MCYR
Multidisciplinary Conference for Young Researchers

BOOK OF ABSTRACTS

5TH INTERNATIONAL MULTIDISCIPLINARY CONFERENCE FOR YOUNG RESEARCHERS

"Resilience in the Face of Global Challenges"

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"RESILIENCE IN THE FACE OF GLOBAL CHALLENGES"

The MCYR conference aims to provide a platform for early career researchers with opportunities for engaging in discussions across various disciplines to showcase their research. Our primary goals are to offer a podium for researchers to present their work, foster an environment for informal, in-depth feedback, and facilitate networking opportunities, enabling participants to establish connections with professionals and institutions in their respective fields.

The 5th MCYR took place in Prague – at the Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague.

About the conference

The **5th Multidisciplinary Conference for Young Researchers** brought together early-career researchers from around the world, united by a shared dedication to tackling the pressing issues of our time. This year's conference theme, "Resilience in the Face of Global Challenges," offered a vibrant platform for exploring innovative solutions to complex global issues, fostering new perspectives and collaborative approaches.

As we delved into diverse topics ranging from environmental sustainability to cutting-edge technological advancements, the conference served as a bridge across disciplines. This unique gathering highlighted the essential role of interdisciplinary approaches in addressing today's globalized challenges, fostering an environment where young researchers could connect, share insights, and build lasting networks.

The conference embodied the spirit of curiosity and open inquiry, empowering participants to question assumptions, forge new ideas, and work towards sustainable solutions. Together, we engaged in meaningful discussions on resilience, sustainability, and the transformative power of knowledge, affirming our commitment to shaping a more resilient and adaptable future.

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About the conference

The 5th Multidisciplinary Conference for Young Researchers, hosted this year at the Czech University of Life Sciences Prague (CZU), organized by the BioResources & Technology Division (BRT), was held at the Faculty of Tropical AgriSciences. This year's conference, supported within the framework of the "AgriSciences Platform for Scientific Enhancement of HEIs in Ukraine" by the Czech Republic's Development Cooperation and the Ministry of Foreign Affairs, united young researchers to explore "Resilience in the Face of Global Challenges" through interdisciplinary dialogue.

Key partners, including the AgriSci-UA Platform, OSIRIS, COMUNIDAD and BIO-CAPITAL , contributed to the conference's robust program, encouraging participants to tackle pressing global issues with diverse perspectives. Set in the historical city of Prague – often called the "City of a Hundred Spires" – the conference provided an inspiring environment for scholarly exchange, where the city's cultural heritage underscored the importance of building a resilient future.

MCYR 2024
Scientific Committee

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Czech University of Life Sciences Prague, Prague, Czech Republic

MCYR 2024 Scientific Sessions

This year's MCYR conference features a range of thematic sessions that cover key aspects of global and societal challenges:

- **Society and Culture**
- **Plants and Agriculture**
- **Animals and Ecology**
- **Technology and Innovation**
- **Climate and Sustainability**

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KEYNOTE SPEECH

From Curiosity to Impact: Charting Your Path as an Early-Career Researcher
Assoc. Prof. Dr. Hynek Roubík

This year MCYR keynote address, the challenges and opportunities that early-career researchers encounter on their academic journeys. Focusing on the power of curiosity, he discussed its role as a driving force behind research.

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MCYR 2024 Session Chairs

Assoc. Prof. Dr. Yelizaveta Chernysh,
BRT Senior Researcher.

Expertise: bio-based products, interdisciplinary research in waste recycling, bioenergy, and environmental protection.

Dr. Charles Ogbu,
BRT Junior Researcher

Expertise: techno-economic analysis, life cycle assessment, optimization of system operations, energy use, and minimizing environmental impacts.

Ing. Mgr. Adam Hruška,
BRT Junior Researcher; PhD student.

Expertise: machine learning, food security, crisis-induced food insecurities, population resilience, and integrating artificial intelligence into agriculture.

Ing. Chama Theodore Ketuama,
BRT Junior Researcher; PhD student

Expertise: waste management, appropriate technologies, and the economic and socio-technical aspects of biogas energy transitions in rural households.

Ing. Antoine Bercy,
BRT Junior Researcher; PhD student.

Expertise: biogas technology, improving efficiency through harmonization of biogas systems, and advancing digester technologies for diverse applications.

Ing. AbdulAzeez Shobajo,
BRT Junior Researcher; PhD student

Expertise: anaerobic digestion, soil analysis, sustainable recycling of organic and industrial waste, and transforming waste into value-added bio-based products.

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Dear Participant of MCYR 2024

On behalf of the Scientific Committee and Organizing committee, we would like to extend our deepest gratitude for your participation in the 5th International Multidisciplinary Conference for Young Researchers (MCYR). Your presence, insights, and contributions played a vital role in making this year's conference again a resounding success.

With the theme "Resilience in the Face of Global Challenges", the conference aimed to foster interdisciplinary collaboration and highlight the innovative work of emerging researchers like yourself. The engagement, the quality of discussions, and the exciting ideas exchanged throughout the event was truly inspiring.

As we look ahead, we hope that the connections you made and the knowledge you gained will contribute to your future success. We encourage you to stay engaged with the growing MCYR community and to continue sharing your achievements and discoveries.

Organizing Committee

Head of the Organizing Committee
Viktoriia Chubur

Head of the Scientific Committee
Assoc. Prof. Dr. Hynek Roubík

Organizing Committee Members
Jan Staš
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Charles Ogbu
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Manvendra Kumar

MCYR 2024 Scientific Sessions

SOCIETY AND CULTURE

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War-induced Migration and its Impact on the Ukrainian Agriculture

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Abstract: Agriculture is among the sectors most affected by migration. Russian invasion in 2022 led to massive displacement of citizens to Ukraine's western regions and especially abroad. Ukraine, a country with developed agriculture, has faced loses and decline in the sector's efficiency. Cluster, index and time series analyses were used to investigate peculiarities of war-induced migration and its impact on the productivity of Ukrainian agriculture. Germany, Poland and Czechia have taken the most of Ukrainian migrants. Many of them are young and highly educated. Mass migration of the economically active population depletes the labor resources and productive capacity of Ukrainian agriculture. Agricultural production in 2023 decreased by 16% compared to 2021, due to 6.3% drop in employment and 10.4% decrease in productivity. The balance of Ukrainian agricultural managers' optimistic and pessimistic expectations regarding production volumes in 2024 is negative. Agribusinesses are forced to engage women to work in traditionally male occupations and to hire retirees. Agricultural production as a field of Ukraine's international specialization is beyond doubt. The postwar reconstruction of Ukrainian agriculture should be carried out on a modern technological basis. This will allow to restore the production potential and human capital of agriculture. The return of Ukrainian refugees and their integration into agricultural workforce are important for achieving this goal.

Keywords: migration; displaced people; agriculture; Russian-Ukrainian war

Acknowledgement: We are thankful to the Czech Development Cooperation for the grant for Multidisciplinary research teams, which allowed this scientific cooperation to start via AgriSci-UA.

The Impact of the 2011 War on the Reality of Food Security in Syria

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Abstract: The study aimed to analyze the food situation in Syria between two time periods with different levels of security and political stability, namely the period of peace (2000, 2005) and the period of war (2011, 2016), using specific indicators to assess the reality of food security, which enables us to estimate the effects of war on it, and to provide some solutions or proposals that can reduce these effects in a way that helps restore stability to Syrian food security and ensure that each individual meets his needs for food supplies. The study found an increase in the malnutrition index from 5.4% in the pre-war period to 11.1% in 2016 (the war period), and a significant increase was observed in the number of people suffering from malnutrition to reach 2.2 million people compared to the pre-war period, where it was 1 million people, and the percentage of arable land equipped for irrigation decreased from 7.7% to 7.1% during the war period.

The malnutrition index increased during the war period, as did the number of people suffering from malnutrition, and there was a noticeable and significant decline in the percentage of arable land equipped for irrigation.

Keywords: food security, health, malnutrition, undernourishment, food imports

Understanding the Stampedes over the Years in India: Lesson and Learning

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Abstract: India is the most populous country in the world with one-sixth of the world's population (equivalent to nearly 17% of the total world population). Religious and social gatherings, festival, public transport, marketplace, political processions, disasters etc., are some of the common events or occasions that attract thousands and millions of people/devotees. These gatherings come with mishaps until instinct to manage them is not controlled efficiently and effectively. Stampedes is quite common congregation incident where an occurrence in which a large group of frightened or excited people run together in a wild and uncontrolled way to escape from something, get out of a place, etc. Open source data related to human stampedes were collected from various sources such as reports, print media, journal publications, different search engines etc. specific to India since 2005 onwards The details include the name and type of event, location, number of injuries and fatalities, probable reason for the stampede. Over the years, India has witnessed a series of stampedes. 12 major cases of stampede disasters reported in India, in which total of nearly 2000 people sacrificed their lives; most of them are women and have gathered for religious events since 2005 onwards. In India, religious events where mammoth crowd gathers and witnessed the maximum stampedes. Lessons from past experience, Government have introduced the Disaster Management Act, 2005 that provides a comprehensive framework for disaster preparedness and response, including guidelines for managing large gatherings.

Keywords: Stampede disasters, Religious gathering, Disaster Management Act, 2005

Acknowledgement: I would like to acknowledge the open library as the source and citing print article and magazine.

Gender Accents in the Economic Life of the Ukrainian Village in the 1920s

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Abstract: The significant growth in Ukraine's interest in researching the role of women in the economic life of Ukrainian villages, which became quite typical in the 1920s, is due to the significant development of feminist ideology in Ukrainian society and the attempt to determine the place of women in the economic development of individual Ukrainian villages or small regions. Background: The purpose of the study is to summarize the results of the author's long-term observations of women's participation in the economic development of Ukrainian villages on the basis of spontaneous self-organization. the author's field studies of dozens of Ukrainian villages, analysis of scientific publications in the field of urbanism and gender studies. A study of the actual material of the study shows that in 1926, women agrarians accounted for about 45% of the population, and women industrialists made up about 5% of the population. But at the same time, women farmers were responsible for 55% of all agricultural work. Women's industries produced more than 25% of all non-food products. In some industries, this indicator reached even 100%. One of the main factors that significantly influenced the emergence and development of women's small non-agricultural entrepreneurship in Ukraine was, first of all, the great need of the rural population for cheap and high-quality non-agricultural goods and building materials, since the factory industry satisfied it by no more than 30%. And the lack of manpower after the First World War and the revolution should not be forgotten. The study of the economic life of the Ukrainian village in the 1920s allows the author to assert that women played a significant role in the social and economic history of Ukraine.

