4th MULTIDISCIPLINARY CONFERENCE FOR YOUNG RESEARCHERS

Energy, Sustainability & Society

BOOK OF ABSTRACTS

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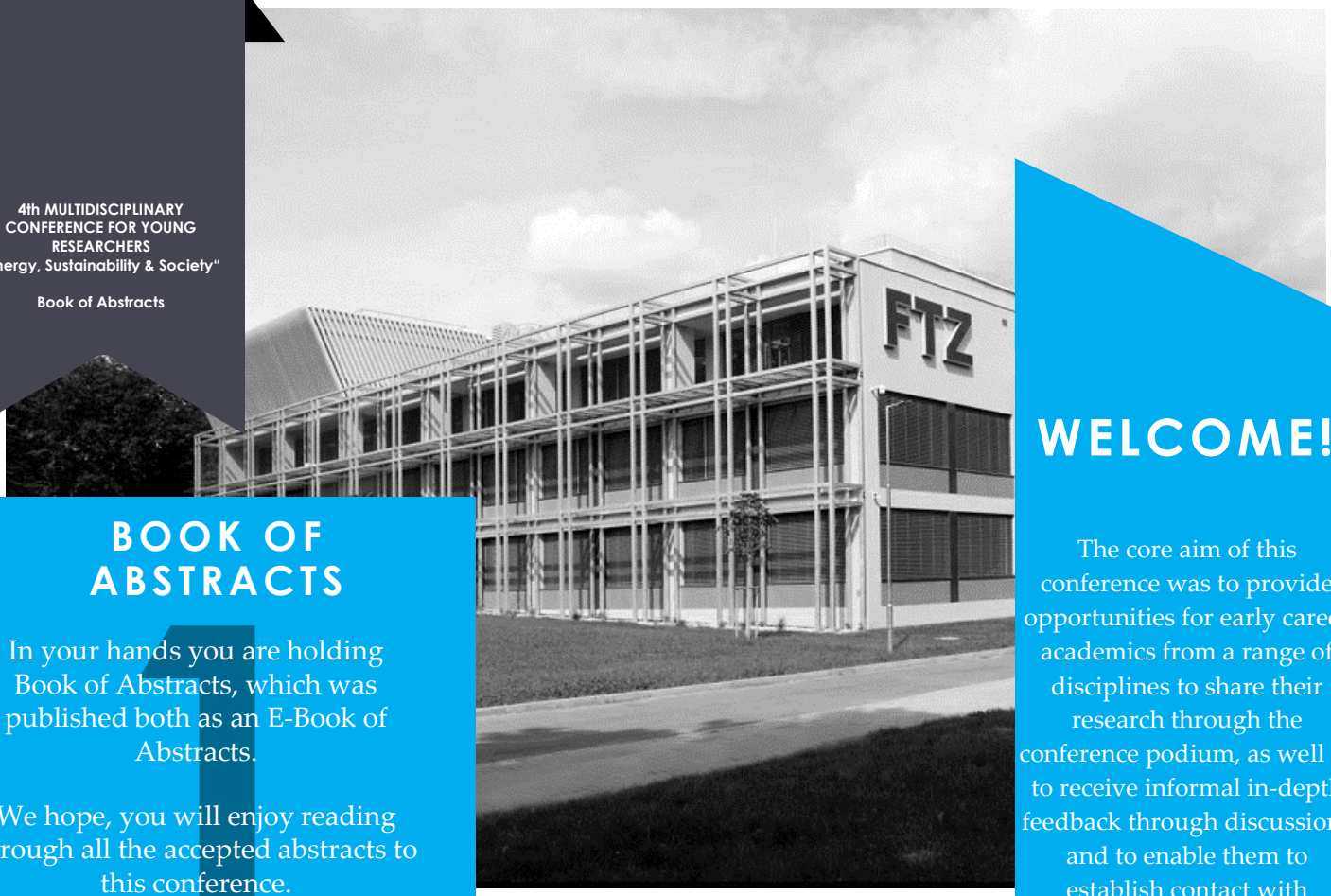
"Energy, Sustainability & Society"

Book of Abstracts



WELCOME!

The core aim of this conference was to provide opportunities for early career academics from a range of disciplines to share their research through the conference podium, as well as to receive informal in-depth feedback through discussions and to enable them to establish contact with professionals and other institutions.

1 BOOK OF ABSTRACTS

In your hands you are holding Book of Abstracts, which was published both as an E-Book of Abstracts.

We hope, you will enjoy reading through all the accepted abstracts to this conference.

2 ABOUT ORGANIZERS

The conference is organized by:

Czech University of Life Sciences Prague,
Faculty of Tropical AgriSciences,

Biogas Research Team

3 VENUE

Our 4th Multidisciplinary conference for Young Researchers took place in Prague – at Czech University of Life Sciences Prague.

SCIENTIFIC COMMITTEE

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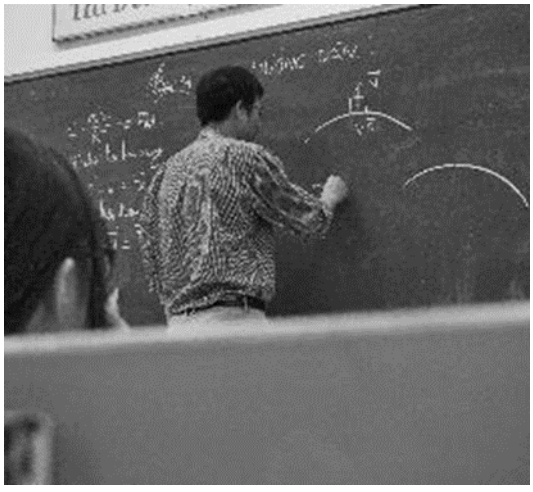
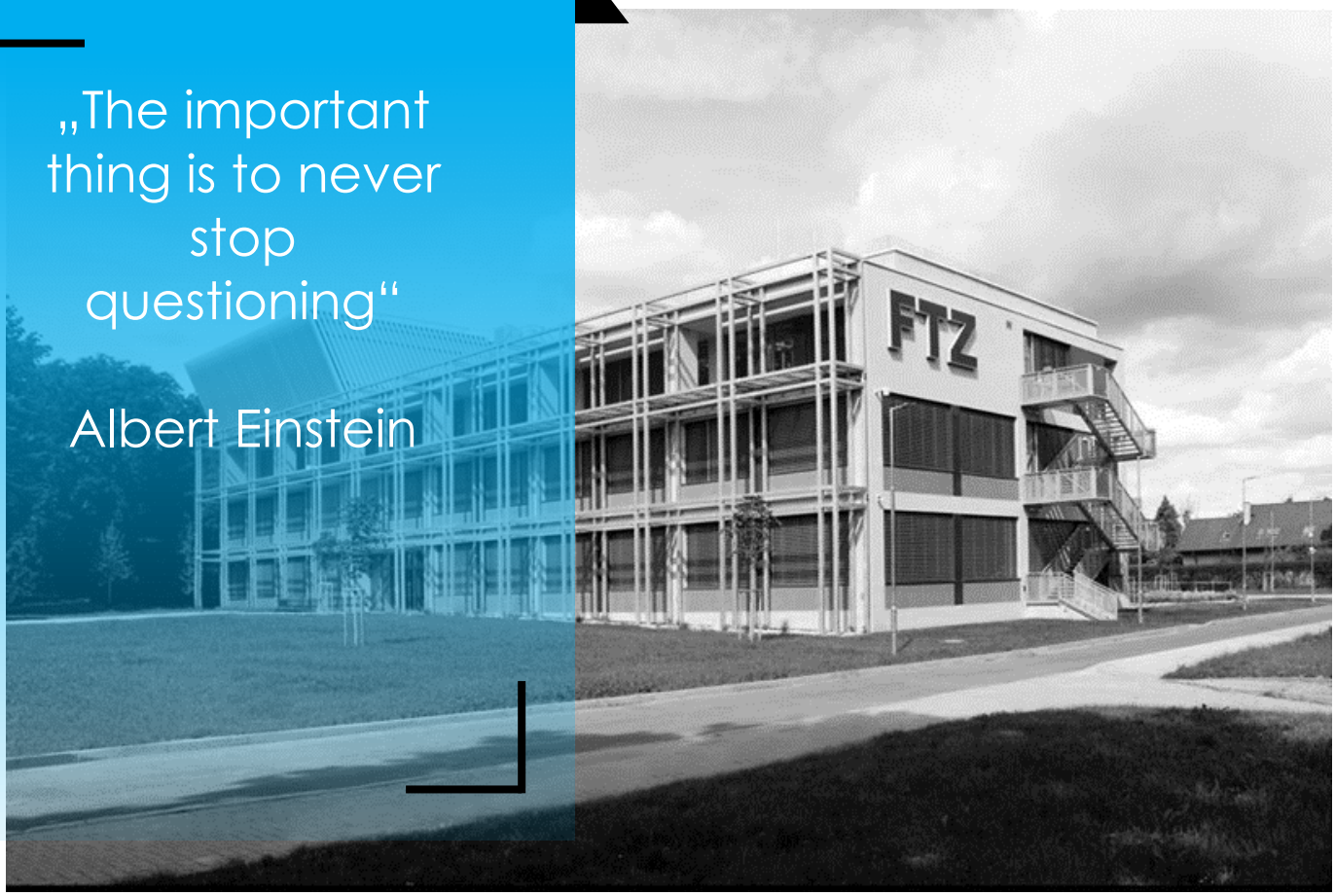


„The important thing is to never stop questioning“

Albert Einstein



4th Multidisciplinary Conference for Young Researchers

This year with topic of: Energy, Sustainability and Society

We gathered for the highly anticipated 4th Multidisciplinary Conference for Young Researchers. This conference is a testament to the vibrant spirit of academic inquiry and the dedication of emerging scholars. Our collective focus for this gathering is nothing short of pivotal, revolving around the paramount themes of "Energy, Sustainability, and Society."

As we embark on this intellectual journey, we are poised to explore the intricate nexus of energy, sustainability, and society, unearthing innovative solutions and novel perspectives that promise to shape our collective future.

The significance of this conference is underscored by its multidisciplinary nature. It serves as a convergence point for scholars hailing from diverse academic backgrounds, fostering cross-pollination of ideas and the forging of interdisciplinary collaborations.

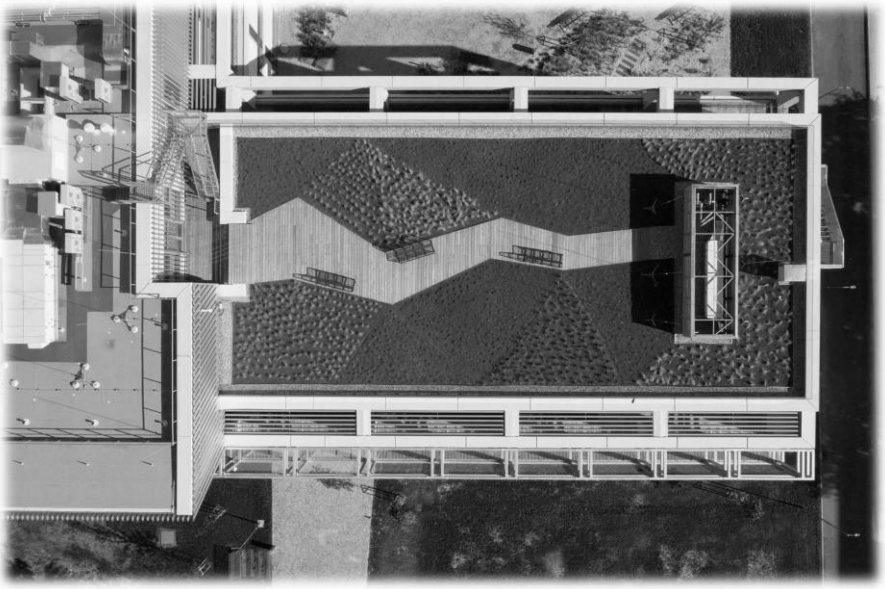
Our deliberations will span the realms of science, engineering, social sciences, and more, highlighting the interconnectedness of the challenges and opportunities that lie before us. Together, we shall delve into the intricate web of energy systems, the imperatives of sustainability, and the profound implications for society in the 21st century.

About the conference and venue

This conference is partly organized within the framework of the project " *AgriSciences Platform for Scientific Enhancement of HEIs in Ukraine*" (2023) by the support of the Development Cooperation of the Czech Republic through ia Ministry of Foreign Affairs

The conference this year took place in the venue of Czech University of Life Sciences Prague, specifically at the Faculty of Tropical AgriSciences.

Prague, often referred to as the "City of a Hundred Spires," is an architectural marvel that captivates with its timeless beauty. Nestled along the serene banks of the Vltava River, this enchanting European capital boasts a rich tapestry of history and culture that unfolds in its cobblestone streets, Gothic and Baroque facades, and ornate bridges. With its fairytale-like Old Town Square, the iconic Charles Bridge adorned with statues, and the majestic Prague Castle overlooking the city, every corner of Prague seems to tell a story of centuries past. And at our conference, we hope we will look also at the centuries ahead.



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Marek Jelínek, CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE, CZ

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Barbora Fišerová, CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE, CZ

&

Hynek Roubík, CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE, CZ

SCIENTIFIC SESSIONS

As you might remember from previous year of our conference, we always prepare sections based on the received abstracts.

This is also one of the unique approaches of our conference, that we are open opportunities to early carreer researchers from all various disciplines and based on each years interest and submitted abstracts, we develop the sessions and match them with appropriate experts.

This years, we identified following key disciplines:

- Exploring Sustainable Development and Economics
- Waste to Energy: Opportunities and Challenges
- Environmental Sciences
- Medicine and Veterinary medicine
- Agrobiology
- Advancements in Agriculture Engineering
- Food security: Challenges to come
- Ukraine - Current challenges and opportunities

Thank you note

In this little paragraph, we would like to thank you for joining us during 4th MCYR.

Dear Participants of the MCYR Conference,

As we draw the curtains on the MCYR, we want to express our gratitude to each and every one of you for contributing to the success of this event.

The core aim of MCYR was to provide a platform for early career researchers, from diverse disciplines, to showcase their research. Your enthusiastic participation and the insightful discussions that unfolded during the conference podium and feedback sessions made this aim a resounding reality. Your presentations were both inspiring and illuminating, offering fresh perspectives and novel insights into the various fields of research.

The publication of your abstracts in the Book of Abstracts, will continue to be a source of knowledge and inspiration for others. This E-Book of Abstracts will stand as a testament to your hard work and dedication to advancing your respective fields.

We also extend our thanks to the Biogas Research Team at the Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, and the AgriSciences Platform for their unwavering support in co-organizing this conference.

In the spirit of nurturing young talent and fostering collaboration among emerging researchers, your participation and dedication have been invaluable. We look forward to witnessing the incredible contributions you will make to the world of research in the future!

Once again, thank you for your dedication, and we hope to meet you at 5th MCYR c!

KEYNOTE SPEECHES

Keynote Topic: Unlocking Success: Navigating the Path of an Early Career Researcher

Assoc. Prof. Dr. Hynek Roubík

In this keynote address, Assoc. Prof. Dr. Roubík was sharing his insights into the journey of early career researchers. He provided valuable advice on how to navigate the challenges and opportunities in the world of research, drawing from his own experiences and successes.

Keynote Topic: Publication Bias in Scientific Findings – the case of Prunus persica

Dr. Stacy Hammond

Dr. Hammond's keynote was delving into the intriguing topic of publication bias in scientific research, using the case of Prunus persica as an illustrative example.

Keynote Topic: The Rise of Chatbots and Their Impact on Society

Dr. Školník

Dr. Školník's keynote explored the fascinating world of chatbots and their evolving role in society. He discussed the current state of chatbot technology, its applications, and the ethical considerations surrounding their use.

Session Chairs

This year we had a number of excellent young session chairs. Here you have an opportunity to get familiar with them.

- **Ing. et Ing. Eduardo Duque Dussán, MBA, PhD(c)**

  Mechanical and Chemical engineer born in Colombia, with more than ten years of experience in different industrial processes, he is an extended member of the Biogas Research Team. Eduardo is passionate about machine design and its interaction with waste management processes. He also works in the gasification, pyrolysis, biogas, and wastewater treatment solutions of post-harvesting by-products for a sustainable environment through sustainable technologies. He has experiences from Hungary, Romania, Poland, Switzerland, Germany, Austria, Sweden, Czechia, United States, Mexico, Colombia, Brazil and Zambia.

- **Ing. Stacy Hammond, Ph.D. – Researcher (Crop Research Institute, Prague) and Communications Manager at the Biogas Research Team (BRT)**

  Stacy is a Researcher at the Division of Plant Physiology and Cryobiology at the Crop Research Institute (CRI) Prague. As a cryobiologist, she feels she contributes to society by saving plant biodiversity for the present and future generations through the cryobanking of endangered species. Her work entails developing new in vitro techniques that ensure the safe storage of crops such as garlic, shallots, potatoes, raspberries, and many others that you would never think are in danger of extinction! She is also the newly appointed Communications Manager of the Biogas Research Team (BRT) and hopes to be an asset with her knowledge and skills in science communication. Her primary focus will be to continue to expand the visibility and outreach of the BRT and stimulate fresh thinking and innovation to enable the team to surpass its full potential through teamwork, innovative thinking, open collaboration and transparency.

- **Ing. Marek Jelínek**

Environmental engineer with focus on Sustainable Rural Development and member of Biogas Research Team. He has experience with implementation of renewable technologies and developing projects in Eastern Europe (especially Ukraine and Moldova) and Southeast Asia (especially Vietnam). He is focused on organic waste management and appropriate technologies, currently working on assessment of biogas technology in Southeast Asia.

- **Ing. Jan Staš, PhD(c)**

  He is currently studying for his PhD and is a member of a multidisciplinary scientific team. He has experience in preparing scientific texts, scientific posters and presentations at conferences. He is the author of one scientific article. He has been devoted to the issue of food processing for a long time. He is also a member of a multidisciplinary scientific team: Biogas Research Team.

