in every subject raised.

This year, we will celebrate the 10th Scientific Student Conference. We are very pleased to see how the SSC grows every year. Students play a determining role in a development and success of the conference what is acknowledged by the ELLS Board. The Scientific Student Conference provides an international forum to share results of research projects, acquire new knowledge, exchange ideas on the latest developments as well as to set new directions. The SSC contributes to establishing mutual understanding for present and future challenges, hence we encourage you as students of biosciences to expand your horizons and further your interest in topics presented.

As Chair of the ELLS network, I would like to express my deep and heartfelt gratitude to this year SSC host, Wageningen University & Research. They have planned an exciting and remarkable event for all of us. I cordially thank all authors for their input and the session chairs for their dedication.

Thank you for joining us at this exceptional 10th SSC conference.

Best wishes,
Professor Wiesław Bielawski
ELLS Chair of the Board

Welcome at Wageningen University & Research

In 2001 the Euroleague for Life Sciences was founded during a meeting in Wageningen, followed in 2009 by the very first ELLS Scientific Student Conference. We are very happy to host the 10th ELLS Scientific Student Conference again in Wageningen!

I consider the Scientific Student Conference one of the most important and successful activities of ELLS. Important, because it is up to the future generation of scientists, policymakers and entrepreneurs to make a difference in resolving the big challenges that global communities are facing today. In addressing climate change, we desperately need to come up with bio-based solutions for energy, materials and pharmaceuticals. The ever increasing world population needs to be fed in a safe, healthy and sustainable way and we must fight global outbreaks of – partially new – food related diseases. It is necessary to work on sustainable solutions for our metropolitan areas, since in the near future over 70 percent of the people will live in cities and megacities. And, last but not least, mankind needs to (re) define its relation with the natural world. All these themes are part of this 10th ELLS Scientific Student Conference and I am looking forward to the results!

Resolving these big issues is only possible when we work together on a European and global scale. Different cultures and identities shed different lights on defining questions and formulating answers. Learning to cooperate in an international context is important and within the ELLS-network students are becoming familiar with such cooperation across borders and they can begin building their international network. The theme of the conference - *Life Sciences: looking across disciplines* – emphasizes the necessity to not only work together in an international context, but also in multi- and interdisciplinary teams. The complex problems of current societies cannot be addressed with any single-disciplinary approach. Wageningen University celebrates its 100th anniversary this year and part of our success over these hundred years has been our multi- and interdisciplinary approach to reach societal impact.

Clearly, all previous conferences were successful in these respects, and I'm confident that this will also be the case for the present one. I hope you will use the opportunity not only to participate actively in the conference but also to enjoy the social events to build up your international network.

I wish you an inspiring conference!
Prof. dr Arthur P.J. Mol,
Rector Magnificus Wageningen University

Programme

FRIDAY, 9 NOVEMBER 2018

09.00 – 11.30	Campus Activity at Wageningen University
10.00 – 11.45	Registration and coffee Ground floor, Orion
11.45 – 12.05	Opening and welcome C1040, Orion
12.15 – 13.15	Poster session 1.1 Ground floor, Orion
	Poster session 1.2 Ground floor, Orion
13.15 – 14.00	Lunch the Spot, Orion
14.00 – 15.00	Oral session 1.1 C1040, Orion | Oral session 1.2 C2050, Orion
	Oral session 1.3 C2051, Orion | Oral session 1.4 C4016, Orion
15.00 – 16.00	Poster session 2.1 Ground floor, Orion
	Poster session 2.2 Ground floor, Orion
16.00 – 16.15	Coffee break the Spot, Orion
16.15 – 16.45	1st Keynote speaker, Nicholas Dickinson C1040, Orion
	- Professor of Ecology at Lincoln University in New Zealand
16.45 – 17.05	2nd Keynote speaker, Ingrid van Engelshoven C1040, Orion
	- Minister at the Ministry of Education, Culture and Science in The Netherlands
17.05 – 17.30	Coffee break the Spot, Orion
17.30 – 18.30	Oral session 2.1 C1040, Orion | Oral session 2.2 C2050, Orion
	Oral session 2.3 C2051, Orion | Oral session 2.4 C3034, Orion
19.00	Dinner the Spot, Orion
21.30 – 01.00	Student party SSR-W

SATURDAY, 10 NOVEMBER 2018

08.30 – 09.00	Registration and coffee Ground floor, Orion
09.00 – 10.00	Oral session 3.1 C1040, Orion | Oral session 3.2 C2050, Orion
	Oral session 3.3 C2051, Orion | Oral session 3.4 C2035, Orion
10.10 – 11.10	Poster session 3.1 Ground floor, Orion
	Poster session 3.2 Ground floor, Orion
11.20 – 12.20	Oral session 4.1 C1040, Orion | Oral session 4.2 C2050, Orion
	Oral session 4.3 C2051, Orion | Oral session 4.4 C2035, Orion
12.20 – 13.15	Lunch the Spot, Orion
13.15 – 14.15	Case Study Competition C1005, Orion
14.15 – 15.00	3rd Keynote speaker, Mirte Bosse C1005, Orion
	- Postdoc at the department of Animal Sciences
	at Wageningen University & Research
15.00 – 15.30	Coffee break the Spot, Orion
15.30 – 16.30	Award ceremony C1005, Orion
	Closing of the conference C1005, Orion

Venue

The conference venue is the Campus of Wageningen University & Research. All oral and poster sessions, as well as breaks, lunches and the conference dinner will take place in the Orion building on Campus.

Orion, building number 103
Bronland 1
6708 WH Wageningen

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

Student Party

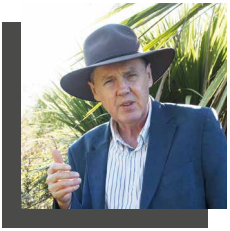
The student party will take place at student association SSR-W, one of the major student associations in Wageningen. Show your conference badge to get access.

SSR-W
Generaal Foulkesweg 30
6703 BS Wageningen

Wi-fi

If you use Eduroam at your home university, please use the login from your home university. Otherwise you can text ells2018 to 06-51287129 (00 31 6 51287129) and receive a login code for your mobile and laptop. Valid from 8 – 10 November 2018.

Keynote speakers



Keynote Speaker 1: Nicholas Dickinson
Nicholas Dickinson is Professor of Ecology in the Faculty of Agriculture and Life Sciences at our ELLS partner Lincoln University. He is a research leader in phytoremediation: harnessing natural processes associated with plants and soil rhizospheres for the clean-up of polluted and degraded environments. Nick's keynote presentation, Agroecology: across disciplines and boundaries, will focus on multidisciplinary approaches and innovative ways in which biodiversity can be used to add value and future-proof agricultural soils and environments in New Zealand.

Keynote Speaker 2: Ingrid van Engelshoven
Ingrid van Engelshoven is a Dutch politician, management consultant and former civil servant. On 26 October 2017, Ingrid van Engelshoven was appointed as Minister for Education, Culture and Science in the Netherlands in Mark Rutte's third cabinet. She is a member of Democrats 66 (D66). She was the party chairwoman from May 2007 until March 2013, and has been a D66 alderman of the municipal council of The Hague.
In this keynote, Minister Van Engelshoven will engage in an interactive session with students of the conference.

Keynote Speaker 3: Mirte Bosse
Mirte Bosse is a self-claimed 'ecologist gone genomics'. She has a background in biology and ecology, but switched to genomics for her PhD in Animal Breeding and Genomics in Wageningen on 'the hybrid nature of pig genomes' (cum laude). After her PhD she combined her both passions with a postdoc in ecological genomics at the Netherlands Institute of Ecology (NIOO). She recently received a competitive VENI grant and is now working on the negative impact of inbreeding from a genomics perspective. Her future lies within the novel field of conservation genomics, in which genomic tools are used to conserve endangered species. This year Dr Bosse was nominated as best scientific talent (top 25) from The Netherlands and Belgium by the newspaper New Scientist for her publication record and passion for outreach.

Scientific Student Conference 2018
Euroleague for Life Sciences

Oral session 1.1

Friday 9 November 2018 at 14:00-15:00
C1040 Orion

Diversity and ecology of spontaneous vegetation on flat gravel roofs in Vienna

Julia Virgolini

BOKU, Austria

Study programme level: MSc

Keywords: urban spontaneous vegetation, gravel roof

The high structural density of urban architecture generates a mosaic of habitats, which results in a broad plant species composition of the urban spontaneous vegetation, consisting of indigenous species, common generalist species and non-native species. Flat gravel roofs (FGR) are commonly build since the last century until today as an alternative to pitched roofs. On the one hand the spontaneous vegetation (SV) on gravel roof considered as weeds and a risk to constructions but on the other hand the SV can contribute to urban biodiversity, providing habitats for adjusted flora and fauna. Developed vegetation on FGR has also an aesthetic aspect and ecosystem function, similar to extensive green roof systems. The aim of this study was to identify plant species and communities colonizing this very urban habitat. Further research questions address the contribution of FGR to Vienna's plant diversity and the potential habitat suitability for endangered species and invasive alien species. The plant species occurrence and diversity was investigated on 72 FGR during the vegetation period in 2017. Correlations of the building height, graveled area, exposition, gravel depth, management of the roofs and vegetation abundance provided the habitat characteristics of the FGR for the spontaneous vegetation development. The habitat suitability and the species richness of FGR is limited by the building height, age of the gravel roof and the management. Generating knowledge on the spontaneous vegetation of FGR supports the development of sustainable and ecological alternatives to bare gravel roofs and solutions for management conflicts. It may encourage more gravel roof owners to go wild and let vegetation dynamics work.

Acknowledgements: Inga-Maria Besener, BSc, Univ.-Prof. Dr. Karl-Georg Bernhardt, Dr. Dipl.-Ing. Katharina Lapin

Humans and Nature

Impacts of climate change on the carbon cycle in the arctic tundra during the growing season

Joseph Gaudard, Emily Pickering Pedersen

SCIENCE, Denmark

Study programme level: MSc

Keywords: Arctic, tundra, carbon cycle, methane

The arctic is one of the regions of the world that is most impacted by climate change. One of the expected effects is a shift in the precipitation regime, which might affect the carbon cycle. If the summer precipitation increases, the tundra could emit more methane (CH4) and carbon dioxide (CO2), and therefore lead to a positive climate feedback. In the same way, higher temperatures could increase the availability of phosphorus (P) in the soil (arctic ecosystems are generally P limited), possibly enhancing plant growth or changing plant species composition.

The aim of this study was to find out how the carbon cycle in the arctic tundra is affected by a higher precipitation regime and increased phosphorus availability. A set of 24 homogeneous plots were selected in the tundra near the Arctic Station, Disko Island (Greenland). The experiment was designed with 6 blocks of 4 plots each. Treatments included P addition (2.5g/sqm, 4 times), water addition (equivalent of 8mm of rain per week), the combination of P and water addition, and control in a full factorial design. Carbon fluxes (CO2 and CH4) were measured weekly using a closed loop chamber system with a Picarro-62201-i Analyser. Net ecosystem exchange was measured using a transparent chamber and ecosystem respiration was measured by covering the chamber with a black cloth. Measurements were conducted during the whole growing season (from end of June till beginning of September). These data allow for the comparison of carbon fluxes between the treatments in order to see if and how the carbon cycle in the arctic tundra is affected by climate change.

Acknowledgements: Anders Michelsen, Prof., Herbert Formayer, Assoc. Prof. Dr.

Humans and Nature

Generation of Black Carbon in Mediterranean shrubland soils during a wildfire and it's immediate quantification

Anumeha Topno

UHOH, Germany

Study programme level: MSc

Keywords: wildfires, blackcarbon, soils, shrublands, MIRS

Land use changes coupled with climatic changes have escalated the frequency and intensity of wildfires in the Mediterranean. Burned soils are believed to contain measurable amounts of Black Carbon (BC), a continuum of highly condensed aromatic residues formed during incomplete combustion of biomass. Its enhanced resistance to biological degradation and prolonged residence time in soils, makes it a potential carbon sink. Quantitative information is however, inconsistent. Hence, contrasting the generally assessed long-term (> 25 years) physicochemical changes in soil properties, we studied the short-term changes on SOC due to generation of BC compounds in the soil surface (uppermost 0-5 cm) immediately after fire. Prescribed burnings were conducted at three sites, with diverse fire histories. Soils were sampled after two days from control and burned plots. BC was isolated as the oxidation-resistant residue of low-temperature acid-dichromate oxidation. mid-infrared diffuse reflectance Fourier transform spectroscopy with partial least square regressions (midDRIFTS-PLSR), was applied as a rapid and inexpensive alternative to identify and validate aromatic compounds found in soils after wildfires. The BC accumulation in the litter and 0-5 cm layers were low, with mean BC around 2% of dry soil. Increase in BC% of Total Organic Carbon (TOC) implied an increase in recalcitrance of SOC, however, it was restricted to the litter layers and remained ≤ 10% of dry soil. midDRIFTS identified the aromatic functional groups produced consequent to wildfire and an increased aromaticity in post-fire soil litter. PLSR successfully predicted TOC% model ($r > 0.98$), however BC % predictions were moderate ($r < 0.66$). Overall, we concluded that wildfires resulted in non-uniform and low generation of BC in the upper soil layers whereas presence of BC in deeper horizons corroborated its stable nature. The effect of fire on SOC is complex and depends on various environmental factors and hence needs further investigation.

Acknowledgements: Christian Brandt, Dr. Pere Rovira, Dr. Prof. Georg Cadisch

Humans and Nature

Scientific Student Conference 2018
Euroleague for Life Sciences

Oral session 1.2

Friday 9 November 2018 at 14:00-15:00
C2050 Orion

“Growing batteries” development of an all-biobased supercapacitor

Hoe Ren Wong, Wolfgang Onyeali

UHOH, Germany

Study programme level: MSc

Keywords: supercapacitors, hemp, biobased, energy-storage, carbon

The available sources of energy are diverse and are likely to be even more diverse in the future. Many of these energy sources, such as wind and solar energy, are not constant and require energy storage devices to facilitate a constant energy supply. Moreover, as the energy supply of the future most likely will consist of grids that smartly regulate the dynamic interplay of power supply and power utilization, fast-charging and durable energy storage systems are becoming indispensable for efficient grids that reliably supply power to the people and facilitate clean electric mobility.

Current energy storage devices such as rechargeable batteries are based on "difficult" materials (e.g. lithium) that are scarce, un-ecological to mine and problematic to dispose.

Therefore, more attention is being put on supercapacitors as they can be manufactured from materials derived from plants, are more durable and charge faster than conventional batteries.

We present the process of making an entirely biobased supercapacitor from production and processing residues such as hemp straw, allowing supercapacitors to be "grown" and assembled in an integrated bioeconomic system.

At this stage we are developing the preparation of the hemp-based carbon material for the electrodes using HTC. Different parts of the hemp plant were carbonized at different reaction times (5-24 h) at 250 °C and characterized with electric conductivity measurements. Currently, we are testing them in a simple supercapacitor setup.

The results have shown that the materials produced are suitable for making supercapacitors with regards to the electrical conductivity of the carbon material, with a resistance of 5.57 ohm and conductivity of 0.3863 S/m.

Also we are developing a biobased binder that will glue the carbon material onto the current collector.

Acknowledgements: Daniel Barajas, Nancy Lopez, Conversion Technologies of Biobased Resources - UHOH

Biobased Solutions

Czech wind power potential assessment based on Austrian and Danish site characteristics

Felix Nitsch

BOKU, Austria

Study programme level: MSc

Keywords: renewable energies, spatial analysis, land-use

Wind power is a promising technology to reduce greenhouse gas emissions in the electricity sector. However, besides climatic limitations such as prevalent wind speeds, further parameters like population density, land use, and protected areas restrict the available sites. Typically, in the assessments of wind power potential, the restrictions are normatively chosen based on legal, technical, or other criteria. We assess in contrast wind power expansion in the Czech Republic considering wind power site characteristics observed in Austria and Denmark. For this purpose, we use spatially highly resolved data on wind turbine deployment in Austria and Denmark and join it with high quality input data from the LUISA terrestrial modelling platform, and the IRENA Global Wind Atlas. In preliminary calculations, we identified a maximum potential area of 769 km2 in the Austrian scenario and 519 km2 in the Danish scenario for the Czech Republic which translates to 3,685 MW respectively 913 MW of installed capacity. The results show, that the calculated wind power potential only partly meets the capacities as required by recent studies on the decarbonization of the electricity sector. This illustrates the existing challenge of a large-scale installation of onshore wind power turbines in densely populated European areas. A sensitivity analysis examined the impact of the single parameters in a maximum and minimum scenario. The availability was mainly determined by wind speed, sea level as well as the population density close to the wind power sites. Protected areas do not seem to significantly limit the potential areas for wind power expansion. The data sets generated in this study can be used in further research to identify and address land use conflicts arising from the expansion of renewable energies.

Acknowledgements: Johannes Schmidt, Stefan Höltinger

Humans and Nature

Cloud gazing and catching the sun's rays: Quantifying fast fluctuations in solar radiation to estimate peaks in neighbourhood solar energy generation

Esther Peerlings

WUR, The Netherlands

Study programme level: MSc

Keywords: Clouds, solar energy, grid operation

On a sunny day with fine-weather clouds, solar panels in a neighbourhood experience fast and large fluctuations in solar radiation when clouds pass. This leads to similar fast fluctuations in solar energy generation in the neighbourhood electricity grid. Currently more and more households choose to be sustainable and install solar panels, thereby increasing the contribution of fluctuating solar energy in the grid. As a consequence, the neighbourhood electricity grid becomes heavily sensitive to a single cloud. Hence, it has become an urgent challenge for grid operators to balance supply and demand on the neighbourhood electricity grid, as unforeseen fluctuations may pose a threat to the stability and quality of the neighbourhood electricity grid. To accurately manage a neighbourhood electricity grid, we need to understand thoroughly how clouds influence minute-to-minute fluctuations in solar radiation.

We aim to quantify and understand the characteristics of minute-to-minute fluctuations in solar radiation. This aim bridges the knowledge gap between atmospheric processes and solar energy forecasting. We analyse the data on meteorological variables observed every minute at the Veenkampen weather station, Wageningen, in the period June 2011 – December 2017. The data analysis consists of developing a classification scheme of multiple classes. The classes represent characteristic weather conditions and are grouped by (1) mean cloud cover and (2) cloud properties (e.g. size and velocity). In the next step we quantify per class the short duration and large intensity of solar radiation fluctuations. Our end result is a classification scheme of peaks in solar radiation fluctuations at neighbourhood scale, which is a stepping stone to enable large-scale installation of solar panels in cities.

Acknowledgements: Chiel van Heerwaarden

Metropolitan Solutions

Scientific Student Conference 2018
Euroleague for Life Sciences

Oral session 1.3

Friday 9 November 2018 at 14:00-15:00
C2051 Orion

Microcapsulation of chokeberry extract using dietary fiber as a coating material

Ewelina Pieczykolan, Marcin Andrzej Kurek

WULS-SGGW, Poland

Study programme level: MSc

Keywords: anthocyanins, dietary fiber, microencapsulation

In the daily diet it is important to use a varied products to provide bioactive compounds. Not only nutrients valuable for human health are, but compounds such as anthocyanins are important as well. They are flavonoids that positively affect the sense of sight and blood vessels, have antioxidant properties and inhibit aggregation of platelets. Soluble fractions of dietary fiber delay movement of intestinal contents, nourish intestinal microflora. Moreover they bind cholesterol and bile acids and regulate the level of glucose in blood.

The aim of the study was to use microencapsulation technology to create a dried chokeberry extract coated with dietary fiber. Aqueous extracts from chokeberry fruit were encapsulated and spray dried using maltodextrin as a coating material with the addition of guar gum, gum arabic, pectin, beta-glucan and inulin. Microcapsules were tested for bulk density, moisture content, hydroscopicity, water solubility, particle size and colour. The preparations also determined the total content of anthocyanins and ascorbic acid on the day of drying and after 7 days of storage.

In the research, the highest moisture content for gum arabic capsules was observed. The most different parameters of colour was observed for capsules with beta-glucan. Samples were varied in terms of particle size. The biggest particles were observed for gum arabic and the smallest for guar gum. The differences were noticed also in chemical assays. The highest content of anthocyanins on the day of drying and after 7 days of storage was noticed for beta-glucan samples whereas the lowest content was observed for gum arabic samples. In case of ascorbic acid content the sample which stood out particularly was pectin sample. Obtained results revealed that polysaccharides that generally have higher molecular weight like beta-glucan could lead to better preservation of anthocyanins during storage while pectin was most successful in ascorbic acid preservation.

Acknowledgements: This work was supported by The National Centre for Research and Development project “Microencapsulation as the technique for increasing the application of beta-glucan in the food industry [LIDER/25/0022/L7/15/NCBR/2016]”. Special acknowledgements for Małg

From Field to Fork

Beta-glucan as wall material in encapsulation of elderberry extract (Sambucus nigra)

Małgorzata Sobieralska, M.A. Kurek

WULS-SGGW, Poland

Study programme level: BSc

Keywords: β-glucan, Elderberry, Microencapsulation

Highly nutritious elderberry (Sambucus nigra) known as anti-obesity product thanks to antioxidant bioactive compounds such as anthocyanins, flavonols, phenolic acids and proanthocyanidins was microencapsulated in health beneficial fiber as beta-glucan. The aim of the study was to investigate the extract of different ratio of beta-glucan as wall material on properties of microencapsulated (beta-glucan, elderberry) extract.

Firstly, the extract was obtained by the water: acetone extraction method to extract mainly anthocyanins from ground dried fruits. The extract was mixed with maltodextrin (MD)-beta-glucan mixture. Control sample was MD with arabic gum (92.5:7.5). The ratio of maltodextrin replacement by beta-glucan was 2, 4, 8 and 12% with constant content of solids – 30%. Homogenized solutions were spray-dried and stored in freezer before examination. The physical parameters of quality that were determined were: particle size , color, water content, bulk density, moisture content, hydroscopicity, water solubility index. For determination of the anthocyanins and vitamin C content and stability the content was measured on the day of preparation and a week later.

Our results indicated that the beta-glucan wall material samples had higher process quality compared to control samples. Addition of beta-glucan insignificantly decreases encapsulation efficiency. Among powders with beta-glucan content, the powder with 1% beta-glucan content was characterized by the the smallest (24μm) particle size. The sample with 2% beta-glucan content had the highest water solubility and polydispersity index. Due to the encapsulation efficiency, moisture content and water solubility index the optimum condition of microencapsulation process for elderberry extract was for samples with 0,5% beta-glucan as wall material content. It could be concluded that beta-glucan could act as potential encapsulation agent in clean label products to replace widely used arabic gum.

Acknowledgements: Pieczykolan E., This work was supported by The National Centre for Research and Development project "Microencapsulation as the technique for increasing the application of beta-glucan in the food industry [LIDER/25/0022/L7/15/NCBR/2016]"

From Field to Fork

Expression of Mal d 1 allergens in both the skin and the flesh of apples obtained from retail chains in the Czech Republic

Tereza Zunová

CULS, Czech Republic

Study programme level: MSc

Keywords: apples, expression, qRT-PCR, retail chains

Apple allergy is one of the most common types of food allergy. The main allergen Mal d 1 is a complex gene family of 31 loci, where each of the loci codes a different isoallergen. Particular isoforms have varying levels of expression depending on many factor, both genetic and environmental. In this diploma thesis, the expression of isollergens Mal d 1.01, Mal d 1.02, Mal d 1.06A and Mal d 1.06B was studied. Differences in the expression of individual isoforms

were evaluated, based on fruits' variety, pomology, origin, packaging and quality. Furthermore, the differences between the expression of allergens in the skin and in the pulp were evaluated. Relative gene expression based on qRT-PCR, ΔCq and ΔΔCq values was used as an evaluation method. The gene for actin served as a housekeeping gene. Golden Delicious was used as a reference sample. The results show predominant expression of isoallergens Mal d 1.01 and Mal d 1.02, both being much more common than other isoforms. Varieties with highly expressed allergens include Golden Delicious and Jonagold, on the other hand, only low levels of expression were found in Modi cultivar. Our findings also suggest that the skin has a higher allergenicity than the pulp, and that factors such as storage duration, storage method, fruit handling, packing, quality and pathogenesis associated with defensive reactions of the fruit under unfavourable conditions cause higher expression of allergens. Most other studies compare cultivars with high and low allergenicity, compare skin and flesh in expression of allergens, or compare allergenicity in different storage conditions. Our research was unique because it used a more comprehensive approach, assessing a multitude of possible factors related to fruit production, transportation, storage and sales at the same time.

Acknowledgements: doc. Dr. Ing. Pavel Vejl

From Field to Fork

Scientific Student Conference 2018
Euroleague for Life Sciences

Oral session 1.4

Friday 9 November 2018 at 14:00-15:00
C4016 Orion

Viruses in pet reptiles in Poland: is it a common occurrence and should we worry

Joanna Pasterny, Jakub Seń

WULS-SGGW, Poland

Study programme level: MSc

Keywords: infectious diseases, Adenovirus, Herpesvirus, Nidovirus

Viruses cause many serious diseases in veterinary patients. To date, there has been no research on the prevalence of specific viruses in the most popular reptile species kept in captivity in Poland.