Keywords: Ukrainian village; gender aspects; peasantry; history; memory

Human-wildlife Interactions: Cultural Perspectives and Sensitivities Influence Conservation Efforts for the Philippine Brown Deer (Rusa marianna Desmarest, 1822)

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Abstract: Philippine brown deer (*Rusa marianna* Desmarest, 1822) is an endangered Cervid threatened by hunting, habitat loss, and fragmentation. It is endemic to the Philippine archipelago, while a thriving population was introduced to the Mariana Islands as a game animal. These distinct populations remain underexplored, especially from the lenses of human-wildlife conflict and coexistence (HWCC). We interviewed the indigenous Obu Manuvu forest guards in the Southern Philippines to investigate cultural perspectives and sensitivities (CPS) influencing deer conservation. We documented that the deer is a sacred species, having been declared a Pusaka by the Obu Manuvu. It is sanctified for its inherent value as part of cultural identity, and ethnozoological uses like in medical remedies. Pusaka is an indigenous worldview of coexistence influencing culture-based conservation, which includes a forest guarding system to monitor and protect wildlife. The ethnic group also declared parts of their ancestral domain as holy grounds where hunting and tree-cutting are prohibited. Additionally, we found that women are equitably involved in conservation and the forest guards have positive values orientation and conservation attitude. However, deforestation, hunting, and human encroachment remain a threat to the dwindling deer population. Deer bushmeat is locally sold, especially by non-indigenous peoples, despite stringent customary policies. A subsistence economy emerges as the main driver of this human-wildlife conflict. Sustainable deer conservation requires working closely with indigenous peoples like the Obu Manuvu. There is a need to employ similar efforts with diverse cultural communities in the Southern Philippines to ensure a thriving future for the deer.

Keywords: Obu Manuvu; human-wildlife conflict; coexistence; Mt. Apo; Philippines

Sustainable Exploitation of Natural Resources in Africa: the Likely Role of Religious Beliefs

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Abstract: This study examines the relationship between religious beliefs and the way natural resources are exploited in African countries. Little work has been done on the role of so-called "modern" religions in the sustainable use of natural resources on the African continent. The present study seeks to fill this gap. We use the corrected standard error panels to estimate our parameters. But before this, we eliminate the risk of autocorrelation and heteroscedasticity errors through appropriate econometric tests. Overall, our results show that, whatever the religion indicator selected, there is a significant effect of religious beliefs on material consumption, but in different directions and to different degrees. In particular, we observe on the one hand a negative link between natural resource consumption and the world's main religions (Christianity and Islam) and between resource consumption and Gross Domestic Product per capita. On the other hand, the "Education" variable and countries with a high proportion of adherents to so-called "traditional" religions (i.e. the "Ethnic" variable) have a positive relationship with the volume of natural resource use. Following the study, we recommend that the voices of religions must be considered when making crucial decisions that affect the lives of people in society, with aim to improve their well- being through the achievement of sustainable development, and to reduce the haphazard exploitation of resources.

Keywords: religious beliefs; sustainable exploitation; sustainable development; natural resources; Africa

Understanding the Experience of Water Pollution and Climate Change among Urban Residents in China: A Mixed Methods Approach

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Abstract: Water pollution is a serious environmental problem worldwide. Particularly in China, where rapid industrialization has led to serious pollution incidents, it is important to examine the perception of environmental risks. Pollution is also a social problem and can only be reduced with behavioural change. Past experiences with pollution significantly shape individuals' perceptions of environmental risks and shape their future attitudes. The aim of the study is to characterize the experiences of residents living in direct-administered municipalities in China (Beijing, Tianjin, Shanghai, Chongqing) with water pollution. This study employs a mixed research design and uses a combination of psychometric surveys and in-depth semi-structured interviews with urban residents. The survey assesses residents' experiences of industrial accidents, water pollution due to industrial production, and pollution associated with inadequate waste management. In addition, participants were asked about other climate change-related issues such as water scarcity and flooding, along with the timeliness of their experiences. The quantitative data is complemented by representative findings from the qualitative interviews. Findings show that despite potential concerns arising from the political climate, participants in each of the cities studied reported direct experiences of pollution, water scarcity and flooding. Some participants showed a willingness to share their experiences more openly, albeit with an awareness of the sensitive nature of the topic. The study sheds light on the experiences of water pollution among urban residents in China and highlights the importance of understanding local perspectives to develop effective risk communication and environmental education.

Keywords: China; climate change; environmental risk perception; water pollution; water scarcity

Acknowledgement: The project is funded by Ministry of Education, Youth and Sports of the Czech Republic (IGA_FF_2024_037).

Climate Impacts on Barley Cultivation and Production in Syria

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Abstract: The study aimed to identify the reality of barley food security in Syria between (2013-2022), as the area planted with barley witnessed a clear decline during the periods of the Syrian crisis. By calculating the food security indicators, it became clear that the abundance of barley was not constant, but rather increased from 2013 to decrease in 2017 to record 1,301 thousand tons, then gradually increased and recorded the highest value in 2020, reaching 2,564 thousand tons, as the abundance of barley increased at an average rate of about 13.2%, and the compound annual growth rate reached 8.2%. The feed gap began in 2014 to form a large deficit in 2015, 2016, 2018, 2021, where the highest deficit in 2021 reached about 1,518 thousand tons, and production decreased in that year, and the lowest value of self-sufficiency was recorded in the same year by 11.3%. In contrast, we note during 2018 an increase in the percentage of dependence on imports to reach 67.9%, while the average self-sufficiency rate of barley in Syria during the period (2013-2021) reached about 50.4%, and despite the years of drought, war and the Syrian crisis, this number is acceptable, and the average percentage of dependence on imports reached about 33.7%.

Keywords: barley, food security, self-sufficiency, available CAGR.

Importance of Stakeholder Mapping in Implementing Gender Equality Plans, Case Study of AGRIGEP Universities

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Abstract: A Gender Equality Plan (GEP) in academia is a strategic tool for promoting gender equality and addressing disparities in recruitment, career advancement, leadership, and work-life balance. Reports show that GEP implementation drives positive changes in research and innovation organizations at national and EU levels Stakeholder mapping is crucial for the effective and sustainable implementation of GEPs. Within the first year of the EU-funded AGRIGEP project (No. 1010941580), three targeted universities conducted stakeholder mapping exercises, identifying gaps and enhancing engagement strategies. The stakeholder map was created using a four-dimensional approach – the origin of stakeholders (internal vs external), involvement of stakeholders (existing vs new), the importance of stakeholders (key vs supportive vs potentially supportive) and frequency of stakeholders' involvement among universities (involved by one or more targeted universities). Findings revealed a lack of systematic stakeholder approaches, with networks largely dependent on personal contacts, making them fragile. Few external stakeholders were identified, reflecting perceived low external interest in promoting gender equality in academia. The universities concluded that a comprehensive strategy, active stakeholder engagement, and enhanced visibility are essential. The project builds on EU-funded sister projects like SUPERA, UNISAFE, and RESET to expand the Community of Practice..

Keywords: gender equality; inclusion and diversity; EU-Horizon Europe criterion

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Interior Green Walls: Perception of the People with Daily Contact

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Abstract: The implementation of interior green walls which contain living greenery, a growing medium (soil or substrate), and a water supply system, provide benefits not only for the environmental health of indoor spaces but also affect the well-being of people who are in direct and regular contact with these elements. The study reflects the growing interest of companies, commercial buildings, and educational and medical institutions in building green areas in the interior of buildings, which are primarily intended not only for everyday work but also for relaxation and meeting people. The project aims to analyse current trends in the use of interior green wall technologies and the perception of well-being from the perspective of people in daily contact. Data were collected through 20 semi-structured interviews with people in daily contact with interior green walls and were analysed in Atlas.ti software (thematic analysis). People in daily contact with interior green walls are describing their perception as positive towards their well-being. The positive perception of people with daily contact with green walls is mainly due to the pleasant working environment, the calming effect associated with the green colour, and the modern natural look. However, most people do not perceive a significant difference in the microclimatic conditions in the spaces where these walls are located.

Keywords: interior green walls, perception, working environment, microclimatic conditions

Acknowledgement: This research is funded by the Faculty of Regional Development and International Studies. Mendel University in Brno, which supported the project IGA24-FRRMS-009, and without their help, the project could not have been realized.

Public Perception of Extreme Weather Events and Climate Change

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Abstract: Extreme weather events and climate change are becoming more and more frequent, having a major impact on the lives of people around the world. These phenomena should be commonly discussed topics in society, as they represent a key threat to current and future generations. An online questionnaire was designed, based on existing research on climate change related topics, such as the Eurobarometer (2023) and studies conducted by STEM and the 2050 Institute (2022). The questionnaire consists of 21 closed-ended questions and is structured in 4 parts - identification of respondents, views on climate change, future developments and actors in the fight against global climate change, and assessment of knowledge on the Green Deal for Europe. A total of 235 respondents participated. The Czech public has a positive attitude towards climate protection, but a significant number of respondents admit to a lack of awareness and orientation on the issue, which prevents them from taking a strong stance. The research results indicate that the majority of the Czech public does not deny the existence of climate change and shows at least a basic interest in this topic. At the same time, the public is convinced of the positive impact of human activity on climate change. However, the efforts shown can be considered insufficient. The section dealing with the Green Deal for Europe points most strongly to the lack of awareness of respondents in the area of combating climate change. While the research shows that the majority of respondents identify the Green Deal as necessary and useful, the lack of awareness of respondents and their limited ability to assess the actions of the Green Deal, may have accounted for much of the concern noted by the research about the readiness, thoughtfulness and feasibility of this agreement.

Keywords: extreme weather events; perception; climate change

National and Cultural Identity in Mass Media: How to Resist Manipulations and Hate Speech

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Abstract: The mass media has become an arena where hate speech flourishes, not just as isolated incidents, but as a calculated means of manipulation. The research on this issue paints a disturbing picture—one where national and cultural identities are weaponized to foster division and animosity. Researchers have developed several methods to identify and mitigate the spread of such toxic content. Machine learning algorithms work by employing large datasets annotated for hate speech, these algorithms are trained to recognize patterns and features indicative of hateful language. The use of keyword detection involves creating exhaustive lists of terms and phrases frequently associated with hate speech. In the vast landscape of modern discourse, hate speech emerges as a malignant force, manifesting in various pernicious forms. Verbal aggression, intended to incite prejudicial hostility against specific groups based on race, religion, gender, sexual orientation, or other identifiable characteristics, is one such type. In an era dominated by mass media, national and cultural identities are increasingly susceptible to manipulation and hate speech. Recognizing the signs of manipulative tactics—such as sensationalist language, emotional exploitation, and selective reporting—enables individuals to navigate media landscapes with a more judicious mindset.