- **Yelizaveta Chernysh, PhD**

Doctor of Science, Associate Professor at the Department of Ecology and Environmental Protection Technologies, Sumy State University, Ukraine; Senior Researcher in the Biogas Research Team, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague. Dr. Chernysh's research focuses on waste processing biotechnology with a particular focus on the biochemical intensification of phosphogypsum recycling with the production of environmentally friendly products (e.g. biofertilizers).

- **Chama Theodore Ketuama, Dipl.-Ing. MSc, PhD(c)**

  Agricultural Engineer with over 10 years of experience in agriculture and renewable energy and member of Biogas Research Team. Having studied in Cameroon, Australia, Kenya and the Czech Republic, he has technical expertise in organic waste management, biogas technology, water resources management, farm mechanization, irrigation, as well as in project and financial management. He is focused on research and rural development through promoting biogas technology as an option to provide clean household energy and climate change mitigation. He has participated in designing, implementing, and evaluating development projects in Cameroon, Czech Republic, Bosnia & Herzegovina, Moldova, and Zambia.

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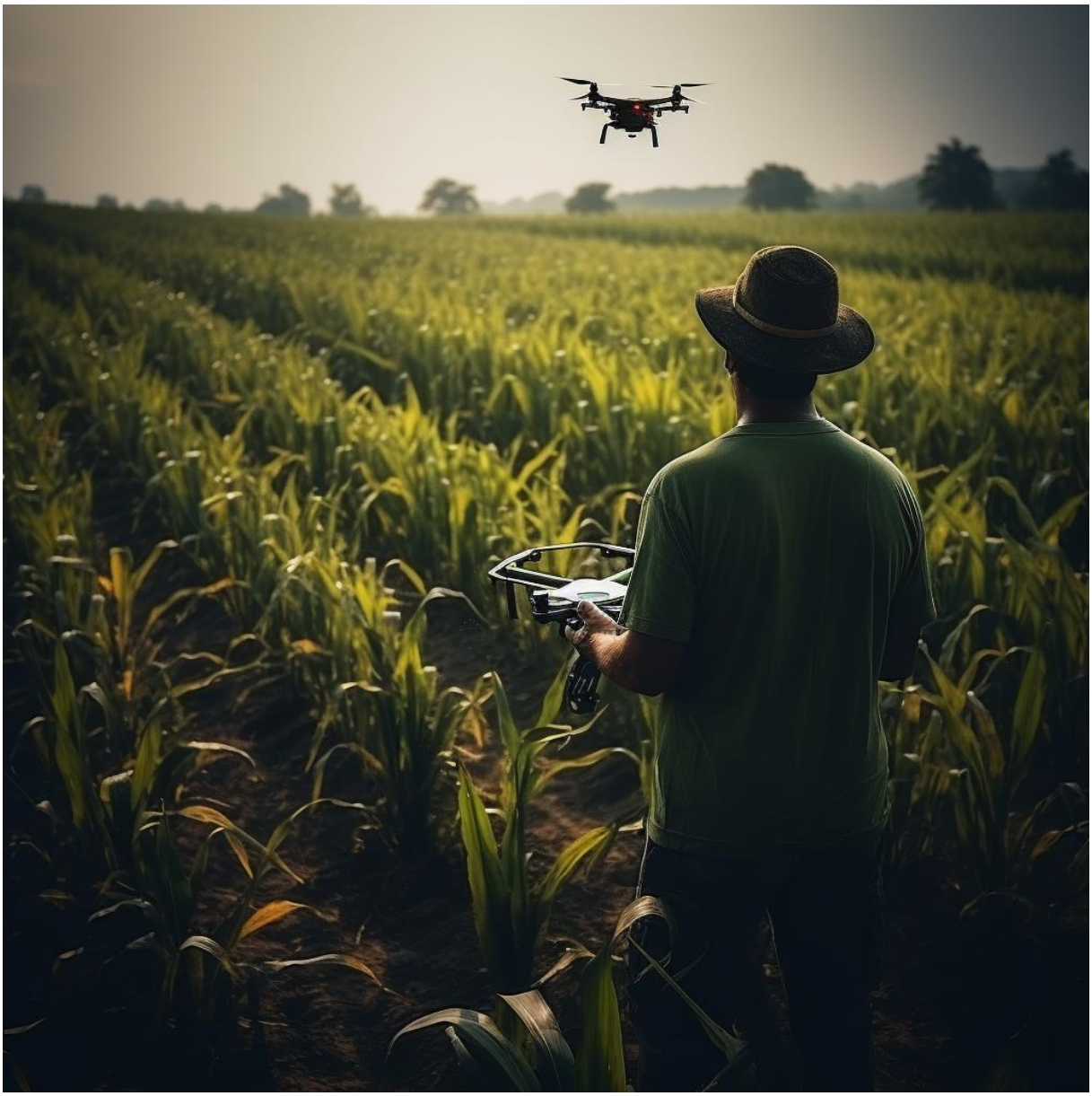
AGRICULTURAL ENGINEERING



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Enhancing Selective Coffee Harvesting in Challenging Terrains: A Modal Analysis and Vibration-Based Approach

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Abstract:

Background: Selective coffee harvesting has always been a challenge for those coffee growers who live in mountainous regions; the access of harvesting cars and tools to the plots is expensive and complicated. The labour is also scarce and intensive. Therefore, it is necessary to design an apparatus that helps harvest the ripe fruits without damaging the tree. **Methods**: Following the theory of natural frequency and modal analysis, the critical vibration frequencies of coffee were calculated at different ripening stages; afterwards, an air-pressurised nozzle was designed to deliver air shots at the desired frequency, collapsing the peduncle of the fruits, harvesting those of interest while reducing all types of mechanical damage. **Results:** Although all the experiments were performed in the laboratory, the fruit was successfully removed and its vibration profiles were also characterised. **Conclusions: The information** obtained allows to design different vibration-based devices that could ease the selective harvesting of coffee.

Keywords: Coffee; Frequency, Modal Analysis; Selective Harvesting, Vibration.

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Moisture Management in Solar Drying of Coffee: Comparing Different Methods to Prevent Remoisturizing

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Abstract:

Background: When wet-processed coffee reaches its equilibrium moisture content (10-12% (wb)), remoisturizing of the seed can occur, mainly when using natural convection drying methods. Considering that in Colombia, around 96% of coffee growers are smallholders and their use of solar drying technologies is high due to their easy and inexpensive operation, it is mandatory to develop techniques to avoid coffee remoisturizing applicable to solar drying apparatuses. **Methods**: Dry coffee (10% (wb)) was laid on solar drying in different configurations: Piled, covered with a geomembrane, packed in fibre bags, and flattened. Overnight, the moisture regain was evaluated. **Results:** Although all configurations showed moisture regain, the piled-covered coffee gained less from all the evaluated methods. **Conclusions: The pile-covered** method is an easy in-farm applicable method; therefore, coffee growers can easily apply it and reduce the risk of developing microorganisms, fungi, and mycotoxins due to moisture regain in their product.

Keywords: Coffee Drying; Equilibrium Moisture Content; Remoisturizing; Solar Drying.

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Pre-sowing inoculation system and its associated expenses

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[2] Volodymyr Martsynkovskyy Computational Mechanics Department, Sumy State University, M. Sumtsova str., 2, 40000.

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Background: Recently, the issue of using biofertilizers has been raised more and more frequently in Ukraine. However, the inoculation process is quite energy-consuming. Therefore, a model of mechanism for inoculation during sowing was created and the coasts for its creation were counted. **Methods:** Modeling of seeding device was created in the program SolidWorks and printed on the Fling Bear Ghost 5. Arduino Nano and sensors were used to create electronic control of the system model. (3) **Results:** A model of the pre-sowing inoculation system was created (Figure 1), total amount of expenses was 237,5 €. (4) **Conclusions:** The use of 3D modeling and 3D printing are quite convenient technologies for agricultural engineers, as it allows create cheap models of inventions and thus immediately correct possible errors or inaccuracies on full-scale inventions.

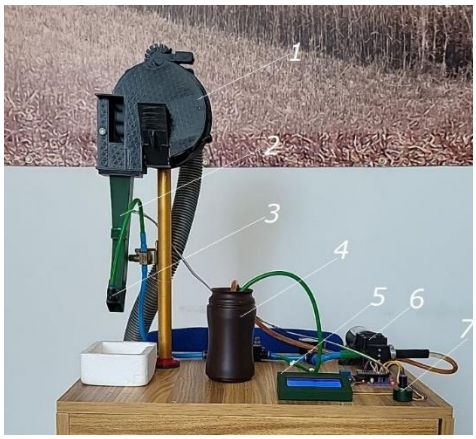

Figure 1. Model of pre-sowing seed inoculation system, where 1 - seeding device; 2 - sowing tube; 3 – nozzle; 4 - container for working fluid; 5 – monitor; 6 – water pump; 7 – encoder.

Keywords: seed inoculation; pre-sowing; sowing machine

Acknowledgement: We are thankful to the Czech government support provided by the Ministry of Foreign Affairs of the Czech Republic, which allowed this scientific cooperation to start within the project "Interuniversity cooperation as a tool for enhancement of quality of selected universities in Ukraine".

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Comparative Analysis of Different Types of Mixing Nodes in terms of Efficiency, Productivity, and Ecology

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Abstract: Faced with globalisation, climate change, and demographic changes, agriculture is employing technology such as agrodrones in precision agriculture. A key aspect of their efficiency lies in the configuration of specialised mixing nodes for fluid dispersion. Correct mixing ensures homogeneous fluid composition, improves dispersion efficacy, and minimises impact on the environment. This paper explores the interplay between time and resource use, safety, productivity, and the configuration of these mixing nodes. Using BEE AGRO mixers and DJI Agras T30 agrodrones, and data from field operators, it was determined that optimal configuration can enhance operations and identify areas for improvement, underscoring the role of mixing nodes in advancing agrodrone efficacy. By adding special options to the basic configuration of mixing nodes, parameters such as productivity and efficiency can be improved and increased, and the process can also be made more environmentally friendly.

Keywords: Agrodrone, mixing node, precision farming, sustainable development, agricultural sector.

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Suppressing interdependence of measured values of tribodiagnostic sensors

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Abstract: Tribodiagnostic sensors are important tools for the preventive and predictive maintenance of industrial machinery for the early detection of wear and failures. The authors present how in the real world measured values may be interdependent and how these dependencies complicate the interpretation of measured data and the execution of diagnostic conclusions. Using real data measured in industrial applications, the authors present methods to counteract these dependencies and possibilities for further development.

Keywords: tribodiagnostics, oil quality sensor; loss factor, oil degradation, moisture sensor; relative humidity, oil analysis, varnish, reliability, database, iIoT, industry 4.0, maintenance

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Technological Advancements for Optimising Agrivoltaic Systems in Ukraine

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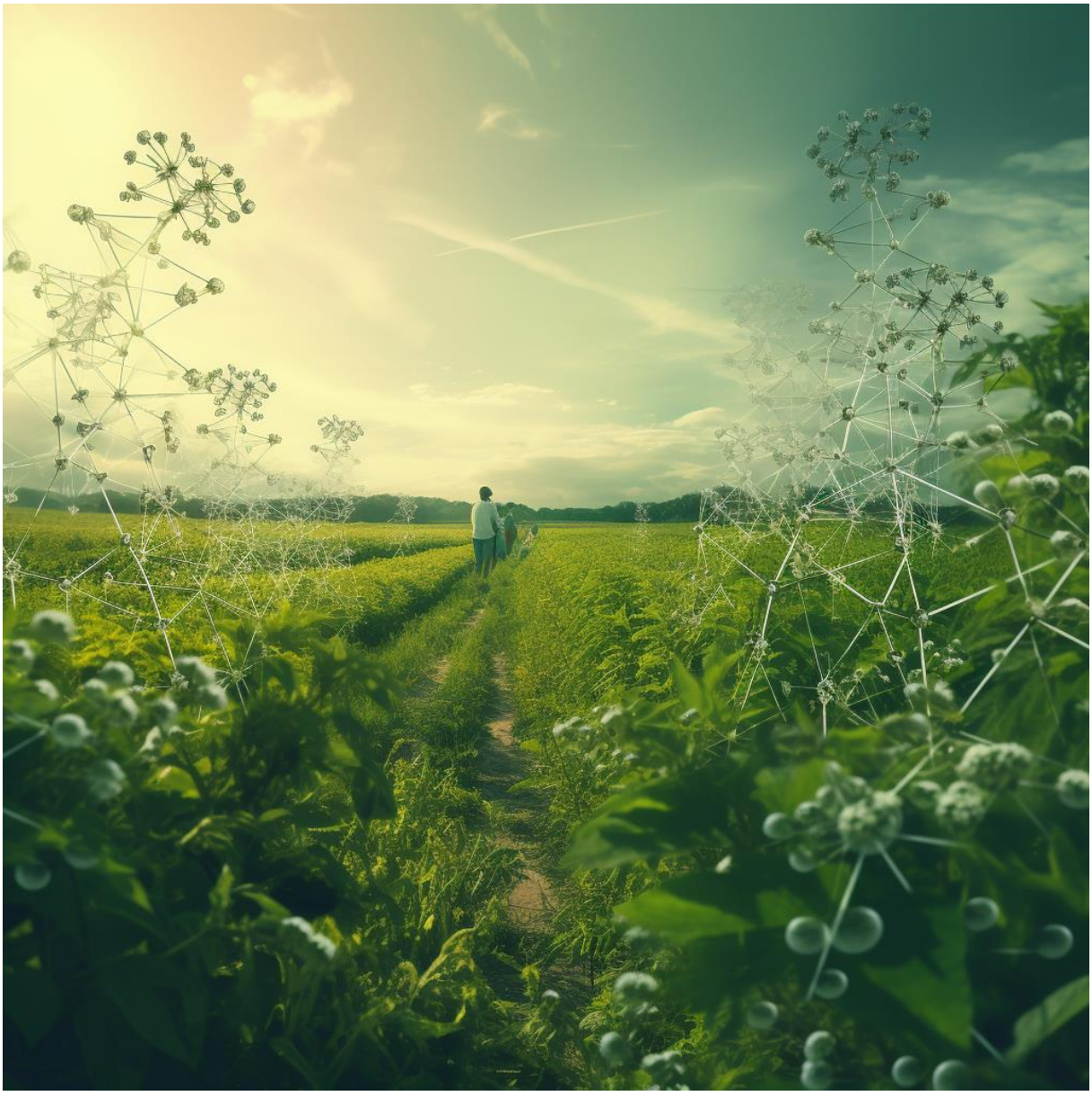
Abstract: This study aims to explore the potential and benefits of using modern technologies to improve the performance of agrivoltaic systems in Ukraine. The research uses a literature review and case study analysis to analyse various optimisation methods used in agrivoltaic systems. The study identifies the potential for using high-performance solar panels with contamination-resistant coatings to improve the productivity of agrivoltaic systems. It also highlights the implementation of precise star-tracking technologies for maximising solar energy collection by continuously adjusting panel angles. Additionally, the use of integrated monitoring and control systems to optimise system performance is discussed. The findings indicate that the incorporation of modern technologies can significantly improve the performance of agrivoltaic systems in Ukraine. The implementation of these solutions will contribute to the development of agrivoltaicand provide a sustainable energy source for the agricultural sector. The study emphasises the objective benefits and potential for further advancements in agro-voltaics.

Keywords: agro-voltaic systems; solar panels; solar energy

AGROBIOLOGY



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Synthetic polyploid induction improves essential oil yield and other agronomical traits in *Melissa Officinalis* L.

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Abstract:

Background: *Melissa officinalis* L. is a widely grown crop with ethnopharmacological properties attributed to its essential oils. However, the essential oil yield is relatively low, requiring efforts to enhance production. This study aimed to induce polyploidy in *M. officinalis*, generating genotypes with improved essential oil yield. **Methods**: The nodal segments were micropropagated and treated with oryzalin at different concentrations (20, 40, and 60 μM) and durations (24 and 48 hours). **Results**: The highest polyploid induction rate (8%) occurred with oryzalin treatment at 40 μM for 24 hours. The induced tetraploid plants exhibited robust growth, including longer shoots, larger leaves, and more leaves per shoot. Compared to diploid plants, tetraploid plants demonstrated a 75% increase in average essential oil yield, mainly due to significantly larger peltate trichomes. **Conclusions**: Overall, oryzalin effectively induced polyploidy in *M. officinalis*, resulting in genotypes with superior agronomic traits. Polyploid lemon balm holds promise for commercial cultivation and improvement.

Keywords: Polyploidization; Oryzalin; Essential oil; Crop improvement; *Melissa officinalis*

Acknowledgement: This research was funded by the Internal Grant Agency, grant number 20233105, Faculty of Tropical AgriSciences, Czech University of Life Sciences in Prague.

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Impact of Electromagnetic Radiation Treatment on rapeseed Sowing Quality as Sustainable Yield Enhancement

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Abstract: (1) **Background**: The impact of climate change on agriculture could dramatically reduce global rapeseed production, especially in vulnerable regions. In this regard, the development of environmentally clean and economically beneficial methods to increase the sustainability of agricultural crops is becoming urgent. Recently, the use of incoherent optical radiation from various ranges based on LED energy sources is gaining more and more popularity. The purpose of our research was to study the rapeseed growth processes depending on treatment with incoherent optical radiation of the red (660 nm) and blue (460 nm), both separately and together.; (2) **Methods**: Rapeseed seeds were chosen for the experiments. Exposure was 10 and 30 minutes for each type of variant. Grow Light 2 Full Spectrum LED plant lamp was used. The energy of germination and laboratory germination and, in addition, the length of roots and seedlings were studied.; (3) **Results**: The results obtained showed that the most significant effect on the germination energy and laboratory germination had a variant of the combined action of both the red and blue ranges for 30 minutes. (4) **Conclusions**: The mode of the combined action for 30 min shows the possibilities of activating the biopotential of seeds.