Knowledge about the geographic range of various viruses and epidemiological data on their prevalence may improve diagnostic procedures and the effectiveness of treatment. This is especially important due to the difficulties of diagnosing.

Four veterinary clinics in Warsaw have agreed to participate in the study. Veterinarians specialized in exotic animals collected dry swabs during routine visits of their patients; samples were sent to the Polish office of LABOKLIN® laboratory. Swabs were collected in each patient from the soft palate, the cloaca, and any lesions, if found.

The samples were analysed by using pathogen specific PCRs. Ranaviruses , adenoviruses and herpesviruses were preliminarily selected to be included in this study; all snakes were additionally tested for Nidoviruses and Reptarenaviruses which are specific for this reptile group.

From 254 animals sampled for the research, 41 tested positive for one of the viral infections investigated in this study. The most common infections were by and Adenovirus (26), none of the animals had a positive result for Ranavirus or Reptarenavirus. Herpesvirus (2) had very few positive outcomes. For Adenovirus, the majority of positive results was isolated from bearded dragons (Pogona vitticeps, 19 out of 54 animals). Nidovirus was found in the Python family (7 positive results) and Morelia family (6). Both Herpesvirus isolations come from green iguanas (Iguana iguana; 5 animals tested).

Acknowledgements: Rachel Marschang, DVM, ECZM Łukasz Skomorucha DVM Marta Marciniak DVM Kacper Stanicki DVM Gabor Kamiński DVM

Global One Health

Risk assessment of Toxoplasma gondii in Danish indoor sows

Stine Thorsø Nielsen, Grith Kirkhoff Guldbech, Isabella Linde Westergaard

SCIENCE, Denmark

Study programme level: MSc

Keywords: Toxoplasma gondii, risk assessment, pigs

Toxoplasma gondii is found worldwide in up to one-third of the human population. Consumption of undercooked meat is considered a significant risk factor for human infections. Denmark has a substantial export of pork and a large national consumption. A recent study revealed a seroprevalence of 33.7 % in Danish indoor sows. Identified risk factors included cats' access to pig farms, presence of rodents and small herd size. The present cross-sectional study aimed to risk rank Danish indoor sow herds and identify risk factors for transmission of T. gondii related to management practices. Data were collected from September 2017 to March 2018 and combined questionnaire interviews, observational surveys and sampling from cats and mice at sow herds randomly selected from all Danish farms. Cat faecal samples were examined for T. gondii oocysts. Mice brains were isolated and kept frozen until examined by PCR. In total, 56 sow herds were visited, 52 cat faecal samples were collected from 22 farms, and 137 mice were caught by snap traps from 32 farms. All faecal samples were microscopically and PCR negative for T. gondii. Eight percent of the mice were T. gondii positive with the T. gondii DNA verified by SANGER sequencing, leading to 10% of the farms testing positive for T. gondii. The life cycle was fulfilled at Danish indoor sow herds supporting the previous prevalence study in sows. Recommendations are necessary to improve the control of T. gondii in Danish sow herds.

Acknowledgements: Maria Vang Johansen, Henrik Vedel Nielsen, Tina Birk Jensen

Global One Health

Investigation into udder traits, milk production and mastitis in sheep

Olasunkanmi Yusuf, Chris Logan, Anne Ridler and Andrew Greer.

LU, New Zealand

Study programme level: MSc

Keywords: Intra-mammary infection; somatic cell-count; mastitis

INTRODUCTION: Intra-mammary infections (IMI) can lead to clinical and sub-clinical mastitis in lactating ewes, causing pains and impacting their productivity and welfare. Farmers incur costs associated with mastitis through treatment of infected animals, increased replacement rates and reduced lactation yield due to malfunctioning of a part or whole udder which may hinder lamb growth. Somatic cell-count (SCC) is a predictor of udder health with $>400\times10^3$ cells/mL being high. The objective of the study was to determine incidences of mastitis in crossbred sheep while evaluating impacts on milk production and lamb growth. The study also examined the suitability of udder traits as indicators of clinical and sub-clinical mastitis.

RESULTS: Associations between milk production, SCC, prevalence of mastitis, udder traits, and lamb growth were evaluated in 121 twin-suckled crossbred non-dairy ewes at four, eight and twelve weeks after parturition. Generally, milk production per 4 hours declined with time, viz, 1.09±0.04 litres at week 4, 0.68±0.02 litres at week 8 and 0.48±0.01 litres at week 12 with corresponding mean SCC of $320x10^3$ cells/mL, $390x10^3$ cells/mL and $280x10^3$ cells/mL, respectively. Incidence of mastitis was around 10.5%. Twenty of the 25 animals with signs of infection had SCC $>400\times10^3$ cells/mL indicative of mastitis but only 5 displayed elevated SCC at more than one sampling time. Udder traits showed inconsistent association with SCC and milk production throughout the sampling periods. Lamb growth was also unaffected, with no relationship between lamb liveweight, SCC and milk production ($P>0.05$ for all).

CONCLUSION: Incidence of subclinical mastitis was low but present in the flock, and the udder traits provided poor indicators of either mastitis or milk production. The incidence of elevated SCC was 16% of individuals and varied throughout lactation, indicating an ability of ewes to self-resolve infections. Although, mastitis was present but impact on lamb growth was negligible.

Acknowledgements: Ivan Barnett, Rebecca Johnson and Martin Ridgeway.

Global One Health

Scientific Student Conference 2018
Euroleague for Life Sciences

Oral session 2.1

Friday 9 November 2018 at 17:30-18:30
C1040 Orion

Holocene temperature reconstructions from ice core borehole temperatures in Renland, Eastern Greenland

Sonja Wahl

UHOH, Germany

Study programme level: MSc

Keywords: Climate Change, ice cores, paleo thermometer, glaciology

Measured ice core borehole temperatures contain valuable information about climatic conditions of the past. Numerical borehole temperature models are the tool for extracting this information, allowing the reconstruction of past temperatures. Profound knowledge about the ice flow is required when developing a borehole temperature model.

Reconstructions of the Holocene temperature history of the Eastern Greenlandic peninsula Renland were made which are of use for estimating the future Greenland Ice Sheet behaviour in a changing climate and the associated socioeconomic effects.

Borehole temperature models were set up for two ice core drill sites located in close proximity to each other on the Renland Ice Cap. Surface temperature reconstruction was performed using temperature records from remote weather stations as well as d18O isotope proxy data. Both methods calculate similar temperatures for the 20th-century, revealing a mid-century warming and a steep increase in temperatures since 1980. Holocene temperatures were reconstructed by calibrating an isotope paleothermometer. The resulting temperature estimates agree in their overall pattern and indicate a climatic optimum around 9ky b2k with an apparent and mostly steady cooling trend thereafter.

The developed borehole temperature models are limited in their temporal validity, but demonstrate the feasibility to model temperature profiles of the Renland Ice Cap. They can be further modified to extend their validity into the glacial, allowing temperature reconstructions of the entire ice core record, dating back into the Eemian.

Acknowledgements: Bo Møllesøe Vinther (CIC, KU), Kirsten Warrach-Sagi (UHOH)

Humans and Nature

Micropropagation of Tacca integrifolia, a tropical ornamental plant

Pavla Bryxová, Iva Viehmannová, Miroslav Klíma, Petra Hlásná Čepková

CULS, Czech Republic

Study programme level: MSc

Keywords: in vitro, floriculture, Tacca integrifolia

Tacca integrifolia (Dioscoreaceae) is a perennial plant originating from tropical Asian regions. It is cultivated for its unusual inflorescence and showy leaves in the gardens and interiors. Tacca has become increasingly popular through the floricultural world trade. Micropropagation is a tool for large-scale plant multiplication of superior varieties in horticulture industry. This technique can overcome the problems with low germination index and slow plant reproduction.

The objective of this study was to develop a suitable protocol for micropropagation using cytokinins and auxins as plant growth regulators. For the multiplication experiment, shoots were cultivated on MS (Murashige & Skoog, 1962) culture medium supplemented with cytokinins BAP and zeatin at concentrations 0.3-2.0 mg/l in combination with auxin NAA at concentration 0.1 mg/l. Overall, higher number of shoots provided BAP over zeatin. Optimal treatment proved to be 1.5 mg/l BAP with addition of 0.1 mg/l NAA producing the highest number of adventitious shoots (8.05±1.40 shoots per explant). On the contrary, zeatin promoted plant height more than BAP. The highest explants (approx. 7.50±0.79 cm) were obtained from medium supplemented by 0.7 mg/l zeatin + 0.1 mg/l NAA. Rooting of shoots obtained in previous step was tested on MS medium supplemented by auxin NAA at concentration 0.1 and 0.3 mg/l. The highest number of roots was obtained from treatment 0.1 mg/l NAA (3.18±0.45 roots per explant). Well-rooted plants were transferred ex vitro, to the greenhouse conditions. After eight weeks of plant cultivation, survival rate reached 86.2%. This protocol can serve for mass propagation of T. integrifolia, an ornamental plant of high potential in floricultural world.

Acknowledgements: Financial support by Internal Grant Agency of the Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague (Project No. 20185015), Ing. Iva Viehmannová PhD, Ing. Miroslav Klíma PhD, Ing. Petra Hlásná Čepková PhD.

Humans and Nature

The role of zoological gardens in the reintroduction of mammals in Central and Eastern Europe

Blanka Maria Niechoda, Magdalena Przymusińska

WULS-SGGW, Poland

Study programme level: BSc

Keywords: zoological gardens, wildlife reintroduction, conservation

Actions aimed at nature conservation in Europe have a long tradition that originated in the Middle Ages. However, specific actions, based on scientific principles have only started on a wider scale in the twentieth century. Until then, as a result of both direct human activity in the form of unregulated hunting or combating alleged pests and environmental degradation, many mammalian populations in Central and Eastern Europe found themselves on the verge of extinction. After the Second World War, the first active protective measures were initiated, such as breeding and reintroduction programs aimed at restoring or strengthening weakened populations.

Until the beginning of the XXth century the main goal of zoological gardens was to entertain people. Nowadays they also focus their actions on wildlife conservation. As the result of this, zoos often play a role in reintroduction activities as they both provide animals for breeding and lend needed infrastructures. In the face of the recent turbulent debate on the role and functioning of modern zoological gardens, the assessment of their importance in the process of restoring endangered mammal species in Central and Eastern Europe has been attempted. In order to achieve that data acquired from regional nature conservation organisations and zoological gardens has been analysed and confronted with available professional literature.

Acknowledgements: Krzysztof Klimaszewski, Robert Mysłajek

Humans and Nature

Scientific Student Conference 2018
Euroleague for Life Sciences

Oral session 2.2

Friday 9 November 2018 at 17:30-18:30
C2050 Orion

Food Waste related emissions and policy frameworks in the EU. A comparative study between select European Member States their Food Banks

Santeri Lehtonen

BOKU, Austria

Study programme level: MSc

Keywords: Food: -waste, -redistribution, -security, -banks

"Recently, Food Loss and Waste (FLW) has become increasingly discussed both pertaining to its large contribution to man-made climate change, and its moral dimensions regarding food security. In the EU 88 million tonnes of FLW is generated annually, wasting 143 billion euros and emitting 170 million tCO2. Food redistribution can significantly cut FLW, for example through Food Banks (FB). FBs redistribute surplus food from the food supply chain through charity organisations to the most deprived. In the EU Circular Economy Package FBs are defined as 'prevention' and are a preferred method of tackling FLW, as they mitigate Climate Change and improve food security & nutrition. Despite this, many legislative and economic hurdles constrict the functioning and capacity of FBs. Concentrating on five 'Case Study Organisation' (CSO) in five EU countries (AT, DK, FI, HU & PL), this Thesis work describes these hurdles and suggests best practises. Furthermore, the mitigative capacity of the CSOs is analysed. It is found that in 2017 the five CSOs combined saved over 195,000 tonnes of carbon emissions -- 25 tonnes CO2eq. for each tonne they emitted (e.g. through storage and transport). The combined economic saving of their operations was found to be over 90 million € (carbon price + market value of saved food), without considering the indirect value brought to society by providing crucial social services. Through increased investment in Food Banks, governments can not only reduce FLW, but also significantly reduce carbon emissions, save money and resources, increase social cohesion and reduce deprivation."

Acknowledgements: Gudrun Obersteiner, Christian Bugge-Henriksen

Metropolitan Solutions

Willingness of farmers to engage in short rotation plantation on marginal lands in Western Slovakia - Identification of incentives and barriers

Barbora Pollakova

BOKU, Austria and Wood K plus, Market Analysis and Research Team

Study programme level: MSc

Keywords: short rotation plantation, dendromass, farmers

According to scientific literature, the most frequently mentioned benefits of short rotation plantation for farmers are related to economic and environmental aspects. However, some studies highlighted the barriers prevailing among farmers resulting in the reluctance to engage in short rotation plantation. To achieve the goals of biobased economy it is essential to explore reasons standing behind low acceptance of this agricultural production system for farmers. This concept of production on agricultural land is very recent in Slovakia and therefore represents a research gap which should be addressed by this study. This study aims to identify incentive and preventive factors for farmers to engage in short rotation plantation (SRP) on marginal lands in Western Slovakia. The study sample encompassed 19 farmers either engaged or not engaged in short rotation plantation. The study has identified land fragmentation, landowners' consent, long-term contracts, no present tradition of short rotation plantation in Slovakia, food versus fuel debate to be the most prominent barriers. Additionally, we found economic aspects to play an incentivizing role. Lastly, environmental aspects and usefulness of produced biomass behaved either as barriers or as incentives. Notably, economic aspects are an important and very relevant driver however do not seem to be sufficient alone in serving as incentive to all farmers to engage in SRP. Future policy making needs to reflect the reality of other prominent factors such as environmental or personal since they were found to influence farmers' decisions as well. The study showed that an effective dissemination on potential benefits of SRP for farmers and society is considered essential for the successful achievement of the goals towards sustainability.

Acknowledgements: Co-authors – Wood K plus: Lea Ranacher, Franziska Hesser - Market Analysis and Innovation Research Team, Feistmantelstraße 4, 1180 Vienna, Austria; BOKU: Peter Schwarzbauer - University of Natural Resources and Life Sciences Vienna, Institute of Marketing and Innovation, Feistmantelstraße 4, 1180 Vienna, Austria. This study received funding from the Bio Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 745874.

Biobased Solutions

Macroalgae as feed supplement for reduction of methane emission in livestock - Overview of current knowledge and potential Nordic species

Hanna Silwer

SLU, Sweden

Study programme level: BSc

Keywords: Algae, bromoform, climate change, dairy

Climate change is a fact and production systems are in need of modernization and sustainable development. Methane is a problematic and potent greenhouse gas and is emitted as a natural byproduct from livestock metabolism.

Asparagopsis taxiformis is an exotic alga that has been found to reduce methane production in livestock rumen by 99% when ingested with everyday feed, at as low inclusion rates as 2% of total organic matter. The biochemical mechanism behind the methane emission reduction is an inhibition of methanogens in the final enzymatic step of methanogenesis in the rumen. This inhibition is conducted by algae secondary metabolites, especially bromoform.

Algae species found in Swedish watercourses are plenty, however only few species contain the desired secondary metabolites of interest. Red algae seem to be the most potent producers of antimethanogenic secondary metabolites. These algae can potentially be produced in open or closed systems and thus be used as supplements in livestock feed for methane reduction. However, the possibility for sustainable largescale algae production and effects on animal health has to be investigated properly before algae can be used commercially. A possible future product has to be accepted by the farmers and be easily integrated with the basal feed.

The market in Sweden has few actors that work with algae. Because of this there is need of further research and development of this sector. Nevertheless, this can mean the rise of a potential new niche on the countryside.

Acknowledgements: Malin Hultberg

Biobased Solutions

Scientific Student Conference 2018
Euroleague for Life Sciences

Oral session 2.3

Friday 9 November 2018 at 17:30-18:30
C2051 Orion

Taxing meat; a content analysis of online media from Sweden, Denmark, France, Italy, and the United Kingdom

Joseph C. Mosca

SCIENCE, Denmark

Study programme level: MSc

Keywords: meat tax, Europe, online media, content analysis

Current food systems contribute approximately 20 – 30% of greenhouse gas (GHG) emissions globally. These emissions represent a more significant overall contribution to global GHG than all of the transport sectors combined. Therefore, understanding and reshaping our current food system is paramount to achieving Paris Agreement reduction targets and creating a sustainable and livable future. Increasing wealth and industrialization has led to a greater appetite for animal products, which have a higher energy, land and water resource footprint than several plant alternatives. The proponents for a transformation in western European food systems argue that by consuming less meat, the benefits will be two-fold. Firstly, the environmental benefits of emitting fewer greenhouse gases and secondly, the social and health benefits from eating more plant-based foods to reduce the occurrence of non-communicable diseases.

A content analysis was performed using online media from Sweden, Denmark, France, Italy, and the United Kingdom to delve further into the pros and cons of motivating consumers to alter their diet through the taxation of meat products. Online articles published between 15/05/2017 – 15/05/2018 were found using a keyword search in their respective languages. Subsequently, these articles were examined and coded accordingly to various emerging themes, following a framework of inductive content analysis.

The main arguments against the taxation of meat according to the articles examined include the unfair financial burden on consumers, the cultural importance of meat in western European diets, the idea that developing countries are the real problem, and finally that western European farmers are already leaders in sustainable agriculture and therefore need not change.

The research then looked into these arguments to determine whether or not they are substantiated or whether they are the product of emotional media framing.

Until the public can unanimously accept the negative climate externalities associated with the overconsumption of meat, as well as the associated health consequences of overindulgence, it will be challenging and politically dubious to seriously introduce it, let alone propose it, into public policy.

Acknowledgements: Anders Michelsen, Prof. Herbert Formayer, Assoc. Prof. Dr.

Humans and Nature

Thinking outside the CAP: reducing domestic cattle farming as strategy for resilient food systems, in the context of Sweden's Defence Policy

Miriam Augdoppler

SLU, Sweden

Study programme level: MSc

Keywords: food-system resilience, cattle farming, CAP

In the context of the newly created Defence Policy, Sweden is trying to improve overall national preparedness for wartime. Preserving productive arable land by reducing resource-intensive agriculture is expected to improve self-sufficiency of the country and thus decrease vulnerabilities in the supply chain.

This research aimed to identify management options for domestic livestock production which can increase resilience in the Swedish food system. Potential limitations and opportunities for successful implementation under the Common Agricultural Policy (CAP) have been identified, for assessing compatibility of EU and national objectives. Lessons learned from crisis management of the 20th century helped to select existing scenarios on Swedish livestock management which can contribute to national preparedness. Three strategies for domestic cattle farming have then been derived that could improve the adaptive capacity in agriculture. Feasibility of the results has been assessed by looking at cross-interactions between national and EU level, in the context of the CAP's current Pillar I programs.

The analysis indicates that Sweden should adjust crisis management to current political and economic conditions and allow transformations in the food system, to ensure domestic supply in the future. The potential strategy of Ecological Leftovers suggests localized and circular agricultural systems for higher diversity in the sector. PLANT involves innovations for less resource-intensive production options and thus generates new knowledge. Economic Sustainability would increase redundancy of arable land through pasture grazing, to ensure flexibility in resource management. A combined implementation of these strategies is proposed for higher levels of resilience in the national food system and could further facilitate sustainable transformation of Sweden's agriculture. Objectives of the CAP would support the stated management orientations, but inefficiencies of low targeted payments are limiting potential benefits by this policy. Changing conditions for direct payments are therefore suggested for future reforms that could improve effectiveness of CAP supports.

From Field to Fork

Linking Smallholder Farmers to Processor: A case for Making Markets Work for the Poor (M4P) Approach in Nigeria

Pius Nnahiwe, Jiri Hejkrlik

CULS, Czech Republic

Study programme level: MSc

Keywords: tomato, market, income, development interventions

In recent years, development projects implemented in sub-Saharan Africa have employed the use of market system analysis such as Making Markets Work for the Poor (M4P) approach in addressing major factors affecting smallholder farmers income. Empirical evidence from past research reveals that facilitating market linkages and tapping into modern markets have economic benefits for farmers. Thus, contributing to the body of knowledge and in line with recommendations from recent studies, this study assesses the impact of a development intervention using the M4P approach, on the income of smallholder farmers in sub-Saharan Africa. It draws evidence from a case of facilitating alternative guaranteed market for smallholder tomato farmers linked to a processing factory in Kaduna state, Nigeria, through a DFID funded project implemented between 2012 to 2017. A multi-stage convenience sampling technique was used to collect data using structured survey questionnaire from one hundred and twenty-six (126) smallholder tomato farmers that sold their produce to the processing factory and one hundred and twenty-one (121) smallholder tomato farmers as a control group. Data was analyzed by descriptive statistical tools. Also, the study employed quasi-experiment using the difference in difference estimator method to evaluate changes in income from before to after participating in the farmer-processor linkage intervention between participant farmers and non-participant farmers. The preliminary results describe the major factors affecting smallholder farmers income in the study area as poor access to alternative guaranteed markets and commercial off-takers of farm produce. It is envisaged that the difference in difference estimate will reveal a positive impact on the income of smallholder farmers who participated in the M4P farmer-processor linkage initiative.

From Field to Fork

Scientific Student Conference 2018
Euroleague for Life Sciences

Oral session 2.4

Friday 9 November 2018 at 17:30-18:30
C3034 Orion

Hype, threat or opportunity? - An analysis of blockchain technology for supply chains and its potential effects on Swedish primary producers.

Emilie Åberg

SLU, Sweden

Study programme level: BSc

Keywords: blockchain, traceability, transparency, food safety,

Food supply chains are growing more complex, and food fraud and food safety concerns are causing health issues, economic losses, and negatively affecting consumer trust in the food industry. Blockchain applications for enhanced traceability and transparency are a new, much hyped technology. For the layperson it can be difficult to assess whether the technology delivers on its many promises, and, if it does, what the consequences may be for different actors in the supply chain. This work consists of a SWOT analysis and a literature review, where the potential for blockchain technology to enhance supply chains is first analysed, and then discussed from the perspective of its possible effect on the Swedish primary producer. These producers are today facing a weak position in the market, with price pressure from retailers, increased imports as well as large food retailer's own brand products to compete with, as well as difficulty verifying and making visible their quality claims, added value propositions, and brands. Other important trends, such as The Internet of Things, Big Data, and Smart Agriculture, could combine with the increased transparency made possible through blockchain, and open up new opportunities for primary producers as they start to play the leading role in "the story of the product". At the same time, more transparent supply chains will bring with them new questions to be considered, as customers and other actors gain access to large information flows and more insight into the food system than ever before.

Acknowledgements: Madeleine Uggla, Lotta Nordmark,

From Field to Fork

The potential risks and impacts of releasing gene drive modified organisms into wild populations: an ecosystem vulnerability analysis approach with study cases

Carina Roberta Lalyer

SCIENCE, Denmark

Study programme level: MSc

Keywords: ecosystem, gene drives, vulnerability analysis

Gene drive technologies developed in previous years in such a way that attracted the attention of conservationists, biologists and the public to help solve problems that the world has been dealing with for decades. There is an open discussion to use gene drives to potentially conserve biodiversity against invasive species or control pests that damage crops. Although the benefits seem to be attractive, at the present date there is a knowledge gap about the effects of releasing gene drive modified organisms (GDMO) and the potential risks for wild populations and ultimately ecosystems. Technologies (e.g. CRISPR-Cas9 or Medea gene drives) are being developed to propagate a specific gene throughout a population, bypassing the normal 50:50 Mendelian law of heredity. In this way, the desired gene would spread to the targeted population at a fast pace, with the intent to transform, suppress or even eradicate the targeted population.

This work aims to bridge that gap and identify what the most important potential ecological consequences are on the environment if such organisms are released. By developing an ecosystem vulnerability assessment, this study investigates how exposed and sensitive the targeted population and ecosystems are, and what the potential impact at an ecological scale is. As a model, the study used animal species that were proposed for gene editing techniques to control their wild population because they are invasive, causing the extinction of native species or that they are crop pests causing a substantial loss of economic revenue.

Furthermore, potential effects and risks were analyzed using species specific characteristics concerning their biology and ecology to investigate how the gene drive could spread throughout the population in time and space. The species' functional traits were analyzed to hypothesize what effects could result from the rapid decline in population number of the target species.