Keywords: hate speech; manipulation; resistance to manipulation

The Impact of Covid-19 on Market Structure in the U.S. passenger air transportation Sector

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Abstract: This research seeks to evaluate the COVID-19 pandemic's impact on the market structure of the U.S. passenger air transportation sector. At the onset of COVID-19, U.S. passenger airlines drastically scaled down operations. As COVID-19 progressed, these firms embarked on an arduous recovery facing reduced demand and increased travel restrictions. The market structure of the U.S. passenger air transportation sector was altered by the varied response strategies employed by U.S. passenger airlines. It is important to understand these market changes to improve policy and firm strategy in preparation for a similar crisis in the future. Using the T-100 dataset from the United States Department of Transportation, market competition was measured by computing the Herfindahl-Hirschman Index (HHI) monthly along individual routes from 2015 to 2023. Routes were defined as individual markets by origin and destination. An air carrier's participation in a particular market was defined as daily service on a given route. Market presence (route service) among legacy, low-cost, and ultra low-cost carriers varied in response to the COVID-19 pandemic. In response to the pandemic, findings show legacy carrier market presence to be less sensitive than ultra low-cost carrier market presence. Route-level HHIs fluctuate throughout the crisis but indicate less competition than pre-pandemic levels on most routes by the end of 2023. The differing responses by carrier type could explain the volatility of route-level HHI as adding and dropping routes denotes changes in competition along said routes.

Keywords: market structure; market presence; competition; legacy carrier; ultra-low-cost carrier

Exploring the Drivers and Impacts of CSR Practices in the Food Business Sector

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Abstract: Small businesses are crucial to their communities' vitality, with many owners considering local well-being as a key business responsibility. Despite growing research on small business social responsibility, our understanding of the determinants of responsible practices in small businesses, particularly in developing countries, remains limited. This study employs an ordered logit regression model to examine the factors influencing food businesses' participation in socially responsible practices. We also use Propensity Score Matching (PSM) to assess whether socially responsible practices correlate with better business performance. The analysis is based on a survey of 244 small food businesses, categorizing their CSR engagement as low, medium, or high. The distribution is 56.97% in low, 27.46% in medium, and 15.57% in high levels of CSR. The ordered logit regression results reveal that association membership positively affects the likelihood of engaging in socially responsible practices ($p < 0.05$). In contrast, mentorship negatively impacts the likelihood of high CSR participation ($p < 0.10$). Greater CSR awareness is associated with a reduced likelihood of high-level CSR engagement ($p < 0.001$), while perceived benefits of CSR positively influence participation ($p < 0.001$). PSM results show that firms with high CSR activities experience a 9.41% increase in profitability compared to those with minimal CSR. Therefore, we recommend that agribusiness firms expand their CSR initiatives and increase efforts to educate and train on practical CSR implementation. Promoting the tangible benefits of CSR can further support responsible practices.

Keywords: food business, Ghana, socially responsible practices

Determinants of Digital Financial Inclusion Among Young Entrepreneurs in Informal Sector: Evidence from Ghana

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Abstract: Digital Financial Inclusion (DFI) has become a critical focus for development, yet many informal enterprises, particularly small businesses, struggle to access traditional banking services. Using data from the World Bank's Informal Sector Enterprise Surveys 2022. We explore the determinants of digital financial inclusion among young business owners in Ghana's informal sector. Specifically, we examine the determinants of access to digital financial services and the use of digital financial services. The study uses logit regression to examine the determinants of access to digital financial services, while multivariate probit regression models were used to analyse the usage of digital financial services The results show that 53% of young entrepreneurs use digital payments. The logistic regression results show that Higher educational attainment has a significant effect on digital financial services access ($p < 0.01$). In addition, experience in business slightly increases the likelihood of accessing digital financial services (0.01). young entrepreneurs that keep records ($p < 0.01$) and have bank accounts are significantly more likely to access digital financial services ($p < 0.01$). The multivariate probit regression results show that higher education positively influences the use of digital money for saving, paying bills, receiving payments and paying loans. Keeping records and having a bank account are strongly associated with greater use of digital financial services. Conversely, internet use has a positive effect on financial engagement, while computer use has a negative effect. The study recommends encouraging record keeping, improving digital infrastructure and promoting access to financial services for informal sector businesses.

Keywords: informal enterprises, digital financial inclusion, Ghana

Problematic Aspects of Reintegration of Veterans from Military Service Into Civilian Life

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Abstract: The main goal is to study the problem of veterans returning from military service to civilian life and help them reintegrate into. According to the Ministry of Veterans, there are 851,068 veterans in Ukraine today, but 5 million are expected to be veterans, with the war expected to end soon. In addition, according to Global Firepower, there are 500,000 troops in the Armed Forces of Ukraine. Ukrainian veterans are a heterogeneous group. Their lives before the conflict were diverse: many veterans were civilians before taking up arms, while others were professional military officers. Not all returning veterans need benefits. Young men and women who come back from war need quality education, decent jobs and medical care. Thus, reintegration is a complex, individualised process that goes beyond the simple provision of benefits and payments. It is a joint task of veterans, civil society, local communities and the government. The absence of a comprehensive reintegration policy and limited employment opportunities for veterans, combined with a highly polarised environment with easy access to weapons, can create a challenging political landscape in Ukraine. The challenges to successful implementation of veterans' reintegration can be grouped into 2 groups: 1. Societal barriers, 2. Individual barriers. A veteran is not a social burden for the state, but a motivated community member with unique experience and a range of opportunities who can develop the country he or she defended!

Keywords: Veteran; reintegration; war

Acknowledgement: We look forward to cooperating and implementing joint projects to rebuild Ukraine.

The War Impact on Social Capital and Resilience: the Case of Ukraine

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Abstract: This study investigates the effect of the Russian war against Ukraine on social capital. Using an online survey in Ukraine, we apply two measures of conflict exposure: geocoded conflict data, and self-reported war experience. First, regression results reveal a negative effect of conflict on both measures of social capital. Second, using a trauma-based war exposure measure – which has been shown to be positively correlated with PTSD in Ukraine – we provide empirical evidence for the heterogeneous effects of objective war events and war-related stress experience. Interactive results between these variables reveal that the negative relationship between war events and social capital becomes less intensive. As such, our findings complement existing theories that explain the consequences of post-traumatic experiences on social cohesion. Finally, this study tackles potential endogeneity In this article we investigated the impact of the Russian full-scale invasion on social capital in Ukraine. We find that conflict has a negative effect on prosocial behaviour and trust in the short term. An instrumental variable method indicates that historical determinants can causally explain the current war and its effects on social capital. Our results are relevant for political decision-makers and the recovery process of Ukraine. Social capital, such as prosociality and institutional trust, are essential components of cohesive societies and thriving economies. Politics aimed at mitigating the consequences of war should not only focus on substantial financial reconstruction but also specifically target the strengthening of social cohesion and trust in institutions.

Keywords: conflict; social preferences; institutional trust; instrumental variable regression; Russian-Ukrainian war

Acknowledgement: For comments and discussion, we thank Felipe Valencia Caicedo, Sebastian J. Goerg, Char-lotte Fiedler, participants at BEWIP Lunch Seminar (TUM), and seminar participants at the Bonn International Centre for Conflict Studies (BICC). We thank Ellen Monroe for generously sharing data with us. Ethics approval: This study is part of a project on "Recovery and social capital in Ukraine" and obtained ethics approval from the German Association for Experimental Economic Research (https://gfew.de/ethik/kTYMPfNh).

Arrhythmias and Conduction Disturbances in Patients with Primary Systemic Vasculitides

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Abstract: Primary systemic vasculitides (PSV) are multisystem diseases characterized by inflammation and necrosis of blood vessel walls. Cardiovascular manifestations include cardiomyopathy, coronary arteritis, pericarditis, valvulitis, arrhythmias, conduction blocks, and aortic dissection. Rhythm and conduction disturbances occur in 66-70% of PSV patients. This study aims to summarize the mechanisms and prevalence of these disturbances in PSV patients based on clinical cases and literature. A retrospective analysis was conducted on medical records of PSV patients treated in the rheumatology department of Vinnytsia Municipal Clinical Hospital No. 1 from 2017 to 2022, using Statistica 10 for statistical analysis. Among 24 patients (mean age 53.04 ± 14.87 years; 66.67% female), rhythm and conduction disturbances were identified in 10 (41.67%) patients (mean age 58 ± 12.74 years; 60% female). Observed arrhythmias included: 1) IgA-associated vasculitis – 2 (20%): a) sinus tachycardia (ST), persistent atrial fibrillation (AF); b) permanent AF; 2) Granulomatosis with polyangiitis (GPA) – 2 (20%): a) ST, supraventricular extrasystole (SE); b) ST, SE, and ventricular extrasystole (VE), atrial pacemaker migration; 3) Microscopic polyangiitis (MPA) – 1 (10%): permanent AF; 4) Primary CNS angiitis – 1 (10%): permanent AF; 5) Eosinophilic granulomatosis with polyangiitis (EGPA) – 1 (10%): ST, SE; 6) Takayasu arteritis – 1 (10%): ST, VE; 7) Undifferentiated systemic vasculitis (SV) – 2 (20%): ST in both cases. The most common arrhythmias in PSV patients were ST, permanent AF, and SE. Timely diagnosis and treatment are crucial for improving patient quality of life and reducing cardiovascular mortality.

Keywords: primary systemic vasculitides; cardiovascular manifestations; arrhythmias

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Factors Influencing Tree Use among Small Farmers of Gorkha District, Nepal: Livelihood Perspective

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Abstract: In eastern Nepal's Gorkha district, prone to natural disasters, agroforestry is crucial in livelihood sustenance, contributing to 42% of household income despite the 2015 earthquake's impacts. Through a socio-economic survey and focus group discussion among 13 households in Goganpani village, Ajirkot Rural Municipality ward no. 4, this study examines the determinants of tree cultivation on farms. Our survey revealed that households are significantly reliant on trees, crops, and livestock for their livelihoods, and factors such as ethnicity, farm size, crop yield, and total tropical livestock units (TLU) influence the proportion of dependence from various sources, including farmland, community forest, leasehold land, or government-managed forest. Notably, the Gurung community exhibits greater self-sufficiency due to better access to education and larger farm sizes than the Dalits and Tamangs. The most widely cultivated staple foods were finger millet and maize, while tapioca was the least grown crop. However, the self-sufficiency in crops is only six months a year, and households rely on the local market for the rest of the year. Culturally and ecologically important tree species like *Alnus nepalensis*, *Ficus semicordata var. semicordata,* and *Schima wallichii (DC.) Korth* was recognized based on their UVI and IVI values. Livestock rearing is integral to the farming system, with farmland providing 80% of the fodder and the remaining 20% coming from government-managed, leasehold, and community forests. However, tree-based agroforestry faces challenges like wildlife conflicts, with farm trees attracting fauna that damages crops.

Keywords: gorkha; agroforestry; trees; crops; livestock

Acknowledgement: We express our gratitude to the Erasmus Mundus Joint Master in Global Forestry (GLOFOR) program for funding the field course in Nepal.