Keywords: electromagnetic radiation, wavelength, phytochrome, rapeseed, biopotential, seed treatment, productivity, agricultural technologies

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Moisture accumulation in typical chernozem under soil protection farming system

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Abstract: Background: To determine the moisture content of typical chernozem with different levels of soil coverage with plant remains. **Methods**: Field determinations of soil moisture in the 0–20 cm layer were performed using a LUTRON PMS-714 soil moisture metre (a two-contact electrode is used to measure the electrical conductivity of the sample, then the results are converted into a "%" indicator of moisture content in the soil sample). **Results**: Covering the soil surface with plant residues by 40–45% creates conditions for only a slight preservation of moisture, but does not play a significant role. Coverage of 70% or more will retain moisture much more effectively. And, of course, 100% coverage is the ideal option for its preservation. **Conclusions**: Mulching the soil with plant remains of the predecessor is one of the measures to preserve moisture in crops. But this method cannot fully preserve all the moisture that is in the soil during the growing season of crops.

Keywords: chernozem typical; moisture; farming system; plant remains.

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Use of electrophysical indicators during strawberry growing on drip irrigation

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Abstract: Background: To compare the changes in the electrophysical parameters of typical chernozems under different fertilisation systems under drip irrigation conditions. **Methods**: The determination of electrophysical indicators (electrical conductivity, total mineralisation, salinity) was carried out with the help of a conductometer-salt metre EZODO-8200 M. **Results**: It has been established that the largest changes in electrophysical parameters of a typical chernozem occur from the ridge to a depth of 20-30 cm. There is a difference in the obtained values of electrophysical indicators between variants of fertilisation of typical chernozem (control, mineral system, organo-mineral system, organic system), and also during years of researches is revealed. **Conclusions**: Electrophysical indicators change depending on the depth of sampling, which is related to the assimilation of nutrients from the soil by plants and fertilisation systems and correlates to a significant extent with the acid-base characteristics of the soil. The data obtained confirm the effectiveness and efficiency of the use of electrophysical indicators of the soil during the application of fertilisers and the use of drip irrigation.

Keywords: chernozem typical; electrophysical indicators; drip irrigation; fertilisation.

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Novel Applications of *Sida hermaphrodita* (L.) Rusby using *In Vitro* Culture Systems

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Abstract: **Background:** Investigating the potential of chemical compounds produced in plant stem cells and stem cell-like cell cultures has the potential to open new avenues for crop improvement and applications. **Methods:** We induced callus cell biomass growth in *S. hermaphrodita* explants using various auxin and cytokinin mixes. The presence of stem cells in the resultant biomass was confirmed using a neutral red-based vacuole-staining method and microscopic analysis. **Results:** Microscopic analysis revealed abundant vacuoles, indicative of stem cells or stem cell-like cells in the callus biomass. We observed a significant increase in fresh weight during the sub-cultivation cycles, confirming the presence of these cells. **Conclusions:** The successful establishment of *in vitro* stem cell or stem cell-like cell cultures of *S. hermaphrodita* paves the way for the development of innovative *in vitro* cultivation systems. These findings could potentially expand the range of applications of this crop, exemplifying the significance and versatility of stem cell research in plant biotechnology.

Keywords: callus culture, plant stem cells, dedifferentiated cells

Acknowledgement: This work was founded by the Operational Programme Integrated Infrastructure within the project code 313011W112 Sustainable smart farming systems taking into account the future challenges.

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Impact of *Trichoderma viride* against *Meloidogyne incognita* on ginger by analyzing its photosynthetic pigments and sugar content

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Abstract: Ginger is a major cash crop used as a spice globally. The Koraput district in Odisha is one of India's largest ginger growers. This plant loses its yield due to *Meloidogyne incognita* infestation alone or in a disease complex. Several nematicides are readily available to keep infection below the economic threshold, but environmental degradation and economic issues make them unviable. *Trichoderma viride*, a biological control agent, reduces nematodes and increases plant development. This study selected two germplasms, SURAVI (resistant) and SUPRABHA (highly susceptible). The photosynthetic pigments of the leaves, chlorophyll 'a', 'b', and total chlorophyll content, and the rhizome's total sugar, starch, and reducing sugar content were examined with the hypothesis that *Trichoderma viride* inoculation will significantly affect the selected properties compared to other treatments. Only *Trichoderma viride* (TV) inoculation treatment improved chlorophyll content (a, b, and total), while plants infected with nematodes alone (MI) had the highest rhizome sugar, starch, and sugar content.

Keywords: chlorophyll, ginger, *Meloidogyne incognita, Trichoderma viride,* total sugar

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Classification of Plant Electrical Signals for Early Detection of Viral Diseases

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Abstract:

Background: Early detection of viral diseases in plants is crucial to minimise crop losses and prevent disease spread. This study aimed to accurately classify electrical signals from healthy and infected plants using machine-learning models. **Methods**: Tobacco plants (n=300) were grown under controlled conditions. Half of the plants were inoculated with Alfalfa Mosaic Virus, confirmed by RT-PCR. Electrical signals were recorded from all plants before the appearance of visible symptoms. Following signal processing and feature extraction, classification was performed using Support Vector Machine (SVM) and Logistic Regression (LR) algorithms. **Results**: The three characteristics of median, autoregressive, and autocorrelation were identified as distinguishing characteristics. The classification accuracy reached 97% and 71% for SVM and LR respectively with those features. **Conclusions**: The electrical signals of plants contain useful information that can be utilised for the detection of viral infections in their early stages using the SVM algorithm.

Keywords: Signal processing, Support Vector Machine, Logistic Regression, Autoregressive, Autocorrelation

Acknowledgment: We extend our heartfelt gratitude to Dr. Maghsoud Pazhouhandeh for his valuable support and guidance throughout this study.

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Integrative meta-analysis of *Brassica napus* transcriptome infected by *Leptosphaeria maculans*

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Abstract: Background: Fungi represent the most serious pathogens of oilseed rape. There are many diseases with *Brassica napus* such as clubroot, sclerotinia stem rot, and blackleg. Ascomycetes *Leptosphaeria* spp. cause significant yield losses in all cultivation areas around the world. Identification of the pathways of biological and molecular functions of pathogenicity genes will help plant protection and breeding programmes protect crops against their pathogens. **Methods**: In this study, the RNA-seq datasets of *B. napus* infected by *L. maculans* were integrated. **Results**: This meta-analysis identified 11580 differentially expressed genes (DEGs). In addition, co-expression analysis showed 8 distinct modules and 10 hub genes. The gene ontology analysis presented the most important biological process, such as defense response and systemic acquired resistance pathways. **Conclusions**: These candidate genes could be used in plant breeding research to increase resistance against this fungus.

Keywords: *Brassica napus*; *Leptosphaeria maculans*; Transcriptome; Meta-analysis; Co-expression analysis; Gene ontology analysis

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The co-expression analysis of soybean transcriptome to the identification of key drought stress-responsive genes

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Abstract: Background: Drought is one of the most common abiotic stresses that soybean crops deal with under field conditions and results in loss of yields. Studying the various adaptive strategies of plants to drought stress is crucial. Methods: We discovered novel gene modules involved in this stress using transcriptome data. The microarray datasets in response to drought stress were retrieved from the GEO database and integrated. Results: Co-expression analysis identified the most important modules and 8 hub genes. The analysis of gene ontology showed a group of biological processes that included the metabolic process of carbohydrates, and molecular functions that included oxidoreductase activity, peroxidase activity, and antioxidant activity. KEGG analysis demonstrated metabolic pathways and the biosynthesis of secondary metabolites. Conclusions: In order to develop the current growth of soybean cultivation, it is essential to enhance the productivity and protection of this crop. The present study can be used for breeding programmes with the aim of producing drought-resistant plants.

Keywords: Soybean; Drought; Transcriptome data; Co-expression analysis.

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Influence of fertiliser products on the yield and quality of corn grain

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Background: In recent years, the question about organic cultivation of crops is becoming more popular. It means that farmers who want to use organic products have to follow certain rules. So, the aim of our study was to estimate the effect of seed inoculation and foliar fertilisation of corn by special fertiliser products with microorganisms certified Organic standard. **Methods**: Corn seeds were treated with biofertilizers in liquid (Leanum) and powdered (Vitamin O7) forms and then sown in the field. During the summer period, the plants were treated with liquid fertiliser once or twice. **Results**: It was found that fertilisation affected corn yield and grain quality – protein, ash, starch content. **Conclusions**: So, the use of seed inoculants and foliar fertilisation generally leads to increased yield, but at different levels. The protein and oil content had a weak positive correlation with applied fertilisers in the background of flat-cut tillage.

Keywords: biofertilizer, organic farming, microbial inoculation, seed treatment, foliar application.

Acknowledgement: We are thankful to the Czech government support provided by the Ministry of Foreign Affairs of the Czech Republic, which allowed this scientific cooperation to start within the project "AgriSci-UA Platform".

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Genome-wide identification of the microbial opsin proteins in *Leptosphaeria maculans* and *Fusarium oxysporum*

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Abstract: Background: *Leptosphaeria maculans* and *Fusarium oxysporum* are two important fungal pathogens of *Brassica napus*. The fungal G-protein-coupled receptor (GPCR) is responsible for recognizing a variety of host plants signals. Opsin is a member of the GPCR family A. Little is known about microbial opsin. **Methods:** In this study, transmembrane analysis, protein structures, and conserved motifs of this protein were investigated. **Results:** The opsin isoforms of these two fungi presented almost different transmembrane structures. Conformational changes in four isoforms of *F. oxysporum* were observed that could affect their functions, such as pathogenicity. A variety of ligands were also identified and different distribution motifs among all isoforms were observed. **Conclusions:** These findings have led to the hypothesis that the opsin proteins might have specific functions in the pathogenicity, growth, and sporulation of these fungi. This potential role of opsin proteins should be investigated in future research in programmes for plant breeding and protection.

Keywords: *Leptosphaeria maculans*; *Brassica napus*; G-protein-coupled receptor (GPCR); Opsin protein

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Weed control for corn in organic farming

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Background. Corn in organic farming suffers from weeds, which prompts the search for effective combinations of ways to control weeds. **Methods**: After the winter wheat was harvested, oil radish was seeded as a cover crop, which was wrapped for corn, using plowing to a depth of 25-27 cm, sweep ploughing to a depth of 25-27, discing 13-15 and 6-8 cm. Potential weediness was determined by washing seeds from the soil on sieves, and weediness was determined by the quantitative weight method. **Results**: The use of oil radish as cover crop in combination with deep tillage at 25-27 cm provided the lowest number of weed seeds at 0-30 cm (98.9 million pcs./ha). During plowing and tillage to a depth of 25-27 cm with cover crops, weed numbers and mass were the lowest during the corn growing period. **Conclusions**: The most promising in suppressing the spread of weeds is a combination of cover crops and sweep plowing 25-27 cm.

Keywords: green manures, tillage, Zea mays L., oil radish, weediness.

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Influence of cover crops on soil agrochemical properties

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Background. The aim of the research is to evaluate the effectiveness of using of different cover crop species grown in the interrow spacing of *Ginkgo biloba* L. Mulching can help to plants coop with stressful weather conditions and improve soil. **Methods**: We used some cover crops for Forest-steppe of Ukraine such as a phacelia, white clover, red clover, ryegrass, sainfoin, white mustard. Seed of cover crops were sown into row spacing between Ginkgo plants. **Results**: It was found that content NH_4^++NO_3^- in the soil was the highest on the plot with mustard. P-P_2O_5 content was the highest on the plots without cover crops, but K-K_2O was the lowest on that variant. **Conclusions**: Depending on the type of cover crops, a different tendency to the consumption of nutrients from the soil was noted. After wrapping the biomass in the soil, these nutrients will gradually move back into the soil.

Keywords: organic farming, green manures, nutrients, soil fertility, Ginkgo biloba.

Acknowledgement: We are thankful to the Ministry of Foreign Affairs of the Czech Republic support, which allowed this scientific cooperation to start.

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Publication bias in scientific findings – the case of *Prunus persica*

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Abstract: As scientists, we strive to publish the latest discoveries, but often after hours, days, or even months of testing, retesting, checking, and confirming some experiments simply do not work regardless of detailed or elaborate experimental designs. Such negative results often get left behind, moving on to work on something new in the hopes of achieving positive outcomes. After all, there is no point in publishing negative results. Or is there? One of the attributes of scientific work is the falsifiability of a hypothesis. The hypothesis must be capable of being tested and proven wrong. The aim of this submission is to show the potential of negative results, as they are also a contribution to science that can shorten the path for others. Here, we will present the case of developing a slow growth method for the medium-term conservation of *Prunus persica*, where two genotypes, 15 treatments, two repetitions and 6 months were tested, to no avail. So, where do we go from here?

Keywords: Hypothesis falsifiability, publication bias, scientific knowledge, *Prunus persica,* slow growth method

Acknowledgement: Funded by the Ministry of Agriculture of the Czech Republic, grant number MZE RO0423 (Young scientist grant #3201) and encouraged by the OSIRIS project (funded by the European Union's Horizon Europe research and innovation programme) under grant agreement No. 101094725.

Powdery mildew species diversity on the Asteraceae family in the Czech Republic

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Abstract: Powdery mildew is one of the primary pathogens that attack plants of the Asteraceae family. Powdery mildew causes significant damage to plants in general. The species that occur in the Asteraceae family are quite similar morphologically, making their exact identification difficult. Despite this, the taxonomic system of this pathogen has been highly refined. The aim of this study is to broaden the knowledge about the spectrum of powdery mildew fungi species detected on Asteraceae ornamental plants in the Czech Republic. The samples were taken in 2021-2023 in gardens and parks in southern and central Moravia. Eleven different genera of powdery mildew were confirmed on 33 species of perennial ornamental plants, all belonging to the genus *Golovinomyces: G. ambrosiae, G. asterum* var. *asterum, G. asterum* var. *moroczkovskii, G. asterum* var. *solidaginis, G. cichoracearum* var. *cichoracearum, G. depressus, G. echinopis, G. latisporus. G. macrocarpus, G. orontii, G. spadiceus.*

Keywords: powdery mildew, Asteraceae, *Golovinomyces*, ornamental perennials

Acknowledgement: This work was financially supported by Internal Grant Agency of Faculty of AgriSciences Mendel University in Brno (AF-IGA2023-IP-068).

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Integrative meta-analysis of Soybean transcriptome responses to biotic stresses

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Abstract: Background: Soybean (*Glycine max L.*) is one of the most important legume crops. It is infected by different pathogens that cause losing yield every year. **Methods**: To identify novel pathogens-responsive genes and their underlying molecular mechanisms, we integrated soybean transcriptome datasets. **Results**: The meta-analysis identified 3123 differentially expressed genes (DEGs). Gene Ontology and KEGG analyses showed the key biological processes, such as regulation of defense response, and salicylic and jasmonic acid mediated signaling pathways. The promoter analysis of DEGs showed that the AP2/ERF, WRKY, bHLH, and MYB-related families were the most prevalent. Based on the co-expression analysis, 7 modules were uncovered. Moreover, the PPI analysis identified significant hub genes, such as *JAZ1/5*, *RCR3*, *PYL10*, *TIFY10B*, *AOC4*, and *AOS2*. **Conclusions**: Taken together, these findings could lead to a better understanding of the mechanisms underlying resistance to pathogens in soybeans, which may use by crop biotechnologists to accelerate plant genetic engineering.

Keywords: *Glycine max*, Pathogens, Transcriptome, Meta-analysis, Co-expression analysis.

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Psychological aspects of management enterprises in Spain and Ukraine

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Abstract. Background: the purpose of the research is to determine the characteristics of management psychology in the work of business entities of different countries. **Methods**: theoretical generalisations - establishing the importance of the social and psychological climate of companies; system method - in the study of psychological aspects in the management of enterprises; the method of comparison – when comparing the management psychology system of Spanish and Ukrainian companies; modelling method – when establishing a model of the psychology of company management. **Results**: The theoretical provisions of the formation of the social and psychological climate of companies were considered; A comparative analysis of the psychology of company management was carried out in Spain and Ukraine was carried out; a model of management psychology of Spanish and Ukrainian companies was formed. **Conclusions:** the main conclusions include the high role of management psychology of companies with the aim of increasing the overall their social and economic efficiency.

Keywords: psychological aspects; management; enterprises.

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Studying the economic feasibility of growing barley and using it as green fodder for animals

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Abstract: This study aimed to determine the economic feasibility of establishing a facility to grow barley and use it as a green fodder for animals, and to study the economic importance of using barley cultivars in animal nutrition. The feasibility study (using some economic indicators) was used, After analysing the data, the results showed that project of green barley production is economically feasible, since the ratio of revenues to costs (at an appropriate discount factor) was 1.66 and the value was greater than 1, The internal rate of return (IRR) reached 56.1%, which is a good number compared to the bank interest rate. Cultured barley is an important source of food for livestock. The results also showed that there is a positive correlation between the use of sprouted barley and the cost of raising livestock, especially in drought years, and also showed that the production of green cultivar barley contributes to solving the problem of food security and water security in terms of providing large areas of agricultural land and irrigation water for other crops.

Keywords: barley, green fodder, Hydroponics, Economic efficiency, Economic indicators, Internal rate of return.

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Demographic Factors Affecting Organisational Citizenship Behaviour: Empirical Study of Turkish Academics

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Abstract: Background: This study measured the effect of various demographic factors on Organisational Citizenship Behaviour (OCB) in context of Turkish academics. The main aim of this study is to see the effect of demographic factors such as age, gender, academic title, marital status, and years of employment on OCB. Specifically, that how different demographic factors effect OCB. **Methods**: Quantitative methodology is used for this study. The data were collected online through Google docs using questionnaire. The sample includes 110 Turkish academicians from 45 different Turkish universities from across Turkey.; **Results**: SPSS software is used in order to see the results of this study by running crosstabs, ANOVA test etc. Organizational Citizenship Behaviour is very important because it has several benefits such as increasing employee morale, reducing stress, and creating better social interactions between employees. **Conclusions**: This study is important because Organizational Citizenship Behaviour becomes a crucial topic for researchers and practitioners who want to study in this area.

Keywords: Demographic Factors, Organizational Citizenship Behaviour (OCB), Turkish Academicians

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Development and simulation of on-farm activities non-linear optimized programming model for small-scale (A1) farms of Zvimba district

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Abstract: In this research, we built a series of farm level models of Zimbabwe typical farms. We adopted positive mathematical programming method which changes linear to non-linear programming model, by adding quadratic cost function into the objective function. The optimisation is carried in General Algebraic Modelling System (GAMS) platform while model data are stored in Excel spreadsheets. Several policy scenarios are simulated, focusing on input and output prices. The results are interpreted counterfactually. This means that the results of scenarios (policy options) are compared to baseline (business as usual scenario). The model offers a multi-cropping plan (maize, tobacco, millets, cotton or soybean) in contrast to common dual cropping plan (tobacco and maize) showing that using same farm resource level a farm can attain higher optimum profits. In conclusion, optimization modelling improves insight into farm management and thus should be encouraged to enhance extension advisory services and policy decisions in Zimbabwe.