Acknowledgements: Dr. Bernd Giese, Dr. Johannes Friess

Global One Health

The success of population assisted migration of European tree species in the light of climate change

Hinke Wiersma

WUR, The Netherlands

Study programme level: MSc

Keywords: provenance; population-assisted-migration; drought-resistance; productivity; drought

Climate change is largely manifested through an increasing frequency of extreme events like extreme droughts, which will cause detrimental effects on forest ecosystems world-wide. To mitigate climate change impacts the concept of population assisted migration was introduced. The idea is to plant provenances of a given species that originate from areas with a different climate resembling the future climate of the area where they are planted. Multiple publications reflected upon the performance of various provenances under harsh climate conditions, like drought. Yet there is no general overview where the success of population assisted migration is evaluated. This research aims at partly filling this gap by trying to find an answer on the question: Do provenances of a given tree species originating from southern Europe perform better under drought conditions than provenances originating from central or northern Europe? An analysis was performed based on 12 studies dealing with data from provenance trials of two selected tree species in Europe, namely European beech (Fagus sylvatica L.) and Scots pine (Pinus sylvestris L.). The provenances of the different studies were ranked, according to their performance, in seven classes by using different indicators for 'drought-resistance' and 'productivity'. The results of the ranking showed that southern European beech provenances did perform better for drought-resistance in general, but not uniformly. Besides that, southern provenances of both pine and beech were generally not more productive than more northern provenances. Furthermore, for both species, provenances local to the trial site did generally not perform better than more distant provenances. It became obvious that genetic diversity or specific site conditions at the area of origin of a provenance could explain why there is no clear distinct pattern in provenance performance. Furthermore, other climate extremes next to drought could favour other provenances.

Acknowledgements: dr. UGW (Ute) Sass-Klaassen, dr.ir. P (Paul) Copini

Global One Health

Scientific Student Conference 2018
Euroleague for Life Sciences

Oral session 3.1

Saturday 10 November 2018 at 09:00-10:00
C1040 Orion

Assessing the environmental dialogue in Northern-Brabant from a farmers' perspective

Simone Uijttewaal

WUR, The Netherlands

Study programme level: MSc

Keywords: dialogue, agriculture, policy evaluation

In the Netherlands a combination of a high number of livestock farms and a high human population density leads to conflicting situations. The public raises concerns about zoonotic outbreaks like the Q-fever outbreak of 2009, animal welfare, harmful emissions and climate change. The concerns result in a critical attitude from citizens towards agriculture and its farmers. To address complex problems and to bridge the gap between citizens and farmers, a so-called "Environmental Dialogue" has been implemented in the province of Northern-Brabant. According to this policy, farmers are required to initiate a dialogue with neighbouring residents when they make changes to their farms. The environmental dialogue in Northern-Brabant has not been evaluated yet. The aim of this study is to deepen the understanding of farmers' perceptions of the societal concerns and the environmental dialogue, as they are the ones that have to make sense of the policy in their daily life practices.
Preliminary results of the semi-structured interviews held with farmers at their farms show that the farmers do appreciate the dialogue as a means to inform the neighbours and take into account small concerns. From the interviews it also became apparent that from the farmers' viewpoint, neighbouring citizens see the dialogue as an opportunity to pour out all frustrations instead of having an open conversation. This is a crucial point for policy makers, as this means that it might be necessary to inform the public about the characteristics and purpose of a dialogue. The results of this study are of importance for policy makers and other stakeholders like the representatives of the farmers, as eventually the Northern-Brabant policy aims to achieve conscious and socially acceptable livestock farms in Northern-Brabant, in which farmers play a central role.

Acknowledgements: Tim Stevens & Lotte Burgsteden

Humans and Nature

The role of eco-innovations in sustainable development of companies

Mateusz Perzanowski

WULS-SGGW, Poland

Study programme level: MSc

Keywords: eco-innovations, sustainable development, circular economy

The aim of this diploma thesis was identification of the role of eco-innovations implemented by companies in implementing by them the sustainable development idea. Theoretical part of the study was the analysis of the sustainable development and eco-innovations concepts, which was based on the literature of the subject. In the next part benefits of eco-innovations were identified and examples of such activities were presented. Moreover, motivating factors and barriers to the implementation of eco-innovative activities were presented. The final effect of the analysis was confirmation of previously adopted research hypotheses which clearly indicated an important role of eco-innovations in the process of sustainable development of company. Eco-innovations are one of the key tools for introducing sustainable development assumptions. The goal of eco-innovations is to minimize the negative impacts of industry on the environment, which is also the main purpose of sustainable development idea. Eco-innovations implemented in the companies bring environmental, ecological, economic and social benefits, which has a positive impact on the sustainable development of company. The areas affected by eco-innovations overlap with the components of the concept of sustainable development, constituting a synthesis of human development, economic development and the well-being of the natural environment. In addition, based on the results of the conducted analysis, it was also concluded that the interest in the subject of sustainable development by enterprises will constantly increase, due to the development of policies regulations in the field of environmental protection (e.g. circular economy) and increasing environmental awareness of consumers, which will somehow force to the transformation of management towards sustainable development. It can also be concluded that creating an economic growth based on innovations in the environmental sector may result in improving the efficiency of the economy (in the use of raw materials), creating a market for ecological good/services and creating new jobs.

Acknowledgements: Nina Drejerska

Humans and Nature

Watching the wind? Social acceptance of coastal wind power

Daniel Valentini

SLU, Sweden

Study programme level: First year PhD (at moment of submission)

Keywords: acceptance, coastal wind power, Denmark

Wind power is widely recognised as a cornerstone for a green energy transition. But it is also contested for various reasons. Local actors' acceptance is increasingly documented to be essential for the implementation of wind power projects. Since local resistance can hamper or even prevent wind power constructions, it is important to understand actors opposing wind turbines in their "backyard". The aim of this study is to gain a deeper understanding of acceptance of coastal wind power technology on a local level by investigating a controversial coastal wind farm in its planning phase; the Vesterhav Syd wind power project at the Danish west coast of Jutland. Acceptance is analysed using a sequential mixed methods design drawing on concepts of social acceptance, justice and trust. Based on a quantitative content analysis of regional survey data (n=148), it can be shown that 72% of the survey respondents are concerned about the wind park construction in their vicinity. Concerns are dominantly related to the perception of visual and natural impairment through the project and a fear of losing tourists in this popular holiday destination. To analyse acceptance of a perceived vulnerable actor group in greater detail, semi-structured interviews were subsequently conducted with actors in the tourism sector. Common concerns are uncertainties about outcome effects the project might have for the region (e.g. reduced tourist numbers and more employment in the energy sector), as well as an inadequate planning process. The results resonate with research advocating changes in IEA and planning processes for wind energy projects. To enhance the successful implementation of coastal wind power it is recommended to: improve uncertainty management, enhance collaboration in decision-making on a community level and acknowledge divergent local perspectives during project planning and implementation of wind power developments.

Acknowledgements: Lotten Westberg, Jens Emborg

Humans and Nature

Scientific Student Conference 2018
Euroleague for Life Sciences

Oral session 3.2

Saturday 10 November 2018 at 09:00-10:00
C2050 Orion

Effect of land use change dynamics on exposure to natural hazards, Bogotá-Colombia.

Laura Catalina Quintero Uribe

BOKU, Austria

Study programme level: MSc

Keywords: urban growth, land-use, exposure, hazards

In recent past decades, natural hazard management has gained an increasing importance. In particular, a higher number of elements at risk are exposed to natural hazards, mainly due to societal change and an associated increase in construction activities. Spatial planning may help to overcome the challenges associated with these increase in land use, in particular in those areas where land resources are scarce. The aim of this paper is to assess such land-use dynamics in the Colombian capital Bogotá, and the implication arising from the considerable increase of informal settlements in areas endangered by natural hazards for regional and local politics. The article looks at how spatial planning can reduce future developments in hazard-prone areas and the consequences on actual policy and decision-making processes. Using a land use change model together with information on multiple hazard types, potential driving factors for this development are identified and evaluated. The City of Bogotá is the political, cultural and economic center of Colombia, with a total of 8'181.047 inhabitants. The rapid growth and the densification of the urban areas – both a result of demographic change but also changing policies in the public administration – led to complex and highly variable scenarios of land use change, making the implementation of disaster risk reduction (DRR) policies and sustainable land use plans challenging. As a result, it has exacerbated the socio-economic polarization, leaving marginalized communities overexposed to natural hazards.

A main conclusion of this work is how the better understanding of the relationship between land use change and exposure to natural hazards can contribute to more effective land use policies with respect to disaster risk management.

Acknowledgements: Master thesis supervisors Prof Dr. Sven Fuchs and Dr. Thomas Thaler as well as the efforts of the co-supervisor Claudia Bieling are highly appreciated.

Metropolitan Solutions

Which Governance Aspects Promote and Inhibit the Uptake of Nature-Based Solutions in Cities? - Sustainable Urban Drainage Systems in Tampere, Finland and Eindhoven, the Netherlands

Niklas Effenberger

UHOH, Germany

Study programme level: MSc

Keywords: NBS, SUDS, Governance, Municipalities

The 21st century is shaped by two major processes: Urbanisation and climate change. Cities are major contributors to global warming, while increasingly suffering from its impacts. Grey infrastructure accompanied and supported urbanisation in the past. It now turns out to be insufficient when it comes to extreme weather events. Cities need to find new answers to mitigate the causes of climate change and respond to the new challenges. Nature-Based Solutions (NBS) provide an answer to this problem. The NBS concept offers a new, more sustainable city development, embracing all approaches which bring nature back into the urban environment. In the NBS concept "Sustainable Urban Drainage Systems (SUDS)" are a promising means to re-naturalise urban water cycles. This study examines the development of SUDS in the two cities of Tampere and Eindhoven. Both cities are frontrunners in the application of SUDS in Europe. Semi-structured interviews with actors from the private, public and societal sector identify barriers and supporting governance aspects for the uptake of SUDS.

Cooperation among different stakeholders, knowledge distribution about main benefits of the concept, the creation of a vision towards a common goal, personal commitment of individuals, the provision of sufficient funding and the support by science and politics are identified as major aspects promoting.

SUDS uptake. Eindhoven stands out with new approaches for cross-sectoral cooperation. Tampere fosters new ways of cooperation and tests the new solutions in two districts which are exempt from mainstream development. Path dependency of public institutions, silo-thinking, lack of knowledge.

and vision, the lack of effective regulation, the exclusiveness of the development to expert groups and financial barriers are identified as main obstacles impeding further uptake. The new concept requires a change in administrative procedures, an organisational change of municipal institutions. For a further uptake, cross-sectoral cooperation and stakeholder involvement should be encouraged.

Acknowledgements: Prof. Claudia Bieling, Societal Transition and Agriculture, University of Hohenheim, M.Sc. Tom Hawxwell, Fraunhofer IAO, Urban Governance Innovation

Metropolitan Solutions

The 'uberization' of agricultural mechanization services: a case study of EM3 Agri Services in Rajasthan, India

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UHOH, Germany

Study programme level: MSc

Keywords: mechanization, ICT-applications, sharing-economy

Smallholder farmers' access to mechanization in many developing countries remains limited despite its key role for agricultural development. In India, the provision of tractor services has remained largely unorganized and is mainly dominated by wealthy farmers and government custom hiring centers, which have limited scale and reach.

In the last years, several start-ups and some machinery manufacturers have developed mobile/smartphone tools that follow the approach of the Uber private-car hire service aiming to improve the access of smallholders to mechanization services. This research analyzes the way in which the business model developed by EM3 Agri Services, India's first provider of an ICT-driven model of farm services, innovates the access of machinery services in Rajasthan and intends to reduce the transaction costs compared to conventional models. The study is based on a survey of 100 households, as well as 25 in-depth interviews, focus group discussions and Net Process Mapping with tractor owners and EM3's field staff in five different districts of Rajasthan.

The results assess the impact of this model on the farmers' access to mechanization. 29 farmer-owned EM3 franchises operate in Rajasthan with a partial subsidy for machinery acquisition. Although the business model developed allows access to equipment with high and affordable technology, the use of mobile/smartphone tools by farmers remains limited. The comparison between different groups of farmers shows the impact of this initiative on the on-farm productivity and income. The study also captures the farmers' opinions about the services provided and evaluates the influence of the model at the community level. Moreover, the analysis of the organizational and governance challenges of tractor-service provision via mobile/smartphone tools as well as ways to overcome them is performed and identified. The findings offer valuable insights into the underlying dynamics by which the "uberization" of mechanization can improve the livelihoods of local communities in developing countries.

Acknowledgments: Indian Institute of Management Udaipur, EM3 Agri Services Metropolitan Solutions

Metropolitan Solutions

Scientific Student Conference 2018
Euroleague for Life Sciences

Oral session 3.3

Saturday 10 November 2018 at 09:00-10:00
C2051 Orion

Characterisation of rhizosphere chemistry as a means to understand exudation process of the biological nitrification inhibiting compound "brachialactone" in Brachiaria humidicola

Supriya Verma

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Study programme level: MSc

Keywords: BNI, brachialactone, root exudate profiling

The ability of plants to suppress soil nitrification through the release of nitrification inhibitors from the roots is termed 'biological nitrification inhibition' (BNI). The tropical forage grass B. humidicola (Bh) releases a root exudate termed "brachialactone" that deters both ammonia monooxygenase (AMO) and hydroxylamine oxidoreductase (HAO) enzymatic pathways in nitrifying organisms such as Nitrosomonas europeae. What remains unknown is if brachialactone is exuded via an activeor passive process. We studied the exudation pattern of brachialactone in hydroponically grown Bh under the effect of N nutrition and pH. We tried to minimized root plasma membrane damage by studying the exudation patterns in full nutrient trap solutions for a period of 4 hours. The trial included 4 treatments with different nitrogen sources (i.e. ammonium/nitrate and sole-ammonium) and pH (4.8 and 6). The root exudates were analyzed for ammonium/nitrate levels, brachialactone, sugars, amino acids and carboxylates. To elucidate whether brachialactone is released by means of a regulated process, its exudation levels were compared to the exudation levels of analyzed metabolites. Our study confirmed that the nutritional N form and pH has a significant effect on brachialactone exudation ($p=0.0001$). We have found that brachialactone exudation is correlated with ammonium uptake and organic acids exudation. Relatively constant exudation rates of amino acids and sugars under all treatments indicates that there was no plasma membrane damage of the root cells. The correlation between brachialactone exudation and ammonium uptake indicates that the exudation is either by facilitated diffusion or an active process. The previous studies have stressed on the fact that ammonium acts as a trigger for the brachialactone exudation. However, we have an alternate hypothesis that acidic pH plays an important role in the release of brachialactone supported by the fact that we observed low levels of brachialactone under ammonium nutrition at alkaline pH.

Acknowledgements: Konrad Egenolf, Jochen Schoene, Gunther Neumann, Frank Rasche

Humans and Nature

Investigating nutrient management trade-offs using the Land Utilisation Capability Indicator (LUCI)

Grace Tariro Gowera

LU, New Zealand

Study programme level: MSc

Keywords: LUCI, nutrient management, water-quality

Ecosystems provide several services which are important to human livelihoods, such as clean water, nutritious food, and wood. This has led to the demand for an enhanced understanding of ecosystem services throughout the world. Rural land-use has intensified, concerns over the impacts on ecosystem services and water quality management have increased. This places farmers under pressure to manage the export of nutrients to waterways and maintain the sustainability of freshwater. To meet the demand for water quality management, several modeling tools have been developed. These range from tools that provide simple mapping of ecosystem services based on the land cover to advanced process-based models that involve biological and physical mechanisms that produce ecosystem services. The Land Utilisation Capability Indicator (LUCI) models a variety of ecosystem services: agricultural productivity, habitat, carbon sequestration, flood mitigation, diffuse pollution, and erosion. LUCI runs simultaneously from farm to catchment and national scale with a fine resolution and focuses on rural environments, which assists farmers in quantifying and exploring spatially explicit solutions to improve water quality. The aim of this research is to identify sources, sinks, and pathways of nutrients in Kaituna catchment. Within the catchment, initial results indicate strong spatial gradients in the total generated Nitrogen (N) and Phosphorus (P) loads and are linked to combined land cover and soil order categories. The topography of the catchment has a great influence on the N and P loads as the highest loads are positioned at the toe-slope in the landscape and the lower loads are positioned uphill.

Acknowledgments: Crile Doscher, Peter Almond.

Humans and Nature

Methane concentration in the Elbe Estuary, North Sea – Distribution, sources and impact of environmental factors

Hanna Winkler

SCIENCE, Denmark

Study programme level: MSc

Keywords: Methane, River Elbe, Estuary

Estuaries are complex systems, which are responsible for emitting the biggest share of global methane emissions from oceans into the atmosphere. The river Elbe is one of the major waterways in central Europe, making the selected site in the southern North Sea a highly relevant case study. The conducted research is part of the project "MOSES", which implements an observing system to investigate short-term events and long-term trends in the earth system. Measurements on methane concentrations will be conducted using off-axis integrated-cavity output spectroscopy with a high spatial and temporal resolution. Records will be taken continuously at a fixed station in Cuxhaven and along a 60 km long transect from Cuxhaven to the island Heligoland. The impact of different environmental factors, such as temperature, salinity, turbidity and tide on the methane distribution and emissions will be determined. Some of these factors and processes are predicted to be affected by changing climatic conditions which can in return alter biogeochemical cycles in coastal systems. It is expected that the distribution will be influenced by the methane-rich input of the Elbe, or alternatively by the input of surrounding marshes. Furthermore, an impact on the amount of discharge is to be expected. Comparisons with classical records from previous years will be performed.

Humans and Nature

Scientific Student Conference 2018
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Oral session 3.4

Saturday 10 November 2018 at 09:00-10:00
C2035 Orion

Breastfeeding and complementary feeding: a longitudinal study into the association with linear growth in Rwandan infants

Eva de Groot

WUR, The Netherlands

Study programme level: MSc (graduated August 2018)

Keywords: Linear growth, infants, complementary & breast-feeding

Stunting, a length-for-age Z-score of -2 or less, is a large global burden and seen in 38% of children under five years old in Rwanda. Causes of this linear growth impairment include nutritional, morbidity and household factors. In this longitudinal study, the associations between 13 breastfeeding and complementary feeding factors and linear growth were investigated in infants from birth until twelve months of age in rural Rwanda. Data of 192 participants were analysed using tests on tertiles of total linear growth and linear mixed models for monthly linear growth. It was shown that the tertile of infants with the least total growth had lower rates of early initiation of breastfeeding (93.1% vs. 87.2%, p=<0.001) and higher consumption of micronutrient powders (7.6% vs. 1.5%, p<0.001). Moreover, multiple associations regarding household and morbidity characteristics indicate that children in the lowest tertile of growth grow up in poorer households. In linear mixed models analysis, early initiation of breastfeeding was associated with linear growth in interaction with time as well as by itself (β=0.14 cm, p=0.001 and β=0.03 cm, p=0.001, respectively). In a combined model of all WHO infant and young child indicators, diet diversity was also associated with linear growth in interaction with time (β=-0.08 cm, p=0.006). Overall, especially early initiation of breastfeeding seems to be highly associated to linear growth and its effect is robust in all models. The effect size becomes larger over time, which may be due to a sustained protective effect of colostrum and the child's increased exposure to pathogens towards the end of the first year of life. Combining factors into one model resulted in a reduction of significance of multiple effect estimates. This shows that some of the factors are dependent on each other. Selecting a set of mutually exclusive IYCF factors remains challenging and more research into this is needed.

Acknowledgements: Supervisor WUR: Dr. Ir. A. (Alida) Melse-Boonstra, Supervisor in Rwanda: Eric Matsiko (PhD candidate).

Global One Health

The role of Omega-3 polyunsaturated fatty acids particularly from fish in improving the immune system with a focus on inflammation and autoimmune diseases specifically Multiple Sclerosis

Salam Kamalmaz

SLU, Sweden

Study programme level: BSc

Keywords: Omega-3, immune system, inflammation

Inflammation is part of the body's responses to infections and injuries, but an improper inflammatory response can cause serious diseases. Multiple sclerosis (MS) is an autoimmune inflammatory disease that affects the central nervous system. The disease is the primary cause of disability among young adults aged between 20-40 years. The reason for MS is unknown and no treatment can fully cure it. There are disease-modifying drugs used to slow down the progression of MS. Such drugs are not always effective, are of high cost and have side effects. Therefore, it can be discussed whether a complementary alternative in the form of a natural source may be more efficient in treating MS than the used drugs. An example of such natural source is fish due to the anti-inflammatory properties of omega-3 polyunsaturated fatty acids that exist in fish and fish oil.

The aim was to extract information from available literature and scientific articles about the link between the dietary intake of omega-3 fatty acids (particularly from fish) and an enhanced immune system. Another purpose was to shed light on the role such fatty acids play in decreasing inflammation and lowering the risk of MS and treating the outcomes of it.

There are not many clinical trials involving the research on this topic. Most of the available studies state that omega-3 fatty acid intake improve the overall quality of life and boost the immune system. Several studies have also shown that the high intake of omega-3 fatty acids helps to treat some outcomes of MS such as the physical disability, fatigue, and depression.

Further information about the role of nutrigenomics on the immune system's functionality is needed in order to know if there is a direct link between MS and the intake of omega-3 fatty acids.

Keywords: Omega-3 PUFA, autoimmune disease, immune system, inflammation, metabolism and multiple sclerosis

Acknowledgements: Sabine Sampels

Global One Health

Long-term dietary fiber intake and risk of chronic obstructive pulmonary disease: a prospective cohort study of Swedish women

Maria Szmidt 1, Joanna Kałuża 1,2,3, Alicja Wolk 2,3

WULS-SGGW, Poland

Study programme level: First year PhD (at moment of submission)

Keywords: COPD, fiber, intake, prospective-cohort, women

Until now, only two prospective cohort studies based on baseline diet investigated dietary fiber intake in relation to risk of COPD, but none of them tested long-term fiber intake. Both studies indicate that total dietary fiber intake is associated with decreased risk of COPD; however, results on specific fiber sources are inconsistent.

Thus, we examined the association of baseline and long-term intake of total fiber and specific fiber sources with COPD risk in the population-based prospective cohort of 35,339 Swedish women (age 61.5+/-9.1 years). Dietary fiber intake was assessed twice with a self-administered food frequency questionnaire (1987, 1997). Cox proportional hazard regression models were used to estimate hazard ratios (HRs) and 95% confidence intervals (CIs).

During follow-up 2002-2014 (407,067 person-years), 1,557 COPD cases were identified via linkage to the Swedish National Patient Register. Baseline (1997) and long-term (average from 1987 and 1997) dietary fiber intake was associated with lower COPD incidence. Women in the highest vs. lowest quintile of baseline fiber intake (≥26.5 vs. <17.6 g/day) had 32% (95%CI:9-33%, P-trend<0.001) lower risk of COPD. For specific fiber sources, cereal (≥16.4 vs. <9.4 g/day; HR=0.84, 95%CI:0.72-0.98, P-trend=0.04) and fruit (≥7.6 vs. <2.6 g/day; HR=0.77, 95%CI:0.65-0.91, P-trend<0.0001), but not vegetable fiber intake (≥5.4 vs. <2.2 g/day; HR=0.97, 95%CI:0,83-1.13, P-trend=0.91) were associated with lower COPD incidence.

Long-term high dietary fiber intake (>26.4 vs. <17.6 g/day) was associated with a 30% (95%CI:17-41%, P-trend<0.001) lower risk of COPD; every 5 g/day increment of fiber intake was associated with a 12% (95%CI:7-17%) lower risk. Current and ex-smokers with low long-term fiber intake (<17.6 g/day) compared to never smokers with high intake (>26.4 g/day) had a 33-fold (95%CI:23.6-46.6) and 10-fold (95%CI:7.0-16.3), respectively, higher risk of COPD.

Findings of this prospective study indicate that high fiber intake is a modifiable lifestyle factor which may decrease risk of COPD.

Acknowledgements: 1 Department of Human Nutrition, Warsaw University of Life Sciences–SGGW, 02-776 Warsaw, Poland; 2 Unit of Nutritional Epidemiology, Institute of Environmental Medicine, Karolinska Institutet, SE 171-77 Stockholm, Sweden; 3 Department of Surgical Sciences, Uppsala University, Uppsala, Sweden.

Global One Health

Scientific Student Conference 2018
Euroleague for Life Sciences

Oral session 4.1

Saturday 10 November 2018 at 11:20-12:20
C1040 Orion

Are forests getting younger? A case study of climate change impact on growth dynamics of old-growth forests of Carpathians

Ing. Krešimir Begović

CULS, Czech Republic

Study programme level: First year PhD (at moment of submission)

Keywords: Climate change, Dendroecology, Forest dynamics

In forest ecology, one of the pivotal research interests is forests adaptation to recent environmental changes. As trees age, they undergo complexed physiological and morphological changes, mostly visible as low photosynthetic rates, reduced growth, leaf size reduction as well as metabolic changes due to changes in tree size and structural complexity. From the beginning of 21st century, throughout Europe a lot invaluable data had been produced from dendo-ecological studies. Several studies have shown that tree growth had accelerated during the last couple of decades, while contrasting growth responses suggest that young trees are particularly responsive to warming climate, while reduced growth in old trees could alter the species' potential as a carbon sink in the future.