Enhancing Crop Resilience Amidst Global Challenges: Reducing Leaf Nicotine Levels through NPK Fertilization and Potassium Sources from Muriate of Potash

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Abstract: Nicotine is widely considered to be addictive; thus, reducing consumer dependency on the constituent has been a focus of regulatory groups in recent years. This study aimed to investigate the impact of NPK fertilizers, incorporating different potassium (K) sources, on nicotine content in K326 tobacco leaves. The research was conducted using a randomized complete block design at three sites (Chunya, Kahama, and Tabora) during the 2023–24 cropping season. Five fertilizer treatments were tested: control (T1), basal standard (T2: 30g $N_{10}P_{18}K_{24}$ with K sources from KCl and K_2SO_4, top-dressed with 8g CAN 27%), T3 (30g $N_{11}P_{22}K_{21}$ from KCl, top-dressed with 8g CAN 27%), T4 (two splits of 15g $N_{11}P_{22}K_{21}$ from KCl, top-dressed with 8g CAN 27%), and T5 (two splits of $N_{11}P_{22}K_{21}$ at 10g and 12.5g bi-weekly, without CAN 27%). Seedbeds received 5g NPK as per treatments, and seedlings were transplanted into trial plots with 1.2m ridge spacing and 50cm intra-spacing. Basal applications were administered 14 days post-transplant for T2 and T3, and every two weeks for T4, with T5 receiving no CAN 27%. Results indicated that incorporating KCl and K_2SO_4 with CAN 27% significantly increased nicotine levels (2.66%). In contrast, using KCl alone in NPK fertilizer reduced nicotine levels to 2.02%. These findings suggest that NPK fertilizers split with K sourced from KCl, without CAN 27%, effectively lower nicotine levels in tobacco leaves. This approach not only contributes to tobacco harm reduction but also strengthens agricultural resilience against addictive challenges.

Keywords: nicotine; sulphate; muriet; potash; fertilizer

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Genetic Evaluation of M4 Population of Pigeon pea (*Cajanus cajan*(l.) Millsp.) through Molecular Markers

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Abstract: Pigeon pea cultivation in the Konkan region of Maharashtra struggles due to insufficient irrigation during the prolonged rabi season. This study aims to develop early-maturing Pigeon pea varieties by assessing the genetic diversity of gamma-irradiated mutant lines using ISSR markers. This research supports the goal of enhancing food production in changing agricultural conditions. Gamma-irradiated Pigeon pea mutant lines were analyzed using twenty ISSR markers. Fieldwork was conducted at the Agricultural Botany farm, and laboratory analyses were performed at the Plant Biotechnology Centre, College of Agriculture, Dapoli. ISSR markers assessed polymorphism and allele identification, with cluster analysis used to determine genetic relationships among the mutant lines. ISSR analysis showed 84.56% polymorphism among gamma-irradiated Pigeon pea mutants, identifying 142 alleles (average 7.1 per marker). Cluster analysis grouped mutants into two primary clusters, revealing significant genetic diversity and relationships. ISSR markers are effective in assessing genetic diversity among gamma-irradiated Pigeon pea mutants. The identified genetic variability and relationships provide valuable insights for selecting early-maturing mutants, aiding future breeding programs.

Keywords: Pigeon pea; genetic variability; ISSR markers; DNA fingerprinting; molecular markers

Production of High Ricinoleic Acid in *Ricinus Communis* by Gene Editing

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Abstract: *Ricinus communis* (family: Euphorbiaceae), commonly known as Castor bean, is a non-edible oil plant belonging to the family Euphorbiaceae. It is cultivated extensively worldwide due to its seeds' high oil content, making it a valuable resource for various industrial applications. The study aims to enhance ricinoleic acid production in Castor beans by genetically editing the FAD2 enzyme using the CRISPR/Cas9 system, thus improving its industrial utility. To achieve this goal, two sgRNA probes targeting different sites (CBFAD2A and CBFAD2B) within the FAD2 gene were designed. The process involved optimizing protoplast isolation, transfection via electroporation, and the regeneration of mutagenized R. communis protoplasts into mature plants. Following transfection with constructs encoding Cas9 and sgRNA, the target gene DNA was amplified to evaluate mutagenesis efficiency. The study successfully demonstrated a knockdown in the FAD2 gene, confirming the CRISPR/Cas9 system's effectiveness in inducing mutations. This genetic modification is expected to enhance ricinoleic acid production in the edited Castor bean plants. This advancement aims to develop a Colombian Castor bean line with increased ricinoleic acid production, potentially leading to higher yields and greater efficiency for several industries, including pharmaceuticals, lubricants, and biofuels.

Keywords: CRISPR/Cas9; FAD2 enzyme; genetic editing; ricinoleic acid; *Ricinus communis*.

Effects of Biological Seed Treatments on Pest Occurrence, Production Parameters and Yield of Pea (*Pisum sativum* L.) in Organic Farming

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Abstract: Biological control, particularly uses of bacteria of lactic acid fermentation, mycoparasitic, and entomopathogenic fungi, is among the promising alternative strategies for control of pests in pea organic farming systems. The aim of this research was to evaluate the potential of application of bacteria of lactic acid fermentation, mycoparasitic (*Trichoderma virens*) and entomopathogenic fungi (*Metarhizium brunneum*) in consideration of pest occurrence, growth plant parameters and seed yield of pea (*Pisum sativum* L.). Field experiments were performed in the certified organic field at Zvikov, district České Budějovice, Czech Republic during the 2023 vegetation season. The small plot experiment was conducted with the randomized complete block design with three different seed treatments and untreated control in three replications. The results showed a reduction in pest occurrence and improved plant length, root nodulation, dry matter of plants and roots. Seed treatment with bacteria of lactic acid fermentation was most effective in enhancing root nodule production and promoting plant growth. Moreover, seed dressing with bacteria of lactic acid and *Trichoderma virens* resulted in higher values of pea number of pods per plant, number of seeds per plant, and seed yield. Compared with the untreated control, treatment of pea seeds with these treatments also resulted in an increase in the protein content of pea seeds. The results of this study indicate the potential of harnessing biocontrol treatments on pest, growth and seed quality of field peas in organic farming conditions.

Keywords: biological control; lactic acid bacteria; *Metarhizium brunneum*; *Pisum sativum* L.; *Trichoderma virens.*

Acknowledgement: The research was financially supported by the Grant Agency of the University of South Bohemia in České Budějovice, Czech Republic, under grant number GA JU 085/2022/Z

The Influence of Resource-Saving Soybean Cultivation Technology on the Phytopathological State of the Soil

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Abstract: In modern conditions of agriculture in Ukraine, there is a growing need to control the phytosanitary condition of soybean crops, the profitability of which can be significantly reduced due to the development of diseases. In recent years, agricultural producers are increasingly using measures to preserve soil cover, biologize agriculture, which contributes to obtaining the potential productivity of crops and optimizing the phytosanitary state of crops without the use of pesticides. One of these measures is the introduction of minimum tillage. Field research was conducted during 2022-2024 in the conditions of southern Ukraine. The cultivation of soybeans using no-till technology contributed to the change in the ecological conditions for the formation and development of microorganisms in the soil in all years of research. According to the results of phytopathological analysis of soil samples, on average over the years of research, the total number of fungi was from 79.5 to 94.4 thousand CFU/g soil. Of the potential toxin-forming species in the investigated soil samples *Penicillium funiculosum*, *Penicillium solitum*, *Gliocladium roseum*, *Aspergillus niger*, *Aspergillus fumigates*, *Trichoderma harzianum*, *Fusarium oxysporum*, *Fusarium sporotrichioides*, *Alternaria alternata* were found. The share of potential toxin-producing species of fungi was 45.8-59.1% of the total number of selected species, depending on the soybean cultivation technology. The share of pathogenic fungi in soil samples using no-till technology was 7.8 thousand CFU/g soil or 8.3% of the total number of selected species. A slightly higher number of pathogenic microorganisms was noted under the classical technology of soybean cultivation - 23.2 thousand CFU/g soil or 29.2% of the total number of selected species, which exceeded the indicators of the no-till option by 66.4%. They were represented by the following species *Fusarium oxysporum* (*Schlecht.*) *Snyd. et Hans.*, *Fusarium sporotrichioides nom. nov. Bilai*, *Peronospora manshurica Sydow*, *Alternaria alternata (Fr.) Keissl.*

Keywords: soybean, resource-saving technology, phytosanitary state of crops.

The Impact of the War on the Agriculture of Ukraine: the Scale of Social, Ecological and Economic Losses

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Abstract: Russia's full-scale invasion of Ukraine in February 2022 caused significant damage to the country's economic system. Certain spheres have experienced a practically devastating impact. They include, in particular, the agri-food system of Ukraine. Our task is to systematize and assess the scale of the impact of the war on the agricultural sector of Ukraine in social, ecological and economic dimensions. The study is based on a comparative analysis of dynamic and structural changes in the development of agriculture in Ukraine in three directions. The results of the study indicate significant losses of the agricultural sector of Ukraine: economic – loss of land in the occupied territories and in the war zone, loss of livestock, destruction of the infrastructure of production, processing and storage of agricultural products; social – loss of human capital and violation of humanitarian security; environmental – violation of environmental safety. The available methods make it possible to estimate with a sufficient degree of accuracy direct economic losses (harvests stolen or destroyed by the Russians, grain stores damaged or destroyed, etc.). Difficulties are caused by the process of assessing indirect losses (deterioration of product quality due to land and water pollution, food shortages, etc.). Part of the losses in the agricultural sector are reversible: it is possible to rebuild the infrastructure, breed livestock, carry out measures to restore land, etc. The development of relevant methods of economic assessment of irreversible losses and the search for effective mechanisms for preventing such losses remain an open issue.

Keywords: agriculture; economic, environmental and social losses; Ukraine; war

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The Hardness of Fallow and Arable Chernozem in Spring

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Abstract: Hardness is one of the main indicators used to characterise the physical condition of the soil and to assess the environment in which plants grow and develop. Increased hardness leads to an increase in the energy required to cultivate the soil and worsens the conditions for the emergence of plant seedlings on the soil surface. The aim of the research is to determine the hardness of typical chernozems in agricultural and natural phytocoenoses. Hardness analysis was carried out directly in the field in the spring (10/03/2024) using the LAN-M soil density meter, an electronic device for measuring the degree of soil compaction in fields in accordance with ASAE S313.3. Soil hardness varies widely and depends on soil conditions. As a result of our research it was found that the soil hardness on the fallow land variant was in the low range and did not exceed the optimum values (0-14 kg/cm^2, 0-200 psi). The upper part of the profile of the arable chernozem also has optimum hardness values. A noticeable compaction can be seen from the depth, which is reflected in the increase in hardness to medium (14-21 kg/cm^2, 0-300 psi) and high (over 21 kg/cm^2, over 300 psi) values. In spring, before the grasses start to grow again, there is a noticeable decrease in hardness. This is due to hydrothermal factors and, in particular, an increase in soil moisture during the autumn and winter.