Keywords: non-linear, optimization, policy decisions, positive mathematical programming, modelling

Acknowledgment: Acknowledgement goes to the IGA Grant from Czech University of Life Sciences (2018).

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What really makes food-based entrepreneurs succeed: Evidence from young entrepreneurs in Ghana

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Abstract:

Background: Entrepreneurship is one solution to the problem of youth unemployment. This study examines the relationship between entrepreneurial motivation (EM), entrepreneurial orientation (EO), corporate social responsibility (CSR) and business success (BS) among young food-based small business founders. **Methods**: Quantitative data were collected through face-to-face interviews with 244 young food processors from the Northern, Ashanti and Greater Accra regions of Ghana in 2021.Data analysis was conducted using PLS-SEM analysis. **Results:** The results show that young women (82%) run most of the enterprises and most entrepreneurs (50%) have tertiary education. The empirical results showed that EO and CSR are positively related to entrepreneurial success. **Conclusions:** The study concludes that CSR should be promoted among small businesses and that EO should be taken into account when admitting people to entrepreneurial programmes.

Keywords: Entrepreneurship, Ghana, Corporate Social Responsibility, Entrepreneurial Motivation

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Study of the Correlation between Net International Investment Position and International Migration Balance

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Abstract: Background: The inflow and outflow of foreign capital investments are related to the country's immigration flow. The purpose of this study is to establish the relationship between these categories. **Methods:** Spearman and Kendall rank correlation methods were used to investigate the functional relationship between net international investment position (NIIP) and balance of international migration (BIM). **Results:** The dynamics of NIIP and VIM in Ukraine is presented, and these indicators are normalised to account for the difference in units of measurement. The Spearman rank correlation coefficient is calculated for the NIIP and BIM unitless measures, and the results are statistically significant. The Kendall rank correlation coefficient is also calculated, and the results confirm the inverse correlation between the NIIP and the BIM. **Conclusions:** The findings of this study suggest that NIIP and BIM are inversely correlated and that this correlation is statistically significant. This has important implications for the management of the country's financial system.

Keywords: migration; balance of international migration; net international investment position; socio-economic development of Ukraine; correlation coefficient; Spearman coefficient; Kendall coefficient; natural normalisation; rank.

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Intrinsic Drivers of Agricultural Land Abandonment: A case study of Nigeria

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Abstract: Land abandonment is an emerging global trend with implications for food security, ecosystems, and the environment. Research conducted in Europe, Asia, and North America has mainly focused on the extrinsic drivers of this phenomenon, while studies on the intrinsic drivers in Africa and globally remain limited. Therefore, this study aims to explore both extrinsic and intrinsic drivers in Africa, using Nigeria as a case study. The place attachment theory was the focus of this study. A multi-stage random sampling technique was used to select 450 farmers from selected geo-political zones, states, and rural areas of Nigeria. Data were collected using semi-structured questionnaires and analyzed using binary regression modeling. The results showed that attachment plays a role in the decision to abandon agricultural land, as the community of origin of the respondents and the willingness to sell their land were significant in the decision to abandon land, highlighting the multidimensional complexity of global land abandonment.

Keywords: Land abandonment, Place attachment, Africa, Nigeria, Binary Logistic Regression

Acknowledgment: I would like to acknowledge and sincerely appreciate the Faculty of Tropical AgriSciences - Internal Grant Agency (IGA) - Grant Number – 2023113

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Grid-parity economic assessment of decentralised solar PV generation: Nigeria as a case study

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Abstract: Distributed renewable energy has proven to be a promising solution to mitigate energy crises and other financial and environmental issues associated with the global energy sector. However, the practise of using a decentralised solar photovoltaic generation system in Nigeria is still in its infancy stage. In this study, the cost-effectiveness and profitability of the photovoltaic system were evaluated using a probabilistic approach through the PVsyst simulation framework. The nominal capacity of the system, the levelized cost of electricity (LCOE), inflation, discount rate, debt financing, net present value (NPV) and internal rate of return (IRR) were adopted. The average LCOE is found to be 0.07 $/kWh, which is lower compared to the 0.10 $/kWh grid tariff. The findings show that photovoltaic systems have achieved cost parity with grid electricity. Finally, the study has confirmed that decentralised solar photovoltaic generation is economically feasible in Nigeria.

Keywords: Photovoltaic; Decentralised generation; Grid parity; LCOE; Nigeria.

Acknowledgment: We are grateful to the National Agency for Science and Engineering Infrastructure (NASENI) Nigeria and the National Institute of Solar Energy India for their technical support, and to the NERC for having granted us access to the tariff and other PV data during our study.

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Feasibility analysis of agrivoltaics implementation in Ukraine

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Abstract: This study examines the feasibility of implementing agrivoltaics in the energy sector of Ukraine, considering its broader context and potential impact on the agricultural sector. The analysis utilizes methods of literature review and review of comparative cost-benefit assessments, with consideration of environmental impact. The study establishes the potential of agrivoltaicsto serve as a sustainable energy source for agricultural production. It examines the economic advantages, such as reduced energy costs and the potential for additional income from excess energy sales. Furthermore, environmental benefits are considered, including reduced greenhouse gas emissions and decreased resource consumption. Based on the analysis, it is concluded that the introduction of agrivoltaicsin Ukraine is economically viable and promotes sustainable development. Agrivoltaicsoffer agricultural enterprises a stable and environmentally friendly energy source, fostering their growth and enhancing competitiveness. The findings emphasise the potential of agrivoltaicsto contribute to a sustainable and resilient agricultural sector in Ukraine.

Keywords: solar radiation, crop suitability, financial viability. land availability, environmental impact, solar panels

ENVIRONMENTAL SCIENCES

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Digitalisation and Environmental Concerns: How the Internet Affects Data Processing in Environmental Studies

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Abstract: *(1) Background:* Using the Internet as a research tool has become common among natural resource and other professionals. The Internet and World Wide Web provide a myriad of new possibilities for practicing research activities such as information and data collection, research collaboration, result dissemination, and scholarly publishing. This review focused on analysing the potential use of Internet resources to address environmental research issues, as well as the impact of the Internet on data processing in environmental research. *(2) Methods:* Open databases were searched for statistics on the use of various Internet resources in environmental research. Statistical data from various Internet resources were analysed to monitor research activities on the topic. *(3) Results:* Identified directions for the development, dissemination, and implementation of flexible and scalable systems to maximise the use of ecological knowledge derived from big environmental data in its many forms. *(4) Conclusions:* The adoption of open science approaches and other best practises for implementing environmental research, as well as closer collaboration between environmental researchers, ecoinformaticians, and programmers, provide opportunities to develop, disseminate, and adopt flexible and scalable systems to maximise the use of environmental knowledge derived from big environmental data in its many forms.

Keywords: Internet resources; environmental research; ecoinformatics

Acknowledgement: The author (Y.Ch.) expresses gratitude to the European Fund for Displaced Scientists - ALLEA for the opportunity to conduct the study presented.

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Civil Engineering Inspection Integrated with Artificial Intelligence and Fuzzy Logic, destined for Residential Properties Appraisals

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Abstract: The concept of civil engineering inspection encompasses the idea of examining. Therefore, to predict the price of a residential apartment for the first time, the experiment involved inspecting the building and adding computational tools and algorithms to help create association rules based on knowledge of civil engineering converting the conservation coefficient of five levels into linguistic expressions. This method decodes the results of a building inspection combined with factors such as human subjectivity, transforming them into added value for an application in civil construction analysed by fuzzy logic and through the error metrics RSME, MAE, and MAPE. It provides good relationships for predicting property prices. The result is acceptable to Jelgava City by error metrics for evaluation forecasts, with MAPE around 9% to 10%. Therefore, MAPE < 10% is excellent, and MAPE < 20% is good in the context of the forecast ability of our data.

Keywords: Inspection; Artificial Intelligence; Real Estate Appraisal; Information Technologies; Civil Engineering.

Experimental Investigation of Innovative Complex Air Cleaner Efficiency

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Abstract: Low air exchange rates in indoor environments cause a considerable increase in the levels of chemical pollutants in the air. This study aims to conduct experimental research on the efficiency of a complex air cleaner prototype by observing how aerosol particles, as a byproduct of VOC decomposition, are generated at each stage of the device. It contains five oxidation gas-to-particle conversion processes: non-thermal plasma, photolysis, bipolar ionization, electrostatic precipitation, and an ozone destructor, developed by the Department of Environmental Engineering at the Kaunas University of Technology. The method used: application of terpene in the air stream to create an atmosphere with VOCs and ELPI+ Dekati instrument to measure real-time aerosol particle number concentration and size distribution. Overall, the complex air purifier prototype had a particle removal efficiency of approximately 99,7%. In general, the device demonstrated efficiency. Additional experimental studies should be performed while changing different gaseous pollutants and the parameters of the device.

Keywords: Indoor air quality; volatile organic compounds; advanced oxidation processes.

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Human -wildlife conflict at the forest arm interface of Guraferda and Arsi, Negelle District, Ethiopia

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Abstract: Human-wildlife conflict is an interaction between humans and wildlife. Existed since both roamed the same land. The study was carried out in Gurafeda and Arsi Negelle, Ethiopia, from December 2016 to January 2017. A questionnaire survey, focus group discussions, key informant interviews, direct observation, and a review of the literature were used. A total of 247 households (86 in Guraferda and 161 in Arsi Negelle) participated. SPSS was used. 72% in Guraferda and 96% in Arsi Negelle insured the existence of conflict between humans and wildlife, with crop damage and livestock depredation being the main causes. 38% were warthogs (Phacochoerus africanus) in Guraferda, and 32% were porcupines (Hystrix cristata) in Arsi Negelle. 18% of frequently damaged crops were rice in Guraferda, and 5% were corn in Arsi Negelle. Spotted hyenas (Crocuta crocuta) and common jackals (Canes aureus) were responsible for the highest livestock depredation. Significantly different (2 =25.845, df = 3, P =0.001).

Keywords: Attitude, Human wildlife conflict, Forest farm interface.

Acknowledgement: For CIFOR(Center for. International Forestry Research).

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Effect of diurnal solar radiation regime and tree density on Norway spruce sap flow (*Picea abies* [L.] Karst.) in fragmented stands

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Abstract: The continuous threat of ongoing climate changes and related weather anomalies pose a significant challenge to forest ecosystems. The phytosociological structure of forests plays a crucial role in determining their resilience to various biotic and abiotic stressors. Moreover, stand density, which regulates the allocation of resources within individual trees, is a vital aspect for comprehending forest functioning. This study was conducted in Norway spruce forests located in the Czech Republic, where we investigated the influence of tree density on sap flow rates within three predefined directions corresponding to sun position during the morning (5:00-11:10 hours; East), noon (11:10-15:10 hours; South), and evening (15:10-21:10 hours; West) intervals. Tree density was calculated within a 10 m radius buffer around each tree using high spatial resolution aerial imagery acquired by the Unmanned Aerial Vehicle (UAV). We measured the sap flow in 10-minute intervals for 25 selected trees during the nine hottest days of the summer in 2019. We normalized the sap flow measures using the abundance of tree foliage, which was qualitatively evaluated in the field as a reverse estimate of defoliation. Normalized data were used in further statistical analyses. Our findings reveal a strong negative correlation between sap flow and tree density, underscoring the substantial impact of neighboring tree density on tree transpiration. This relationship was most pronounced during midday, followed by the evening and morning hours, suggesting that sparser stands experience more water deficit. The interaction between stand density and incoming solar radiation may constitute a crucial factor allowing forests to endure and adapt to climate change and other stressors, such as bark beetle infestations.

Keywords: solar radiation; sun positioning; azimuth angle; bark beetle outbreaks; transpiration; competition effect.

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How can remote sensing help with the prediction and mapping of toxic elements in the soil environment?

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Abstract: (1) **Background**: The remote sensing capability was investigated to predict and map toxic elements at a mine waste dump; (2) **Methods**: Individual Sentinel-2A and Landsat 8-OLI imagery bands and their fusion product were used as input variables of partial least squares regression (PLSR) prediction models. Fusion of the images was performed using some popular and novel image fusion techniques including Brovey, Gram-Schmidt (GS), hue-saturation-value (HSV), wavelet, principal component analysis (PCA), and area-to-point regression kriging (ATPRK); (3) **Results**: ATPRK produced the best predictions while preserving both spatial and spectral characteristics of Sentinel-2A and Landsat 8-OLI data. Compared to Landsat 8-OLI, higher prediction accuracies were obtained by Sentinel-2A data, for all elements except Arsenic. However, fusion of the images yielded the best prediction performances for all toxic elements. (4) **Conclusion:** Remote sensing can be considered as an efficient tool for the prediction and mapping of toxic elements.

Keywords: Toxic elements; Data fusion; Satellite imagery; Prediction and mapping

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Analysis of EIA Results for Constructions of Road Transport Infrastructure

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Abstract: (1) **Background:** Construction and use of transport infrastructure is one of the human activities that fundamentally affects the quality of the environment. The EIA process is a globally recognised tool used in the planning and permitting of transport constructions to prevent, mitigate, or compensate for negative effects on the environment. However, its effectiveness is often discussed. Post-project analysis is an important part of the EIA to determine the level of effectiveness of the EIA. (2) **Methods:** In this research, 52 EIA process of the highway projects in the Czech Republic have been studied and the principles of EIA post-project analysis have been applied. Using statistical methods, we investigated information on the proposed follow-up monitoring and changes in its design over time. (3) **Results and Conclusion:** Although the research results indicate gradual learning from previous processes and an increase in the design of follow-up monitoring over time, it also confirms the insufficient design of specific follow-up monitoring.

Keywords: Sustainability, Mitigation measures, Decision making process, Impact assessment, Environment, EIA Follow up

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Rural development of Guimaras Island, Philippines: How does climate change threaten local mango-driven development?

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Abstract: Guimaras Island, Philippines, has built its brand around a specific type of mango: *Mango Carabao*, which is integrated in all sectors and is a vital economic contributor to rural development. **Background**: With climate change (e.g., "El Nina"), farmers are having difficulties inducing trees. With first link of the mango production (cultivation) threatened, question arises: How may climate change affect the rural development of Guimaras Island? **Methods**: Data were collected through 15 semi-structured interviews with local farmers, producers, and scientific institutions on the Guimaras Island (02/2023). Thematic analysis was conducted in the Atlas.ti software. Statistical information were gathered through Provincial Office for Agricultural Sciences. **Results**: Local farmers and producers are already witnessing the effects of climate change and are unable to produce mango as they used to. **Conclusions:** Farmers, producers and service providers need to adapt to a different cultivation period of the mangoes and diversify their fruit production.

Keywords: rural development; mango carabao; climate change, Guimaras island, Philippines

Acknowledgement: This research is funded by the Faculty of Regional Development and International Studies. Mendel University in Brno, which supported the IGA-FRRMS-23-019 project, and without their help, the project could not have been realized. Special gratitude to Guimaras State University, Philippines, who prepared perfect conditions for data collection, especially direct contact with interviewed target groups.

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The Potential of Green Ammonia Production from Animal Waste in the EU and Ukraine

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Abstract: Ammonia holds great promise in the context of the transition to carbon-free energy. However, industrial production of ammonia is based on the Haber-Bosch process, which assumes the consumption of natural gas and coal, which in this case does not make it a truly carbon-free solution. This paper proposes an environmentally friendly ammonia production method that does not include the use of fossil fuels. It is based on an approach for regulating ammonium nitrogen concentration in a biogas reactor and consists of the sorption of ammonia from the gas phase by a solution of monoammonium phosphate, obtaining diammonium phosphate, and further heating it with the release of ammonia. In this case, the sorbent regeneration can be carried out using the thermal energy obtained at the cogeneration plant.

Keywords: green ammonia, anaerobic treatment, waste utilisation, optimisation, potential ammonia production.

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Adsorption of methylene blue and malachite green from the binary component system on the biochar derived from solid biogas digestate

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Abstract: In the present work, biochar was prepared from the biogas digestate of the pig farm in central Vietnam. The obtained biochar calcined at different processing temperatures had the characteristics of X-ray diffraction, nitrogen adsorption/desorption isotherms, high-resolution scanning electron microscopy (HR-SEM), mapping – energy dispersive X-ray spectroscopy (mapping-EDX). Results showed that the biochar has a porous structure probably associated with the active pyrolysis of the lignocellulosic fragments and the calcination (or shrinkage) processes that is a promising adsorbent for wastewater treatment. The biochar exhibits excellent adsorption toward methylene blue and malachite from an aqueous solution. The equilibrium data of the binary-component system were analysed via models that combine the three single-component isotherms (Langmuir, Freundlich, and Sips) into the ideal adsorption solution theory (IAST) and the Langmuir and P-factor-Langmuir extended models. In addition, the kinetics and thermal dynamics for simultaneous adsorption of methylene blue and malachite green were also addressed. The finding in this study would provide a new insight into utilizing biochar produced from solid biogas digestate in organic pollutant removal.

Keywords: biochar; biogas digestate; malachite green; methylene blue

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Perception of water pollution and environmental risks in direct administered municipalities of China

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Abstract: Background: This contribution presents preliminary findings of a comprehensive study investigating residents' perceptions of water pollution and associated risks in four direct-administered municipalities in China. **Methods**: Using a robust mixed-method research approach, the study integrates quantitative psychometric questionnaires with qualitative in-depth interviews. **Results**: The research results notably illuminate statistically significant disparities in the perceptions of water and environmental risks between Chinese residents and expatriates residing in the same municipalities. The qualitative analysis provides an understanding of the intricate cultural and social determinants that influence the restricted participation of Chinese residents in environmental conservation initiatives. **Conclusions**: By emphasising the interplay between environmental quality and sustainability, this study strongly advocates a paradigm shift in public attitudes and behaviour. Recognising water pollution as a multifaceted challenge that encompasses natural and social dimensions, this research underscores the crucial role of understanding public perceptions in catalysing meaningful environmental transformations for a more sustainable future.