Old-growth forests (i.e. primary forests) represent forest communities that have managed to attain great age untainted by direct human activity. These forests play an important role in mitigating the effects of climate change, acting as the carbon sink and by preserving the natural structural features, which in the end support biodiversity and preserve species richness. Old forests of the Carpathians are one of Europe's most substantial carbon reserves and a refuge for numerous European endemic species.

Using methods of tree-ring analysis, growth trends of Norway spruce forests of various age and size are thoroughly analysed. Growth rates of individual trees in the last 30 years are compared to past growth trends, while linear mixed-effect model will be applied to correlate and differentiate impact of driving growth-factors (including life history of individual trees, disturbance histories of different plots and locations and response to changing climate factors) and age on development of spruce forests.

The results are expected to prove that these natural forests are undergoing serious irreversible changes in the light of the growing environmental changes, in no small part due to indirect human activity.

Acknowledgements: Prof. Dr. Ing. Miroslav Svoboda, PhD.

Humans and Nature

Regeneration Ecology of Quercus species in Gaurishankar Conservation Area, Nepal

Jokin Idoate Lacasia

BOKU, Austria

Study programme level: MSc

Keywords: Regeneration; Quercus semecarpifolia; Quercus lanata

Subsistence hill agriculture is widely practise in the mid hill areas of Nepal, which creates a big dependence and pressure on the forests, and on *Quercus semecarpifolia* and *Q. lanata* species in particular. These species have an important provisioning service value due to their capacity of supplying fodder, leaf litter, firewood and timber. They are however being overexploited and moreover, *Q. semecarpifolia* forests are facing an imminent threat due to their failure to regenerate. This study aims to provide insight into the ecology of their regeneration, and to assess the condition of selected forests. 42 cluster of plots were established in Gaurishankar Conservation Area (Central Development Region), distributed in different land uses and along different environmental conditions. Each cluster of plots contained 4 subplots (1m²) in which regeneration densities of the studied species, microsite covers, soil characteristics, light availability and distance to the closest potential mother tree were recorded. Furthermore, vegetation surveys were conducted in 20 plots. The least degraded forests of both species had a continuous regeneration, as well as the degraded *Q. lanata* forest. However, regeneration was almost absent in the degraded *Q. semecarpifolia* forest, which had a very dense layer of competing vegetation. Distance to the potential mother tree had a strong negative effect on both species, highlighting a seeds dispersity failure in the study area. Both species favoured thick organic soil horizons. *Q. semecarpifolia* seedlings showed a preference for shadier environments in opposition to *Q. lanata*. Overall, the results corroborate the failure of *Q. semecarpifolia* forests to regenerate under heavy anthropogenic pressure. Furthermore, the high ability of *Q. lanata* to cope with these human-induced disturbances has been confirmed. The results of the microsites variables study were used to develop guidelines for current and future restoration and afforestation projects in the area.

Acknowledgements: Klaus Katzensteiner, Jens-Peter Barnekow, Georg Grazer

Humans and Nature

Genetic diversity in selected populations of European beech in the Czech Republic

Dagmar Zádrapová

CULS, Czech Republic

Study programme level: MSc

Keywords: European beech, SSRs, genetic structure

The aim of the research is to determine the genetic variability of ten probably indigenous populations of European beech (Fagus sylvatica L.) in the Czech Republic. For this purpose, 250 samples from across the country were analysed. Each of the selected populations was represented by a total of 20 or 30 individuals. To assess the influence of significant geographic distance on genetic variability, 19 samples were collected in Estonia and analysed. Microsatellite markers (SSRs) were used to evaluate genetic variability. The selected individuals were genotyped with 21 polymorphic microsatellite loci. Genetic structure, intrapopulation and interpopulation relations of the populations were quantified using several software tools, such as GeneMarker, CERVUS, GenAlEx or POPTREEw. The results showed a degree of resemblance between the selected beech populations from the Czech Republic and their genetic variability. They also supported the hypothesis of the influence of extensive geographic distance on genetic diversity.

The results of the survey will be used as a starting point for more detailed analysis of genetic parameters of European beech in the Czech Republic and for study of the influence of particular genetic structures on the physiological qualities of specific tree individuals in specific environments. Maintenance of genetic variability is one of the key points of current nature conservation, therefore the results can have a significant impact in applied sciences, such as forestry and tree breeding, especially in the context of a changing environment under climate change.

Humans and Nature

Scientific Student Conference 2018
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Oral session 4.2

Saturday 10 November 2018 at 11:20-12:20
C2050 Orion

Modelling the selection of processes and ingredients for mild fractionation of agro-materials

Alberto Castiglioni

WUR, The Netherlands

Study programme level: MSc

Keywords: Mild fractionation; Ingredients; Decision-support; Optimization

The food we eat is often made from a mix of ingredients. These ingredients are commonly produced using fractionation, a process in which multiple ingredients are obtained from a single agricultural raw material. For instance, potatoes are often processed to obtain starch-rich ingredients for application in soups. Other ingredients are also produced besides starch, such as fibers and proteins, and should all be valorized. Several fractionation processes exist to process agro-materials, each leading to ingredients with different chemical composition and functionality. Conventionally, producers focus on obtaining standardized ingredients with high chemical purity, which enables the use of ingredients in a variety of products. Harsh processing conditions are applied to achieve high purity, resulting in high water and energy requirements. However, chemical purity is not always necessary and less pure ingredients could have a higher nutritional value and better functionality. As a result, mild fractionation is often sufficient, and requires less water and energy. The decision upon the fractionation process and the optimal portfolio of ingredients for product formulation is not straightforward, and producers need decision-support tools to optimize resource-efficiency in their processes. In this work, a framework is proposed to support producers in the selection of agro-materials, fractionation processes and ingredients. The framework is illustrated for a case study on fractionation of legumes for applications in protein-rich foods. The results show that selecting ingredients from mild fractionation reduces water and energy use and that a wider range of product functionalities can be achieved. Moreover, protein-rich ingredients resulting from mild fractionation contain more fibers, which could contribute to a healthier diet. In general, the outcome of the case study shows that mild fractionation provides opportunities for more sustainable production and that the developed framework provides quantitative decision support for the design of products and processes in the context of mild fractionation.

Acknowledgements: Jochem Jonkman, Renzo Akkerman

From Field to Fork

Diagnosing phosphorous deficiency in Barley (Hordeum vulgare) and evaluation of foliar applications of phosphates with an NPQ based assay

Stine Tougaard

SCIENCE, Denmark

Study programme level: MSc

Keywords: Non-photochemical quenching, foliar fertilization, photosynthesis

Phosphorous (P) deficiencies in food crop production can severely limit the maximum yield. P is one of the most important plant nutrients, but is also a limited ressource. P has a very low plant availability and mobility in soil, which result in inefficient P fertilization. Bypassing the soil entirely with foliar fertilizers applied directly to the leaves can increase the phosphorous use efficiency. However, uptake of P through leaves are not well understood, and efficiency of the fertilizers vary wildly.

To optimize the use of foliar P fertilizers, we want to measure when and if the plants are P deficient. If P status is known, application can be timed correctly and efficiency evaluated. P deficiency give rise to changes in photosynthesis caused by a lack of Pi as substrate for photosynthesis. These changes affect the chlorophyll a fluorescence emitted, and lead to a faster induction of Non-Photochemical Quenching (NPQ). In this research, the faster NPQ induction is used as an assay to diagnose P deficiency in Spring Barley.

Using an imaging technique mapping the NPQ development across a whole leaf, we show that localized application of phosphate solution to the leaf restore the P status. Dipping leaves in KH_2PO_4 solution restore NPQ development where KCl does not. Uptake of spray applied phosphate are observed when the relative humidity is above the point of deliquescence of the solution. Translocation out of the treated area can also be evaluated with images of all plant leaves.

The assay have been used to evaluate the efficiency of different foliar fertilization compositions under development for field application to increase the efficiency of phosphorous fertilization.

Acknowledgements: Professor Søren Husted

From Field to Fork

Why forbidden fruit isn't the sweetest: Quality amendment processes in geographical indications from Spain

Valeria Migsch

BOKU, Austria

Study programme level: MSc

Keywords: geographical indications, collective decision making

Geographical indications (GI) are products that are linked very strongly with their respective region of origin. They are established by producers deciding collectively on a set of rules of production. By effectively protecting the product as inherent to the region, a virtuous circle of valorization is put into place, with the added value being remunerated back into the region of origin.

Within the European Union, agricultural products and foodstuffs can be protected as GI on national as well as Union level, with the product being registered within the DOOR database. The core piece of registry is the product specification which consists of the rules of production. The registration process itself is very time-consuming and can take up to several years. As an analysis of the DOOR database has shown, a significant number of GI have been subjected to an amendment of their product specification, thus directly impacting product quality. With the amendment process being also very elaborate, producers must have very valid reasons for putting amendments in place.

To analyze the successful management of GI it therefore seems reasonable to examine GI that have been subjected to an amendment. Therefore, the question addressed in this paper is how exactly these changes are initiated and consequently implemented. Being currently ranked third within the European Union regarding the number of registered GI, Spain provides a number of products eligible for analysis. For this paper, the Melocotón de Calanda (a peach) and the Pera de Rincón de Soto (a pear) have been chosen for a comparative case study, with semi-structured interviews being conducted with stakeholder groups of production. Using the institutional and development analysis framework (IAD framework) by Elinor Ostrom, the amendment process will be analyzed thoroughly, examining objectives and relationships among stakeholders as well as its outcome.

Acknowledgements: Marianne Penker, Xiomara Quiñones-Ruiz, Hanna Forster

From Field to Fork

Scientific Student Conference 2018
Euroleague for Life Sciences

Oral session 4.3

Saturday 10 November 2018 at 11:20-12:20
C2051 Orion

Effect of different potassium salts on the physicochemical properties of chemically activated hydrochar

Yeisson González Vargas, Catalina Rodríguez Correa, Andrea Kruse

UHOH, Germany

Study programme level: MSc

Keywords: Activated_carbon, chemical_activation, activation_agent, potassium_salts, surface_area

Char produced by hydrothermal carbonization (HTC) can be transformed into functional carbon materials like activated carbon (AC). Additionally, several studies have demonstrated that potassium is the most efficient alkali metal to produce large microporous surface areas. In this study, beer spent grains were converted to AC via HTC and chemical activation. Four different potassium salts were used as activation agent (KOH, K2CO3, K2B4O7, K2C2O4) to understand the effect of the counter ion on the physicochemical properties of ACs. The activation was conducted at 600 °C for 2 h with a constant N2 flow (5 l/min) and keeping the potassium-to-char mole ratio constant. To measure and compare the effects of the activation agent, the ACs were characterized for their elemental composition (CHNSO), adsorption capacity (methylene blue and gas adsorption isotherms), surface area, pore size distribution and micropore volume. The activation process showed lower yields for the KOH treatment than for the other three treatments, whereas the adsorption capacity (≈600 mg/l in MB solution of 1000 mg/l) was highest compared with the other salts. The treatment with K2C2O4 showed slightly better adsorption properties than those with K2CO3 and K2B4O7. Similar trends were observed for the surface areas, where the highest value was obtained with KOH (1450 m2/g). Interestingly, the elemental composition was not considerably affected by the activating agent. The results point towards KOH to be the most suitable activation agent to produce ACs with large microporous volumes and surface areas.

Acknowledgements: Prof. Dr. Andrea Kruse

Biobased Solution

Multi-Criteria assessment of waste substrates for production of advanced biogas in Emilia-Romagna (Italy)

Giovanni Zanaroli

SLU, Sweden

Study programme level: MSc

Keywords: biogas, waste, energy, circular-economy, life-cycle

Advanced biogas can be produced out of any waste organic source and used as a renewable fuel or injected into the gas grid. Biogas systems are examples of circular economy, where energy production can be integrated with waste management and nutrient recycling in agriculture. They can contribute to emissions reduction, offsetting fossil fuels and substitution of mineral fertilizers. This report focuses exclusively on the production of biogas from waste substrates in order to assess its potential contribution to energy, transport and agricultural sectors, as well as its feasibility and opportunity of implementation. In line with a new incentive scheme and the recent momentum gained by upgraded biogas in Italy, the regional context of Emilia-Romagna is taken as a case study. Based on a recent article, a multi-criteria assessment is carried out in order to holistically evaluate some of the principal types of bio-wastes available in the region (i.e urban, agricultural, agro-industrial and forestry residues) Potential biogas yields are considered, but also: nutrient contents in bio-digestates, environmental benefits, impacts and energy balances of the life cycle, competition and geographical distribution of the substrates, economic profitability, technological feasibility and differences on institutional support and public perception. Data from a local research project are integrated with data from a literature review and partly elaborated with GIS and LCA. The comprehensive assessment might be helpful for decision making of public administrations and private businesses.

Acknowledgements: Åke Nordberg (SLU), Niclas Scott Bensen (KU), Sergio Piccinini (CRPA Emilia-Romagna)

Biobased Solutions

Batch Pyrolysis of Cotton Stalks for Evaluation of Biochar Energy Potential

Sean Anayah

SCIENCE, Denmark

Study programme level: MSc

Keywords: biochar, carbon sequestration, soil remediation

This thesis focuses on the thermochemical conversion of cotton stalks (CS) through pyrolysis for energy production. CS remaining after harvest has minimal economic value, and it does not compete towards food or feed provision. Furthermore, CS residue must be disposed of through burying or burning to prevent it from serving as an overwintering site for the agricultural pest, pink bollworm (*Pectinophora gossypiella*). Therefore, a solution to this problem is the pyrolysis of the remnant CS residues. Two of the pyrolysis products, bio-oil and synthesis-gas, can undergo processing for use as a high energy fuel. The third product, biochar, can be used as a fuel, however it can also improve soil quality and be a means of carbon capture and storage (CCS). In the context of limiting the effects of global climate change, meeting the Paris Conference of Parties 21 threshold of ± 2°C temperature is presumed to occur in conjunction with CCS, renewable energy, and a reduction in worldwide emissions. In the experiments, CS was pyrolyzed at temperatures between 300 - 800°C by 100°C intervals at a fixed 30-minute residence time. The average yields of products were determined. The calorific value, proximate, and elemental composition of biochar was measured and analyzed. An estimation of global CS residues was undertaken, and based on the char calorific values and yields, an estimation of the potential energy was determined and compared with the potential energy stored in raw CS. It was found that pyrolysis products have higher energy potential as well as other advantages; namely, decreased transportation and storage costs and a reduction in GHG emissions compared to the direct combustion of CS. Furthermore, the explored pyrolysis process is self-sustaining through a refeed of the synthesis-gas to provide power to the reactor, therefore, a form of sustainable thermochemical conversion.

Acknowledgements: Dr. Christoph Pfeifer, Dr. Rafat Al Afif, Dr. Niclas Scott Bentsen

Biobased Solutions

Scientific Student Conference 2018
Euroleague for Life Sciences

Oral session 4.4

Saturday 10 November 2018 at 11:20-12:20
C2035 Orion

Bisphenol-A, from conception to management: An ethnographic investigation in Western Switzerland

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BOKU, Austria

Study programme level: MSc

Keywords: Bisphenol-a, ethnography, public health, controversy.

Bisphenol-A (BPA) is an endocrine disruptor present in everyday objects (baby bottles, plastic containers, computers, till receipts, etc.). From an industrial success in the late half of the 20th century, the molecule became an object of strong policy preoccupations after the scandal on BPA baby bottles. Our ethnographic study investigates how a substance, first considered as inoffensive, became progressively constructed as a socioenvironmental problem –and this- from the confined laboratory to other spaces: medias, parliaments, industries, associations, etc. Our chosen social science qualitative approach is based on a literature review of technical and informal readings, as well as interviews with scientists, politicians and concerned consumers. Our study-case presents the scientific and socio-historical grips that might have produced the emergence of this specific sanitary problem among a defined network of actors. Our work illustrates also how the progressive establishment of a new paradigm in toxicology is currently undermining and challenging public health policy. Furthermore, and as a last contribution, we examined how authorities deal with socioenvironmental problems when they are placed on the quicksand of scientific uncertainty. By doing so, we hope to contribute originally to a better understanding of the actual limits of scientific and legislative standards, as well as framing a path for an improved regulatory framework on chemicals.

Acknowledgements: DERUNG, Nicolas

Global One Health

2-Hydroxyoleic acid, a synthetic derivative of oleic acid, acts as a partial PPARgamma ligand and influences differentiation of 3T3-L1 preadipocytes

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UHOH, Germany

Study programme level: BSc

Keywords: adipose_tissue, 3T3-L1_cells, oleic_acid, 2-hydroxyoleic_acid, PPARgamma

Obesity and its comorbidities are a present epidemic health problem in developed and developing countries. Adipose tissue not only stores excess energy but is also an important endocrine organ regulating systemic energy homeostasis. On the molecular level, the ligand-activated nuclear hormone receptor PPARgamma is a promising therapeutic target acting as a key transcription factor that regulates energy metabolism of adipocytes. Full PPARgamma agonists such as Thiazolidinediones (TZDs) show a strong insulin-sensitizing effect and are used in treatment of insulin resistance (IR) and type 2 diabetes (T2D). Nevertheless, they induce numerous adverse effects, implying that partial PPARgamma ligands without side effects need to be identified. Oleic acid (OA), but especially its synthetic counterpart 2-hydroxyoleic acid (2OHOA) were shown to have a therapeutic potential in the treatment of different cancer types and cardiovascular disease. However, their effect on obesity and related diseases is to date underreported. In our group, we studied the effect of 2OHOA and OA on adipogenesis using 3T3-L1 adipocytes as model for white adipose tissue. 3T3-L1 cells were subjected to different concentrations of OA or 2OHOA during hormonally induced differentiation. An enhancing effect of 2OHOA on lipid accumulation during differentiation was observed by means of Oil Red O assay. Furthermore, 2OHOA was shown to elevate the protein expression of PPARgamma and perilipin-1 in 3T3-L1 adipocytes during differentiation in a dose-dependent manner via Western Blotting and subsequent densitometric quantitation. Additionally, we identified 2OHOA as a partial PPARgamma ligand using a luciferase reporter gene assay. In comparison to the full PPARgamma agonist Rosiglitazone (RG), 100 µM 2OHOA was half as potent as 100 nM RG. We conclude, that 2OHOA could have a therapeutic potential for the treatment of obesity related metabolic disorders such as IR and T2D, which should be studied in greater detail.

Acknowledgements: Dr. Judith Lauvai, Prof. Dr. Lutz Graeve

Global One Health

Plant oils rich in medium-chain fatty acids inhibit the efficacy of antibiotics

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CULS, Czech Republic

Study programme level: MSc

Keywords: antagonism, antibiotics, bacteria, Staphylococcus aureus

One of the most significant and widespread problems in infectious disease treatment is the development of resistance to chemotherapeutics. Considerable efforts are being made to discover new antibacterial agents against methicillin resistant Staphylococcus aureus (MRSA) strains that have developed resistance to most existing antibiotics. One of the options are medium-chained fatty acids (MCFA) which antibacterial activity is well known, However, nothing is known about their interactions with antibiotics in case of S. aureus. The objective of this study was to evaluate the interactions between MCFA and the standard antibiotics (oxacillin) if applied on selected strains of Staphylococcus aureus. The oils used were from coconut (Cocos nucifera), palm kernel (Elaeis guineensis), tucuma (Astrocaryum vulgare) and muru-muru (Astrocaryum murumuru). The fatty acids profile of each oil was determined by gas chromatography. Tested strains of Staphylococcus aureus were methicillin sensitive (S) and resistant (R) strains ATCC 29213 and ATCC 43300, and one clinical isolate (SA1) provided by the Motol University Hospital (Prague, Czech Republic). Minimum inhibitory concentrations (MIC) of individual oils were determined by microdilution assay in a 96-well microtiter plate. To evaluate the combinatory effect of selected cleaved vegetable oils, the fractional inhibitory concentration (FIC) value was used. All tested cleaved oils showed an antimicrobial effect, however, all tested oils had also considerable antagonistic effect against the oxacilin if applied on all (both R and S) strains of S. aureus at concentration 2048 mg/l and higher. Some MCFA caused an inhibition already at concentration of 1024 mg/l. Despite the natural antimicrobial affect, because the MCFA decrease the efficacy of oxacilin, they should be avoided in diet during the antibiotic therapy of diseases caused by Staphylococcus.

Global One Health

Scientific Student Conference 2018
Euroleague for Life Sciences

Poster session 1.1

Friday 9 November 2018 at 12:15-13:15
Ground Floor, Orion

The effect of reforestation on the carbon sequestration capacity of a degraded dryland in Binh Thuan, Vietnam

Alexander Hollaus(1), Alena Rabitz(1), Pham Tien Duc(2), Tu Binh Minh(2), Axel Mentler(1), Erich Inselsbacher(3)

BOKU, Austria

Study programme level: First year PhD (at moment of submission)

Keywords: Reforestation, Carbon Sequestration, Climate Change

Land degradation in drylands, also called desertification, caused by human impacts and climatic factors, results in a decline of ecological functionality as well as socioeconomic problems. Moreover, land degradation releases carbon (C) from soil and vegetation into the atmosphere in the form of carbon dioxide where it acts as a greenhouse gas contributing to global warming. A key measure used for C sequestration and ecosystem restoration is reforestation. We examine the interactions between reforestation and C sequestration during the restoration of a dryland area in Binh Thuan, Vietnam, by a comparison between the C content in the soil and C stored in vegetation of degraded, reforested as well as natural forest areas. Soil samples were taken in the study area and analyzed in the laboratory for total C content as well as other soil characteristics to determine soil fertility. Additionally, a remote sensing analysis of the research area was carried out to create a potential C sequestration map. The results indicate a high C sequestration potential in Acacia mangium plantations compared to Azadirachta indica plantations and barren land during the first 10 years. Tree species used for plantations are, along with the age of the forest, a major factor determining the C storage capacity. Nonetheless, natural forests store a higher proportion of C in soil and contribute to higher biodiversity. Human impact on the C storage potential in plantations and natural forests is very high since logging for timber or charcoal production was observed to cause a decrease in biomass and soil C. In conclusion, reforestation in the research area could potentially help in sequestering C and mitigating dryland degradation.

Acknowledgements: This work was supported by the scholarship for short-term scientific work abroad of the University of Vienna. (1) University of Natural Resources and Life Sciences, Austria, (2) Vietnam National University - Hanoi University of Science, Vietnam, (3) University of Vienna, Austria

Humans and Nature

Agricultural efficiency and food security; is microcredit the answer?

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CULS, Czech Republic

Study programme level: First year PhD (at moment of submission)

Keywords: generalised propensity score, dose-response, efficiency

Credit constraints is one of the crucial challenges facing agriculture and food security in developing economies. Addressing the challenge, the study examined the impact of microcredit access on Technical Efficiency (TE) of poultry farmers, its implications on food security using a farm level data collected randomly from 67 microcredit borrowers (≥ 2 years) and 45 non-borrowers in the Dormaa Municipality of Ghana using semi-structured questionnaires. We applied the Cobb-Douglas Stochastic Frontier Production Function with Technical Inefficiency (TI) incorporated, to estimate farm-specific TEs and the effect of microcredit on poultry farmers' TE. The results revealed that 62.4% of deviation of the observed output from the frontier output and 95.8% of variation in total output were due to TI, implying a bigger room for enhancing farmers' TE. Albeit, farmers produced at Increasing Return to Scale (return to scale = 1.06). Enhancing TE therefore requires investments to improve the chicks, drugs, technology and especially feed quality (i.e. have positive impact on productivity), whilst reducing the cost of labour and services which influenced productivity inversely. Furthermore, access to microcredit, farming experience and education significantly reduces TI whereas larger household size significantly increased farmers' TI. However, the TI model can be bias towards pre-treatment characteristics of the treated. We therefore adopted the Generalised Propensity Score (GPS) matching, considering microcredit as a continuous treatment variable, to answer the counterfactual question, "what would have happened to a given unit of farmers had they received a different level of microcredit". The estimated dose-response function based on a balanced distribution of pre-treatment variables shows that farmers' TE increase as the intensity of their microcredit received increase. In conclusion, results from both models proves that access to microcredit has a direct impact on farmers' TEs. This can certainly improve the sector's output and ensure optimum food security in Ghana.