Keywords: chernozem typical; hardness; phytocoenoses; soil moisture

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The Influence of Biological Preparations on the Productivity of Corn Hybrids in the Conditions of Southern Ukraine

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Abstract: Corn (*Zea mays* L.), one of the most productive grain crops, plays a leading role in successfully solving the task of sustainable grain production in Ukraine. In order to increase the level of realization of the biological potential of corn, it is important to introduce into production modern effective and competitive cultivation technologies, which should be based on the selection of highly productive hybrids adapted to the conditions of Ukraine and the use of modern biological preparations Experimental research was conducted in 2023 at the experimental field of the Mykolaiv National Agrarian University. The object of research was the processes of growth and development of corn plants of Gran 6 and Tesla hybrids, their formation of productivity As a result of the research, it was established that the highest yield of grain, on average, according to biological preparations, was formed by plants of the Gran 6 hybrid - 8.35 t/ha, which is higher than the yield of the Tesla hybrid by 0.11 t/ha. It should be noted that the highest yield of corn grain was obtained with pre-sowing treatment of seeds with the biological preparation Organic-balance and foliar feeding of plants with the biological preparation Azotophyt-r - 8.40-8.51 t/ha, depending on the studied hybrid. In the conditions of the south of Ukraine, the highest yield of corn grain is provided by the combination of pre-sowing treatment of seeds with the biological preparation Organic-balance and foliar feeding of plants during the growing season with Azotophyt-r for growing the Gran 6 hybrid.

Keywords: Zea mays, grain yield, biological preparations

Productivity of Seed Pea Varieties in Conditions of Southern Ukraine

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Abstract: Peas are one of the main leguminous crops in Ukraine. It has high nutritional and fodder value. Peas are the main source of vegetable protein. In terms of pea production, Ukraine is one of the first places in Europe and the whole world. To form a high grain yield, an optimal system of plant nutrition during the growing season, as well as the selection of the most adapted varieties, is necessary. Therefore, the selection of the most effective methods of adaptive and biological technologies for growing peas is of important practical importance Experimental research was conducted in 2024 at the research field of the Mykolaiv National Agrarian University. The object of research was the processes of growth and development of pea plants, their formation of productivity Research has established that in the conditions of the acute drought of 2024, the studied pea varieties formed a grain yield at the level of 1.37-2.52 t/ha. The highest productivity was for the cultivation of the White Angel variety and exceeded the indicators of other studied varieties by 0.27-1.15 t/ha or 10.7-45.6%. The use of biological preparations ensured an increase in the yield of pea grain by 0.08-1.17 t/ha compared to the control. Thus, during the cultivation of the White Angel variety, pre-sowing treatment of seeds with biological preparation Azotophyt and treatment of plants during the growing season, Organic Balance produced 3.18 t/ha of grain, which is 3.5 - 20.8% more than other variants of the experiment In the conditions of the south of Ukraine, the combination of pre-sowing seed treatment with Azotophyt biopreparation and foliar feeding of plants during the growing season with Organic-balance provides the highest seed pea yield. Among the studied varieties, the highest productivity was formed by plants of the White Angel variety.

Keywords: peas, varieties, biological preparations, grain yield

Cultivating Resilience: *Cistus ladanifer* L. Growth on Marginal Lands

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Abstract: *Cistus ladanifer* L., commonly known as rockrose, is a resilient Mediterranean shrub that thrives in marginal lands unsuitable for conventional agriculture. Its extracts are used in perfumery for their aromatic and fixative properties and have potential as cosmetic ingredients. Cultivated plants may produce more homogeneous and high-quality extracts than those from wild plants. This study provides a preliminary evaluation of the cultivation potential of *C. ladanifer* on such land, focusing on survival and growth rates. Seedlings, obtained from their natural habitat in Hiendelaencina (Castilla-La Mancha, Spain), were planted on an experimental plot in the marginal lands of CEDER-CIEMAT (Castilla y León, Spain), characterized by poor soil quality, low fertility, and minimal water retention capacity. The seedlings were planted in spring and autumn 2022, arranged in seven rows with a plant spacing of 75 cm, totalling 53 plants per row, and were monitored over a two-year period. Initial results indicate survival rates over 78% for spring plants and 67% for autumn plants six months after transplantation, despite harsh conditions. Average height increases were 35 cm for spring plants and 14 cm for autumn plants over two years. The findings suggest that *C. ladanifer* is a viable option for cultivation on marginal lands, as the plants demonstrated substantial resilience to drought and poor soil.

Keywords: rockrose; cultivation; survival rate; degraded soil

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Evaluation of Changes in Electrophysical Parameters of Typical Chernozems During Strawberry Cultivation

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Abstract: A modern soil monitoring system on agricultural land includes a system for monitoring, collecting, processing, transmitting, storing and analysing information on changes in soil quality and fertility, and for developing practical and scientifically based recommendations for decision-making on the prevention and elimination of various types of negative processes. The electrophysical parameters (electrical conductivity, total mineralisation, salinity) were determined using a conductivity-salinity meter (EZODO-8200 M) in the upper part of the soil-water suspension. In most cases, recent research has shown a decrease in the electrical conductivity of soil-water suspensions compared to previous research. The largest changes occurred in the control variant in the upper part of the soil, where the values decreased from 268 μs/cm to 69 μs/cm, in the mineral system variant (decrease of 189 μs/cm) and in the organic-mineral system (decrease of 146 μs/cm). On the contrary, there was an increase in electrical conductivity last year compared to previous years in the lower thickness of the control and mineral system variants studied. The evaluation of the electrophysical parameters shows that the electrical conductivity of the soil-water suspensions is mostly low, medium and occasionally high in the first year, medium and low in the second year and low and occasionally high and medium in the third year. The difference in the obtained values of electrophysical parameters between the variants of different fertilisation of typical chernozems (control, mineral system, organic-mineral system, organic system) and over the years of research was revealed. The dynamics of changes in electrophysical parameters were observed and groups with high, medium and low values were identified.

Keywords: chernozem typical; electrophysical indicators; drip irrigation.

Characterisation, Development, and Efficacy of Wild *Metarhizium* Strains

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Abstract: Chemical pesticides have been used to eradicate pests in crop production in the past 50 years. However, the resistance and the impact on non-targeted organisms and the environment have resulted in finding alternative, biological control-based pest management. In this research, 6 strains of *Metarhizium ssp*. were used, and the observations were made based on the development and efficacy of each strain. In radial growth, there were so many differences among the strains, with Zam 1 (Zambian strain) having the largest colony sizes and Zam 5 and 4 (Zambian strains) having the smallest colonies. The fastest strain in efficacy was the strain F52 *M. brunneum*, a commercial product; on day 5, mortality was 100% and all the strains attained not less than 90 % after 9 days of incubation. The strain that attained the highest germination was MKC, Micheal Kalista CFU (*M. brunneum*), a Czech-isolated strain, and the strain with the lowest strain is Zam 4. Based on the findings for overall development and efficacy, there were differences observed. The strain Zam 5 has shown good potential for use in pest management, but its production would be low. All strains have shown potential until we get results from genetics to determine what type of strains we have.

Keywords: *Metarhizium spp*.; Biological control; Zambian strains; *M. brunneum*; efficacy.

Morphobiological Features and Productivity of Essential Oil Plants of the Lamiaceae Family in the Conditions of the Southern Steppe of Ukraine

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Abstract: The relevance of growing essential oil plants of the Lamiaceae family is currently growing due to the growing demand for natural plant raw materials and essential oil, as well as the possibility of growing plants of this family on degraded, unproductive lands for the purpose of their phytoremediation under conditions of climate change and use for agritourism. The aim of the research was to study the morphobiological features and productivity of essential oil plants of the Lamiaceae family in the conditions of the Southern Steppe of Ukraine. To achieve this goal, methods of field and laboratory experiments, phenological observations, and statistical analysis were used. The material for the research work was varieties of *Lavandula angustifolia* Mill., *Lavandula hybrida* Rev., *Hyssopus officinalis* L., *Mentha x piperita* L., *Melissa officinalis* L., *Salvia sclarea* L. The viability of essential oil plants ranged from 85.0 to 100% depending on the type and variety of plants and the quality of planting material. Winter hardiness during three years of cultivation was 80.5-98.7%. During the growing seasons, the plants of all studied species went through all phases of vegetation and formed a crop of plant material, which increased dynamically from the first to the third year and depended on the genotype and agro-meteorological conditions of the growing year. The obtained results show the high adaptability of essential oil plants of the Lamiaceae family and allow us to recommend them for cultivation in the Southern Steppe of Ukraine.

Keywords: essential oil plants; survival; winter hardiness; adaptation; productivity

Optimization of Green Microwave-Assisted Extraction Method for *Cistus ladanifer* L. Essential Oil

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Abstract: *Cistus ladanifer* L., commonly known as rockrose, is a Mediterranean shrub increasingly used for the production of essential oil (EO), which is rich in bioactive compounds with significant industrial applications in perfumery and cosmetics. Traditional extraction methods for EO are time-intensive and require substantial water usage, which can have adverse environmental impacts. This study explores the efficiency and effectiveness of solvent-free microwave extraction (SFME) as a green alternative for obtaining EOs from *C. ladanifer*. Microwave extraction was conducted using one kilogram of fresh plant material, shredded to a particle size of 20 mm, and immersed in 4 litres of distilled water, under varying power levels (500-1800 W) and extraction times (30-135 min) to optimize EO yield. The optimal SFME conditions were determined to be 1000 W and an extraction time of 90 min. Results demonstrated that SFME significantly reduced extraction time compared to traditional methods while maintaining a high yield of rockrose EOs. In conclusion, solvent-free microwave extraction could be a viable and environmentally friendly alternative for the efficient extraction of EOs from C. ladanifer, although further research is required.

Keywords: rockrose; distillation; extraction efficiency; yield improvement; solvent-free microwave extraction

Acknowledgement: This work has been supported by GO ESjara project. The GO ESjara: Essential Rockrose Oil for the Development of Bioeconomy in Rural Areas aims to develop the value chain for the utilization of rockroses (*Cistus ladanifer* and *Cistus laurifolius*) to obtain essential oils by valorizing residues and by-products. European Commision:https://commission.europa.eu/eu-regional-and-urban-development/topics/rural-development_en. The operational group GO-ESJara has received a grant of 598.428,13 € for its innovation project. The project amount is 100% financed with funds from the European Recovery Instrument (EU Next Generation), as established in Royal Decree 169/2018, of March 23. The organization responsible for the content is GO-ESJara. The General Directorate of Rural Development, Innovation, and Agri-food Training (DGDRIFA) is the managing authority responsible for the implementation of the FEADER aid. European Agricultural Fund for Rural Development: Europe invests in rural areas.