Keywords: Beijing; China; Chongqing; environmental psychology; psychometric approach; risk perception; Shanghai; Tianjin; water pollution; water sustainability

Acknowledgement: This contribution was supported by the Ministry of Education, Youth and Sports of the Czech Republic within the project IGA_FF_2023_031 "Perception of water quality in direct-administered municipalities of China" of the Palacký University Olomouc.

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Composting: an effective municipal sewage sludge treatment method in aerobic conditions

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Abstract: In this study, nutrient-rich municipal sewage sludge from municipal wastewater treatment plants was treated via composting process to produce valuable compost and achieve the goals of circular economy in which waste products become useful material. The composted feedstock included sewage sludge, wood chips, and straw. Composting was processed in two phases: in an aerated bioreactor (thermophilic temperature) and in a turned windrow (ambient temperature). The two-week-thermophilic phase was sufficient to hygienize the compost (no bacteria of the genus Salmonella and live intestinal parasite eggs were isolated from the samples taken from the bioreactor). During composting, organic matter content decreased rapidly during high-temperature phase; and then decreased slowly. The rate of organic matter removal in turned windrow was around seven times lower than its in aerated bioreactor. The results indicated composting of sewage sludge, wood chips, and straw is an effective method to produce compost with great potential for agricultural purposes.

Keywords: sewage sludge; composting; organic matter removal; aerated bioreactor; turned windrow

FOOD SECURITY CHALLENGES TO COME

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Gender-specific Vulnerability on Climate Change and Food Security Status - A catchment approach on agroforestry systems: a multi-country case study

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Abstract: 1) **Background**: The study assessed gender-specific vulnerability levels of smallholder farmers against climate change and food security, and the specific role of the agroforestry system. 2) **Methods**: The study was conducted in Ethiopia (Zege Catchment) (ZC), Zimbabwe (Upper Save Catchment) (USC), and Burkina Faso (Nakambe Catchment) (NC). The study employed a quantitative approach with a complement of a qualitative approach. 3) **Results**: Households in ZC (58%), in NC (55%), and US (40%) do not cover their household food consumption from crop production. Exposure indicators in ZC (0.758), USC (0.774) and NC (0,944); and sensitivity indicators in ZC (0.849), and NC (0.937) are statistically significant and highly correlated with vulnerability and in the USC, the adaptive capacity (0.746) and exposure (0.774) are statistically significant and highly correlated with vulnerability. The vulnerability levels of the NC are very high (0.75) (0.85 female and 0.65 male participants) as compared to the USC (0.66) (0.69 female and 0.61 male participants) and ZC (0.47) (0.34 female and 0.58 male participants). Female-headed households had a statistically significantly lower vulnerability index compared to male in ZC, while male-headed households had a statistically significantly lower vulnerability index compared to female in USC and NC. The reason is land certification in ZC (80%), higher than US (10%) and NC (8%). 4) **Conclusion**: Agroforestry practises have a substantial benefit in increasing women's adaptive capacity and reducing their vulnerability to climate change and food insecurity.

Keywords: Climate change vulnerability, Agroforestry, Gender, Food security, Sub-Saharan Africa

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Ethnobotanical uses and production constraints of Drumstick tree (*Moringa oleifera* Engl., Moringaceae) in Kilifi County, Kenya

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Abstract: Background: Kilifi is a food insecure county despite being a major moringa growing area in Kenya. Although moringa has the potential to improve food security, its use in the area has remained low. Therefore, our study aimed to evaluate the ethnobotanical uses and constraints of the plant production in the area. **Method**: An ethnobotanical survey was conducted using focus group discussions and face-to-face interviews. Fidelity levels (FL) and Overall Use Value (OUV) were estimated accordingly. A sample T test was used to compare the mean use value of the use categories. **Results**: FL was (2.63% - 92.11%) among the plant parts, and (5.26% - 59.21%) in use categories. The OUV was highest in the Giriama tribe, women and the people aged > 60 years among use categories. **Conclusions**: The low use pattern and OUV indicated that the plant is underutilised, that is why it is necessary to promote its cultivation and uses in the region.

Keywords: Kenya; food insecurity; malnutrition; dry lands; neglected crops

Acknowledgement: I wish to acknowledge the financial support of Internal Grant Agency of the Faculty of Tropical AgriSciences of the Czech University of Life Sciences Prague (project No. IGA FTZ 20233114) and world Agroforestry Centre (CIFOR-ICRAF).

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Application of water extract from honeysuckle leaves and its effect on the quality of fresh chicken meat

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Abstract: In this article, we reflect on potential of natural preservative for fresh chicken and its important significance for fresh chicken processing and comprehensive utilisation of honeysuckle leaves. The methods of pH, colour, thiobarbituric acid reactive substances (TBARS), VBN determination, and textural profile were used. The fresh-keeping effect of honeysuckle leaf water extract (WE-HL) was studied in fresh chickens, pH value, colour, TBARS, VBN, texture profile of fresh chickens containing WE-HL, *butylated hydroxyanisole* (BHA) and butylated hydroxytoluene (BHT), respectively, were determined during 7-day storage at 4°C. The results showed that WE-HL can inhibit the oxidation of protein and fat in fresh chicken and has not significantly changed the colour and texture of fresh chicken during storage ($p > 0.05$). Its ability to inhibit lipid oxidation was higher than that of BHA and BHT. In this article, WE-HL is noted to be a promising fresh chicken preservative.

Keywords: honeysuckle leaves; water extract, chicken meat; quality, antioxidant, texture

Acknowledgement: The authors thank to the funding support of the Project in Henan Province (No. 224200510019 and No. 222102110179).

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Conflict and rurality as determinants of food security: Evidence from the Kurdistan Region of Iraq

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Abstract: Achieving food security globally by 2030 is one of the main Sustainable Development Goals of the United Nations (SDG 2: Zero Hunger). This research was conducted in the Kurdistan Region, Iraq. The main aims of the study are to assess the status of household food security and determine the effect of conflict, rurality and household socio-economic characteristics on food security. The data from 391 respondents was collected using Multistage Sampling. The results show that conflict has a negative effect on household food security. Food security is higher in urban areas. The food-insecure households are characterised by lower income, fewer assets, and limited access to the food market. The findings can extend theories of rurality, conflict and food security; and add value to the existing literature. Conclusively, the main drivers of food insecurity in our study are conflict, rurality, low income, lack of assets, and limited access to the food market.

Keywords: household food security, conflict, urban-rural, socio-economic characteristics.

Acknowledgement: Thanks to the Faculty of Tropical AgriSciences for the "Internal Grant Agency" (IGA). Also, thanks to the main supervisor of the research (Miroslava Bavorová), the co-supervisor from the Kurdistan Region of Iraq (Dara Jamil), and the co-author (Ayat Ulla).

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Perception, purchasing behaviour and determinants of local rice consumption among different income strata of Ghana

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Abstract: Background: Although rice consumption is a strategic food security crop in Ghana, the country is highly dependent on imports, with over 70% of rice being imported. This study investigated perceptions and determinants of local rice consumption in three income strata (high, medium, and low) in Kumasi Metropolis, Ghana. **Methods:** A multistage sampling design was used to interview 414 local rice consumers. Data were analysed using a perception index and ordered probit regression. **Results:** The results show that consumers agree that local rice is nutritious and affordable, but has a poor appearance (3.61). The ordered probit model shows that affordability and nutritional quality are positively and significantly associated with the frequency of consuming local rice at the probability level of 1%. **Conclusions:** The study concludes that stakeholders should be trained to improve and maintain the quality of local rice in terms of taste, nutritional quality and aroma.

Keywords: Consumer behaviour, food security, Ghana, local rice.

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Typification of *Cryptosporidium muris* and *Cryptosporidium andersoni* using MLST analysis

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Abstract:

Background: This study aims to determine the genotypes of *C. muris* and *C. andersoni* isolated from various animal species using MLST subtyping analysis. **Methods**: 21 samples were taken from the faeces of dogs, mice, cattle, and pigs and from the environment. They were isolated at our facility using the DNA-Sorb-B extraction kit. The water samples were filtered using membrane microfilters. Nested PCR using primers targeting the SSU rRNA gene region detected *C. muris* and *C. andersoni*. MLST analysis was performed using the amplification of minisatellite/microsatellite markers at the MS1, MS2, MS3, MS16 loci and the accuracy of the data was confirmed by sequencing. **Results**: Using the MLST analysis, we managed to obtain 12 subtypes of *C. muris* and 5 subtypes of *C. andersoni*. **Conclusions**: Based on the similarity of C. muris and C. andersoni subtypes with cases in other world works, a high risk of transmission of these species can be stated.

Keywords: MLST analysis, *Cryptosporidium muris*, *Cryptosporidium andersoni*, nested PCR

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In vitro biodegradation of zearalenone by the cell-free supernatants of *Lactobacillus* spp. and *Bacillus subtilis*

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Abstract: Mycotoxic contamination of food and feed is a worldwide problem. However, lactobacilli and bacilli strains can be used in the biodegradation strategy; (1) **Background**: Zearalenone degradation via cell-free supernatants (CFS) of probiotics and *Bacillus subtilis* can be a safe method; (2) **Methods**: To evaluate the *in vitro* detoxification effect (%) of CFS *Lb. fermentum 2I3*, *Lb. reuteri L26*, *Lb. plantarum CCM 1904* and *Bacillus subtilis CCM 2794* at various concentrations (100%, 50%, 25% and 12.5%) against zearalenone at concentration 1 ppm was used the ELISA method; (3) **Results**: The best degradation effect was observed with CFS of *Bacillus subtilis CCM 2794* at 100% concentration which degraded zearalenone by 4.4%. Of the lactobacilli, *Lactobacillus fermentum 2I3* was the most effective at 100% concentration and reduced the value of zearalenone by 2.8%; (4) **Conclusions**: The ability of CFS to degrade zearalenone was directly proportional to the concentrations of lactobacilli and *Bacillus subtilis*.

Keywords: degradation; mycotoxins; cell-free supernatants; *Lactobacillus* spp.; *Bacillus subtilis*

Acknowledgement: This work was supported by the scientific grant agency VEGA project no. 1/0402/20 and KEGA project no. 006UVLF-4/2022.

Mimicking the porcine intestine: Establishing an in vivo-like model

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Abstract:
Background: The aim of this study was to establish a model that mimics the intestinal environment by co-culturing porcine intestinal IPEC-J2 cells and porcine monocyte-derived dendritic cells (moDCs) on Transwellâ inserts. Furthermore, our objective was to study the interactions of enterocytes with immune cells in the *lamina propria* during the action of probiotic-derived exopolysaccharides (EPS) obtained from *Limosilactobacillus reuteri* L26 Biocenol™ and the enterotoxigenic bacterial strain *E. coli* (ETEC), depending on their mutual interference. **Methods:** An immature population of porcine moDCs was generated by culturing monocytes in a medium supplemented with the growth factors GM-CSF and IL-4. A macromolecular permeability assay and transepithelial electrical resistance (TEER) measurements confirmed a fully differentiated tight intestinal epithelium of IPEC-J2 cells that represent the apical compartment of this intestinal model. **Results**: The results revealed that IPEC-J2 cells directly treated with EPS and ETEC affected untreated moDCs cultured in the basolateral compartment and altered gene expression for genes encoding IL-6, IL-12, IL-1b, and MCP-1 in immune cells. **Conclusions**: By modulating moDC gene expression, we infer crosstalk between cell cultures through humoral signals and propose the potential for this *in vitro* model as an alternative to animal testing.

Keywords: Co-culture, IPEC-J2, moDCs, qPCR, TEER,

Acknowledgement: This work was supported by VEGA 1/0633/17.

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Intestinal immune response of rainbow trout (*Oncorhynchus mykiss*) supplemented with probiotic-based diet after *Aeromonas salmonicida* infection

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Abstract:

(1) Background: This study investigated the impact of feeding rainbow trout with fish feed containing the encapsulated probiotic strain *Lactobacillus plantarum* R2 Biocenol™ CCM 8674 on their immune response when challenged with *Aeromonas salmonicida.* **(2) Methods**: Two groups were used: one received consistent probiotic feed for 10 weeks, while the other remained untreated. The fish were infected after 7 weeks. Gut samples were collected 1 and 3 weeks post-infection. The study focused on key genes associated with intestinal immune molecules. **(3) Results**: One week post infection fish showed a significant reduction in proinflammatory cytokines (IL-1, IL-8, TNF-α) in the probiotic group, with a trend of down-regulation in other essential inflammatory molecules. The second sampling indicated increased gene expression of CD4 and CD8 molecules, suggesting stimulation of cellular immunity in the probiotic group. **(4) Conclusions**: Therefore, the incorporation of probiotics in fish feed may significantly alter the intestinal immune response and reduce the progression of infection in rainbow trout.

Keywords: probiotic feed, intestinal immune response, aquaculture, qPCR

Acknowledgement: This work was funded by the project ERDF/ESF "Profish" [No. CZ.02.1.01/0.0/0.0/16_019/0000869, Czech Republic] and by the Slovak Research and Development Agency under the contract no. [APVV-19-0234].

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Prevalence of *Malassezia globosa* and *Malassezia restricta* on the healthy human skin

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Abstract: (1) **Background**: The genus *Malassezia* includes 18 lipophilic species that have been isolated from healthy and diseased human and animal skin. *Malassezia* yeasts are associated with skin diseases such as pityriasis versicolor, seborrheic dermatitis, atopic dermatitis, *Malassezia* folliculitis, and increased dandruff formation. (2) **Methods**: Laboratory cultivation methods, PCR and sequencing, were used to evaluate the occurrence of *M. globosa* and *M. restricta* in a group of *Malassezia* yeasts isolated from healthy back skin and scalp hair. (3) **Results**: From a total of 84 samples, *Malassezia* spp. was confirmed in 21 clinical isolates. *M. globosa* was identified in only 2 samples and *M. restricta* was not confirmed in any sample. (4) **Conclusions**: In general, *M. globosa* and *M. restricta* are most often isolated from human skin, although this was not confirmed in the tested group of people.

Keywords: *Malassezia*; occurrence; skin; PCR

Acknowledgement: This work (project) was supported by the Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic and Slovak Academy of Sciences (VEGA grant No. 1/0446/22).

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SARS-CoV-2 inhibiting antibodies were discovered in the sera of one leopard and two rhinoceros during serosurveillance on Dvůr Králové Zoo animals

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Abstract: COVID-19, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), emerged in Wuhan in 2019 and spread rapidly throughout the world. Since the onset of the COVID-19 pandemic, several animal species have been found to be susceptible to infection. Regular serosurveillance conducted in zoos may provide comprehensive insight into the impact of viruses on wild animals, given their proximity to the human population compared to free-ranging wildlife. Therefore, we aimed to carry out serosurveillance on zoo animals by using non-species-specific indirect ELISA. We tested 92 serum samples collected from different animal species kept at Safari Park Dvůr Králové (Czechia, EU). Based on the ELISA results, sera from 26 animals contained antibodies that react with SARS-CoV-2 virions. The ability of these sera to block SARS-CoV-2 replication was further tested using a virus neutralisation assay. SARS-CoV-2 neutralising antibodies were detected in the serum of two white rhinoceroses and one Persian leopard.

Keywords: COVID-19, SARS-CoV-2, serological surveillance, indirect ELISA, virus neutralization test (VNT), wild animals, Zoo health

Acknowledgement: We thank staff in the Dvůr Králové Zoo for animal management, sample collection and processing. We would like to thank their colleagues from the Czech University of Life Sciences Prague and the Veterinary Research Institute, Czechia for their contributions toward this study. This study was supported by the Ministry of Health of the Czech Republic (grant no. NU21-05-00143) and by a grant from the Czech University of Life Sciences Prague (no. IGA 20223108).

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Biotopic distribution of helminths of ungulates in Ukraine

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Abstract: The patterns of distribution of helminths in sheep, goats, cattle and horses on the territory of Ukraine for different types of biotopes remain unexplored. **Methods:** The distribution of helminths was analysed according to the European classification of biotopes EUNIS. **Results:** The level of suitability of biotopes as grazing areas is not the same according to the properties of the soils and the structure of the plant cover. In agricultural animals of the steppe biotopes, forest-steppe zone, and the Polissya zone of Ukraine, helminths of the Nematoda class are mostly common. **Conclusions:** In cattle, small ruminants and horses, members of the Nematoda class dominate, including nematodes of the genus *Haemonchus*, *Nematodirus*, *Strongylus*, *Strongyloides*, *Trichuris*, *Parasacaris*. Among representatives of the Trematoda class, the most common genus is *Dicrocoelium* and *Fasciola*, and the Cestoda class is *Moniezia*.

Keywords: ungulate helminths, biodiversity, biocenotic distribution, geohelminths, biohelminths.

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Ticks, its hosts and pathogens located in urban and peri-urban areas in Slovakia: new hazards for public health.

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Abstract: (1) **Background**: Hard ticks are important vectors of dangerous pathogens occuring worldwide. They are vectors of a wide range of protozoal, bacterial, and viral pathogens, which are significant both to humans and wildlife. In urban habitats, small and medium-sized mammals, birds, companion animals (cats and dogs), and larger animals (deer, roe deer, and wild boars) play a role in maintaining tick populations and as reservoirs of tick-borne pathogens. Abundance of hard ticks in Slovak urban and peri-urban areas was monitored in 4 model cities and its surroundings. For model cities were selected 4 regional cities – Bratislava, Žilina, Nitra and Košice. Due to the location of these cities in the country and the climate region, they represent the prevailing types of geographical zones, from warm and dry to moderately cold and moderately humid areas. (2) **Methods**: Ticks were collected by the flagging method with white cotton flag (1m^2). They are examined by molecular biology methods like Reverse line blot hybridization assay (RLB) for detection of hosts and Polymerase chain reaction (PCR) for pathogen detection. Primers and probes used for RLB were prepared by commercial company.; (3) **Results**: In first year of our research, we examined ticks collected in Košice (totally 754 collected ticks). We identified 3 species: *Ixodes ricinus, Dermacentor reticulatus and Haemaphysalis concinna.* We found 289 males, 283 females and 137 nymphs *I. Ricinus*. More rarely collected ticks we *D. reticulatus*, which we found 24 males and 31 females only. *D. reticulatus* was found for the first time in the central part of the city of Košice. We also found 2 females of *H. concinna*. Our partial results of host detection research bring us first results, that ticks are most often brought to the city by birds and small rodents. (4) **Conclusions**: We found the presence of hard ticks of the species *I. ricinus, D. reticulatus, H. concinna* in center of Slovak cities. These results indicate stable tick population in the city, regardless of the type of area surveyed, there is a high risk of tick bites and consequently, of contracting tick-borne disease.