Acknowledgements: Verner Vladimír

From Field to Fork

Reflex bleeding as an anti-predation strategy in ladybirds (Coleoptera: Coccinellidae)

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CULS, Czech Republic

Study programme level: MSc

Keywords: Reflex bleeding, Ladybirds, Coccinellidae

Defence strategy against natural enemy plays an important role in the existence of an organism. The efficiency of the defence strategy in one species may explain its effectiveness in evading the attack by the natural enemy or intraguild predation. Reflex bleeding or auto-haemorrhaging is one of the many defence mechanism against predator found in insects and in some reptiles. This behaviour is reported widely in several insect taxa, including ladybirds. However, there is a lack of studies reporting both interspecific and intraspecific comparison of reflex bleeding behaviour in insect species. In this study, reflex bleeding behaviour among several ladybird species is compared by measuring reflex blood volume released while auto-haemorrhaging. Intraspecific effects of sex, live weight and body size on the relative amount of reflex blood were also investigated. The physiological costs associated with the reflex bleeding behaviour were addressed by comparing haemocyte concentration per microliter of haemolymph in controlled individuals and individuals forced to repeated reflex bleeding. A significant difference was observed in the reflex bleeding behaviour among the studied ladybird species. Effects of sex and live weight on the relative amount of reflex blood released were insignificant, but the effect of structural body size was found to have some significant effect. This suggests the efficiency of reflex bleeding behaviour could be higher in species with larger individuals.

Acknowledgements: Ing. Michal Knapp, Ph.D.

Humans and Nature

Urban biodiversity in informal urban green spaces - A comparison of Vienna and Copenhagen

Hedwig Bartl

SCIENCE, Denmark

Study programme level: MSc

Keywords: urban biodiversity, informal green spaces

With increasing worldwide urbanization, more and more pressure and demands are put upon urban green spaces, especially in regards with urban biodiversity. Urban informal green spaces (IGS) offer the potential for not only biodiversity conservation, but also social benefits, as they can be used as recreational areas. Projects to promote biodiversity on IGS have been ongoing in Vienna, the capital of Austria, since the 1990s, whereas Copenhagen, capital of Denmark, is now starting to show interest in such plans. Therefore, this study compares the biodiversity on two IGS in Vienna and two in Copenhagen and makes suggestions, how to find a management trade-off between ecological and social benefits on all sites.

The biodiversity assessment consisted of two parts: (1) habitat diversity, measured with a habitat unit index and calculated with a Shannon-Wiener Diversity Index. (2) species diversity, consisting of a butterfly species assessment and a host plant assessment for 8 pre-selected butterfly species. Butterflies were chosen as biodiversity indicator, as they directly depend on plant species richness and are sensitive to disturbances and environmental change.

A comparison of the results show that the measured biodiversity is higher on the sites in Vienna than in Copenhagen. Thus, it suggests that management of IGS on a city-wide scale can have a positive impact on biodiversity.

Acknowledgements: Andrew Gordon Howe; Marcela Suarez-Rubio; Katharina Kagerl; Erika Bartl

Metropolitan Solutions

The influence of agricultural credit in Sustainability and technology adoption - The case of cocoa production in post-conflict Colombia

Andrés Bodensiek

SLU, Sweden

Study programme level: MSc

Keywords: sustainable innovations, credit, crop subtitution

The purpose of this master´s programme thesis is to analyze and understand how the access to credit in Colombia's cocoa production influences sustainability and technology adoption, considering crop quality and productivity is one the main problems faced by cocoa farmers in this country nowadays. After discussing the concepts of agricultural credits, sustainability, and technology adoption, this document explores the main relations present in the literature explaining the connection between these three elements in the period between the sowing and selling of the cocoa beans. This is done by means of a literature review of academic papers in English and Spanish languages. The empirical part of the document focuses on the case of the cocoa production in 122 farms in three different municipalities located in the south region of the department of Tolima, in Colombia. The method it utilizes for the construction of the empirical model is a standard OLS and Probit regressions and data obtained through direct surveys with the farmers. The results will collaborate in the formulation of policy recommendation for the improvement of credit access to be used to sustainability enhancement and better technology adoption in the cocoa production in post-conflict Colombia.

Acknowledgments: Prof. Helena Hansson, Thesis supervisor. AFEPA MSc programme directives

Biobased Solutions

Comparison of the bioavailability of different curcumin formulations in healthy humans

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UHOH, Germany

Study programme level: MSc

Keywords: Bioavailability, clinical trial, curcumin, curcuminoids

The group of curcuminoids consists of curcumin, demethoxycurcumin and bisdemethoxycurcumin and can be found in the rhizome of turmeric (Curcuma longa). Curcumin is the predominant curcuminoid and commonly used as a food colorant (E100), spice and in Ayurvedic medicine, due to its positive health effects, including anti-carcinogenic, anti-oxidative and anti-inflammatory activities. Different approaches to improve the low bioavailability of curcumin have been developed and are marketed in the form of curcumin supplements.

Our aim was to directly compare, for the first time, the pharmacokinetics of curcuminoids from seven curcumin formulations in comparison to native curcumin in healthy humans.

We carried out a randomized, double-blind, cross-over study (1-week wash-out before and between the study days) with 12 healthy subjects (6 women and 6 men). Subjects received a single oral dose of one formulation normalized to 207 mg curcumin. Standardized meals were provided during the whole study day and the evening before. Blood was sampled at 0, 1, 2, 4, 6, 8 and 24 hours after the intake of the formulation. This procedure was repeated for each formulation. Free and conjugated curcumin, demethoxycurcumin and bisdemethoxycurcumin were extracted from plasma and quantified by HPLC-FD and pharmacokinetic parameters (AUC, Cmax, tmax) calculated and compared.

From Field to Fork

Commercialisation of mopane worms by small-scale businesses in South Africa

Michelle Oude Wolbers

WUR, The Netherlands

Study programme level: MSc

Keywords: food security, insects, commercialisation

Between 2010 and 2050 the food demand will grow rapidly. To reach food security, the use of insects as a food source can be one of the solutions. In rural areas of developing countries, insects are already part of the diet. In urban areas they are seen as a delicacy. Creating enough supply of insects is not easy. Nevertheless, commercialisation of insects can be an important opportunity for people in developing countries because it provides food and jobs. The research focusses particularly on enabling commercialisation of mopane worms (Imbrasia belina) to formal urban markets by small-scale businesses in South Africa. For commercialisation, the consumer and formal market demands should be met. This means that the products should be of high-quality, high in convenience, low in costs, and it should be consistent and reliable in its supply. To reach this, small-scale businesses should become more productive and grow. This requires dealing with the main challenges, which are: lack of sustainable collection, little education, work experience and motivation, lack of suitable collection methods, lack of new technologies, (cross)contamination due to poor hygienic handling, low availability of resources, no proper preservation, not in compliance with consumer demands, no optimal packaging methods, little collaboration with formal markets and no working in cooperatives. All these challenges were taken into account in creating two sustainable scenarios. Scenario 1 exists out of dealing with the challenges easily, without the need for big investments. It is a stepping stone for scenario 2. Scenario 2 applies semi-rearing, which is more complicated and needs more investment. Nevertheless, scenario 2 makes commercialisation to supermarkets reachable. When small-scale businesses can deal with all of these challenges, they will be able to grow and become more productive. Due to that, they can reach commercialisation and fulfil the consumer and formal market demands.

Acknowledgements: My supervisors Catriona Lakemond and Geoffrey Hagelaar. They guided and supported me during the research. Besides, I interviewed multiple people that will remain anonymously but I am also very thankful for their contribution.

Metropolitan Solutions

Molecular sex identification in pigeons

Anna Alama

WULS-SGGW, Poland

Study programme level: MSc

Keywords: sex identification, PCR-RFLP, CHD1, monomorphism

Knowledge of the gender of birds is indispensable in research on ecology and evolution, which main purpose is to preserve natural populations. Also in poultry and fancy bird breeding breeders need information about sex to properly match individuals into breeding pairs and achieve effective breeding. The sex of most species of birds is difficult to diagnose before sexual maturity, but in monomorphic species and breeds this problem also occurs after. The distinction between females and males is difficult due to the lack of differences in tertiary sexual characteristics. One of the monomorphic breed is Wrocław Meat Pigeon breed belonging to the first group of formed pigeons. The breed was established as a result of crossbreeding of the following pigeon breeds: the Homing Pigeon, the Polish Lynx, the King and the Texaner. Initially the identification of sex was based on observation of behaviour and direct studying of anatomical differences in the reproductive system. Only with the development of molecular diagnostics less invasive methods based on genetic analysis have been developed. The aim of this research was molecular identification of sex by PCR-RFLP method in which P2 and P8 primers were used to amplify of CHD1 (chromohelicase DNA binding protein 1) gene sequence. Analysis used biological material collected from 46 birds. Fragments (370 bp CHD1-Z; 350 bp CHD1-W) obtained in result of the PCR reaction were digested by BsuRI edonuclease. Restriction enzyme digested only the sequence in Z chromosome into fragments of 305 bp and 65 bp length. The difference between CHD1-Z and CHD1-W fragments was visualized in 3% gel agarose, which showed single band for males and double band for females. As a result of the performed analysis 23 individuals of each sex was identifited.

Acknowledgements: Joanna Gruszczyńska, Maciej Miąsko

Humans and Nature

The use of sonication to obtain a tea infusion

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WULS-SGGW, Poland

Study programme level: MSc

Keywords: sonication, green tea, ultrasounds, brew

The aim of this work was to obtain a tea infusion using non-thermal method such as sonication. The use of ultrasound results in damage to cellular tissue and cause "release" of the cells content. The traditional way of brewing green tea, which is rich in bioactive compounds, can cause losing of polyphenols, flavonoids, antioxidant activity, ect. This compounds prevents the formation of free radicals, slows down the aging process of the body, reduce the risk of cardiovascular disease and cancer. Typically, hot water is required for brewing tea, which also causes degradation of the bioactive compounds contained in the tea. Therefore, it is worth to protect valuable components in tea from degradation.

Green teas (sprinkled and express) available on the Polish market was used for this research. The tea was poured with water at temperature 25°C and 70°C and then sonicated for 3 minutes using an ultrasonic probe. Tea infusions were made using the traditional method of pouring tea leaves with water at 70°C and 90°C, which was recommended by the manufacturer. In the obtained extracts, the amount of polyphenols content was determined by the Folin-Ciocalteu method, the flavonoid content by spectrophotometric method and the antioxidant activity by the reduction of the DPPH radical. In addition, the color of tea infusions in the L*a*b* system and the evaluation of organoleptic properties was study. All determinations were made for both traditional brewed teas and those obtained by sonication.

The obtained results indicate that it is possible to obtain tea infusion using water at room temperature with sonication. Receive tea infusion using such parameters seems to be very promising in the production of iced tea, especially since the bioactive compounds in tea, prepared in this way, was comparable or higher level in comparison to the samples prepared at temperature 70°C and 90°C.

Acknowledgements: dr inż. Małgorzata Nowacka

Humans and Nature

Improving diagnosis and treatment of insect bite hypersensitivity in horses using recombinant allergens

Marion van Vugt

WUR, The Netherlands

Study programme level: MSc

Keywords: allergy, diagnosis, allergen-specific immunotherapy

Midges of the Culicoides genus, and especially Culicoides obsoletus, cause insect bite hypersensitivity (IBH) in horses. This is a TH2-skewed allergy for which neither a diagnostic test nor a treatment is commercially available yet. For diagnosis, an indirect ELISA is being developed which detects the presence of allergen-specific IgE in serum by a polyclonal anti-horse IgE IgY. Allergen-specific immunotherapy seems to be a promising way of treating IBH, but needs more development. In this study, some problems of production of the recombinant allergens, necessary for diagnosis and treatment, are studied, the diagnostic ELISA is further optimized and the recombinant allergen are modified to apply the SpyTag-SpyCatcher method, thereby enabling the allergens to covalently bind to virus-like particles or beads, which could be used to modulate the immune response and deliver the allergen to more specific sites. This study shows that low concentrations of imidazole could already affect the purification process and addition of 20mM L-arginine during dialysis prevents aggregation of the allergen and thereby decreases the loss of the protein. Problems regarding low purity of the end-product still require more research. Furthermore, the ELISA should still be improved by decreasing the background reactivity of two important allergens with the IgY. The optimal dilution of the IgY to discriminate IBH-positive and -negative horses is found to be 1:800. SpyTag was successfully added to the vector expressing the recombinant allergen for some of the allergens. This is promising for the making the allergen-specific immunotherapy more specific and powerful. These results show that the protocol for the allergen purification is not yet optimal, but confirms the benefits of adding L-arginine and gives new insights and opportunities into improving the diagnostic test and therapy.

Acknowledgements: Dr. E. J. Tijhaar

Global One Health

Scientific Student Conference 2018
Euroleague for Life Sciences

Poster session 1.2

Friday 9 November 2018 at 12:15-13:15
Ground Floor, Orion

Introgression of wild and cultivated relatives into Triticum durum to increase fusarium head blight resistance (FHB)

Birgit Siemayr

BOKU, Austria

Study programme level: MSc

Keywords: Triticum durum, FHB resistance

Fusarium spp. is one of the most dangerous diseases in wheat, because it leads not only to reduced yield, but it also contaminates the harvest with mycotoxins. It is especially important to reduce the contamination in Triticum durum, as it is only used for human nutrition. Moreover, T. durum is very susceptible to the FHB fungi, due to straw shortening genes, which cause a disease-promoting microclimate among the plants. Therefore, resistance breeding is very important for the farmers, but also for the consumers. For this reason, resistance donors from related species were crossed with susceptible elite durum cultivars and the offspring was tested for FHB resistance. The research questions were the following: Which of the offspring lines combine the requested traits “short and resistant”? Do the lines, which contain the resistant alleles, show really better results relating to resistance? Is there a correlation between susceptibility to FHB and flowering date, plant height and lodging? To answer these questions the susceptible durum-cultivars Floradur, Durobonus, Karur and SZD1029K were crossed with resistant experimental lines DBC480-1 (origin from T. aestivum), Triticum dicoccoides and Triticum dicoccum. Out of these crosses 730 lines were developed and have been genotyped for three FHB resistance loci and phenotyped for disease severity. Two repetitions on the field were grown, spray inoculated with Fusarium spp. at anthesis and evaluated for FHB severity, flowering date and plant height. Analysis of the results is still in progress, but it is expected to identify short and resistant lines, which will be of great value for FHB resistance breeding in durum wheat. The importance of this work is due to an increasing demand for pasta in the North. But the high rainfall probability in northern countries is leading to a higher FHB infection rate.

Acknowledgements: Bürstmayr Hermann, Steiner Barbara, Schwarz Petra

Global One Health

Spatio-temporal patterns of Silicon Fractions in Lower Austrian topsoils

Johanna Reiter

BOKU, Austria

Study programme level: BSc

Keywords: Silicon, pH, Carbon, soil

Silicon (Si) has recently received increasing attention as beneficial element for plants. Research has shown that Si bioavailability is an important factor for plant health and plant growth. Information about the Si concentrations in Austrian soils is not available apart from recent master theses conducted in our research group. To obtain information on the Si status of soils in the Lower Austrian Chernozem region near Vienna we collected 100 topsoils between November 2016 and March 2017 from the same cultivated sites where 20-30 years ago the Austrian soil mapping services had sampled and archived part of the material. We measured potentially plant-available (0.01 M $CaCl_2$ extraction) and amorphous Si fractions (0.2 M NaOH extraction) in the archived and the re-sampled soils. The Si concentrations in both extracts were measured using the molybdenum blue method and spectrophotometry. Furthermore, the organic carbon content and pH of the resampled and the archived soils was measured.Initially we hypothesized that the amorphous Si concentrations might have decreased during the monitoring period because of Si-depleting management practices such as straw removal and depletion of organic carbon. In contrast, our findings indicate no relevant change of amorphous Si. Similarly, no relevant change in potentially-plant available Si could be observed, however, at both sampling times more than one third of the soils were below critical values indicating possible Si deficiency for crops. Our observations can be related to substantially increased organic carbon contents and the virtually unchanged values of soil pH. Further data analysis is being conducted to explore the effect of climate and soil factors on the silicon status of Chernozems in Lower Austria. Our results have implications for crop management and our understanding of cycling of Si in cultivated soils.

Acknowledgements: Walter W. Wenzel, Markus Puschenreiter

Humans and Nature

What factors influence better market access among collective action of small farmers in Moldova?

Cristina Conea, Jiri Hejkrlik

CULS, Czech Republic

Study programme level: MSc

Keywords: social-capital, value-chain, horizontal integration

There is a believe among development donors, practitioners and academics that improving market access for smallholders will lead to increased income, food security, more rural employment and sustainable agricultural growth. However, persistent market failures as a lack of information on prices and technologies, high transaction costs, credit constraints, low bargaining power or small quantities of production often limit smallholders' ability to improve their market access. Moreover, as the new procurement systems require larger supply volumes, smallholders are left behind to larger farm enterprises. To address these challenges, value chain interventions such as horizontal integration and support of collective action is often proposed as a tool to overcome these obstacles. There is an increasing evidence that if acting collectively, farmers can reduce transaction costs for market exchanges, attain economies of scale and bargaining power, obtain necessary market information, secure access to new technologies and tap into high-value markets. Therefore, our main research question was to find out, if acting collectively, farmers in cooperatives in Moldova gain better access to markets and if agricultural cooperative groups are an efficient form to improve farmers' livelihood and contribute to food security in Moldova. We investigated factors influencing small farmers' access to local and international markets among 23 cooperative groups, that covered 134 farmers across the whole country. The analysis considered factors as: institutional, socio-economic, innovation, financial and infrastructural factors of the groups. The preliminary results show that education, cooperative size, output, AMIS, credit, distance to major market and frequency of group meetings were established to be the most statistically significant for improvement of market access. Contrary to our a priori expectations, agricultural market and information services had a negative influence on improvement of market access even though it was statistically significant in our study.

From Field to Fork

Determining the actual state of acidification of forest soils in Jizera Mountains

Klára Tesaříková

CULS, Czech Republic

Study programme level: BSc

Keywords: acidification, forest soils, Al speciation

Acidification is the natural forest soil degradation process whose intensity increases due to human activity. One example is excessive burning of fossil fuels. In the last century, this burning was the cause of high NOx and SO2 emissions, that are behind the acid rain formation.

The aim of the practical part was to determine the actual state of acidification of forest soils in Jizera Mountains which is protected landscape area in the northern part of the Czech Republic.

Within the framework of the research project of the Grant Service of Forests of the Czech Republic.

In May and June 2017 there were picked up soil samples at ten different locations. These were samples from the whole soil profile. The aim was to determine pH values and the pseudototal content of the main nutrients and elements (Ca, K, Mg, Fe, S, Al) and potentially hazardous elements (As, Cu, Mn, Pb, Zn) in the aqua regia extract.

The lowest average pH/H2O values were measured in the upper horizons. At depths of 40-80 cm, the average pH/H2O are about 5. The average pH/KCl in FH horizons are less than 3.5 and they are increasing in teh direction of the depth.

The highest Al content was then measured in the lower parts of the horizons. The highest concentrations of Cu, Zn and Pb were measured in FH horizons, on the other hand, the Mn content is the lowest in the FH horizons and increases in the depth of the soil profiles.

In the aqua regia extract the mineral bonds dissolve. Therefore, only the potential content of elements in the soil is determined. In the diploma thesis, the primary research will also be followed by the observation of aluminium speciation.

Acknowledgements: Thank RNDr. Václav Tejnecký, Ph.D. and doc. Ing. Ondřej Drábek, Ph. D. for the opportunity to participate in the project of the Grant Service of Forests of the Czech Republic. Thanks for soil samples measurement in labs as well.

Humans and Nature

Children cooking and eating insects – Effects of expectations, exposure and food neophobia

Ching Yue Chow, Reisya Rizki Riantiningtyas

SCIENCE, Denmark

Study programme level: MSc

Keywords: Insects, Cooking, Children, Food-neophobia, Disgust

Edible insect is promoted as a sustainable source of animal proteins to meet the increasing world population and growing consumer demand. However, entomophagy (the consumption of insects) is not well-accepted in the Western world, mainly due to perceived disgust and food neophobia. In the present study, the potential of cooking activities to introduce insects into diet among children, its effect on children's willingness to taste, and liking of insect foods were examined.

Two types of insects (grasshopper and mealworm) were incorporated into oatmeal ball, a traditional Danish confectionery. Children tasted and evaluated the insect foods that were either self-prepared during cooking activities or prepared by the experimenter. Results showed cooking activities did not pose immediate effect on willingness to taste and liking of insect foods, whereas food exposure order and insect types showed significant effects. First time exposure to the insect foods received higher liking ratings compared to second time exposure, irrespective of children's involvement in cooking activities. This can be explained by Assimilation-Contrast theory, where first contrast is prevalent in first exposure, and assimilation to expectation are seen in the second. Results also showed that the mealworm version of oatmeal ball was more liked than the grasshopper version. We suggest that it is caused by different degree of 'animalness' of the two insects. In addition, children's food neophobia level was negatively correlated with their enjoyment of cooking activities and liking of insect foods. In sum, this study is the first demonstration that used cooking to encourage insect tasting among children. It provides preliminary information that may guide design of future experiments to promote eating insects.

Acknowledgements: Michael Bom Frøst (Academic supervisor), Julia Sick, Sebastian Andersen, Ytse De Vries, Bat-El Menadeva Karpantschof and Kleila Kara (Staff of the Nordic Food Lab). This work was part of the "Taste for Life" project and "inVALUABLE" project.

From Field to Fork

Factors affecting slaughter maturity in lambs raised on pasture

Sarah Henry Bergman

SLU, Sweden

Study programme level: MSc

Keywords: carcass, Gotland-sheep, supplied feeding, winter-lambs

Gotland sheep have a strong season-bound heat resulting in spring-born lambs, which traditionally are slaughtered in the autumn after grazing. A well-known problem in finishing lambs on pasture is reaching slaughter maturity in time. Therefore, a large number of lambs are kept as winter-lambs and the size of the carcasses varies widely. The aim of this study was to identify factors of success by comparing information regarding the lamb's birth, feed and slaughter results.

The study contained information about 1032 slaughter lambs from six different farms. The lambs were born in the spring of 2017 and 882 lambs (85.5 %) were slaughtered in the fall while 150 (14.5 %) were kept as winter-lambs. The lambs were raised on pasture and finished on clover-grass pasture or clover-grass pasture accompanied with alternative pasture crops. Four of the farms supplied concentrate to the lambs from august and onwards.

The farms routines concerning pasture, weighing and slaughter planning, were the major factors affecting the results. The daily gain varied widely between farms (212–347 grams/day) as well as the carcass weight (17.22–20.97 kilograms) and the age at slaughter (152–235 days). Lambs that partially grazed turnip, rape, vetch and grass had higher fat classification than lambs on other crops ($P<0.001$). The slaughter results were not affected positively by supplementation of concentrates.

The proportion of winter-lambs per slaughter lambs varied between 0 and 46 % on the different farms. The live-weight at 60 and 110 days had a significant effect on whether the lamb would be slaughtered or kept as winter-lamb ($P<0.001$). Farms that shaved small lambs at early age had the lowest percentage of winter-lamb. If the lamb was slaughtered or kept as winter-lamb was significantly affected by the age of the ewe ($P<0.01$) but there was no effect by an increased litter size.

Acknowledgements: Katarina Arvidsson Segerkvist, Anna Törnfelt, Annelie Carlsson and Anders Karlsson

From Field to Fork

Loss of diversity in doubled-haploid lines from European maize landraces

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UHOH, Germany

Study programme level: MSc

Keywords: plant breeding, maize, genetic resources

Maize is a major staple across the whole world. Advancing yield and improving the nutritional value of crops is a major challenge in the face of continuous population growth and climate change. Maize landrace populations have been adapting to local environments for hundreds of years and present a valuable source of beneficial diversity. Harnessing this diversity for modern varieties is complex, because alongside favorable diversity landraces introduce undesirable traits to modern populations and require many breeding cycles to reduce negative properties. In addition, maize landraces suffer from strong inbreeding depression, which strongly decreases their fitness after self-fertilization or sib-mating. This is of particular importance for the conservation of landraces in genebanks, where they are maintained in small populations. Previous work proposed that doubled-haploid lines derived from landraces present an alternative for conservation and valorization of genetic diversity, because they do not suffer from further inbreeding depression and are directly available to plant breeders. However, there is a potential loss of diversity during the production of doubled-haploid lines. Here, we analyzed genomic data of 137 individuals from five European landrace populations and 266 doubled-haploid lines derived from these populations to study the potential loss of diversity. First, we compare the population structure of landrace populations and their derived DH-lines, confirming no major change relatedness between populations. Then we pinpoint polymorphisms that were lost in the doubled-haploid lines and discover their functional importance. Our results show that doubled-haploid lines overall represent their landrace well, but have decreased genetic diversity and lost functionally important variation. We conclude that while double-haploid lines from landraces are a valuable tool to introduce adaptive variation into maize breeding programs, they cannot capture the full diversity of landraces and are not well-suited for the conservation of genetic resources.

Acknowledgements: Karl Schmid

From Field to Fork

The use of irrigation water fees for the allocation of water under efficiency and equity aspects

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UHOH, Germany

Study programme level: MSc

Keywords: Irrigation, water pricing, efficiency, equity

The scarcity of water resources, mainly driven by climate change and rapid population growth, is an uprising problem. It has an enormous impact on food production since irrigated agriculture accounts for almost two thirds of global water withdrawals. To deal with this challenge, the appropriate water price should be determined, aiming at both efficient and equitable water allocation, what is hard to achieve. The potential solution is of high importance for many developing countries, with Vietnam as an example, which face economic water scarcity and for which irrigation represents the countries' largest use of water.