Eco-Innovative Extraction of Bioactive Compounds from Olive Pomace for Industrial Valorization

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Abstract: Olive pomace, a by-product of the olive oil industry, holds significant untapped potential due to its rich content of bioactive compounds like polyphenols and tocopherols. This research aims to develop innovative extraction techniques to optimize the recovery of these compounds while minimizing environmental impact. The study focuses on enhancing waste management and sustainability in the olive oil industry, with potential applications across food, dietary supplements, cosmetics, and pharmaceuticals. The total phenolic content and antioxidant activity of olive pomace extracts were assessed using specific methods: antioxidant activity was determined through the DPPH assay, which measures the scavenging ability of extracts against the DPPH radical, while the total phenolic content was quantified using the Folin-Ciocalteu method, which involves a colorimetric reaction to detect phenolic compounds. The results indicate that aqueous extraction of olive pomace under specific conditions (0.5 g of pomace, 10 minutes of extraction at room temperature) produced extracts with a phenolic content of 34.5 mg gallic acid equivalent per solvent extraction. Additionally, these extracts demonstrated significant antioxidant activity, reaching 52.5%. These findings highlight the potential for developing functional products across various sectors, including food, dietary supplements, cosmetics, and pharmaceuticals. Furthermore, the proposed valorization of olive pomace aligns with a more sustainable approach to agricultural waste management, thereby creating new economic opportunities for the olive oil industry.

Keywords: olive pomace; bioactive compounds; polyphenols; eco-innovative extraction; valorization

Enhancing Sustainability in the Coffee Supply Chain: Applying Controlled-Second Fermentation and Integrating Bioenergy Generation Using Dark Fermentation

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Abstract: This study aimed to identify potential spots for reducing the environmental impact of the coffee supply chain through the application of sustainable technology, which focuses on improving the quality of coffee and waste utilization for bioenergy generation. The three bacterial isolates were applied in a controlled-second fermentation of green beans at 37°C for eight hours with a concentration of 10% v/w. The coffee beans were subjected to roasting at varying degrees, specifically light (205°C), medium (219°C), and dark (230°C). Metabolite and amino acid profiling were conducted using ^{1}H NMR and UPLC, respectively, also a cupping test was conducted for flavor assessment. The spent coffee ground (SCG) was pretreated and used as a substrate in dark fermentation for biohydrogen production using isolated *Clostridium tertium* IGP01 as inoculum. The findings indicated that fermentation enhances the concentration of lactic acid, 5-o-caffeoylquinic acid, and all amino acids, except for lysine. As roasting progressed, the concentration of threonine and arginine declined, while that of leucine, isoleucine, and valine increased with increasing roasting degrees. The cupping test shows that the dominance of bitterness increases with the degree of roasting, while the characteristics of sweetness and acidity decrease. For biohydrogen production from SCG, the supplementation of nanoparticles, biochar, and immobilized biochar-nanoparticles enhanced the biohydrogen yield by 25.8-58.0%. The difference in roasting degree influences amino acid profile and flavor characteristics, while the dark fermentation approach can be used to maximize resource utilization for better sustainable practices in the coffee industry.

Keywords: biohydrogen; coffee fermentation; coffee sustainability; roasting degree; spent coffee ground

Cocoa-based Family Farming Systems in Ecuador

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Abstract: Family farming systems (FFSs) contribute to global food production and sustainability, supporting livelihoods and biodiversity. However, despite their importance, research on FFSs in Ecuador's coastal region remains limited. This study aims to address this gap by analyzing the characteristics of cocoa-based FFSs within the agricultural association "15 de Septiembre" in Vinces canton, Los Rios province. To collect information, a questionnaire was administered to the association's members, gathering data on crop types, cultivated area, fertilizer use, labour composition, and motivations for cash crop diversification. Additionally, the Shannon diversity index (H') was used to quantify crop diversity, which was then categorized into ranges for analysis. Farm attributes were examined in relation to cocoa variety and H' ranges. Although farm attributes were initially examined in relation to cocoa variety, further analysis involving H' ranges and motivations for diversification is ongoing. Preliminary results based on cocoa variety show that 60% of farms grew CCN-51, 25% cultivated Nacional, and the remaining farms managed both varieties. Farms growing CCN-51 or both varieties exhibited higher crop diversity, while those cultivating only Nacional had lower diversity. Additionally, farms growing both varieties employed less external labor, although all groups involved at least three family members in cocoa activities. In terms of fertilizer use, farms growing both varieties and only Nacional were more likely to use organic fertilizers, whereas those cultivating CCN-51 primarily relied on chemical fertilizers. These current and forthcoming results will provide insights for stakeholders to better allocate resources and support cocoa-based FFSs.

Keywords: Shannon index; agrobiodiversity; family farming

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Influence of Elevated Climate Conditions on the Plant Virus in Brassica Napus

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Abstract: The global average temperature will rise by up to 1.5°C above pre-industrial levels between 2030 and 2052 if this continues, and CO_2 levels will increase from around 400 to 670 ppm below Representative Concentration Pathway (RCP) 6.0 or 936 ppm below RCP 8.5 by the end of this century. Global climate change exacerbates the threat of plant diseases, including viruses, by disrupting the delicate balance of interactions between plants and pathogens. Now the question is how these elevated climatic condition will effect certain plant-virus interaction. In this study, the effect of elevated temperature (28°C) and CO_2 (0.09%) on the interaction between Brassica napus and turnip yellows virus (TuYV) was investigated by inoculating several genotypes with TuYV and exposing them to these altered conditions. We found a consistent reduction in virus titre. The combination of elevated CO_2 and non-elevated temperature showed the best effect in reducing virus titre in all five genotypes tested. Virus titre was significantly affected by elevated temperature only in genotype OP8482 DH and by elevated CO_2 conditions in three different genotypes namely Rescator, OP8482DH and DK temptation. These results suggest that while climate change poses significant challenges for agriculture, it may also trigger protective responses against viral pathogens in certain plant-virus combinations. A deeper understanding of these mechanisms is crucial for the development of resilient plant varieties in the face of climate change.

Keywords: climate change; elevated temperature; elevated CO_2; Brassica; TuYV

Implementation of Sorghum in Pasta Products

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Abstract: Sorghum, a climate smart, drought-resistant, and gluten-free grain, has significant potential for enriching pasta with higher fiber content, essential nutrients, and antioxidants. In this study, eight (8) Austrian sorghum cultivars were used to prepare durum wheat-sorghum blend (60:40 ratio) pasta. The proximate and rheological properties of sorghum flours and durum-sorghum pasta were evaluated, as well as starch and protein digestibility. Water absorption value (WZ), as measured by Farinograph, ranged between 51.5% - 55.5% for durum wheat and sorghum flours. Extensograph results revealed that all sorghum flours, except one, produced dough with lower resistance and extensibility compared to traditional durum wheat. The durum-sorghum pasta produced from all eight (8) sorghum cultivars achieved good cooking and texture qualities. Average cooking time (CT) of the durum wheat-sorghum pasta blends was between 3.4 and 4.5 minutes. However, cooking loss (CL) values were observed to be above the ideal threshold (≤ 8%) in the pasta samples and correlation analysis showed statistically significant ($p \leq 0.05$) non-zero correlations (-0.68) between CT and CL. Slight colour variations were observed among the different pasta types. The incorporation of sorghum flour resulted in improved protein digestibility in four out of seven cultivars and starch digestibility in three out of seven cultivars when processed into pasta. Preliminary sensory tests indicated sorghum addition did not significantly affect the taste, texture, or overall acceptability of the pasta. This research, therefore, highlighted the potential of using sorghum as a functional ingredient to develop nutritionally improved and widely acceptable pasta products. However, future work is needed at further improving the ratio formulations and up-scaling production processes for commercial applications.

Keywords: Austrian sorghum, starch digestibility, protein digestibility, total phenolic content.

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Tropical roots and tuber plants on local markets in the Peruvian Amazon

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Abstract: The tropical roots and tubers (TR&T) are important source of income and medicine in many developing countries. In the Peruvian Amazon the TR&T are considered underutilised species as people no longer value them, they prefer other food and medicinal sources; this shows why the species are gradually disappearing, being available in most cases only in a few home gardens and local markets. In this context the objective of this study was to document the uses of TR&T in the Peruvian Amazon. This study was carried out through ethnobotanic survey between Oct.2022 – Sept.2023 in 17 local markets of the Peruvian Amazon. The data was collected through ethnobotanic semi-structured questionaries where 31 vendors were interviewed. The results showed that 17 species were local used as food and medicine, the result also indicated that there were divided in 12 genera and 6 botanical families. The most predominant family was Araceae, and the species *Dioscorea trifida* and *Calathea allouia* were the more reported. It is crucial to consider that some of this species in question are endemic, they have been employed by local communities for centuries, and it is vital to conserve them in order to facilitate further investigation into their potential applications in nutrition and health. Most TR&T plant species in the Peruvian Amazon are employed primarily for medicinal purposes (82.35%), they are becoming increasingly scarce in the marketplace. Consequently, it is imperative to advocate for their preservation to facilitate further investigation into their potential applications.

Keywords: ethnobotany; underutilised species; medicinal plants; traditional uses; plant genetic resources

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Determinants of Soybean Adoption by Smallholder Farmers in Kenya

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Abstract: Soybean is an important food, feed and oil crop. It also fixes the atmospheric nitrogen, therefore, making it an important crop in improving farmers' household income, nutrition and soil fertility. Despite the crop numerous benefits, its adoption by smallholder farmers in Kenya is low. This study, therefore, sought to investigate the factors influencing adoption of soybean by smallholder farmers in Kenya. A multistage sampling method was employed to identify 210 sample households from Embu, Tharaka Nithi and Meru counties in the central highlands of Kenya. Data was collected in March 2017 using semi-structured questionnaires and analysed using binary logistic regression model. Out of the sampled households, 41% were adopters while 59% were non-adopters. Results showed that farm size, membership of a farmer group and attendance of training to have a positive and significant influence on adoption of soybean while age to have a negative influence. Young household heads, farmers with large farm sizes, members of farmer group and those who had received training on soybean were more likely to adopt soybean. The results imply that to enhance soybean adoption, there is a need to provide training to older farmers and those with smaller farm sizes.

Keywords: adoption; Kenya; soybean

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Local Knowledge, Management, and Production Challenges Associated with Drumstick Tree (*Moringa oleifera* Lam.) in Kenya

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Abstract: Although *Moringa oleifera* is a multipurpose tree with significant nutritional and therapeutic benefits, it is undervalued and neglected in Kenya as the local people associate it with famine and poverty. It is usually less preferred compared with the major crops locally grown in the country. Our study aimed to evaluate the local knowledge, management, and production challenges associated with the tree in Kilifi County, Kenya. The structured questionnaires were used to collect data from people who had experience of growing *M. oleifera*. We collected data on local knowledge of the plant, management practices, and the associated production challenges. The data was then compared among different categories including age, gender, and ethnic groups. The results revealed that all respondents were familiar with the tree. The majority (96.1%) knew only one variety, while the remaining 3.9% mentioned another variety, which they claimed had comparatively bitter leaves and was morphologically different. The study showed that more than half (55.3%) of the respondents had between one to five trees in their compound, indicating a low preference for the tree compared to major crops. All respondents cited watering and pruning as crucial management practices. Slightly more than half (51.3%) mentioned pests as a constraint in growing the tree, while the bitter taste (60.5%) and small leaves (36.8%) were deterrents to consumption and harvesting, respectively. The tree species is less preferred compared to major crops, hence the need for concerted efforts to raise awareness of its potential benefits and mitigate the production challenges.