Keywords: *Ixodes Ricinus, Dermacentor reticulatus, Haemaphysalis concinna*, reverse line blot hybridization assay, molecular methods, Slovakia, Urban areas

Acknowledgement: This work was financially supported by the project VEGA 1/0287/22.

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Evaluation of the reliability of microscopic diagnosis of Nosema spp. by duplex PCR

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Abstract:

Background: *Nosema* spp. is an intracellular parasite causing diarrheal disease in bees, and can result in the collapse of entire colonies to colonies of bees. The microscopic method of diagnosis is most commonly used for rapid detection of this parasite. Our aim was to evaluate the reliability of microscopic diagnosis in microscopically evaluated samples as negative, using the molecular biology method of duplex PCR. **Methods**: The 291 microscopically evaluated negative samples of the crushed abdomens of bees were examined by duplex PCR, using primer pairs for both *Nosema* spp. *Nosema apis* (321 bp amplicon) and *Nosema ceranae* (218 bp amplicon). **Results**: By visualising the samples using ELFO, we found that out of 291 samples microscopically evaluated as negative, 20 samples were evaluated as positive using duplex PCR. **Conclusions**: Duplex PCR compared to traditional microscopy-based methods is a more sensitive method, has a higher specificity and has the advantage of being able to immediately determine the *Nosema* spp. species, which is not possible with microscopic diagnosis.

Keywords: *Nosema* spp., microscopic, duplex PCR, diagnostics, Slovakia

Acknowledgement: This work was supported by grant projects APVV 21-0185 and VEGA 1/0161/23.

Effect of Tau pathology on Mitochondria

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Abstract:

Background: Alzheimer's disease (AD) is a prevalent neurodegenerative disorder, marked by neurofibrillary tangles (NFTs) and beta amyloid plaques in human brain, linked to cognitive decline and memory loss. Mitochondrial dysfunction contributes to AD progression, since mitochondria provide neurones with ATP, regulate calcium balance, and modulate apoptosis. Clinical data indicate mitochondrial malfunctions, energy metabolism deficits, and oxidative damage in AD. However, the direct impact of tau pathology on mitochondria remains unclear, which requires further investigation. This study examines the influence of tau pathology on mitochondria using in vitro and in vivo AD models. **Methods**: In-vitro experiments employed tau FRET biosensor cells expressing P301L mutant tau protein. While, in-vivo experiments used SHR72 transgenic rats with truncated human tau protein, at an early terminal stage. Flow cytometry, confocal microscopy, and western blotting were utilized to analyse mitochondria. **Conclusions**: Tau pathology was confirmed in both vitro and in vivo. The intensity of the mitotracker fluorescence was significantly reduced in tau-infected cells, and confocal imaging revealed disrupted mitochondrial networks. These findings suggest that tau pathology may trigger mitochondrial dysfunction in AD, However, it requires further investigation.

Keywords: Alzheimer' disease (AD); Neurofibrillary tangles (NFTs); Tau pathology; Mitochondrial dysfunction.

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The identification of rumen ciliate combining classical and optimized Cryo-SEM approaches

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Abstract: The rumen is settled with a complex microbial ecosystem where feeds consumed by animals are digested with the help of rumen microorganisms, which play an important role in contributing nutrients to the host animal. The present study aims to determine and investigate protozoal ciliate species in the rumen using modern microscopy and propose a new method of rumen microorganism observation and compare it with the classical microscopic method. For these purposes, fresh ruminal liquor was collected from four cannulated cows housed in individual pens. The animals were fed the high-concentrated basal diet consisting of 65.82 % hay, 48.06 % grass silage, and 16.82 % cereal concentrate enriched with minerals and vitamins. The experimental group consisted of three cows whose diet was enriched with 30 g (3.14 g/kg of DM) of lyophilized microalgae Chlorella Vulgaris. Total daily dry matter intake per feeding was 11.9 kg. Rumen liquor samples were collected three and six hours after the morning feeding via a rumen cannula with a probe connected to a vacuum pump. After the collection, aliquot samples were immediately transported to the laboratory for further analysis. In this article, we included results of observing protozoal ciliates and their ultrastructures obtained with the optimized cryo-scanning electron microscopy method.

Keywords: rumen; ciliated protozoa; electronic microscopy; Cryo-SEM.

Acknowledgment: This study was supported by the Ministry of Agriculture of the Czech Republic, institutional support MZE-RO1223. We also would like to say a special thanks for cooperation in microscopic analysis to company TESCAN GROUP, a.s. and Dominik Pinkas, M.Sc. from the Institute of Molecular Genetics of the Czech Academy of Sciences.

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From waste to feed raw material: utilising freshwater *Cladophora glomerata* macroalgal biomass in rabbit diets for the assurance of their physiological status

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Abstract: (1) **Background**: In the midst of various challenges and growing consumer demands, efforts are underway to develop strategies for improving animal well-being and sustainability by exploring renewable and natural alternatives to conventional feed materials, particularly from water sources. This study aims to evaluate the impact of the biomass of the freshwater macroalga *C. glomerata* on rabbit physiological traits; (2) **Methods**: A 52-122 day feeding trial involved 20 male Californian rabbits fed standard compound diet (SCD) and SCD + 8% *C. glomerata* from Lithuanian River Šventoji (CG8). Subsequently, 12 rabbits (6 per diet) were analysed for organ development, histomorphometry, short-chain fatty acids (SCFA) and ammoniacal nitrogen level in the intestines; (3) **Results**: 8% *C. glomerata* diet induced changes in the digestive system, including a decrease in duodenal *villus* height, an increase in the duodenal *villus to crypt* ratio, and reduced levels of acetic and lactic acid. However, no negative effects were observed on intestinal organ development or NH_3-N levels; and (4) **Conclusions**: Overall, *C. glomerata* holds promise as a sustainable rabbit feed supplement with minimal impact on organ and intestine development, as well as on NH_3-N levels. Furthermore, it could have a minimal effect on digestive processes.

Keywords: macroalgal biomass; rabbits; health status; sustainability; SCFA; histomorphometry

SUSTAINABLE DEVELOPMENT

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Ugly Shade of Manual Scavengers in India: Insides and Recommendation

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Abstract: The inhumane practise of manual scavenging is an assertion since human progress and is still practised in many parts of the world, including India and Nepal. (1) **Background**: Manual scavenging has been a part of Indian society for decades. Despite legislative efforts against this inhuman practise, there is still a good number in various parts of the country. The purpose of this study was to analyse the existing reports in the media or other agencies for its concrete information reason and casualties to address the context and possible recommendation. (2) **Methods**: It is based on the systematic information collected from print media and government briefing. The key observations were complemented by literature reviews and other existing sources of secondary information. (3) **Results**: A qualitative analysis of the examined report reveals that 62,904 people identified from December 2013 to January 2020 still continue to earn a living from this inhumane cleaning practise. Due to which more than 1000 human lives have been lost while performing hazardous manual scavenging of sewers and septic tanks in the past decade. (4) **Conclusions**: It is prohibited under the Prohibition of Employment as Manual Scavengers and Their Rehabilitation Act, 2013 (PEMSR). But the practise remains prevalent in many parts of India and becomes a source of accidents due to unsanitary conditions, toxic gases released, and improper measures at the time of cleaning the pits. Recommendation has been proposed to comply the use of robotic technologies and accordingly support the infrastructure, design and incentive or subsidiary.

Keywords: Manual scavengers, Print media, PEMSR act, Robotic technology

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Agricultural production in the functional urban area of Győr (Hungary)

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Abstract:

The urbanisation process in a given territorial unit (municipality) usually leads to a higher level of development. Our work explores the impact of this transformation on agriculture in the area around the city. Primarily using data and mapping sources (KSH, NeBIH, TeIR, MÁK MePAR, CLC, LandViewer, municipal database), we analyse how land use and agricultural production have changed in the sample area. After the digitisation of the map sources available after the change of the regime (until 1990), the creation of uniform land use categories will make it possible to compare maps from different sources for different years. This will make it possible to identify changes in land use, including the main crops grown. Map analysis will be complemented by data sources (mainly agricultural censuses) and statistical correlation analysis will be carried out to investigate the relationship between land use changes due to urbanisation and the evolution of agricultural production diversity. The questions we are seeking to answer are: In what areas, with what tendency, is there an increase in built-up areas, and what impact does this have on the diversity of agricultural production in the area? The strong urbanisation of suburban areas in relation to the urban centre is also taking place in suburban settlements further and further away and is strongly reflected in the high degree of urbanisation of the inner areas (construction of housing units, economic facilities, infrastructure). The number of small (kitchen) gardens around households and the number of livestock in the inner areas of settlements is decreasing dramatically. The area under intensive arable farming is being reduced, with the cultivation of economic crops in line with international market requirements and trends.

Keywords: agrobiodiversity, agricultural production, agglomeration, land use, Győr, Hungary

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Development of methodology for comparison of manure and biogas plants digestate for fishpond fertilising

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Abstract: Anaerobic digestion of manure and other biological waste to produce biogas is common in many developing countries. The residue of manure digestion, bio-slurry or digestate, can be used as fertiliser for crop production and aquaculture. Manure for fishpond fertilisation has become increasingly important in recent years for small-scale African fish farmers, mainly due to the increasing prices of chemical fertilisers, but digestate from biogas plants is rarely used. The nutrients in bio-slurry and manure primarily promote the growth of algae and plankton that can serve as fish feed. Using bio-slurry as fishpond fertiliser can lead to similar fish production as with commercial fish feeds and thus increase the productivity of the pond and lower the inputs. Unfortunately, there are no studies that compare the efficiency of manure with digestate. Therefore, this work aims to create and test a methodology for comparing the effect of different fertilisers on water quality, plankton growth and composition, fish mortality, fish growth, and overall productivity of the fishpond.

Keywords: digestate as a fertiliser; extensive aquaculture; fishpond fertiliser; plankton; water quality; fish nutrients.

Acknowledgement: I would like to thank projects Integrated Farming III for letting us implement our research on their ponds and Through biogas towards higher community resilience in Western province project for the digestate. Lastly, thanks belong to Hynek Roubík, the leader of the Biogas Research Team, for consultations and continuous support.

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Reflection of ecology and sustainability themes in contemporary radio plays produced by Radio and Television of Slovakia

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Abstract: On the example of two radio plays (Martina Havierová: Laura and Her (Our) World, 22 March 2022; Terra Apathy / Industrial Eco-Oratory, 25 October 2022; Radio Devín) analyses original artistic perspectives on environmental anxiety and society's relationship to the topic of sustainability. On the one hand, we notice the world of committed young people with subtle nuances of their relationship to their own future and the future of the world, and thus the emphasis on psychological moments. On the other hand, we explore the style of docudrama - the story of the village of Horné Opatovce, which faced an ecological catastrophe after the construction of the aluminium plant in Žiar nad Hronom and was liquidated and wiped off the map in 1969 by a resolution of the government of the Czechoslovak Socialist Republic. The emphasis is on the artistic means (both traditional and experimental) by which the creators respond to the collective social fear for the future of the planet and the attempt to understand that they have done so much to destroy it and so little to save it. It notes a trend of increasing authorial interest in issues of sustainability depending on the generational anchoring of the creators.

Keywords: docudrama, digital sound media, ecological catastrophe, environmental anxiety, future, history, imagination, media audience, perceptual psychology, radio play, sustainability.

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Comparative Eco-Footprints of Solar EVs vs. ICE Vehicles in 2023 Central Europe

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Abstract

This extensive review of the literature serves as a preliminary demonstration, a proof of concept, for a forthcoming investigation. In the scope of this initial study, we examine the ecological implications of using internal combustion engines (ICE) and electric vehicles (EV) in the context of 2023 Central Europe. Our selected vehicles, representative of widely popular choices, are evaluated alongside a commonplace solar panel system, which contributes to our holistic assessment. Although this review offers insight into the ecological rationality of adopting an ICE or an electric vehicle, it serves as a precursor to a more comprehensive analysis. We meticulously explore the complete life cycle of each transportation option, unraveling the intricate relationships between manufacturing, energy use, and environmental impact. Crucially, this study underscores the significance of renewable energy sources, exemplified by the solar panel system, in steering the sustainability of electric vehicles. The insights gained from this research will contribute substantively to the ongoing discourse on sustainable transportation choices, guiding environmentally conscious decision making in the automotive sector.

Keywords: Co_2 footprint; EV,vs. ICE, solar roof, solar energy

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Influence of Chitosan and Glycerol-Sorbitol Concentrations on Physical Properties of Palm Oil Empty Fruit Bunches-Based Bioplastics

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Abstract: (1) **Background**: The utilization of palm oil empty fruit bunches (POEFBs) as bioplastic is feasible due to their substantial cellulose content. This study aimed to investigate the effects of chitosan as a polymer filler and glycerol-sorbitol as a plasticiser on the physical properties of bioplastics; (2) **Methods**: The concentrations subjected to analysis included chitosan at levels of 10%, 20%, and 30% w/v. In relation to the ratios of glycerol-sorbitol concentrations, the compositions investigated included 25:75%, 50:50%, and 75:25% v/v. Casting and evaporation were utilised to produce bioplastics from OPEFBs; (3) **Results**: The findings indicated that the thickness of the samples varied between 0.44 and 1.77 mm. The tensile strength ranged from 0.20 to 1.50 N/cm^2, while the elongation at break spanned from 1.43 to 64.29%. In terms of water resistance, the test results ranged from 2.61% to 6.97%; (4) **Conclusions**: In terms of thickness, tensile strength, elongation in break, and water resistance tests, filler concentrations affected bioplastic development.

Keywords: bioplastics; chitosan; glycerol-sorbitol, physical properties, POEFBs

Acknowledgement: The study was financially supported by Institute for Research and Community Services (LPPM) of Institut Teknologi Del. Ellyas Alga Nainggolan expresses gratitude to Dr. Merry Meryam Martgrita for the opportunity to participate in the internship program.

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UKRAINE - CURRENT CHALLENGES AND OPPORTUNITIES

Sustainable solution of soil remediation for Ukraine's postwar reconstruction under bioenergy production

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Abstract: (1) **Background**: In Ukraine, the area of affected land is growing due to anthropogenic factors, which today have a different genesis: land contamination with heavy metals and other chemicals from local enterprises; shell explosions, leaks of pollutants, and hazardous substances from damaged containers and waste due to the destruction of facilities, etc. Soil remediation after wartime is an important issue. (2) **Methods**: Biochemical analysis of biochar properties using bioinformatic databases. (3) **Results**: The production cycle and requirements for evaluating and standardising biochar products were analysed. The most useful property of biochar for soil remediation is its ability to adsorb in its pores heavy metals, mineral compounds and plant nutrients. This is possible due to the large area of the active cell surface, the pores in the structure and the high cationic capacity for numerous functional groups. (4) **Conclusions**: The production and use of biochar provide a sustainable approach to reducing greenhouse gas emissions, reducing fossil fuel consumption, and regenerating affected land.

Keywords: biochar, soil remediation, bioenergy production

Acknowledgement: The author (Y.Ch.) expresses gratitude to the European Fund for Displaced Scientists - ALLEA for the opportunity to conduct the study presented.

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Metataxonometric studies of phosphogypsum as a substrate for bioprocesses: a review

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Abstract: (1) **Background**: This study reviewed metataxonometric studies of phosphogypsum of different genesis under bioprocesses. As we know, phosphogypsum can have toxic impurities such as heavy metals. There is a gap in the knowledge about the taxonomic tree of Ukrainian phosphogypsum that requires further analysis. (2) **Methods**: bibliometric analysis in the field of taxonometric approach to the study of different ecological and trophic groups of microorganisms adapted to such a substrate as phosphogypsum. Analysis of metabolic pathways of certain groups of microorganisms involved in the conversion of phosphogypsum using bioinformatic databases, namely the KEGG database and EAWAG-BBD. (3) **Results: in** terms of species dominance, such classes predominate: *Gammaproteobacteria, Alphaproteobacteria, Deltaproteobacteria,* and *Epsilonproteobacteria. Actinobacteria* are the second most common phylum in phosphogypsum from different regions of the world, and are associated with low pH values and the elemental composition of impurities such as Fe, Cu, Zn, etc. The growth of sulfat-reducing, sulphur-oxidising bacteria, and *Escherichia coli* cultures in nutrient medium with the addition of Ukrainian phosphogypsum was confirmed in our previous studies. (4) **Conclusions**: Ukrainian phosphogypsum from the Sumy region has significant potential for use in bioprocesses to obtain useful products as a mineral additive to stimulate the growth of microorganisms. It is necessary to note the need for more in-depth analysis and bioinformatic modelling of various conversions of phosphogypsum, which will expand the field of its application.

Keywords: phosphogypsum, metataxonomic study, bioinformatic databases, bibliometric analysis

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Methodology for Detecting Depressive States in Adolescents During Wartime

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Abstract: (1) **Background**: Adolescents in wartime environments can directly witness or experience traumatic events such as violence, loss of loved ones, displacement, or destruction. (2) **Methods**: A linguistic model of the concept of DEATH can help to recognise and minimise depressive states. We utilise a DEATH thesaurus to create indirect questions that revolve around linguistic structures associated with death. It allows us to avoid directly using potentially triggering language in the questions, instead opting for gentler descriptions. The answers should reveal how much adolescents are prone to sombre thoughts by having markers which can be found in a DEATH thesaurus. (3) **Results**: By applying the practical aspects of the linguistic methodology, we can develop and implement a strategy to detect and prevent depressive states in young people without engaging in explicit discussions about death. (4) **Conclusions**: The methodology is sure to recognise and support the depressive states of adolescents during wartime.