This paper aims to analyze efficiency performance and equity effects of three mechanisms of irrigation water pricing: volumetric, non-volumetric and market-based. Moreover, quotas as the fourth mechanism of water management is briefly discussed. In addition to literature review, for the purpose of practical analysis and application, a case study of Vietnam's past experience as well as current pricing reforms is presented.

The conclusions indicate that water allocation is more efficient whenever pricing methods influence the demand for water. However, this would lead to the increased cost of irrigation and affect the income distribution, particularly for the small farmers since they would not be able to afford farming under new pricing mechanism. Income distribution can be affected only by the prices, involving quantity quotas, and most of the existing methods do not fulfill this requirement. As a result, while efficiency performance can be directed by the pricing mechanism used, for managing income distribution water prices serve as a poor mean. To influence both, particularly in the case of Vietnam, only mixed mechanisms should be applied. Those methods combine irrigation pricing with quantitative controls or limits on water use and expose irrigators to the seasonally- and regionally-specific social marginal cost of water supply.

Humans and Nature

The use of an unconventional method of osmotic dehydration using droughts and lyophilisates from carrot and beet to form the color of meat

Nikodem Dominiak, Maciek Filimon, Adam Zalewski,

WULS-SGGW, Poland

Study programme level: BSc

Keywords: meat, beet, carrot, osmotic dehydration

All the time people are looking for different technological methods that make it possible to produce a product with a limited content of substances that have a negative impact on human health. Undoubtedly, these types of substances are sugar and salt, which are excessively present in our diet. Moreover, an alternative is sought for the use of nitrogen compounds, which are responsible for creating for the consumer an attractive color in the final meat product and increasing the microbiological stability of the product.

The aim of the study was to assess the possibility of using lyophilisates and dried carrot and beet as an alternative to the use of salt and sugar in the osmotic dehydration process of meat and to determine the impact of these mentioned raw materials on the formation of the color of the final product.

As a raw material for research was used pork loin (m. longissimus), which was divided into pieces of similar mass and shape. Lyophilisates and droughts were ground to homogeneous dust and then vacuum-packed with loins in a 1:1 mass ratio. The dehydration process was carried out under refrigeration conditions (4 ± 2 ° C).

At weekly intervals, in samples were determined water activity by using Aqua Lab CX-2 apparatus and were made texture measurements (Zwicki 1120) and colors in the CIELab system (Minolta CR-200). In addition, was made an attempt to determine the content of compounds responsible for the creation of the color of carrot and beetroot, which diffused to dehydrated meat.

Based on the research, it can be concluded that droughts and lyophilisates can be used as an alternative to salt and sugar in the osmotic dehydration process. Moreover, the use of generally available raw materials containing natural dyes can be used to form the color of the final product.

Acknowledgements: dr inż. Lech Adamczak

Humans and Nature

Barriers and opportunities for tourism development in San River Valley

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WULS-SGGW, Poland

Study programme level: BSc

Keywords: tourismdevelopment, spatialanalysis, inventory of resourses

San River Valley is picturesque area in South-Eastern Poland in Carpathian Province. It was and still is the main axis of residential areas as well as economic life in this region. This research is concentrated on a small part of the valley, which is located between two gorges of the river and which gathers eight villages. On the right side of the San river Slonne Mountains are located with good landscape, climatic and spa conditions as important as tourist resources. That is one of the reason, that you can assume that this area has great possibilities to tourism development. Tourism development is also a part of socio-economic development, which affects inhabitants' life quality. During last several years the studied area was pulled out of total stagnation and slow tourism development is noticeable there. However there is still a question whether the potential is fully used? What can be done to make better use of resources and attract tourists? And what local residents think about it? The purpose of this study is to find an answers for above questions and to identify barriers locking the development of tourism in this area. In the first part, the research contain inventory of tourist resources within the area of the study, the second concentrate on survey among the residents. The final effect focused on spatial and organizational solutions which decide about the optimal use of the area suitable for tourism, so that it stimulates socio-economic development and favors inhabitants of the area. The research result is a map showing the locations of the necessary tourist infrastructure and an offer of a tourist product.

Acknowledgements: PhD Grazyna Kaminska, PhD Agata Cieszewska

Metropolitan Solutions

Salt marsh response to 30 years of relative increase in sea level

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WUR, The Netherlands

Study programme level: MSc

Keywords: Coastal ecosystems, vegetation, soil subsidence

Climate-change induced Sea Level Rise (SLR) is threatening salt marshes globally. Salt marshes are ecosystems at the boundary of the sea and the land and they provide numerous ecosystem services. Predictions of significant decline in area of salt marshes are debated, but vegetation changes within existing salt marshes have been documented. Here, we used a natural experiment where salt marshes subsided due to natural gas winning, to investigate the effects of (relative) sea level rise on salt marsh sedimentation and vegetation. For vegetation the focus was on the balance between regression and succession, using parameters such as vegetation height, presence and cover of indicator species, and biodiversity indexes. 84 plots divided over four transects and two salt marshes on the Dutch barrier island of Ameland were assessed in 1986 and 2018. The data was analysed using Wilcoxon's signed rank tests, correlations and linear mixed models (LMMs). Thirty years of soil subsidence resulted in lower elevation of the marsh, a decrease in species richness and an increase in average vegetation height. The LMMs show that sedimentation on the marsh during the 30 years of soil subsidence was most strongly affected by distance to sea. Changes in middle zone indicator species cover could be explained by the change in elevation and the clay depth on the marsh. When looking at the results, it is important to mention that there are clear differences between the two marshes assessed in this study. Furthermore, the summer of 2018 was extremely dry and this might have affected our data. All in all, this research sheds a light on the effects of RSLR on salt marshes, thereby aiding predictions for future salt marsh developments.

Acknowledgements: Dr. Juul Limpens, Dr. Loek Kuiters, Ing. Pieter Slim

Humans and Nature

Scientific Student Conference 2018
Euroleague for Life Sciences

Poster session 2.1

Friday 9 November 2018 at 15:00-16:00
Ground Floor, Orion

Development of a plant-based vaccine against Spring Viremia of Carp Virus (SVCV) and Koi Herpes Virus (KHV)

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Study programme level: MSc

Keywords: KHV, SVCV, Carp, Veterinary vaccines

Spring viremia of carp virus (SVCV) and koi herpesvirus (KHV) are highly pathogenic viruses to common carp and koi carp. These viruses are the cause of a high mortality rate and therefore economic losses are significant. A DNA vaccine against SVCV administered via injection has shown to illicit a protective immune response in carp. However, this way of vaccination is labor-intensive, stress-full for the fish and unsuitable for mass immunization. Therefore, oral immunization is a promising alternative. Since oral vaccines need to survive the hostile stomach and gut environment before reaching the immune-sensitive hindgut, antigens need to be protected. In this research, we investigated the opportunity to transiently express the glycoprotein of SVCV and the ORF81 protein of KHV in plants, which can be used as fish feed and thereby be protected against the gut environment. As a carrier of the viral antigens, a virus like particle (VLP) consisting out of Hepatitis B core proteins, was proposed. The proposed approach to bind de antigens to the surface of the VLP is by using the Ecoil-Kcoil protein interaction. To investigate this, the genes encoding for SVCV-G and KHV-ORF81 were cloned in expression vectors pICH008, which induces a high protein yield, and pDGBα, which was used for the expression of Kcoil-G and Kcoil-ORF81 fusion proteins, and both were transiently expressed in Nicotiana benthamiana leaves. The G-protein and ORF81 were identified by Western Blot when using the pICH008 vector for expression.

However, the Kcoil-G and Kcoil-ORF81 fusion proteins have not been confirmed and probably a protein aggregate, with endogenous proteins, was formed. Unfortunately, this made us unable to perform co-infiltration studies with the VLP's to investigate the possibility to express the viral fusion proteins on the VLP surface. However, in the future, this method is promising to develop an effective oral vaccine.

Acknowledgements: dr. Sander van der Krol, prof. dr. Heribert Warzecha

Global One Health

Simulation of the electricity generation capabilities of a Swedish hydropower plant and its ability for short term stabilisation of the electrical grid

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BOKU, Austria

Study programme level: MSc

Keywords: hydropower simulation renewables energy markets

With climate change progressing, the efforts to reduce greenhouse gas emissions are growing stronger. A major driver behind emissions is the energy sector. It was contributing approximately one third of the EU-27 greenhouse gas emissions in 2009. Many countries have announced ambitious plans to change this, especially in the course of the 2015 negotiations for the Paris Agreement. Sweden for example set itself the target to become „fossil-free".

Although it is a country with an already high percentage of renewables in energy generation there still exists an untapped potential for optimising the energy mix. The main sources of electricity in 2014 were nuclear (42.2 %), hydro power (41.6 %).

This research simulates the electricity generation of hydro power plants in Sweden. The question is whether a simulated generation (required to satisfy demand) can be achieved in reality. Focusing on a region, the thesis models the output of a the hydro power plants and then compares the simulated time series to observed ones to detect possible improbabilities in the results of the simulation. The model is derived from observed inflow and generation figures, to simulate the potential of electricity generation in the coming years. Different scenarios are be created to find whether additional storage and/or generation capacities can solve any arising issues with the time series from the project, or lead to more flexibility of the system in general.

Acknowledgements: Johannes Schmidt

Humans and Nature

How can developmental stage influence nutritional value of Death´s head cocroach?

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CULS, Czech Republic

Study programme level: MSc

Keyword: insects, cocroach, protein, fat, nutrition in Europe

Blaberus craniifer is one the most commonly reared insects. In the past they were primary used as a feed for companion animals, today cocrach is used as an alternative source of nutrients for farm animals and humans. Nutrient content of small nymphs (2 – 3 cm), large nymphs (3 – 5 cm) and adults of B. craniifer were determined. Based on the results, adults has proven to be the best source of protein (63,1 g/kg of dry matter), while small nymphs contained 42,0 g/kg of DM and large nymphs 40,1 g/kg DM. On the other hand the highest fat content (42,3 g/kg DM) was found in large nymphs followed by small nymphs (41,5 g/kg DM) and adults (24,3 g/kg DM). Morover, the quality of the nutrients expressed by indices of essencial amino acids, thrombogenicity and heterogenicity were found to be influenced by the dvelopmental stage as well. Ragarding other determined nutrients, level of ash was found to be decreasing from small nymphs to adults (2,4>1,3&g t;0,6 g/kg DM) whereas chitin content was conersely increasing (5,8<6,4<7,3 g/kg DM) during the development of tested cocroaches. The obtained results thus indicate that quantity and quality of the nutirents are not constant and vary within the development.

Acknowledgements: Vladimír Plachý

From Field to Fork

Law enforcement in Wildlife Protected Areas

Jerry Owusu Afriyie, Michael O. Asare Jones Osei-Mensah, Hejcmanova Pavla

CULS, Czech Republic

Study programme level: First year PhD (at moment of submission)

Keywords: Monitoring, patrol staff performance, illegal activity, Ghana

Law enforcement patrols are at the frontline of a protected area's anti-poaching efforts. Their effectiveness, and in particular that of the patrol staff, is one of the most important factors in providing an effective deterrent to illegal activities in an area. We therefore aimed at assessing the long-term trends and dynamics of patrol staff performance and the effectiveness of the law enforcement system in the Kogyae Strict Nature Reserve, Ghana. The assessment was based on patrol report collected between January 2006 and August 2017. Along the patrol routes, the patrol officers recorded all encounters with illegal activities associated with hunting, capturing/harming animals, and all mammals within their visual range. These encounters were examined in terms of monthly man-days of patrol effort and distances walked (km), providing indices of encounter. Across all years, staff performance was lowest in 2006 but highest in 2010 as a result of learning the management system's routine and motivation. Staff performance subsequently decreased due to annual leaves of most patrol staff. Neither rainfall nor seasonal activities had any influence on patrol performance. The encounter rate of illegal activities was highest in the first years after the implementation of the adaptive management system due to improved staff performance and longer distances patrolled. After six years (2011), the encounter rate of illegal activities decreased and remained stable. Snares were the most common illegal activity type because it is silent, time-efficient, and less risky than other forms of hunting. Encounter rates of mammals followed the dynamics of patrol staff performance. The long-term assessment indicates that effective performance of patrols is apt to achieve desired conservation targets through motivation and experience of staff

Acknowledgements: The study was supported by Czech University of Life Sciences Prague, internal grant agency (CIGA) project number 20185007.

Humans and Nature

UAS based spectral exploration of geochemical properties and their influence on crop yields of African tropical soils

Julian Robertson, Florian Wilken, Sebastian Doetterl, Boris Rewald

SCIENCE, Denmark

Study programme level: MSc

Keywords: Multi-/hyperspectral imaging, Remote sensing

Detailed surveys of east African soils remain very limited in scientific debates and research. The lack of a thorough documentation of yield-influencing soil is crucial yet unavailable information to local farming organisations. In providing a quick and cost-effective determination of a broad range of soil properties across large territories, low-cost spectral sensor technology is mounted on unmanned aerial systems (UAS), which marks an important step in survey procedures and data acquisition. Local factors are accounted in the project's procedures, as it is indicated in the prospect of modelling soil C loss according to the in-situ model.

Approximately one hundred cassava field plots (subsistence farming) -- which were distributed in three distinctly different geologies (mafic, intermediate, felsic) and across a variety of geomorphic landscape positions (stable plateaus, eroding slopes, depositional valleys) -- were established along a gradient from the Kivu provinces in Eastern DRC through Rwanda, and towards Uganda. Along the transect, plots were surveyed during the main dry season of 2018 for topsoil (0-5 cm) by using soil parameters, such as texture, pH, and C, N, P and K content that rely on hyper and multispectral UAS data, these parameters' ground truthed with traditional wet chemistry assessments, as well as and other factors connected to plant biomass yields. By being able to model the relation of soil parameters to biomass production, it is possible to infer relationships regarding soil fluxes, in which soil C acts as an important factor.

Acknowledgements: Daniel Muhindo, Benjamin Bukombe, Laurendt Kidinda, Mario Reichenbach, Nelson Mujuni, Clovis Kabaseke, Fernando Bamba, Prof. Landry Cizungu

From Field to Fork

Knocking on the door - a study on nutritional education and women's empowerment on household level in rural Tanzania

Therese Strimell Flodqvist

SLU, Sweden

Study programme level: MSc

Keywords: Nutrition, gender, power relations

In Sub-Saharan Africa, food is often prepared by women, by mothers, grandmothers, daughters or sisters. Despite their crucial role in household food security, women as a group are often disempowered and cannot decide over their own lives. When women are empowered, it positively affects household food and nutrition security. In Tanzania, many are food insecure and 33 % suffer from undernourishment, and one underlying cause is found in the lack of nutritional knowledge. Therefore, during 2016 - 2017, the Scaling up Nutrition (Scale – N) project started to offer nutritional education, to enhance nutrition sensitive, diversified agriculture and to empower women. In this paper, I map the pathways to women's empowerment that nutritional education can create and explore to what extent these have been achieved through the Scale – N project. Specifically, I consider whether the nutritional education has brought about changes in power relatiosn within the household.

I draw on data from 24 face-to-face semi-structured interviews with women and men, and four gender-segregated focus group discussions in two villages in the central region of Dodoma, Tanzania. The data has been analysed using a women's empowerment framework suggested by Kabeer (1999) and intra-household bargaining approach proposed by Agarwal (1997). Findings suggest that the nutritional education has benefited household food consumption, but not necessarily affected power relations within the household. I argue that there is a need for women to be part of all food related decisions, to contribute to their entire family's nutritional needs. In addition, woman struggle with the double burden of domestic and productive work. However, women have their own strategies for how to become less dependet on their husbands. In families where both wife and husband have participated in nutritional education, there are signs on adapting to new techniques, a slight change in diet but mostly a better knowledge in what is good and nutritious food. Thus, it is imperative for Scale – N to continue to conduct nutritional education targeting women while also including men.

Acknowledgements: Johanna Bergman Lodin, Marcos Lana

Global One Health

Impact of traditional Ghanaian fermentation practices on microbial growth in and B-vitamin contents of indigenous Maize dough

Nayema Azad Lopa

UHOH, Germany

Study programme level: MSc

Keywords: Fermentation, microbial growth, pH, B-vitamins

Hidden hunger and food insecurity are warning signs for humanity, along with physical and mental development. Traditional fermentation could be one of the solutions to fight food insecurity and hidden hunger. Besides the conventional, known benefits of fermentation, modern scientific developments have added novel dimensions to food fermentation. According to several studies, fermentation increases food's nutritional value by improving water-soluble vitamin contents, particularly B vitamins. This study's research objective was to evaluate the impact of traditional fermentation on thiamine and riboflavin concentration in maize dough. In addition, during fermentation lactic acid bacteria and yeast growth were assessed to observe their effect on the fermentation. In this study, maize dough was prepared according to traditional Ghanaian practice. The experiment was over seven days at three different temperatures (25°C, 30°C and 35°C). The back slopping technique was also implemented along with spontaneous fermentation. The back slopping is a technique where dough from fermentation with desirable attributes use to initiate fresh one. During the study, lactic acid bacteria and yeast colony showed significant ($p \leq 0.05$) growth. A temperature dependent pH reduction was also observed. The fermentation process produced a decrease in the thiamin content of the fermented sample. In contrast, riboflavin content increased significantly ($p \leq 0.05$) throughout the experiment. The riboflavin increased up to 72% in comparison to the day 0 sample. During the experiment, temperature difference had no significant effect on riboflavin concentration. Back slopping showed significant ($p \leq 0.05$) increase in microbial growth and riboflavin concentration compared to spontaneous fermentation. For higher riboflavin content and the temperature dependent pH effect, maize dough should be fermented at 35°C using back slopping 1 technique. This would be optimum for increased riboflavin content and save food from harmful bacteria.

Acknowledgements: apl. Prof. Dr. Donatus Nohr, Dipl.-LM-Chem. Julian Philipp Wald

From Field to Fork

Analysis of the possible use of lyophilised strawberries in creating products made of puff pastry

Joanna Ćwintal, Adam Zalewski

WULS-SGGW, Poland

Study programme level: BSc

Keywords: strawberries, lyophilisation, puff pastry

One of the newest method of fixation is lyophilisation process, which is based on removing water though the sublimation directly from the frozen material, under reduced pressure. As the result most of substances responsible for taste and aroma are preserved.

The aim of the study was analysis of the ways to use lyophilised strawberries to enriched puff pastry.

Range of work included developing recipe and producing puff pastry containing different percentage of lyophilised strawberries and also texture tested by instrumental methods (both mechanical and acoustic) and sensory assessment.

Lyophilized strawberries have been shredded in Termomix (Vorwerk, Germany). Obtained in this way intermediate product was next evenly applied in butter, which was used as a modification referring to standard/fundamental recipe. Dough has been kneaded for the same amount of time and fold exactly the same amount of times in order to get final product with equal layers of puff pastry divided with layers of fat. Pulp was divided into similar in weight pieces, and rolled. Samples shaped like croissants were baked in the oven (Wachtel, Germany) in 210 oC (410oF).

Samples prepared in this fashion have been subjected to tests: penetration in texturometer TextureAnalyserTA.HD.plus (Stable Micro System, UK) with registration of acoustic emission contact method with the sensor (Brüel&Kjær, Narum, Denmark). Sensory properties and water activity measurements were also conducted.

Lyophilisates can be used to create puff pastry, when we want to obtain specific sensory quality. The use of lyophilised intermediates on wider rage in designing new recepies is worthy of consideration. Based on the results it is easy to notice influence on lyophilisates on the textural properties of puff pastry.

Acknowledgements: PhD, DrSc Agata Marzec

From Field to Fork

Use of cricket flour as a substitute of meat in the frankfurters.

Maciej Filimon, Nikodem Dominiak

WULS-SGGW, Poland

Study programme level: BSc

Keywords: frankfurters, cricket, cricket flour

According to United Nations predictions, human population will increases to more than 9 billion before 2050. It will cause really high demand for food. Feeding such a large population might be a big problem. Using crickets in the food industry can solve it. This little creatures contains much of great assimilable proteins which are good source of exogenous amino acids. Moreover, 4 big crickets has much more microelements like calcium than 100 g of cheese. They present a low risk of transmission of pathogenic infections. Their breeding is more ecological than slaughtering animals. These facts lead to the use of crickets and products such as cricket flour as substitutes for certain ingredients in food production.

The aim of the project was to examine possibility of substitute of pork meat into cricket flour in frankfurters production. In addition, frankfurters produced with cricket flour were compared with frankfurters made with commonly used soy protein concentrate. Three variants of sausages were produced according to industrial production technology. The first variant was a control variant. The second variant was a product wherein 10% of pork meat in the recipe was replaced with soya protein concentrate (hydrated 1: 4). In the last variant cricket flour (hydrated 1: 4), as a substitute of 10% of pork meat was used. The pH values and apparent viscosity of the meat batter were determined. In the final product texture and color parameters were measured and the sensory analysis of the frankfurters was performed. Research was carried out in three repetitions. On the basis of the obtained results, it was found that cricket flour can be an alternative to using a soy protein concentrate in the production of frankfurters.

Acknowledgements: dr.inż (EngD) Lech Adamczak (project supervisor), dr inż. (EngD) Marta Chmiel.

Humans and Nature

Azole fungicides used in agriculture can induce cross-resistance to medical azoles in A. fumigatus

Francine Bruggeman

WUR, The Netherlands

Study programme level: MSc

Keywords: Aspergillus fumigatus, Azole, Resistance, Agriculture

Aspergillus fumigatus is present in soil and sporulates by asexual conidiospores, which disperse freely through air. When the small spores are inhaled and insufficiently cleared by the innate immune system, A. fumigatus can infect the lung tissue, which can be treated with triazoles. However, azole-resistant infections are increasingly reported and go hand in hand in hand with very high mortality rates compared to resistant infections by other pathogens.

Acquisition of azole resistance by A. fumigatus may occur in the patient by local azole exposure, though resistant isolates found in azole-naïve patients indicate the presence of another route of resistant development. Most likely, A. fumigatus is also exposed to azoles in the environment. Azoles play a major role in agriculture to combat phytopathological fungi, causing compost to contain a vast amount of residual azoles. Even though different azoles are used for medicine and agriculture, both groups have very similar molecular structures.

We investigated if A. fumigatus can obtain resistance to medical azoles through exposure to agricultural azoles. An azole-susceptible strain of environmental origin was exposed to agricultural azoles for 8 weeks, after which the resulting evolutionary lines were tested for resistance to medical azoles itraconazole, posaconazole and voriconazole. Exposure to metconazole or to a mixture of prochloraz, prothioconazole and tebuconazole induced cross-resistance to both itraconazole and posaconazole. Additionally, difenoconazole and prochloraz induced cross-resistance to itraconazole.

These findings illustrate the potential of agricultural azoles to induce cross-resistance to medical azoles in A. fumigatus. This indicates that an environmental route of azole resistance development is possible, which shows the importance of development of strategies to decrease azole exposure to A. fumigatus in agriculture.

Acknowledgements: Eveline Snelders, Sijmen Schoustra, Bas Zwaan, Hein van der Lee

Global One Health

Scientific Student Conference 2018
Euroleague for Life Sciences

Poster session 2.2

Friday 9 November 2018 at 15:00-16:00
Ground Floor, Orion

Genetic analysis of common bunt resistance in wheat

Ricarda Pernold

BOKU, Austria

Study programme level: MSc

Keywords: T.aestivum, common bunt, resistance breeding

Common bunt is a seedborne fungal disease caused by Tilletia caries and T. laevis and occurs in wheat production worldwide. Due to the use of chemical seed treatment in conventional agriculture the disease is almost completely under control. But grown under organic conditions where no such effective chemical seed treatment is possible common bunt causes high yield losses and a significant reduction in seed quality. Therefor in organic systems the use of host resistance is a major component for a sustainable disease management. For this research we tried to generate improved resistant lines by crossing the exotic resistant lines Blizzard, Bonneville and PI119333 with five susceptible but adapted wheat cultivars (Rainer, Midas, 20568.1.2, Tommi and Pannonikus). For the cultivars Blizzard and Bonneville resistance loci on chromosomes 1A and 1B and for PI119333 on chromosome 7D are already reported.

The aim was to validate the known resistance QTL in the above mentioned crosses by phenotypic and genotypic characterization. Therefore 412 lines were developed and grown in the field after seed inoculation with common bunt teliospores (T. caries). During a phenotypic estimation common bunt incidences, flowering date, plant height, lodging, plant stand and other diseases like powdery mildew, rust and fusarium head blight were evaluated. In parallel all lines were genotyped with SSR markers gwm374 and gwm264 for the known resistance QTL 1BS. These two markers along with the SSR markers barc83 and cfa2129 flanking the resistance QTL on chromosome 1A were tested on our populations. The analysis of the results is still in progress but it is expected to show that resistant lines also carry the resistance gene from the respective donor line. In future the more precisely mapping and the finding of appropriate markers for the genes of interest will be very important for an efficient identification of resistant cultivars.