Keywords: Moringa, malnutrition, ethnobotany, phytonutrients

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Adoption of Improved Buffalo Breeds in Nepal: Impact on Milk Production, Sale and Consumption

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Abstract: In Nepal, the local buffalo breed adoption has resulted in low production efficiency and poor reproductive performance in this sector. This research aims to investigate socio-economic factors that influence the decision of the farmers to adopt improved buffalo breeds and to measure the impact of their choices on milk productivity, sales volume, and per capita daily consumption. A total of 937 samples were collected from six districts of Nepal following cluster randomization sampling techniques. The data were collected between November and December 2023. Propensity score matching (PSM) combined with probit regression was employed to analyze the data. Field survey data shows that only 21.7% of households in the study area had adopted improved buffalo breeds. The probit regression results show that participation in dairy cooperatives, access to extension services, farming size, grazing land area, and receipt of subsidies positively influenced the adoption, while off-farm activities and male household heads negatively affected it. Similarly, PSM indicated that improved breed adopters exhibited significantly higher milk yield (0.97 liters/day/animal), and sales (0.91 liters/day/animal) as compared to local breed adopters. Moreover, the results indicated that the adoption of improved breeds contributed to an increase of 26 ml per capita/day/animal milk consumption. This study suggested that policymakers should support gender-inclusive, incentive-based buffalo breed improvement initiatives for farmers who own large areas of land through dairy cooperatives and efficient extension services. This approach is expected to increase milk production, a reduction in trade deficits, and an improvement in food and nutrition security in Nepal.

Keywords: adoption of improved breeds; buffalo farming; productivity; socio-economic factors propensity score matching; Nepal

Acknowledgement: The research is funded and supported by ILRI-Sampling Project Nepal.

Development of an in Vitro Propagation Protocol for Oca (*Oxalis tuberosa Molina*), an Andean Tuber Crop

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Abstract: Oca (*Oxalis tuberosa*) belongs to a group of lesser known root and tuber crops (ARTCs) domesticated in the Andes. This tuber crop, rich in starch, plays an important role in the nutrition and food security of local families in the highlands. Due to the predominantly vegetative propagation of oca, traditional methods of breeding and conservation of this species are limited. The aim of this primary study was to develop a micropropagaton protocol for oca as a prerequisite for further biotechnological approaches. For in vitro shoot induction, MS medium (Murashige and Skoog 1962) with plant growth regulators (PGRs) at different concentrations was used. The cytokinins 6–benzylaminopurine (BAP) and zeatin (ZEA) were tested either separately at a concentration of 0.1 mg/l or in combination with the auxin α–naphtaleneacetic acid (NAA) at a concentration 0.03 mg/l. As a control, MS medium without PGRs was used. For in vitro rooting, MS medium containing NAA at a concentration of 0.1 or 0.3 mg/l was tested. The medium containing 0.1 mg/l BAP was the most effective medium for shoot formation, providing 11.30 shoots per plant, and forming the highest number of meristems. The shoots rooted on all media tested, however the optimal medium for rooting was the control, reaching approximately 14.00 roots per explant. The micropropagation protocol developed in this study might be used for large-scale propagation of O. tuberosa in a relatively short time period of time and can be used as a supportive technique in breeding and conservation of oca genetic resources.

Keywords: Andes; cytokinin; micropropagation; Oxalidaceae;

Acknowledgement: This research was financially supported by the Internal Grant Agency of the Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, IGA (Project No. 20243115).

Study of the Influence of Biofertilizers on the Productivity of Corn for Grain in the Conditions of the Sumy Region (Ukraine)

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Abstract: Corn (*Zea mays*) is a major crop globally and in Ukraine, used for various purposes including food and industrial products. With the increasing interest in organic farming, the use of biofertilizers has gained attention due to their potential benefits on crop productivity without the use of chemical components. This study investigates the impact of biofertilizers on corn productivity under the specific conditions of the Sumy region. The research was conducted at the Scientific and Educational Industrial Complex of Sumy National Agrarian University in 2022. The experiment included the use of two types of biofertilizers: LEANUM (liquid) and VITAMIN O7 (powder). These biofertilizers were applied through seed inoculation, foliar application, and a combination of both methods. Corn hybrid Euralis Hemingway EC (FAO 280) was used for the study. Key parameters measured included corn productivity metrics such as the mass of 1000 seeds and yield. The application of biofertilizers did not significantly affect the structure of the corn crop, including the number of rows and grains per row. However, the combined use of LEANUM inoculation and two LEANUM foliar treatments resulted in the highest mass of 1000 seeds and the greatest overall yield. This indicates that the integrated approach of seed inoculation followed by foliar application is the most effective method for enhancing corn productivity in this region. The study concludes that while biofertilizers do not significantly alter the crop structure, their use, particularly in combined application methods, can substantially improve the yield and seed mass of corn. These findings support the use of biofertilizers as a viable strategy for organic corn production, contributing to sustainable agricultural practices in the Sumy region.

Keywords: corn productivity; biofertilizers; organic farming; seed inoculation; foliar application

Disease Resistance of Corn Hybrids Using No-Till Cultivation Technology in the Conditions of Southern Ukraine

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Abstract: Resistance of corn hybrids to diseases under No-till cultivation technology in the conditions of southern Ukraine. Corn plants are affected by a significant number of fungal diseases, of bacterial and viral origin, which significantly affects its productivity and grain quality. One of the measures to combat diseases plants have a selection of hybrids. Field research was carried out during 2022–2023 in the conditions of southern Ukraine. DKS corn hybrids were grown 4795 (FAO 380) and DKS 3730 (FAO 280). Damage to plants by diseases was evaluated on a 9-point scale, where 0–10% plant damage corresponded to 9 points of stability; 10,1–14,0% – 7 points, 14,1–25,0% – 5 points, 24.1–50,0% – 3 points, more than 50% - 1 point. It was established that the spread of diseases in corn was affected by high temperature (25–28°C) and air humidity under the flowering time of the crop, which contributed to damage to the panicle and cobs. It was determined that the investigated corn hybrids were resistant to volatile slag the percentage of damage to plants of hybrid DKS 4795 (control) was 12,1%. Lower development of the disease by 1,5% was observed in the hybrid DKS 3730. The development of bubbly soot in the phase of full maturity was insignificant - 5,4–5,8%. No significant differences between the hybrids were determined, the difference was in within the margin of error. The intensity of the development of fusarium head blight was 14,5% (DKS 4795) and 14,9% (DKS 3730). According to the degree of damage to the cobs of hybrids belonged to medium-resistant - 25,4–28,1% Highest the percentage of disease damage was observed in 2022 with a large amount of precipitation during June-September. More resistant to the causative agent of flying soot the hybrid DKS 3730 was identified, and the hybrid DKS 4795 was identified for Fusarium head blight.

Keywords: corn, hybrids, plant diseases.

Determination of Background Concentrations of Heavy Metals in the Soils of the Sumy Region

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Abstract: Due to the military actions on the territory of Ukraine, there is currently an active contamination of the soil with heavy metals. Their source is the use of ammunition. The concentration is especially high, where constant shelling takes place. To determine the content of heavy metals in typical slightly leached, low-humus medium-loam Chernozem, heavy metal concentrations were determined in the 0-100 cm layer with a step of every 10 cm. The content of chemical elements was determined using the X-ray fluorescence method with the device ThermoScientific Niton XL2. It was determined that none of the identified 27 chemical elements exceeds the sanitary standards established by Ukrainian legislation in the amount of heavy metals in the soil. However, an interesting feature was noted, namely, the highest defective content of barium and ferrum was recorded at the depth of the plow sole - 30-40 cm. Overall, while the current levels of heavy metals do not pose an immediate threat according to sanitary standards, the presence of elevated barium and ferrum at the plow sole depth warrants further monitoring and investigation. It is important to create a database of the content of heavy metals in the soils of Ukraine in order to further understand the impact of military operations on their condition.

Keywords: trace metals; X-ray fluorescence method; background concentrations database; Ukraine; Chernozem

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Substantiation of the Organic-Oriented Model for Agricultural Production: A case study of the Ukrainian Forest-Steppe

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Abstract: The problem of rational soil use and the development of technological principles for stabilising the phytosanitary condition of fields is an important direction of sustainable agricultural development in the postwar period in Ukraine. In this connection, the issue of transition to a biological farming system becomes a priority in the future. Accordingly, the study aims to assess the agro-resource potential of the forest-steppe zone in the organic farming system. Multi-year field studies were carried out using computational-comparative and mathematical statistics methods for large data sets. It was established that the introduction of leguminous crops into organic agroecosystems of the forest-steppe of Ukraine creates favourable conditions for plant development. The productivity of crop rotations was determined. The highest productivity was observed when legume components (soybean, pea, lentil, vetch-oat mixture) were introduced as a precursor of winter wheat under the conditions of using sugar beet in the third year of crop rotation. The yield of fodder-protein units in these variants was 3.78, 3.75, 3.72, and 3.71 t/ha. In the conditions of buckwheat placement in the third year of rotation, the short-rotation crop system revealed a 1.4 times decrease in productivity. It was recommended to the farms of the forest-steppe of Ukraine to adopt economically and energetically feasible crop rotations schemes with different specialisations, which will ensure stabilisation and growth of crop productivity under annual variability of weather conditions and stable trends in climate change, provided that the ecological state of the environment is protected.

Keywords: agricultural production greening, organic agroecosystems, agrotechnical experiments, crop rotation, legume component.

Influence of Foliar Treatment on Maize Yield

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Abstract: According to modern agricultural technologies, one of the important elements in growing agricultural crops is foliar fertilization. Due to the fast, balanced supply of plants with the nutrients they need, productivity increases significantly and the quality of the products obtained improves. Research was conducted according to the following plan: 1) control sample, 2) mineral fertilizer pre-sowing application, 3) foliar treatment of vegetative plants in the phase of 7-9 true leaves, 4) pre-sowing mineral fertilizer with foliar treatment of vegetative plants in the phase of 7-9 true leaves. According to the conditions of the study, the pre-harvest density of corn sowing was 75 thousand plants per hectare. The effectiveness of using Avangard K microfertilizer at the rate of 2 l/ha in the 7-9 of the leaves phase of corn plants was established. The average yield of corn for years of research in the control plots was 5.4 t/ha. The use of mineral fertilizers increases plant productivity, with the average yield being 6.9 t/ha. As for foliar feeding Avangard K, the average yield was 7.0 t/ha. The highest yield values of 7.3 t/ha were recorded in areas with complex application of microfertilizers with foliar feeding Avangard K of plants. Therefore, it can be concluded that the maximum values of corn yield can be obtained with the complex use of mineral fertilizers and foliar fertilizing with microfertilizer Avangard K in the phase of 7-9 leaves of the crop.