Keywords: linguistic model; concept of DEATH; depressive states; wartime

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Analysis of the consequences of the impact of military actions on environmental components

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Abstract: All types of military-technogenic load cause severe pollution and destruction of all components of the environment, destruction of buildings, disturbance of the soil cover, atmospheric air pollution, cluttering of the surface, pollution of surface and underground water, killing of people and animals, destruction of biodiversity, generation of a large amount of waste. The focus of this study is to determine the impact of military actions and their consequences on waste generation and management. Currently, the research has just begun, research problems have been defined, and main tasks have been defined: 1. Determination of the consequences of military actions on the environment. 2. To assess/measure the formation and characteristics/composition of waste. 3. Identify the factors of influence and model the further possible state of waste generation. The negative impact of military actions has irreversible consequences for the environment and society not only in Ukraine but is already taking on global proportions. Therefore, it is necessary to prepare and carry out comprehensive measures for cleaning and restoring the environment.

Keywords: Russian-Ukrainian war, technogenic load, pollution, atmospheric air, water bodies, waste.

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EU practices for sustainable economy implementation

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Abstract: This research explores the entrepreneurial ecosystem of the entrepreneurial ecosystem of Ukraine's regional tourism industry, focusing on the border areas neighboring Hungary, Slovakia, Poland and Romania, and its potential application for sustainable tourism in the postwar context. **Background:** This research explores the entrepreneurial ecosystem in Ukraine's regional tourism industry, focusing on border areas neighboring Hungary, Slovakia, Poland, and Romania, investigating the potential application of Poland's EU integration process to support sustainable tourism. **Methods:** A mixed methods approach examines the development of the entrepreneurship ecosystem through qualitative and quantitative analysis, drawing insights from tourism research, border zones, and EU integration. **Results:** The study identifies opportunities and strategies to promote tourism in postwar contexts, using Ukraine's natural and cultural heritage, particularly in tri-border territories. **Conclusions:** Valuable insights for regional development and actionable information for policymakers, practitioners, and stakeholders contribute to enhancing Ukraine's tourism industry sustainably.

Keywords: Entrepreneurial Ecosystem, Regional Tourism Industry, Post-War Development, Sustainable Tourism, EU Integration, Border Zones, Tri-Border Territories, Schengen Zone, Regional Development, Policy Formulation.

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Treatment of contaminated water during the operation of (Zaporizhzhia) nuclear power plants by ion exchange

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Abstract: Water is an important resource for both human life and the functioning of economically sound social life systems. Therefore, maintaining the proper state of water in accordance with regulatory quality standards for drinking and technical consumption is of great importance today. The purpose of the study is to investigate the processes of purification of contaminated water from the activities of nuclear power plants in Ukraine using the method of ion exchange. In this work, the following sources are analysed and compared: reports, scientific articles, patents, which consider the researched issue. The expediency of existing methods to apply the ion exchange method is determined in the process of water purification contaminated by activities of nuclear power plants. Ways to improve the water purification process by using and modernising the studied process are proposed. The potential use of the ion exchange process in the treatment of water contaminated with radioactive substances, taking into account the non-standard operation of Zaporizhzhia Nuclear Power Plant, and its modernisation are of great importance today. The best way is to use an ion exchange resin-based system, which, under certain and specific conditions, can remove up to 80-90% of radionuclides from water.

Keywords: ion exchange, water purification, radionuclides, cationite, anionite.

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Ukraine as a food supplier and guarantor of food security: pre-war and wartime realities

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Abstract: (1) **Background**: Sustainable food systems ensure food needs of a growing world population. But they are subject to many risks, including the danger of war. The purpose of the study is to describe the role of Ukraine as a supplier in the global food market; analyse the damage to Ukrainian agriculture due to the ongoing military aggression of Russia. (2) **Methods**: Analysis of time series, structure and structural shifts was applied. (3) **Results**: As Ukraine is a net exporter of agricultural products on the international market, the russian invasion caused a number of price, logistical, and humanitarian risks and threatened food security at national, regional, and global levels. The Grain Corridor mitigates these risks, but its functioning is again jeopardised. (4) **Conclusions**: Despite the colossal damage to the agricultural sector, Ukraine remains committed to its role as a reliable partner for countries dependent on its supplies and uses every opportunity to export food commodities.

Keywords: agricultural sector; food security; sustainable food system; Russian-Ukrainian war; Black Sea Grain Initiative; Grain Corridor.

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Ways of optimising state regulation of the agricultural sector in war conditions

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Abstract: Background: Ukraine is a leading supplier of grain, oilseeds and other agricultural products. The Russian aggression, which began in 2014, altered the way of operating in various economic branches. Large areas occupied by Russian invaders, contaminated with explosive hazards, and much agricultural soil are not available for production as the full-scale invasion began in February 2022. **Methods**: The methods of policy analysis, statistical analysis, causal inference, and hypothesis formulation are used to analyse the problems of the agricultural sector and possible ways to improve state regulations. **Results**: The results show a strong connection between war and a decline in production. These findings let us formulate a statement about the ineffectiveness of standard regulations and financing schemes. **Conclusions**: Considering our findings, it is necessary to emphasise the necessity of rearranging the state budget and funding programmes of the agricultural sector to prepare and clear liberated areas.

Keywords: Ukraine, war, state regulation, agriculture.

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Ukrainian village through the prism of modernity (on the example of Kharkiv region)

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Abstract: Today, the main problem of the Ukrainian village is that it does not fit into the format of the current world system in its old form. These changes began during the period of COVID-19, and the war radically changed the village. **Background:** The purpose of the study is to try to summarise the results of the author's long-term observations regarding the evolutionary development of the Ukrainian village based on spontaneous self-organisation. **Methods:** The author's field studies of dozens of villages in the Kharkiv region of Ukraine, analysis of scientific publications in the field of urban planning and social transformations of rural settlements. **Results and Conclusions:** Despite the fact that in recent decades the Ukrainian village was considered a complete ruin, today, in these difficult times, it is it (as at one time in the 1920s) that not only feeds society, but also supports heavy industry, saves the Ukrainian economy from bankruptcy, actively helps military. This national element created something that would unite and merge into a single unit the Ukrainian national soul and the rational element of "Ukrainianism". At the moment, this is not a very numerous group of Ukrainians, however it is a very active one, which also creates high modern culture.

Keywords: Ukrainian village;village functions; peasantry; history; memory

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Assessment of Ammonia Production Potential from Animal Waste in Ukraine: A Promising Approach for Sustainable Resource Management

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Abstract: This scientific paper presents a proposed method to produce ammonia from nitrogen-rich animal waste, such as poultry manure, pig manure, cattle manure, and others. The method's application was demonstrated on a poultry farm with 750 thousand laying hens, yielding 132 tons of ammonia annually. The study assesses the national potential for ammonia production by considering livestock data and the maximum ammonia output per animal. The analysis focusses on industrial livestock, excluding household animals, to facilitate efficient waste collection through mechanisation and automation. The annual potential of ammonia production in Ukraine's main animal husbandry branches is estimated at 263,610 tons, comparable to the country's traditional ammonia production in 2019 (183,000 tons). The regions with the most promising ammonia production are identified as Vinitskaya, Cherkasy, and Kyiv. These findings highlight the potential for sustainable ammonia production and underscore the importance of efficient resource management in the agricultural sector.

Keywords: green ammonia, anaerobic treatment, waste utilization, optimization, potential of ammonia production.

Overview of sunflower cultivation areas in Ukraine in the period from 2021 to 2023

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Background: Despite the decrease in the total cultivated area due to the war in Ukraine, significant changes have occurred in the structure of crop cultivation. This study aimed to investigate the changes in the land area for the cultivation of oilseeds. **Methods**: data are obtained on the basis of analytical and statistical analysis, oral survey. **Results**: Changes in the structure of the cultivated area are explained by the increase in the cost of cultivation technology, logistics chains, and a sharp decrease in the marginality of growing grain crops**. Conclusions:** There was a significant increase in oil crops in the structure of cultivation, in particular, sunflowers. The main factors of this process were: a) the lower cost of cultivation technology due to the presence of processing within Ukraine; b) the problems with the sale of sunflowers were much smaller than, for example, corn; c) the preservation of almost guaranteed marginality.

Keywords: sunflower, oilseed crops, agricultural land, war in Ukraine.

WASTE TO ENERGY OPPORTUNITIES AND CHALLENGES

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Modelling scenarios of agricultural production development on the basis of sustainable development with the use of biogas technologies

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Abstract: *(1) Background:* Today, the topic of low-carbon agricultural production that involves waste recycling and the production of green energy for organic farming systems is becoming increasingly relevant. Consequently, the purpose of this article is to evaluate scenarios for the development of an agricultural company that uses biogas technologies. *(2) Methods*: The results of long-term field research, statistical methods of data processing, and simulation modelling were used to implement scenarios for the development of the Kolos 2000 agricultural enterprise (Kharkiv region, Ukraine) using the Agroecosystem software package. *(3) Results:* The scenario of creating an infrastructure that ensures the production of 500 tons of hard cheese with 50% fat content, 400 tons of cream or sour cream with 15% fat content, 90 tons of veal and beef, biogas with heat energy and organic fertilisers (vermicompost) remaining after anaerobic digestion in a biogas plant is modelled. The potential for bioenergy generation in terms of methane gas is 1.5 million m^3 or 740 m^3/ha. In terms of manure litter with a moisture content of 75%, the annual accumulation of organic fertilisers will be 27,000 or 13.2 tons per hectare. They will return 82% nitrogen, 94% phosphorus and 99% potassium from the crop to the soil. *(4) Conclusions:* The most optimal scenarios for the development of the agricultural sector with the use of biogas plants were identified. Further areas of cooperation between higher education and science organisations in Ukraine (Institute of Water Problems and Reclamation NAAS, State Biotechnological University, Sumy State University) and the Czech Republic (Biogas Research Team, Czech University of Life Sciences in Prague) will focus on conducting bioindication studies on the use of digestate-based fertilisers for agricultural crops and the replacement of traditional energy sources with biogas.

Keywords: agricultural enterprise, sustainability scenarios, biogas, organic fertiliser

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The effect of biochar on the quality of miscanthus biomass as a biofeedstock

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Abstract: Background: There is an obvious lack of data on the thermal characteristics of plant biomass grown on substrates with the addition of biochar. **Methods**: The pot experiment was carried out. Miscanthus was grown in the vegetation containers with two types of Technosols taken in the Western Donbass coal mining region. Treatments included control and nutshell biochar (3% by weight). **Results**: Biochar indirectly affects the thermal characteristics of Miscanthus biomass. Different soils have their own distinct physical and chemical properties depending on the nature of the mineral and organic components. In turn, soil characteristics affect the thermal behaviour of plant biomass. The addition of biochar led to a decrease in the thermal stability of the biomass in the initial stage of destruction (by 14.4-22.6%) and an increase in the stage of decomposition of the main components (by 4.5-6.3%). **Conclusions**: The addition of biochar has an impact on the growth, development, and quality of the biomass.

Keywords: Technosols; miscanthus; biomass; thermolysis.

Acknowledgement: This study was supported by the Ministry of Education and Sciences of Ukraine.

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Towards harmonization of biogas technology: a systematic review of key parameters to identify research extent and standardization.

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Abstract:

Biogas technology through anaerobic digestion is an important renewable energy technology that has the potential to reduce greenhouse gas emissions and contribute to the development of a sustainable energy system. However, research on anaerobic digestion is extensive and fragmented, making it difficult to gain a comprehensive understanding of the technology. This systematic review, following the PRISMA protocol guidelines, aims to provide a comprehensive overview of the anaerobic digestion through the analysis of key parameters that require planning and are crucial for the process to function effectively. This study involved 4,745 articles over 5 anaerobic digestion steps: pre-treatment, reactor design, temperature, H2S cleaning, and biogas upgrading. This review did not aim to analyse the benefits and drawbacks of each method, but rather provides the necessary information for future standardization. The findings contribute to a better understanding of anaerobic digestion technology and serve as a valuable resource for new researchers entering the field. This review also highlights the urgent need for harmonization to facilitate knowledge transfer, avoid redundancy, and uncover potential breakthroughs. Improved harmonization can also support automation of research findings, enabling faster result comparison and alleviating the burden of lengthy review processes.

Keywords: biogas technology; anaerobic digestion; systematic review; pretreatment; reactor design; temperature; desulfurization; biogas upgrading; PRISMA protocol

Acknowledgement: This research received financial support by the Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, grant number IGA (20233111).

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Contribution of biogas technology to Global South nations attainment of sustainable development and circular economy: a bibliometric analysis

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Abstract:

Background: Biogas is an environmentally friendly organic waste management technology that produces clean and renewable energy and organic fertilisers. **Methods**: The study uses RStudio-Biblioshiny to analyse 94 refined research articles from 2179 initial search results using the PRISMA 2020 diagram. It covers January 1988 to April 2023 of Web of Science and Scopus databases. **Results**: The result showed that the three prominent themes in both relevance and degree of development over time are biomass energy, Ethiopia, and bio-digester; while the insignificant themes were waste to energy followed by biogas technology, developing countries and organic waste. Sustainability as a theme has grown in relevance over time, while its degree of development remains low. With an exception to this, the circular economy did not appear as a theme in the reviewed articles. **Conclusions**: To fill this gap, future studies need to address these frameworks with the appropriate methodological approach in the global South context.

Keywords: Anaerobic digestion; bioenergy; Sustainability; Circular Bioeconomy; developing nations.

Acknowledgments: This work was supported by Internal Grant Agency of the Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague [IGA 20233111].

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Farmers' knowledge and use of bioslurry for soil health: A case of the Kenya highlands

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Abstract:
Background: Biogas technology is an important technology that promotes organic waste management while providing energy and soil amendments. Despite increased adoption of the technology within Kenyan highlands, soil health decline remains a productivity challenge. **Methods**: A survey was conducted in Nyeri (N=114) and Nyandarua (N=114) Counties to assess factors influencing farmers' decisions on use of bioslurry for soil health management using structured questionnaires. **Results**: The study revealed that farmers who knew their soil type and had analyzed their soils were 24% and 10% respectively in Nyeri and 16% and 8% respectively in Nyandarua. Only 3.7% (Nyeri) and 1.8% (Nyandarua) utilized sole bioslurry for crop production. Majority applied bioslurry in fodder. Transportation, bulkiness and dearth application recommendations were indicated by 96%(Nyeri) and 92% (Nyandarua) as major bioslurry use challenges. Significant ($P \leq 0.05$) positive correlation was noted between education, soil management and training programs. **Conclusions**: Bioslurry recommendations and soil health trainings are important in the area.

Keywords: Keywords: Soil health, Bioslurry, Kenya highlands, Kenya highlands, Biogas technology.

Acknowledgement: Authors would like to show gratitude to the Government of Kenya for funding this research through The Kenya Climate Smart Agriculture Project (KCSAP). The organizers of the 4th Multidisciplinary Conference for Your Researchers (MCYR) are also appreciated for the forum to share this research finding. First author also appreciates One Plant Fellowship Programme (OPFP).

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Comparative Evaluation of the Different Inoculation Techniques for Effective Food Waste Composting

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Abstract: The main objective of the study is to propose an optimal inoculation strategy to support the food waste composting process. The effects of a *Lactobacillus salivarius* inoculum on food waste composting have been studied by the following parameters (temperature, pH, conductivity, and humidity) and biologically related tests (pathogenic bacterial strains test). The unexpected result of the model test was the excessive amount of moisture (80%) in the case of injection of liquid inoculum. The liquid nature of the food waste was enhanced by the external addition of the broth (reduced conductivity, stagnant temperature), causing the transition to a temporary anaerobic condition and reflected in a lower pH reaching acidic contact. When comparing the use of a bulk inoculum, an increase in pH, conductivity, and decrease in moisture content to an acceptable level are all positive trends that have been detected. Freeze-dry bacterial inoculation could be considered a promising strategy to enhance the food waste composting process.

Keywords: composting, food waste, inoculation

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Sustainable Approach to Reduce Negative Impact of Emission from Open-Burning Crop Residue on the Environment

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Abstract: The open burning system is the fastest and common method in South Asia, including Indonesia, to remove the previous crop residue to prepare the field for the next crop plantation. However, this activity contributes to the release of emission from the incineration processes. Straw is the primary residue of crops that contribute substantially to air pollution due to its open combustion system. This study focused on the main crops that is paddy and maize that are mainly produced in West Nusa Tenggara (WNT). The aim of this research is to identify sustainable approaches to consider mitigation of the negative impact of burning residues that release greenhouse gas emission (GHGs) into the environment. After the harvest process and the post-harvesting process, paddy and maize will produce a abundance of straws, husks (rice), and cobs (corn). Although farmers also use residue for animal feeders, there is still abundant residue that intends to be burnt. An alternative option to the burning method considered converting crop residue into more valuable product in a sustainable way. Utilising agricultural residues such as for energy resources, fertiliser, animal feed, and plant medium (mushroom breeding) willof reduce the pollution to the environment. Furthermore, the approach method of replacing open burning system brings benefit not only in environmental sphere, but also in economic and social sphere, especially for farmer life quality.

Keywords: Sustainable; Emission; Open-Burning; Residue; Environment.

Acknowledgement: This research was funded by the Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, grant number IGA (20233111).

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Conversion of Biogas CO_2 into Environmentally Friendly Motor Fuels

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Abstract: Biogas is a renewable energy source produced from organic waste such as animal waste, plant waste, food waste, etc. Biogas consists of 55 – 75% of methane, 25 – 45% of carbon dioxide and a small amount of hydrogen and hydrogen sulphide. CO_2 is one of the unwanted compounds. It is also greenhouse gas. Due to making biogas usable, CO_2 must be removed. Today, many technologies that allow the withdraw and accumulation of CO_2 are known. A huge number of methods and technologies are given in scientific papers for the transformation of CO_2 into organic compounds. The conversion of CO_2 to methanol to obtain environmentally friendly liquid motor fuels is promising. First, methanol should be converted into diethyl ether and then into light olefins C_{5+} and further into paraffins, naphthenes, and arenes, which are crude gasoline. CO_2 can also be transformed into olefins, which in turn are polymerised to cycloparaffins and arenes. Therefore, the conversion of CO_2 into motor fuels is an important scientific and practical problem.