Acknowledgements: Hermann Bürstmayr, Barbara Steiner

Global One Health

Fields of application for cargo bikes in commercial traffic in the city of Vienna

Marcus Beringer

BOKU, Austria

Study programme level: MSc

Keywords: cargo bikes, sustainable city logistics

More and more traffic in today's cities brings a lot of problems: congestions, noise and pollution cause a lower quality of life for the inhabitants. Trying to shift to a more sustainable way of mobility, cargo bikes could be part of a solution for the future. Bringing not only ecological, but also economic advantages compared to cars, more and more companies are using them for different purposes in the cities. According to literature, between 17 and 30 percent of commercial motorized transports in cities could be shifted to (cargo) bikes.

This thesis focuses on potential areas of use for commercial traffic in the city of Vienna. Using both literature research and expert interviews, concrete examples are shown after starting with an introduction about what exactly cargo bikes are and how many different types exist. One of these examples is a non-profit institution which uses cargo bikes to deliver ready-to-use foods to elderly people. Furthermore, there will be dealt with the topic of factors influencing the use of cargo bikes. The thesis shows that cargo bikes are a viable alternative for the future, but still there are some challenges and barriers to overcome, which means that for example an appropriate infrastructure is needed as well as clarification of some legal regulations.

Acknowledgements: Helmut Hiess

Metropolitan Solutions

The role of probiotic bacteria in the human digestive tract

Andrea Wagnerová, Ing. Veronika Jarošová, Ing. Ivo Doskočil, Ph.D., Ing. Denisa Binderová

CULS, Czech Republic

Study programme level: BSc

Keywords: probiotics, microbiota, in-vitro model

The experimental part of the thesis examines viability of selected lactobacilli (Lactobacillus brevis, L. gasseri and L. plantarum) and pathogens (Escherichia coli, Salmonella enterica and Salmonella sp.) in the in-vitro model of the human digestive tract. The increase or decrease in the number of viable bacteria was determined by comparing the number of living cells before and after the in-vitro digestion. The numbers of bacteria were obtained using a fluorescence method. The fluorescent dye propidium iodide used stains dead cell DNA; therefore, in order to obtain the total number of cells, a part of the samples was killed before and after the process of simulated digestion. Subsequently, the number of living cells was determined as the difference between the total number of cells and the number of dead cells in the sample.

The values of viability among lactobacilli were very similar. L. brevis contained 14.75 ± 5.85 % living cells after digestion, L. gasseri 14.76 ± 4.42 % living cells, and L. plantarum 12.76 ± 1.91 % living cells. However, a significant difference was found between the viability of lactobacilli and pathogens. All pathogens demonstrated an exceedingly high ability to survive passage through the digestive tract while simultaneously increasing the total number of cells. Regarding E. coli, 98.73 ± 1.23 % cells were alive after digestion and the total number of cells increased 2.4 times. S. enterica showed even a 3.4-fold increase in the total number of cells after digestion, 98.55 ± 1.56 % of which were alive. Salmonella sp. recorded a 2.4-fold increase in the number of cells, of which 98.23 ± 1.98 % were alive.

The results indicate that although the viability of the selected lactobacilli did not differ, significant differences have been detected between the viability of lactobacilli and pathogens. These might have been caused by a different degree of tolerance of the bacteria to acids and bile.

Acknowledgements: Ing. Veronika Jarošová, Ing. Ivo Doskočil, Ph.D.

Global One Health

Visualization of environmental data

Irina Georgievová

CULS, Czech Republic

Study programme level: BSc

Keywords: visualization, EDA, R, drought

Visualization is a key tool for a clear and comprehensive presentation of data and their exploratory analysis, where it helps to discover unexpected data behaviour (such as outliers and unexpected patterns), relationships within data and aids further decisions on the analysis direction. Thesis contains description of basic tools and principles of explanatory data analysis (EDA) and summarizes the history of development of data visualization and its theory, whose scientific base was laid mainly by William S. Cleveland, Edward Tuft and Leland Wilkinson. The thesis also describes current data visualization tools in programming language R and discusses both basic and advanced visualization packages (grid, lattice, ggplot2, raster and others) and options in interactive web-based applications build in R Shiny framework. The main contribution of this thesis is development of a web application which uses interactive visualization tools (htmlwidgets and flexdashboard). The application is designed to facilitate analysis of hydrological balance and drought prediction of surface water bodies of the Czech Republic and demonstrates the advantages of modern data visualization in environmental science. The application is part of Project to Support the Perfomance of the State Administration in DROUGHT Issue in 2017: system utility for predicting hydrological situation HAMR and it is available on https://shiny.fzp.czu.cz/KVHEM/HAMR/.

Acknowledgements: Martin Hanel

Humans and Nature

Should nutrition plans for muskoxen (Ovibos moschatus) in captivity be optimized?

Line Enemark

SCIENCE, Denmark

Study programme level: BSc

Keywords: Nutrition, muskoxen, zoo, arctic ungulates

There have been observed low reproduction rates for captive muskoxen in some European zoos. A study showed a linkage between low copper and selenium hair levels and low calf recruitment in wild muskoxen. This shows that mineral deficiencies could cause low reproduction in captive muskoxen. But this could also be caused by other nutritional factors, and the aim of the present study was to find out which nutrient requirements the muskoxen had, and how the requirements were met in Copenhagen Zoo through the nutrition plan made for them. A review of the natural habitat of the muskoxen, and what it forages on, was made to help estimate the nutrient requirements. There was lack of information about natural forage and nutrient content. This meant that nutrient requirements were estimated, with help from a simulation and known requirements of sheep and cattle. The DM and ME for maintenance for muskoxen were found to be around 32 g/kg BW0.75 and 0.245 MJ/kg BW0.75. The estimates for copper, phosphorus, iron, Vitamin A and Vitamin E differed between sheep and cattle, and symptoms of deficiency and toxicity were listed for both sheep and cattle. A nutrition plan for captive muskoxen during winter and summer was analyzed and compared with the estimates. MJ for maintenance was exceeded significantly, and could lead to weight gain causing body temperature to increase, and lower the reproduction rates. If other European zoos feed with a similar diet as the one analyzed, the excess energy could be the cause of low reproduction rates in captive muskoxen. The heath increment could possibly be prevented by keeping an eye on the weight of the muskoxen, cutting down on high-quality hay, providing watering facilities or maybe transportation of ice during summer time. Further studies are needed to estimate more exact requirements.

Acknowledgements: Mette Olaf Nielsen

Global One Health

α-Tocopherol transfer protein modulates the cellular uptake and subcellular localization of γ-tocotrienol and γ-tocopherol in cultured hepatocytes

Sandra Flory, Andrea Irías-Mata, Jan Frank

UHOH, Germany

Study programme level: First year PhD (at moment of submission)

Keywords: α-TTP, γ-tocopherol, γ-tocotrienol, HepG2 cells

Since its discovery, vitamin E research has focused on α-tocopherol, the predominant vitamin E form in human tissues. Less is known about γ-tocotrienol (γT3) and γ-tocopherol (γT), although they are the predominant forms in edible oils. This study aimed to elucidate the influence of the α-tocopherol transfer protein (α-TTP) on cellular uptake and subcellular localization of γT3 and γT in HepG2 cells.

To investigate the time-dependent cellular uptake of γT3 and γT, HepG2 cells with and without α-TTP expression were incubated with 30 µmol/L γT3 or γT and their concentrations inside the cells were measured. The subcellular localization of γT3 and γT was determined in cell organelle fractions after density gradient centrifugation.

γT3 was taken up faster than γT, but α-TTP expression did not affect their cellular uptake. Intracellular γT3 and γT correlated mostly with the cell organelle markers calnexin (endoplasmic reticulum), LAMP1 (lysosomes) and Na^+-K^+-ATPase (plasma membrane). γT3 correlated more than γT with calnexin, and less with LAMP1 and Na^+-K^+-ATPase. In cells with α-TTP expression, the correlation between γT and LAMP1 was stronger; whereas for both compounds the correlation with calnexin diminished.

Our data suggest that α-TTP mediates the accumulation of γT and γT3 in lysosomes. This seems to correlate, to a certain extent, with the respective congeners' binding affinity for α-TTP. α-TTP furthermore appears to reduce their transport to the endoplasmic reticulum, where the first step of degradation occurs, and thereby delays their metabolism.

From Field to Fork

Pullulan films with the addition of propolis in the fight against microbes in food

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WULS-SGGW, Poland

Study programme level: MSc

Keywords: pullulan films, propolis, antimicrobial activity

Consumers' growing interest in convenience and functional food has led producers to seek innovative solutions in technological processes and food packaging methods. Producers want to produce microbiologically safe and slowly perishable food. Such methods include the coating of raw materials and food products with edible coatings based on pullulan with the addition of propolis.

Propolis is a functional addition to food packaging, included antioxidant and antimicrobial properties. The addition of propolis extract to biopolymers, from which films are produced, allows you to effectively interact directly on the surface of the raw material, where the growth of microorganisms is the most common.

The study material was commercial pullulan, propolis, paper discs and tested bacterial and fungal strains.

The aim of this study was to research the antimicrobial effect of ethanol extract of propolis and pullulan films containing ethanol extract of propolis in concentrations of 1, 2, 3, 4, 5 and 10%. The inhibitory effects of propolis extract and films edible against test microorganisms (Staphylococcus aureus, Bacillus subtilis, Escherichia coli, Salmonella Enteritidis, Penicillium chrysogenum and Aspergillus niger) were determined by the disk-diffusion method.

The presented studies confirm the antimicrobial activity of pullulan films with ethanol extract of propolis. G(+) test bacteria and molds are characterized by the highest growth inhibition. While a wide range of substances is known, which may be an addition to edible coatings with antimicrobial activity, the antifungal activity of the coatings is still in the research phase. Therefore, the obtained results are very promising, indicate that pullulan films with added propolis may guarantee a higher microbiological safety of food and prevent the development of some strains of microorganisms.

Acknowledgements: Małgorzata Gniewosz, Katarzyna Pobiega

From Field to Fork

Monitoring of Bemowo Forest (buffer zone of Kampinos National Park) in the aspect of neighbourhood of garbage dump and compost facility in Radiowo

Katarzyna Wielgórska, Magdalena Rogoza, Anna Karlak

WULS-SGGW, Poland

Study programme level: MSc

Keywords: compost facility, animal population monitoring

At the border with Bemowo Forest (BF), which is partially sited in the buffer zone of Kampinos National Park (KNP), there is the biggest "garbage mountain" in Europe and the compost facility – Radiowo. The rubbish mountain is also located near protected areas, including two nature reserves and habitats of rare plant, mammal and birds species. Meadows near the garbage dump constitute an ecological corridor between BF and KNP, ensuring continuity of habitats for species such as moose, for which LB itself is too small as the area for the functioning as an independent population.

In order to investigate the impact of the compost facility on the distribution and migration of animals in the BF area, monitoring was carried out using a variety of methods, such as regular field inspections alongside marked transects and use of camera traps on the animal migration paths. During those inspections we identified the species composition of terio- and ornithofauna in the studied area, determined the places of littering and investigated the odour nuisance. In order to identify the species, trails of animals were determined and faeces were collected, which were also used in the study on heavy metal concentrations. All traces were marked using GPS devices to create a map of their deployment in further stages of the research. After initial field work, the camera traps were hung on the animal migration paths.

The effect of the research is the assessment of the impact of a garbage dump and composting plant on the presence of animals in the BF area. The research results can be used to undertake activities aimed at protecting the studied forest complex and contributing to the minimization of damage caused by the compost facility, and thus improving the comfort of life not only of animals, but also of people.

Acknowledgements: Joanna Gruszczyńska, Beata Grzegrzółka

Humans and Nature

Arbuscular mycorrhizal fungi a benefit to human health?

Ester Klein Hesselink

WUR, The Netherlands

Study programme level: Msc

Keywords: Arbuscular mycorrhizal fungi, soil degradation, intensive agriculture, crop production

Agricultural land has gradually been intensified over the last centuries, which resulted in an increased crop productivity. Higher crop yield is instrumental to feed the human population, which is expected to rise from 7.5 billion towards 10 billion in 2050. However, intensive agriculture comes with a cost. Soil degradation of farming land occurs at a worldwide scale. The Food and Agriculture Organization of the United Nations estimated that about 25% of agricultural land is highly degraded, which is a risk for crop productivity. Therefore, restoration of agricultural soils is required to improve crop productivity. The role of "*Arbuscular mycorrhizal fungi"* (AMF) in improving soil-plant relations have acquired attention in recent literature. AMF are a group of fungi from the *Glomeromycota* that live in symbiosis with the root system of plants. In turn for photosynthetic carbon, these fungi extend the root system by formation of a branched intracellular hyphal system within plant roots and extracellular hyphal system around the roots. This extended root system results in an increased uptake capacity of water and nutrients. Besides increasing crop productivity and yield due to improved uptake capacity, AMF increase gene expression of enzymatic and non-enzymatic antioxidants in the plant. This increased expression of antioxidants improves stress tolerance in crops. Improved stress tolerance is another factor that contributes to an increased plant productivity. Furthermore, extracellular hyphae that penetrate into the soil enhance soil structure. Thus, AMF could improve plant productivity in degraded farming land. However, this is only possible if AMF can be inoculated into the soil. Although AMF occur naturally into soils, their abundance in intensive agricultural land is extremely low. Methods to increase AMF abundance, should consider introduction of AMF in the soil simultaneous with crop planting.

Have you become interested in AMF? I invite you to come to my poster presentation!

Acknowledgements: Ruth Tennekes and Tijs Ketelaar

Global One Health

Public participation in conservation translocations in Scotland. Striving towards democratic decision-making in nature conservation.

Lisette Klein

WUR, The Netherlands

Study programme level: MSc

Keywords: Public participation, Conservation translocations, Decision-making;

Conservation translocations are an increasingly popular management tool among nature conservationists, despite its relatively low success rate. It has been argued that this lack of success is in part caused by neglecting the societal aspects of conservation translocations. Public participation in the decision-making phase of such a project is used to address these societal aspects. However, the effectiveness of public participation practices is regularly questioned and it has barely been studied in the light of conservation translocations.

The policy arrangement approach was used to identify processes affecting the functioning of public participation. These processes were compared to the societal objectives of public participation to determine the extent to which these objectives are achieved. This gave an indication of the effectiveness of public participation practices. Meeting these societal objectives could make decision-making processes more democratic, as democracy and participation are fundamentally intertwined.

Four Scottish conservation translocations were analysed in detail as case studies. Semi-structured interviews were conducted with specialists in the field of Scottish nature conservation. In addition, data was collected on the use of public participation in other Scottish conservation translocations and on perceptions of nature conservationists on public participation in general. The results show that predominantly informing and consultative forms of participation are preferred and used. The study identified several processes which often negatively affect the functioning of public participation, such as distorted power relations and a perceived lack of interest and knowledge among the public.

Under current conditions, public participation in conservation translocations in Scotland is seen to fail. Legal requirements are considered to be met, but societal objectives such as citizen empowerment or legitimising decision-making processes are not achieved. This makes decision-making processes on conservation translocations in Scotland less democratic compared to a situation in which effective public participation practices are used.

Acknowledgements: Dr. Koen Arts MSc MA

Humans and Nature

Scientific Student Conference 2018
Euroleague for Life Sciences

Poster session 3.1

Saturday 10 November 2018 at 10:10-11:10
Ground Floor, Orion

Optimization of Two-Stage Treatment of the Liquid Phase of Digestate

Liz Mabel Vargas Cáceres

CULS, Czech Republic

Study programme level: MSc

Keywords: LPD, nitrification, thermal thickening

Vacuum evaporation of the liquid phase of digestate (LPD) is a technique used to produce a nutrient-rich LPD, which can be used as a fertiliser and to recover a distillate with low concentrations of nutrients, which can be used as a process liquid in the biogas plants for the dilution of feedstocks. Moreover, the considerable reduction in the volume of the LPD, which allows the reduction of costs and fossil fuel consumption needed for its transportation, is another advantage. The adjustment of the pH of the LPD to slightly acidic is a necessary step in order to limit stripping of NH3 during evaporation. This can be achieved by the addition of mineral acids, but considerable amounts of chemicals are needed. Alternatively, nitrification as an LPD pre-treatment seems to be an interesting approach to decrease the pH and make the LPD suitable for vacuum evaporation. This work sought to verify the applicability of nitrification combined with thermal thickening by vacuum evaporation of the LPD. To achieve this goal, the nitrification of the LPD in a continuously stirred tank reactor was performed as a first step. Subsequently, two different series of thickening of the nitrified LPD were carried out. Next, the pH, EC, and concentrations of COD, Total ammonia nitrogen, N-NO2- and N-NO3- were measured, and mass balance of the aforementioned parameters was calculated. The total inorganic nitrogen preserved in the thickened LPD of all the samples increased in concentration more than double after the vacuum evaporation, with N-NO3- being the dominant nitrogen form, whereas in the distillate did not exceed 2 mg/L in all the samples. Mass balance calculations indicated that 99.9% of the total inorganic nitrogen was maintained in the thickened LPD and the percentage of total inorganic nitrogen in the distillates of all the samples did not exceed 0.06%.

Acknowledgements: I would like to express my deepest gratitude to my thesis supervisor Ing. Pavel Švehla, PhD and to Ing. Pavel Míchal. The experiments described in this work were carried out within the framework of the project funded by the National Agency for Agricultur

Metropolitan Solutions

Attitudes toward complementary and alternative medicine among undergraduate students of Universitas Atma Jaya Yogyakarta and its use for maintaining their health status

Gabriela Kubatova, Vladimir Verner, Aneta Hybsova

CULS, Czech Republic

Study programme level: First year PhD (at moment of submission)

Keywords: CAM, perception, questionnaires, Indonesia

Publishing of the studies on perception, knowledge and attitudes towards Complementary and Alternative Medicine (CAM) is on a rise, however still very little is known about CAM practice among university students. This is true particularly for the South-East Asia region, where CAM is substantial part of health care tradition and even lifestyle. Current chances in living standards and social norms, together with continuous economic growth, make these studies very important, especially if they are focused on particular segment of the population. This study is purposively aimed at the students from Universitas Atma Jaya Yogyakarta (UAJY), in Yogyakarta, Indonesia, and on identification of their using patterns and attitudes towards CAM. From December to April 2016, 557 students were interview via semi-structured interviews (52.1% females). Attitude and usage patterns data were evaluated via t-test and $\chi 2$. Correlation was used for identifying the strength of relationship between CAM usage and respondents' characteristic. The usage of at least one of CAM was reported by 93.2%, especially traditional massage (TM), TCM and herbal medicine. From gender perspective, women tent to use more TM, yoga and acupuncture ($p<0.05$). Moreover, the more practices students use, the higher willingness to recommend CAM to others was observed ($p<0.01$). Family, as the initial source of information for the first historical contact with CAM, has been replaced by friends and the internet now. General positive attitude towards CAM should be carefully considered, as respondents had very low awareness about potential side/adverse effects or use with conventional medicine as 38.36% of respondents do not inform their GPs. Undergraduate students shape their identities and attitude towards their health status and can be vulnerable to gain non-adequate information about the safety and precise usage of CAM modalities.

Acknowledgements: Vladimir Verner, Staff of International study office of UAJY

Global One Health

Habitat preferences of red deer in Doupov Mountains

Václav Silovský

CULS, Czech Republic

Study programme level: First year PhD (at moment of submission)

Keywords: Habitat preference, GPS telemetry, LiDAR

The study was based on data from GPS telemetry of the red deer (Cervus elaphus) in the Doupov Mts. 47,403 positional data points were analyzed in total from 9 red deer hinds that were observed telemetrically in the period between January 1st, 2014 and December 28th, 2015. Based on high-precision positional data, buffers around all GPS positions were created. Connection of the buffers' surfaces with the GPS positions and a background map that had been created using aerial laser surface scan -- LiDAR -- showed detailed information on the habitat preferences of deer. Preferences arose from the concrete spot that a given specimen inhabited at that moment, but they also contained wider area values based on the areas of the individual buffers. Observed specimens exhibited preference to cover with taller vegetation during the light part of the day. During night hours, deer preferred mostly open spaces with short vegetation. Moves between the individual habitats in the course of all seasons corresponded with the time of sunrise and sunset. The study also proved the effect of hunting pressure on the choice of habitats. The deer reacted to the hunting pressure effected by extending its stay in habitats with taller vegetation during the light part of the day by one hour compared to months without hunt. Due to the human activity, deer picked taller vegetation in the course of the day, which disrupted its natural grazing cycles that have been proven during night hours in the winter season.

Acknowledgements: Ing. Miloš Ježek, Ph.D.

Humans and Nature

Reintroduction as a conservation method for the African lion

Lærke Edel Toft Holm

SCIENCE, Denmark

Study programme level: BSc

Keywords: Reintroduction, conservation, African lion

The population of the African lion, Panthera leo, is in decline throughout Africa due to humane impacts such as killing and possession of areas otherwise inhabited by lions. As more reserves, especially in South Africa, are established, reintroduction has been used to support the population by reintroducing the lions into the reserves. The International Union for Conservation of Nature have formulated guidelines for reintroduction to ensure success of the implemented reintroductions. Despite the efforts of preparing reserves for the reintroduction of large carnivores, the success of in situ reintroduction has been questioned and there has yet to be conducted a lasting ex situ reintroduction. Simultaneously, the lions in the reserves face new human induced threats such as inbreeding because of isolation from other populations. This paper will examine the effect of reintroductions for the conservation of the African lion.

The guidelines for risk assessment and release and implementation have only been implemented to some extent by the reserves inhabited by lions. Preservation of genetic integrity has not been prioritized by reserves while planning the reintroduction. Instead, socio-economic factors such as legislations and sufficient funding have been considered and implemented. Soft-release as part of the release design enhanced the success rate of in situ and ex situ reintroduction. The age and sex composition of the reintroduced lions where only contemplated by few reserves despite the opportunity of manipulating reproduction rates and mitigating aggression.

If reintroduction should be included in conservation practices of the African lion, the guidelines dictated by the IUCN should constitute an essential part of the planning process prior, during and after release. Cooperation between reserves is necessary to prevent inbreeding. Additionally, post-release monitoring is of great importance to identify unanticipated threats. The lessons learnt from each reintroduction could potentially help enhance the possibility for success in future reintroductions.

Acknowledgements: Nicolai Vitt Meyling

Humans and Nature

The effect of cropping system diversity on soil health: a Swedish on-farm study

Hanna Williams, Tino Colombi & Thomas Keller

SLU, Sweden

Study programme level: MSc

Keywords: Soil health, cropping system, diversity

The capacity of a soil to provide ecosystem services without negative impacts on the environment is defined as soil health. A healthy soil is a fundamental resource for crop production. However, current cropping practices may degrade the soil resource, diminishing the potential to feed a growing world population. Knowledge of how soil and crop management affect soil health can be used to adopt cropping practices that secure food production while at the same time protecting the soil resource. This study aimed at quantifying the effect of cropping system diversity on soil health. We selected twenty farm fields in southern Sweden representing different cropping system diversities, which was defined based on the number of crops and number of organic amendment applications during the last five years. The hypothesis was that farms with a high cropping system diversity have healthier soils than farms with a low cropping system diversity. On each field, we measured soil texture and used the Comprehensive Assessment of Soil Health (CASH) test to assess soil health. In addition, we applied CASH on a presumably less disturbed soil nearby each field. We used eight indicators of the CASH test, including soil physical, chemical and biological properties. We measured penetration resistance in the field, and collected samples for determination of wet aggregate stability, plant available water capacity, organic matter content, active carbon as a measure of the proportion of easily oxidizable organic matter, soil respiration, citrate-extractable soil protein, and pH in the laboratory. Analyses are still in progress, but preliminary results suggest that the less disturbed soil is healthier compared to the in-field soil due to higher active carbon and wet aggregate stability. There are also trends of active carbon and wet aggregate stability being higher in soils from high diversity cropping systems compared to low diversity cropping systems.

Acknowledgements: Financial support from the Royal Swedish Academy of Agriculture and Forestry (KSLA), grant no. GFS2017-0114, is gratefully acknowledged.

Humans and Nature

A survey based study on consumer acceptance of insect protein in India

Anjani Nayak

UHOH, Germany

Study programme level: MSc

Key words: Malnourished, entomophagy, awareness, food security

Protein is quintessential for a healthy life and thus creates a compelling demand, especially in populated countries. This study focuses on insect protein and its acceptance by consumers in India, where an incessant increase in population is creating a food crisis. Eating bugs can be a potential solution to its food insecurity even though it is considered a taboo. Therefore, broadening consumers' views as well as choices were the objectives of this survey.