Keywords: carbon dioxide; motor fuels; methanol; gasoline.

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The optimal mixing ratio of cow manure with food waste using a laboratory UASB reactor

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Abstract: The up-flow Anaerobic Sludge Blanket Reactor (UASB) is recognised as an important technology for the treatment of organic material among anaerobic treatment methods, whether it is animal dung or agricultural waste, wastewater or solid waste. Furthermore, given that the main amount of bioenergy in Syria is estimated at approximately 379 million tons annually, we operated a laboratory UASB reactor with a diameter of 19 cm and a height of 115 cm. The proportions of mixing cow manure with food waste were 20, 30 and 40% at a temperature of 35% for a period of 35 days. Furthermore, the value of pH was estimated at 6.4 at the 20% rate of cow manure, pH = 6.9 at the 40% rate, and pH = 2.7 at the 60% rate. The temperature was controlled at 31°c, so the amount of gas was equal to 7.4, 7.1, and 6.6, respectively. So far, we have found slight changes for gas by changing the mixing ratios, and we continue to conduct experiments

Keywords: UASB, Biogas, animal dung, anaerobic treatment method, solid organic waste,

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Organisational mechanism for providing social support for projects on the use of biogas

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Abstract: (1) **Background**: Today, the environmental and social impacts of biogas production seem to be extremely significant. This is especially relevant in the financially unstable crisis period, in which there is inevitably a shortage of funds for the realisation of socially important projects. The aim will be a detailed study of the main forms and instruments of social support for biogas projects with detailed analysis of social and behavioural factors. (2) **Methods**: A scientometric analysis was performed using the Web of Science and Scopus databases. General scientific methods and techniques were used: logical and qualitative analysis and synthesis; system-structural analysis; comparative analysis. (3) **Results**: A common organisational scheme for the integration of social support for the implementation of biogas technologies on site was established, which is expected to become important in the implementation of such projects in the post-war period for the reconstruction of Ukraine. (4) **Conclusions**: The factors of social support for biogas projects have been outlined, which will allow the realisation of socially significant projects effectively in the future, as well as promotion of business development, creating the necessary conditions for cooperation.

Keywords: sustainable development; crowdsourcing; crowdfunding; social support; biogas technology

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Comparison of conventional anaerobic digestion methods and the UASB reactor

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Abstract:

Anaerobic digestion techniques have developed because they have proven their efficiency when digesting waste with a high organic content. The aim of this study is to compare the traditional methods of digestion of organic waste with the UASB reactor. Therefore, we compared the design and features of the digesters in terms of shape, advantages, and defects. The comparison supports a UASB reactor with ease of design, easy construction and maintenance, small footprint, low construction and operation cost, low excess sludge production, and the generation of energy in the form of biogas. The important parameters during its operation are the temperature, agitation, the ratio of carbon to nitrogen, the pH, the ratio of diameter to height, the concentration of toxic substances, and the time of hydraulic survival. Therefore, it is recommended to apply and develop this technology and conduct experimental studies to increase the production of biogas.

Keywords: UASB, Biogas, Organic waste, Biomass, high-rate anaerobic digestion, energy recovery

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Composting: An Effective Municipal Sewage Sludge Treatment Method in Aerobic Conditions

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Abstract: In this study, nutrient rich municipal wastewater sludge from municipal wastewater treatment plants was treated using the composting process to produce valuable compost and achieve the circular economy goals in which waste products become useful materials. The composted feedstock included sewage sludge, wood chips, and straw. Composting was processed in two phases: in an aerated bioreactor (thermophilic temperature) and in a turned windrow (ambient temperature). The two-week thermophilic phase was sufficient to hygienise the compost (no bacteria of the genus Salmonella and live intestinal parasite eggs were isolated from the samples taken from the bioreactor). During composting, the organic matter content decreased rapidly during high-temperature phase; and then decreased slowly. The rate of organic matter removal in the turned windrow was about seven times lower than in the aerated bioreactor. The results indicated that composting of sewage sludge, wood chips, and straw is an effective method to produce compost with great potential for agricultural purposes.

Keywords: sewage sludge; composting; organic matter removal; aerated bioreactor; turned windrow

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The field of biogas in Ukraine: realities and prospects

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Abstract: This study examines the relevance and prospects for the development of the biogas industry in Ukraine in the context of increasing the use of renewable energy sources. The study uses a survey of the available literature and an analysis of strategies that can advance the biogas sector. According to research results, Ukraine has less biogas plants than other European countries. The poster lists biogas producing companies that generate large amounts of organic waste and help Ukraine become more energy independent. Biogas has the ability to ensure energy independence, reduce negative environmental effects, and foster economic growth. The growth of this renewable energy source can benefit from state assistance in the infrastructural, export, and innovation sectors. The work emphasises the importance of biogas development to achieve Ukraine's strategic goals for sustainable development. The proposed recommendations will contribute to the further development and successful functioning of this area.

Keywords: biogas, biogas industry, energy independence, renewable energy sources.

Technological Readiness and User Acceptance of Koko Bioethanol Cookstoves in Nairobi City County, Kenya

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Abstract: Cleaner and more sustainable cooking methods have drawn a lot of attention in many developing countries as a result of growing concerns about the harmful effects of traditional cooking methods on health and the environment. In Kenya, the introduction of Koko bioethanol cooking fuel into the downstream fuel industry presents a possible substitute for the widespread use of dirty and unclean fuels, such as charcoal and kerosene, in many households. The study examined the technological readiness of Koko cookstoves, evaluating its design, safety, and affordability features. Furthermore, the study investigates consumer acceptance, focussing on end-user opinions, attitudes, and experiences with the Koko bioethanol cookstove. A qualitative research approach was used through targeted interviews with households that have adopted this alternative technology in Nairobi City County. The study's findings suggest that Koko bioethanol cooking solutions are typically compatible with everyday conventional cooking methods, are easy to use, require little maintenance, and are affordable and environmentally friendly.

Keywords: Bio-ethanol stove, clean cooking, renewable energy, low emissions, energy access

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Financial and legislative aspects of biogas development in Poland and Ukraine

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Abstract: (1) EBA experts predict rapid growth of the biogas sector in the near future in all EU countries. However, the development of the biogas market is impossible without legislative and financial support from governments. (2) The analysis of financial and legal aspects of the development of the biogas market in Poland and Ukraine was carried out using statistical and graphical methods, as well as retrospective data analysis. (3) In Poland, the initial incentive for biogas investments ("green" tariff and strict environmental policy) has been replaced by other incentives (tax benefits, energy subsidies). The government of Ukraine, despite the objective problems, is actively working to activate the bio-industry in Ukraine by making changes in the legislation and reforming the energy sector. (4) In the medium and long term, biogas development will bring benefits such as macroeconomic stabilisation, reduced energy consumption, and reduced dependence on energy imports for both countries.

Keywords: sustainability; waste management; energy crisis.

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Utilisation of lignocellulosic biomass from tomato production for energy purposes

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Abstract: *(1) Background:* Lignocellulosic biomass (tomato shoots, stems, and leaves) is a relevant sustainable feedstock for methane digestion, but requires pretreatment. This is the effect of significant amounts of cellulose and hemicellulose surrounded by lignin, which is not digested by anaerobic microorganisms. The aim of the study was to develop an innovative technology to improve the biodegradation of lignocellulosic biomass from tomato production under methane digestion. *(2) Methods*: Thermomechanical pretreatment was performed in a single-screw extruder. *(3) Results:* The methane digestion process of extruded and unextruded biomass was carried out with daily measurements of the biogas yield and composition. An energy balance of the extrusion and methane fermentation process was also made. The efficiency of pretreatment with optimisation of its parameters was evaluated. The main factors that influence the pretreatment of the lignin-cellulosic biomass were determined. *(4) Conclusions:* The realisation of the proposed technological solution in the future will be cooperation with large greenhouse farms, which will allow implementation in practise.

Keywords: lignocellulosic biomass, biogas production, pretreatment

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The resilient nature of yacon: Opportunities for its biomass for potential energy production, a systematic review

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Abstract: (1) **Background**: Interest in alternative crops for biomass production is growing due to the need for renewable energy sources. Yacon (Smallanthus sonchifolius), a perennial tuberous crop from the Andes, is resistant to abiotic stress and has potential as an energy source; (2) **Methods**: This review assesses the suitability of yacon for biomass production for energy. A systematic search yielded 43 studies showing the potential of yacon to produce energy from its biomass; (3) **Results**: Studies revealed that yacon biomass has a high energy production potential producing various valuable gases. Furthermore, yacon tubers were high in carbohydrates, which turned into bioethanol and biogas. Similarly, residual biomass from yacon cultivation, such as leaves and stems, used for anaerobic digestion, produced bioenergy significantly. (4) **Conclusions**: More research is needed to optimise biomass conversion and energy production efficiency using yacon biomass, which will produce sustainable bioenergy systems that reduce emissions and eventually mitigate climate change.

Keywords: Biomass; bioenergy; sustainability; climate change; yacon

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Effect of phosphogypsum addition on anaerobic digestion process

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Abstract: This study focuses on the intensification of anaerobic conversion of organic waste through the incorporation of mineral additives. Phosphogypsum, a residual product of the chemical industry, was chosen as the mineral supplement due to its potential to serve as a source of essential macro- and microelements, facilitating the growth of eco-trophic bacterial groups. To determine its impact on biogas production and the quality of the resulting digestate, experimental studies of anaerobic digestion of organic waste with the addition of phosphogypsum were carried out in continuous bioreactors and in batch test fermentation bioreactors. The study explored the effect of varying phosphogypsum doses on the anaerobic digestion process and biogas generation. Changes in the quality of biogas yield and improvement of digestate quality were found when using phosphogypsum and ultrasonic treatment. These results indicate the possibility of improving phosphogypsum utilisation technologies using biotechnological approaches.

Keywords: anaerobic digestion; phosphogypsum; biogas; digestate.

Acknowledgement: The author expresses gratitude to OeAD (Austria's Agency for Education and Internationalisation) for the opportunity to conduct the study presented.

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Determinants of Biogas Technology Adoption in West Java, Indonesia

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Abstract: Indonesia recognises the potential of biogas technology to address its growing energy demands. However, its broad adoption faces challenges from institutions, socio-economic factors, and technology. This research examined barriers using field surveys, interviews, document analysis, literature review, and biodigester observations based on 2021 data from 201 surveyed farmers in West JavaThe study investigated household preferences for and consumption of biogas, with a focus on dairy farming, involving research organisations and cattle waste-based biogas production. In contrast to previous research, it analysed data obtained from surveys and focus group discussions using descriptive statistics. Using Stata 16, descriptive statistics and a binary logit regression model analysed responses. The findings highlight the development of biogas in West Java, with significant decreases in the use of chemical fertilisers (94%) and the application of combined chemical fertilisers and manure (91%), as well as significant decreases in the consumption of firewood, charcoal, dung cake, and kerosene (58%, 36%, 71%, and 74%, respectively). By effectively managing resources, biogas reduces the need for fuel and improves agriculture and environmental health.

Keywords: Biogas, Bioenergy, Alternative Energy, Animal Waste

Acknowledgment: This research was supported by the Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, grant number IGA (20233111).

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The Effectiveness of Pollutant Removal in Biogas Effluent Using a Biofilter in Anaerobic Baffled Reactor (ABR) as Liquid Organic Fertilizer

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Abstract: The used biofilter is very effectively to remove pollutant from the tofu wastewater through anaerobic digestion process, that can increase the quality of biogas and the effluent which can be utilize as organic fertilizer. The result show that total solid (TS) of biogas effluent is decreasing around 44% for all dosage of organic loading rate (OLR) 50 L/day, 100 L/day, 150 L/day, and 200 L/day, respectively 0.16%, 0.03%, 0.025%, and 0.034%. The effect of biofilter in ABR also increasing the quality of biogas effluent nutrition content that can be utilize as liquid organic fertilizer. The macronutrient content of biogas effluent is Nitrogen (N-total) 175.63 mg/l, available Phosphorus (P-available) 0.675 mg/l, and Potassium (K) 0.014 %. This study aimed to obtain the effectiveness of used biofilter in ABR to remove pollutant content in biogas effluent and to improve the quality of biogas effluent as liquid organic fertilizer.

Keywords: **tofu industry, wastewater, biogas, biofilter**

Acknowledgement: We would like to thank to Agro-industrial waste management laboratory, Faculty of Agriculture, University of Lampung, Indonesia for the support in data collection process, establishing an anaerobic digester reactor, and for possibility to use some of the instruments for analysis. We also thank anonymous SMEs of the tofu industry in Gunung Sulah District, Bandar Lampung City, Indonesia. This research was funded by the Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, grant number IGA (20233111).

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Invasive common reed as a prospective bioenergy feedstock

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Abstract: Reedbeds pose risks and pollution (fires in hot weather, waterlogging, etc.) in large overgrown habitats in Kazakhstan. This locally available biomass can be a potential source of solid biofuels and an alternative to traditionally used coal and wood. The study aims to evaluate the fuel-energy characteristics of the common reed (*Phragmites australis*). The key physicochemical parameters were determined by laboratory measurements following ISO standards. A trial batch of briquettes was also produced and subjected to mechanical durability testing. The results showed that the material belongs to a good quality nonwoody fuel and is characterised by an appropriate net calorific value (15.33 MJ/kg as received) as well as ash content (7.1% dry), and beneficially low nitrogen and sulphur content, very high silicon content, and high temperatures of the melting behaviour of ash. The durability of produced briquettes was 93.45%. Reed biomass can serve as a suitable bioenergy feedstock, reducing the environmental footprint of traditional fuels.

Keywords: biomass to energy; calorific value; fuel-energy properties; Kazakhstan; *Phragmites australis*; renewable energy; solid biofuels; thermal power

Acknowledgement: The laboratory work was conducted in cooperation with the Biomass Characterization Laboratory, CEDER-CIEMAT, Spain, and supported by the Internal Grant Agency of the Faculty of Tropical AgriSciences, CZU Prague [grant number 20233108].

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The Czech University of Life Sciences Prague (CZU) is one of the leading European institutions in the field of life sciences (Around 50th place worldwide in Agriculture and Forestry).

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We live in a world where natural resources are being depleted at an alarming rate.

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CZU Prague is situated on the outskirts of Prague, on a quiet and well-equipped campus that is easily reachable from the city centre by public transport.

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The Faculty of Tropical AgriSciences (FTA), the Czech University of Life Sciences Prague (CZU) is a unique institution in our country with over fifty years of tradition in tropical agriculture, rural development and the sustainable management of natural resources in the tropics.

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The mission of the faculty is the higher education of foreign and Czech students in the fields of tropical agriculture, rural development and the sustainable management of natural and energy resources in the tropics. An integral part of our mission is Research and Development in the field of tropical life sciences and the application of R&D results to the specific conditions of tropical and/or developing countries.

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To be an excellent and very specific institution in the Czech Republic orientated towards the transfer of the latest knowledge and technology between the Czech Republic, the EU and tropical regions respecting the traditional values of the local communities of the developing world as well as their level of socio-economic and technological development.

About Biogas Research Team

The main objective of the solved research at the Biogas Research Team is to determine the real impact of biogas plants (both in developing and developed countries) on the environment, climate change and society and to contribute crucially to the current global debate on small biogas technology. However, our focus goes much beyond. Generally covering majority of topics linked with waste management, renewable energy and related sectors.

The main long-term research interest of the Biogas Research Team is to reveal the current state, bottlenecks and perspectives of various technologies in both developing and developed countries.

Our team is covering what we call the whole **research life cycle** – which, from our point of view, means that we do everything from feasibility studies, system studies, technology development, laboratory scale research, towards implementation.

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About interesting projects to check

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More information: https://osiris4r.eu/

The OSIRIS project is funded by the European Union's Horizon Europe research and innovation programme under grant agreement No. 101094725.

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CEE2ACT: Strategies and action plans for circular bioeconomy

The CEE2ACT international project aims to develop circular bioeconomy strategies and action plans through knowledge transfer and innovative governance models to achieve better-informed decision-making, societal engagement, and innovation. The project will transfer knowledge from model countries (Austria, Germany, the Netherlands, Belgium, Spain, Finland, Sweden), where their experience will serve the target countries of Central and Eastern Europe (Bulgaria, Croatia, Czech Republic, Greece, Hungary, Poland, Romania, Serbia, Slovakia, and Slovenia) to develop appropriate strategies. Knowledge transfer will be implemented through national bioeconomic centres.

More information: https://www.cee2act.eu/

BIOECO-UP: Circular BioEconomy Market Uptake and Policy Support in Central Europe

The bioeconomy concept seeks to replace fossil resources with renewable raw materials in as many areas and applications as possible. The BIOECO-UP project widely establishes this concept across central Europe. The partners will design new circular value chains for the bioeconomy and change consumer behaviour. They will also support the policy level to push ahead with the transformation.

More information: https://www.interreg-central.eu/projects/bioeco-up/

AgriSci-UA - AgriSciences Platform for Scientific Enhancement of HEIs in Ukraine

The platform aims to strengthen the capacities and cooperation of young teachers, researchers and masters and doctoral students at selected Ukrainian universities by creating a platform – AgriSciences Platform for sharing information on Agrarian Sciences.

More information: https://agrisci-ua.com/

AgriSci-UA project is supported by Czech Republic Development Cooperation via Ministry of Foreign Affairs of the Czech Republic.

AgriSci-UA

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UNICOM: Universities – Communities: strengthening cooperation

General objective of the project is to enhance universities' social role through boosting university-community engagement leading to the elaboration of state policy on supporting the third mission of universities for ensuring social cohesion, resilience, sustainability and prosperity in Ukraine.

More information: https://unicom.community/en/unicom-home/

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SCORE: Structural Capacities for Tackling Wicked Problems

Implementation of SCORE sets an overall objective of developing a model and creating a cooperation structure with the project partners in tackling wicked problems. The inclusion of HEIs in addressing such challenges will set the foundation for present and future generations. SCORE aims to enhance various approaches in targeting such complex topics.

More information: https://score-eu.org/

SCORE Project
Structural Capacities for Tackling Wicked Problems

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