India is the second largest populated country in the world. Thus, it is not surprising that it has the highest number of malnourished children in the world as per a World Bank study in 2013. A potential solution to this problem could be the practice of eating bugs, known as entomophagy. Even though insects and their products have been consumed by humans since ancient times, the practice is still considered a taboo. Therefore, the aim of the survey was to grow awareness and acceptance of insects as food among Indians. A total of 366 individuals were divided into two groups. A group was given a presentation on entomophagy and its importance and then a questionnaire to answer. The other group was provided with the same questionnaire without educating them about entomophagy. The results indicated that although more than half of the latter group had heard about eating insects, they showed the least interest in knowing more as they were simply unaware of its importance. In total, more than 85% supported the idea of creating awareness about this protein rich food. However, only around 50% were ready to buy and taste some bugs. Around 68% were ready to add insects to their diet but not in their original form. The survey concluded that more awareness needs to be spread to increase their acceptance and to remove the ick factor. Moreover, producing insect protein requires much less water, feed and land compared to any conventional meat. The emission of greenhouse gases is also negligible in rearing insects compared to other meat production systems. Thus, the long term goal of the survey is to exploit entomophagy to contribute to the food security, employment and sustainability in India and to extend the approach across the world, thus making it a better place to live.

From Field to Fork

The work of dogs in AAI – the evaluation of welfare and human-canine communication

Magdalena Rogoza

WULS-SGGW, Poland

Study programme level: MSc

Keywords: AAI, welfare, human-canine communication

In Poland, there are no legal norms defining the appropriate skills of a dog and a dog guide to work in Animal Assisted Intervention. Also, work norms, such as the duration of classes or the frequency of dog's work per day and per week, are not defined. This research, conducted in Poland, aimed to analyze maintaining of dog welfare and to evaluate human-canine communication while working in therapy with animals. The research was carried out by creating a questionnaire based on Google Forms, which was sent via the Internet to dog guides working in AAI (Animal Assisted Intervention) in Poland. The questionnaire consisted of four parts: dog characteristics, owner / guide characteristics, dog work and human-dog communication. The questions concerned, for example, the work time of the dog, the frequency of work sessions per day and per week or the experience of the guide, Based on received answers, statistical analysis was carried out using Microsoft Office Excel 2007 and IBM SPSS Statistics 24. Based on the conducted analyses, it was concluded that the subject of dog welfare in therapy with animals is a difficult topic, reluctantly discussed by many dog guides. There is a need for unification of training program for future kynotherapists and their dogs, where the topic of maintaining animal welfare, ability to recognize signals sent by dogs and canine body language will be introduced as a part of the program. It is necessary to draw legal regulations concerning the profession of kynotherapist, that is: the amount of dog's work time including the division into passive and active activity of animal; frequency of work sessions per day and per week; knowledge of canine behavior (including calming signals, the body language of a dog); the age at which the dog starts working as well as the age of its retirement.

Acknowledgements: Agnieszka Boruta, Joanna Gruszczyńska, Beata Grzegrzółka

Global One Health

Social involvement in the management of private forests

Katarzyna Szyc, Anna Karlak, Magdalena Rogoza

WULS-SGGW, Poland

Study programme level: First year PhD (at moment of submission)

Keywords: forest management, participation, nature conservation

Private forests constitute almost 1/5 of the forest area in Poland, often forming part of valuable natural areas, especially in the Natura 2000 network. According to Polish law, forest management must be conducted on the basis of a simplified forest management plan (SFMP), which should respect the limitations of nature protection. Forest owners have a real chance to participate in the creation of planning documents regarding their ownership. In this research, the question is whether in the context of nature protection, the possibility of social participation in the creation of SFMP translates into increased interest in valuable natural private property land at the stage of adopting device documents? The research area consists of selected municipalities of the Mazowsze Region, in which the share of private forests in the total forest structure amounts to almost 45%.

We analyzed the degree of involvement of private forest owners in the process of SFMPcreating , with particular emphasis on areas of high natural value. Analysis of proposals and objections that were submitted to the authorities at the stage of project documentation lining to the public has shown little public interest in nature conservation on forest land of private property. Explanation of potential reasons for this state is presented based on a case study for two selected regions: suburbs of the capital city - Warsaw and rural areas.

Acknowledgements: Michał Orzechowski

Humans and Nature

The ovipositor actuation mechanism of a parasitic wasp

Noraly van Meer, Uroš Cerkvenik, Johan L van Leeuwen, Sander WS Gussekloo

WUR, The Netherlands

Study programme level: MSc

Keywords: hymenopteran ovipositor, insect musculature, kinematics

Parasitic wasps use highly specialized ovipositors to drill in various substrates to reach hidden hosts. The needle-like external part of the ovipositor consists of three interconnected elements (valvulae). Insertion of the ovipositor is achieved by alternating movement of these valvulae, which is claimed to reduce the required push force and limit the risk of damage whilst probing. The internal ovipositor inside the abdomen consists of two pairs of chitin plates (valvifers), which provide attachment for the muscles responsible for the movement of the valvulae. Currently it is unclear how valvulae movement is actuated. Here we present a reconstruction of the probing mechanics from four distinct stages of the probing cycle of parasitic wasp Diachasmimorpha longicaudata (Braconidae). Using Synchrotron X-ray microtomographs, 3D reconstructions were created of the ovipositor and its musculature in rest position and in three stages of probing.

The valvifers connect to the valvulae with semi-circular extensions. Furthermore, the first valvifer has additional hinged connections to the second valvifer and the ninth abdominal tergite. We show that only the first valvulae of the ovipositor move independently, while the second valvula remains stationary and can presumably only move due the repositioning of the whole abdomen. The movements of the first valvulae correlate to the rotation of the first valvifer with respect to the other basal plates. This rotation is achieved indirectly by a pair of antagonistic muscles connecting the second valvifer and the abdominal tergite. Two other muscle pairs, connected to the second valvifers and second valvula, deflect and elevate the valvulae. The calculated muscle forces are small, which supports the hypothesis that small push forces are used to probe. Our findings improve the comprehension of hymenopteran probing kinematics and muscle properties, and is another step in understanding the valvula control mechanism.

Acknowledgements: Uroš Cerkvenik, Sander WS Gussekloo

Biobased Solutions

Gene drive technology: friend or foe?

Carina Nieuwenweg

WUR, The Netherlands

Study programme level: PhD

Keywords: gene drives, biosecurity, crispr-cas

A technology that can be used to thrive a designed genetic change through an entire population would have tremendous potential in solving global agricultural, medical and environmental problems. Genetic elements capable of thriving through a population by surpassing Mendelian inheritance rules are called gene drives. They are being synthetical created and developed in order to eradicate vector-borne diseases like Malaria or Zika or eliminate agricultural and ecological pests in the near future.

Gene drive technology is highly effective because it differs from traditional gene editing experiments due to its potential scope, rate and the possible irreversibility of a population-wide change. This makes gene drive technology very potent, but also risky due to its potential strong impact. However, hurdles exist in the design and application of gene drive systems to biologically control entire populations. It is not known how to contain and reverse gene drive systems for example. Molecular strategies are needed to confine and reverse gene drives, in case of accidental release or malicious use.

We have created a device capable of detecting the presence of gene drive constructs in the field and are now working on the design and creation of an anti-gene drive system. This anti-gene drive could reverse the effect of a rogue gene drive system in the environment.

A gene drive roughly consist out of three parts, one of which being an endonuclease such as CRISPR-Cas. Our anti-gene drive system targets the endonuclease part of the rogue gene drive which can only be done by creating new type of gene drive system, based on different CRISPR-Cas systems.

Acknowledgements: Dr. Raymond Staals, Dr. Vittorio Saggiomo

Humans and Nature

Scientific Student Conference 2018
Euroleague for Life Sciences

Poster session 3.2

Saturday 10 November 2018 at 10:10-11:10
Ground Floor, Orion

Plant available water and grain size analysis of volcanic soils of the Galápagos National Park

Greta Schmidt

BOKU, Austria

Study programme level: MSc

Keywords: Volcanic Soils Galápagos Hydrology Geology

Since Charles Darwin visited the Galápagos Islands for the first time in 1835, the islands attracted and inspired researchers across the globe. While flora, fauna and geology of the islands have been subject to intense studies, their soils are rather poorly understood, even less so the physical properties of the latter. Taking into account a general lack of knowledge on the volcanic soils in general and particularly their hydrodynamic behaviour, this calls for more research. A unique new dataset of soil samples from the Islands Santa Cruz, Floreana, Isabela and San Cristóbal makes it possible to study the effects of time and climate on grain size distribution and plant available water of the volcanic Galápagos soils. This analysis will help us to better understand the ecosystem of the Galápagos Islands, volcanic soils and how they are changing over time and with humidity. It could potentially give us an outlook towards the effect of future changes in the environment. The plant available water will be found by determining field capacity and permanent wilting point with Richard's pressure chambers. The grain size analysis will be performed after a pre-treatment with H2O2 by using a sedigraph. These analyses are currently being carried out in the laboratory, and the results will be available by the time of the ELLS student conference.

Acknowledgements: Prof. Franz Zehnter, Prof. Bjarne W. Strobel, Prof. Nicola Rampazzo and Prof. Franz Ottner

Humans and Nature

Effect of rubber powder from waste tires on low-cycle fatigue of one-component polyurethane putty

Martin Tichý, Miroslav Müller, Vladimír Šleger

CULS, Czech Republic

Study programme level: MSc

Keywords: fatigue, recycling, elongation, micro-particles, SEM

The tires waste is globe issue. The aim of this research is to prove usability of this waste and reduce the impact on environment. New recycling methods enable modification of adhesive. Combination of recyclate and adhesive create interesting composite materials, which are proved in all fields of industry. Adhesive technology is highly progressive methods of joints various materials. This research is part of widespread study of polyurethane putty modification by rubber micro-particles from waste tires and the influence on mechanical properties of the adhesive joints. This research follows up low-cycle fatigue and interaction of modified polyurethane putty with rubber powder. Low-cycle stress of adhesive joints was chosen for real simulation appearing in practice. Adhesive joints were tested in 200, 500 and 1000 cycles. The influence on strength and elongation was compared with results of static mechanical tests. The interaction of adhesive bonds was followed up by SEM analyse in three layers, i.e. between polyurethane putty, rubber micro-particles and adherend. Polyurethane putty has good sealing properties and adhesion to various materials, i.e. is applicable for filler modification. On the other hand, has low strength and high price. Rubber powder is suitable for modification, because do not inhibit the sealing and increase strength of polyurethane putty. The modification was with various concentration of rubber powder 5, 10 and 15 wt.%. Mechanical tests prove positive influence of rubber powder on mechanical properties. Mechanical tests follow up percentage difference between static and low-cycle stress. The strength of modified polyurethane putty increased up to 17% and the elongation positively decreased up to 6%.

Acknowledgements: Miroslav Müller, Vladimír Šleger

Biobased Solutions

The influence of arctic soil age on arctic willow (Salix polaris) nutrition

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CULS, Czech Republic

Study programme level: MSc

Keywords: arctic soil, plant nutrition, chronosequence

Ecological research in the Arctic region is currently receiving a great deal of attention. The impact of climate changes on the Arctic ecological systems is large and projected to grow throughout this century and beyond. Glacier mass loss has been observed across the Arctic, consistent with the global trend. Some glaciers are projected to completely disappear in the coming decades. The aim of this study was to determine the amount of selected biogenic elements (P, Ca, K, Mg, Fe, S, Zn) in arctic willow (Salix polaris) samples and to analyse the influence of arctic soil age on arctic willow nutrition after the glacier retreat (Nordenskiöld, Svalbard). The Nordeinskiöld Glacier has been retreating in response to global warming. A soil chronosequence and a primary plant succession have been developing in the retreat area. Plant samples of Salix polaris were collected at 4 sites of different ages to investigate the changes of soil elements availability along the young chronosequences in the cold climate. The amount of biogenic elements in roots and leaves of polar willow samples was determined by inductively coupled plasma optical emission spectrometry. An ion chromatography method was used to determine the basic inorganic anions and low-molecular-mass organic acids in extract.

The hypothesis suggesting a difference between the amounts of elements depending on the age of the soil was confirmed in all samples: young soils contain more P and K, the amount of Ca in S. polaris roots grows with age. The content of selected biogenic elements (P, Ca, K, Mg, S, Zn) in leaves of polar willow is higher than in root samples in all cases except for Fe. Based on the determination of low-molecular-mass organic acids in roots of polar willow, the citronate and malate content is higher than all other anions.

Acknowledgements: Vaclav Tejnecky, Ondrej Drabek, Petra Lulakova

Humans and Nature

Methods of ground-based monitoring of large African ungulates

Zuzana Holubova

CULS, Czech Republic

Study programme level: BSc

Keywords: ground-based monitoring, ungulates, wildlife management

To ensure proper wildlife management, whether in national parks or in private reserves, it is crucial to know at least approximate numbers of animals occurring in that specific locality. Therefore, the key is to choose the most appropriate counting method that is accurate, effective and consistent. Although lately the ground survey is often replaced by aerial survey, if required equipment and funds are not available, traditional ground-based monitoring may still be a good option.

We have compared 3 ground-based monitoring methods that are based on distance measurement: (1) line transects by vehicle, (2) point- square transects and (3) point- 360 degrees transects, used for census of large ungulates living in the Bandia Reserve in Senegal. The 1,344 ha area was divided into 3 zones according to different types and density of vegetation. Two observers using a car followed each randomly selected line or point transect 3 times a day with 3 repetitions. According to our preliminary results, the best method for monitoring large ungulates in the Bandia Reserve is to follow line transects by vehicle. The best time for monitoring is either in the morning or in the evening, but not in the middle of the day when animals are resting and thus are more difficult to spot. However, those conclusions need to take into account the area specifics (e.g. road system, density and type of vegetation) as well as animal species specifics (e.g. shyness, camouflage, body size, gregariousness, etc.), which can be the key factors of the method's feasibility and therefore of the visibility of monitored animals.

Acknowledgements: doc. Ing. Karolina Brandlova, Ph.D., Carlos Castillo Gomez

Humans and Nature

Is there a `triple-win´ for conservation, livelihoods, and governance? - The implications of Broussonetia papyrifera as an ecological resource substitute

Yasmin Stodergger, Carl Salk, Daniel Waiswa

SCIENCE, Denmark

Study programme level: MSc

Keywords: forest regeneration, community involvement, Broussonetia papyrifera, Mabira Central Forest Reserve, biodiversity, local resource governance

Wood extraction and invasive species are commonly perceived as harmful for ecosystem services and detrimental for conservation efforts. However, they can also be beneficial, especially for local communities. Interactions among economic, institutional and ecological factors thus turn these impacts on their head. Villages often depend on nearby forests, as is the case around Mabira Central Forest Reserve in Eastern Uganda, where needs are intensified by the lack of health & educational infrastructure and other income generating opportunities. This is intensified as the area is settled mostly by laid off workers from nearby sugarcane and tea plantations. The demand for forest products such as charcoal and firewood is high due to population pressure, which has led to heavy encroachment on the forest despite the presence of the Ugandan National Forestry Authority (NFA) as well as due to the lack of a functioning governance structure. This demand for wood products is to a big part met by the species Broussonetia papyrifera, an invasive exotic species introduced in the 70s. By being a fast-growing species it provides multiple uses that can spare slower-growing native species. This study compares previous data from these sites with current forest measurements and social data including semi-structured interviews, key informant interviews and focus group discussions in two communities adjacent to the forest reserve. Results show that although still controversial for conservation efforts, Broussonetia papyrifera can support the regeneration of indigenous species and as such increase species richness and maintain biodiversity. The results also show that Broussonetia papyrifera has a key role for local livelihoods despite its low-density wood as various ecosystem services are covered by it. In a country like Uganda with a lack in strong institutions, Broussonetia papyrifera is a resource substitute with the potential to halt further degradation and to support local livelihoods.

Acknowledgements:

Humans and Nature

Protein effect on hydrothermal carbonization of brewer's spent grains

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UHOH, Germany

Study programme level: MSc

Keywords: HTC, BSG, hydrochar, protein, bio-refinery

Brewer's spent grain (BSG) is the main by-product of the brewing industry. It is considered a low-cost lignocellulosic biomass, rich in protein and fiber. Nowadays, its main application has been limited to animal feed mainly because of its complex composition and microbial growth susceptibility arising from its high moisture content, which makes it difficult to store and transport.

Hydrothermal carbonization (HTC) is a thermochemical conversion process conducted under temperatures ranging from 180°C to 250°C and autogenous pressure. HTC is suitable for biomass with high moisture content resulting in three main products: gases (mainly CO2), aqueous chemicals (sugars, acetic acid, and organic acids), and a solid product known as hydrochar. This process allows to expand the range of biomass utilization for bioenergy applications, since the drying step of raw biomass can be avoided.

Considering that BSG protein fraction does not contribute to hydrochar formation as it degrades into amino acids and that hydrochars with high nitrogen content are not desirable when used for combustion since NOx can be formed and harm the environment. BSG is a suitable feedstock for bio-refinery processing to obtain value-added products previous and after HTC conversion.

The aim of this study was firstly to extract protein from BSG for further characterization and quantification. Afterwards, HTC experiments were conducted with the original biomass, acidified protein-extracted biomass, and neutralized protein-extracted biomass. HTC experiments were carried out at two temperatures (190 and 220°C) and four reaction times (0.5, 1, 2, and 4 h).

Hydrochars were characterized by an elemental analysis, proximate analysis, and thermogravimetric analysis (TGA) to measure their thermal stability. Aqueous chemicals were analyzed by high-pressure liquid chromatography (HPLC) and total organic carbon (TOC). Summarized data was compared to show a global overview of the process.

Acknowledgements: Prof. Dr. Andrea Kruse

Biobased Solutions

Model-supported investigation of sensor-based nitrogen fertilization in precision agriculture

Franziska Diebolder

UHOH, Germany

Study programme level: MSc

Keywords: precision agriculture, crop growth modeling

Taking into consideration that agricultural resources like fertilizer, land and water get increasingly scarce and expensive, precision agriculture (PA) has the aim to produce more agricultural yield from less inputs and maintain a healthy environment despite the intensification of agriculture. The concept is to determine within-field variation and manage it to optimize productivity, crop quality and food safety. Especially the uniform application of fertilizers causes cost implications due to over and under-application.

The present study is based on data of a farm in central Germany, which performs site-specific nitrogen fertilization by means of an ISARIA crop sensor. With the indexes IRMI and IBI, the nutritional status of the crops is measured and the fertilizer requirement calculated thereof, without considering soil characteristics. Though, the investigation of the data revealed, that the expected relationship between nitrogen fertilization rate and yield, according to the law of diminishing returns, did not exist.

This raises the demand that precision management needs primarily the understanding of plant and soil. Knowledge about the efficiency of nutrient use, temporal patterns of nutrient uptake by crops as well as nutrient provision of the soil is indispensable. Hence, further analysis of the data by simulating it with the model package Expert-N ought to give clarification. The simulation of soil water flow, soil heat transfer, turnover and transport of soil carbon and nitrogen, soil management and crop growth provided insight into the soil-plant-atmosphere system of winter wheat.

The goal of this study is to get a better understanding about precision agriculture, particularly the relationship between N fertilization and grain yield, by means of crop growth modeling. Furthermore, it should clarify if soil characteristics would be necessary to be considered in site-specific fertilization.

Acknowledgements: Irene Witte, Prof. Dr. Thilo Streck

Global One Health

Research of the possibility of using bioactive compounds found in turmeric for forming the functional properties of butter

Adam Zalewski

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Study programme level: BSc

Keywords: butter, turmeric, supplement

According to CSO data, butter consumption in Poland has been increasing steadily since 2014, while the demand for margarine is falling. The habit of milk fat has created eating habits that can be used to supplement this product with health-promoting compounds.

Fresh turmeric is a raw material with a high content of polyphenols, which slow down the aging process of the body and are considered as "scavengers" of free radicals. Therefore, supplementation of butter in these compounds seems to be right. There are also reports in the literature that fats improve the ability to absorb the beneficial compounds contained in turmeric.

The research purpose was to analyze the possibilities of using bioactive compounds contained in turmeric to increase the nutritional value of butter and to create the possibility of daily, non-invasive supplementation of consumers diet in the compounds contained in it and to study the effect of these compounds on the butter stability.

During the experiment were prepared butter samples in laboratory conditions using 42% cream. At the kneading stage the butter was divided into three parts: without turmeric (control), with 1% addition of fresh homogenized turmeric and 1% addition of dried turmeric.

Samples prepared in this way were subjected to chemical determinations of the acid and peroxide number. There were also made the color measurements and microbiological cultures to determine the durability of the prepared butter. Unused samples were stored under refrigeration conditions. Subsequent markings were made monthly for 5 months. Concurrently, consumer tests were carried out.

Based on the research results, it can be concluded that the addition of turmeric to butter has a positive effect on the durability of the product, delaying its oxidation. Moreover, dyes naturally occurring in turmeric gave the product a yellow color, which may be considered as an alternative to the annatto dye.

Acknowledgements: mgr. Adrian Wojtczak

Humans and Nature

Rehabilitation of large predatory mammals in Poland

Magdalena Przymusińska

WULS-SGGW, Poland

Study programme level: BSc

Keywords: captive management, carnivorans, wildlife rehabilitation

The purpose of this work was to evaluate the work of wildlife rehabilitation centers in Poland in the field of rehabilitation of large predatory mammals. In recent years the populations of large carnivorans - the eurasian wolf, the eurasian lynx and the brown bear, in Poland, have increased visibly. The bigger number of animals means that more often they need help provided by wildlife rehabilitation centers. From the list of wildlife rehabilitation centers approved by the government, were chosen those that have the permission to rehabilitate large predatory mammals. To evaluate their actions, a link to an online questionnaire was sent to representatives of these centers that agreed on cooperation in earlier e-mail correspondence. The questionnaire was consisting of multiple-choice and open-ended questions regarding history information collected upon arrival of the animal, veterinary care, rehabilitation methods and conditions, release methods and eventual post-release monitoring. In spite of the fact that a lot of factors may have an effect on the success of rehabilitation, improvements to monitoring are needed before any necessary changes to the actions taken could be determined. Based on the results of the survey, own observations and professional literature, recommendations for actions undertaken in the field of rehabilitation of large predatory mammals were created.

Acknowledgements: Robert Mysłajek, Bartłomiej Popczyk, Blanka Maria Niechoda,

Humans and Nature

The Role of Cystic Fibrosis Transmembrane Conductance Regulator (CFTR) in the Barrier Function of Differentiated CaCo-2 cells

Lovindy Lebalado

WUR, The Netherlands

Study programme level: MSc

Keywords: CFTR, intestinal barrier function, Caco-2

Background and aim: The intestinal barrier function is important to maintain one's health and a disturbance to the barrier has been related to a decreased intestinal prevention from harmful foreign entities. Energy stress is able to alter the intestinal barrier and it is suggested to modulates the tight junction Claudins. The cystic fibrosis transmembrane conductance regulator (CFTR), an ATP-binding Channel (ABC) protein, is well-known for its function as a chloride ion (Cl-) gated channel. Recently, CFTR has been suggested to influence the cellular processes surrounding intestinal barrier junction regulation. We modulated the CFTR function with an activator and inhibitor and observe the changes toward the barrier function of CaCo-2 cells.

Methods: CaCo-2 cells were differentiated for 14 days and treated with various concentration of VX-770 and CFTRinh-172, an activator and inhibitor of CFTR, respectively. PA was used to mimic the mitochondrial stress condition. Changes in CaCo-2 cells barrier function were measured using TEER at several different time points after exposure of VX-770, CFTRinh-172, pre-incubation of VX-770 with PA, and VX-770 + PA simultaneously.

Results: The incubation with 15 μM VX-770 was found to increase the TEER of differentiated Caco-2 cells. However, it was not significant compared to the untreated cells. The CaCo-2 cells that were incubated with only PA showed no differences in TEER compared to the cells that were pre-incubated 15 μM VX-770 for 6 hours before PA administration.

Conclusion: Activation or inhibition of CFTR activity alone did not influence the TEER values of the CaCo-2 cells compared to the non-treated cells. Our findings suggest that CFTR might regulate the integrity of tight junction proteins of CaCo-2 cells independently of its energy balance.

Acknowledgements: dr. Sander Grefte, HAP Department

Global One Health

ELLS Prize for Excellent Master Theses

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.

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» Viktoria Konrat, MSc Molecular Nutritional Science
Master thesis: Ketogenic diet is associated with consistent alterations of the gut, oral and dental microbiota
Universities: UHOH/CULS

» Elena Spöri, MSc Environmental Science – Soil Water and Biodiversity
Master thesis: Linking the Sustainable Development Goals to Business Model Innovation: A case study at Alfred Kärcher GmbH & Co. KG
Universities: UHOH/ UCPH

» Christian Stetter, MSc Agricultural Economics
MSc thesis: Measuring the effects of Agricultural Subsidies on Production Decisions: An Application to Norwegian Farm Panel Data
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