Keywords: foliar fertilizing; microfertilizer; Avangard K; Zea mays; yield

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Genetic Diversity of Locally Adapted Turkey in Nigeria Using Mitochondrial DNA

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Abstract: The first hypervariable (HV1) region of the mtDNA of 84 samples from Rivers, Kwara, Ebonyi, Oyo and Lagos states were amplified using DBF; 5'-AGGAGGAGGAGACCCAATCC-3 and 5'-CAGTGGGTGAAGCCTGCTAA-3' as forward and reverse primers to study the genetic diversity and population structure of locally adapted Turkey (LAT) in Nigeria. PCR amplicons were sequenced using the sanger sequencer. The sequences were viewed, trimmed, aligned and single nucleotide polymorphism (SNP) was identified using Bioedit and MEGA 11 software. The genetic distances and phylogenetic relationship between the mtDNA sequences of the LAT and those of 12 birds obtained from Genbank were estimated using the pairwise distance and neighbor-joining method of MEGA 11. Analysis of molecular variance and diversity indices were estimated to determine the population structure using ARLEQUIN and DnaSP v6 software. Also, construction of haplotype network was done using median-joining method of PopART 1.7 software. Result from this study showed a non-synonymous SNP at position g.6170(A>G) in eighteen samples and two haplotypes (Hap_1 and Hap_2). The entire population showed low haplotype diversity (0.3409) and very low nucleotide diversity (0.00073). The genetic distances estimated between sampled populations were low (0.00). The phylogenetic tree further confirmed the degree of closeness observed in the estimated genetic distance values. Analysis of molecular variance showed that the genetic variation among populations (8.64%) was lower than the genetic variation within populations (91.36%). This observation and the low fixation index indicated that the sub-populations were not differentiated. The demographic indices showed that some sub-populations were evolving neutrally while some were expanding.

Keywords: Turkey; mtDNA; genetic diversity; single nucleotide polymorphism

Occurrence of *Borrelia burgdorferi* Sensu Lato in Small Wild Mammals Around a Municipal Waste Landfill

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Abstract: Wild mammals can be reservoirs for infectious diseases with zoonotic potential, particularly at municipal waste dumps, which offer shelter and food, creating ideal conditions for the spread of infections. This study aimed to detect *Borrelia burgdorferi* sensu lato (Bbsl) and antibodies in rodents captured at a waste dump. Antibodies were identified using the ELISA method on heart lavage, and Bbsl was directly detected via PCR from kidney tissue. Antibodies to IgM were found in 10.5% (18/170) of rodents, and IgG antibodies in 10% (17/170). The species *Apodemus sylvaticus* had the highest infection rate at 29% (9/31), while *Sorex araneus* had the lowest at 8.7% (2/23). Using PCR, Bbsl was detected in 14.7% (25/170) of rodents, with *A. sylvaticus* showing 22.6% (7/31) and *Microtus arvalis* showing 17.9% (17/95). *A. uralensis* showed no positivity (0/20). Age and sex did not affect infection rates, but there was a significant seasonal difference, with the highest positivity in spring (27%, 10/37) and the lowest in summer (8.5%, 8/94). The overall prevalence of Bbsl is lower than expected due to the landfill conditions not resembling natural tick habitats. Since vertical transmission of Bbsl has not been established in reservoir animals, the lack of a vector hampers infection spread. Nonetheless, there remains a risk for people and pets near the landfill.

Keywords: *Borrelia burgdorferi* sensu lato; zoonoses; wild animals; PCR; ELISA

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Dietary Bacillus Species Modulate Lipid Metabolism-Related Parameters, Growth, Water Quality, and Bacterial Load in Nile Tilapia (Oreochromis Niloticus)

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Abstract: Probiotics have great potential for application in aquaculture. This study evaluated the effects of Bacillus spp. mixtures at concentrations of 0.2 g/kg (PRO-0.2) and 0.5 g/kg (PRO-0.5) on Nile tilapia (*Oreochromis niloticus*) over 90 days. Both supplementation groups (PRO-0.2 and PRO-0.5) showed significantly reduced water ammonia levels compared to the control. The groups also exhibited exponential growth in length and weight, with the PRO-0.5 group achieving the highest mean weight gain. These groups had the lowest food conversion ratios and highest protein efficiency ratios, alongside improved liver function indicated by reduced liver enzyme levels. The lipid profile revealed significantly lower serum levels of low-density lipoprotein, triglycerides, and cholesterol in the PRO groups, while high-density lipoprotein levels increased. Hepatic alkaline phosphatase levels significantly decreased, and the expression of hepatic fatty acid binding protein 3 (FABP3) was reduced in the PRO-0.5 group. Both groups exhibited increased intestinal expression of cd36 and fabp3, with cd36 showing the most substantial rise. Hepatic cd36 expression became prominent in both groups after 90 days. The expression of fas was downregulated, while hepatic lipoprotein lipase (LPL) expression increased at 30 days but decreased after 90 days in the supplemented groups. This study underscores the benefits of Bacillus spp. supplementation on water quality, growth performance, feed efficiency, survivability, lipid metabolism gene expression, lipid profiles, body composition, and bacterial load in Nile tilapia.

Keywords: Bacillus species; lipid metabolism; Nile tilapia; probiotics; Sanolife PRO-F

The Effect of Immunocastration and Amino Acid Supplementation on Meat Quality of Farmed Fallow Deer (*Dama Dama*)

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Abstract: Immunocastration of male animals has a positive effect on animal welfare compared to physical castration; however, its use in deer has not been well-studied, despite the technique being common in intensive commercial deer farming units. Furthermore, the supplementation of rumen-protected amino acids (RPAA) is known to have a positive influence on animal production under conditions where they are limiting; however, immunocastration may change nutrient requirements and thus responses. To further understand the effects of immunocastration and utilization of RPAA in fallow deer, prior; forty-four fallow deer bucks (10 months old; 22.9 ± 2.4 kg) were utilized for this study. Twenty-two bucks were immunocastrated with Improvac® at weeks 1, 8, and 20 of the study, while the other 22 remained intact. Half of each sex-treatment group were supplemented with rumen-protected lysine and methionine (3:1), from week 8 and lasted until the end of the trial at week 39. The animals were slaughtered, and parameters such as body weight, slaughter weight, and average daily gain were taken into consideration. Chemical composition (moisture, ash content, crude protein, IMF, collagen content, and collagen solubility), and fatty acid profiles of the *longissimus thoracis et lumborum* (LTL) and *biceps femoris* (BF) muscles were analyzed. The interaction between nutrition and castration status was significant for the proportion of soluble collagen in the LTL, as well as a number of fatty acid proportions in the LTL and BF, and sensory descriptors such as LTL overall odor intensity, game odor intensity, and BF grass odor intensity, liver flavor, and overall acceptance. Despite the differences in chemical composition, there were no overall sensory acceptance differences for the LTL between treatments, but the BF from non-castrated deer fed without amino acids, and immunocastrated deer fed amino acids had the highest overall acceptance.

Keywords: cervid; immunocastration; venison; meat quality; RP-Lysine; RP-Methionine

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The Impact of the Destruction of the Kakhovka Hydroelectric Power Station Dam on the Biodiversity of the Lower Dnieper

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Abstract: The destruction of the Kakhovka hydroelectric power station dam in 2023 caused a severe ecological disaster in the Lower Dnieper region, affecting both human settlements and biodiversity. The sudden loss of regulated water flow led to significant habitat degradation, particularly in aquatic and wetland ecosystems. This study aims to assess the impact of the dam's destruction on local biodiversity, with a focus on vulnerable species and ecosystem stability. A combination of field surveys, remote sensing, and biodiversity monitoring was employed to assess changes in species populations and habitat conditions before and after the dam's collapse. Data from satellite imagery and Geographic Information Systems (GIS) was used to track hydrological changes, while biodiversity indices and statistical analyses were applied to evaluate species richness and habitat degradation. The destruction of the dam caused a significant decline in fish populations, degradation of wetland habitats, and a marked reduction in bird species dependent on floodplain ecosystems. Habitat fragmentation, altered water quality, and sedimentation contributed to widespread biodiversity loss, with endangered species being disproportionately affected. The ecological impacts of the Kakhovka dam's destruction are extensive, with severe biodiversity loss and habitat fragmentation. While some natural regeneration is possible, long-term conservation and restoration efforts are crucial to mitigate the damage and support ecosystem recovery.

Keywords: biodiversity loss; dam destruction; Lower Dnieper; habitat fragmentation; aquatic ecosystems

Where Sand Meets Water: the Potential of Extensive Aquaculture in the Western Province of Zambia

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Abstract: Aquaculture presents a promising opportunity for sustainable food production in the sandy regions of Zambia's Western Province. This study, part of the Integrated Farming III project, investigates the potential of three different types of ponds for tilapia farming: natural earthen ponds with mixed-sex tilapia, dam liner ponds with mixed-sex tilapia, and dam liner ponds with mono-sex tilapia. We assessed these systems based on productivity (yield per production period), fish size and weight, investment and annual operating costs, and the pay-back period. The research was conducted based on regular monitoring and data collection at chosen sites over one production cycle. Results indicate that dam liner ponds, particularly those stocked with mono-sex tilapia, demonstrate higher productivity and larger average fish size compared to the natural earthen ponds. However, the investment and operational costs for dam liner ponds are significantly higher, resulting in longer pay-back periods. These findings suggest that while dam liner ponds can enhance yields, carefully considering economic factors is crucial for their adoption in resource-limited settings. This study provides valuable insights into sustainable aquaculture strategies that could support local livelihoods in Zambia's challenging sandy environments.

Keywords: aquaculture; tilapia; integrated farming systems; productivity; Western Zambia.

Acknowledgement: I would like to thank project Integrated Farming III for letting us implement our research on their ponds. Furthermore, to acknowledge the "Through Biogas Technology Towards Higher Resilience of the Communities in Western Province of Zambia" project supported by the Czech Development Agency. Lastly, thanks belong to Hynek Roubík, the leader of the BioResources & Technology Division, for consultations and continuous support.

Development and Testing of LAMP Assays for Detection of African Swine Fever Virus

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Abstract: African swine fever (ASF) is a highly contagious and deadly viral disease endemic in domestic pigs and wild boars, causing significant economic losses globally. It is caused by the virus African Swine Fever Virus (ASFV) under the family *Asfaviridae* and genus *Asfivirus*. Rapid and accurate detection is crucial in the management of ASF outbreaks. Loop-mediated isothermal amplification (LAMP) has emerged as a promising alternative to wildly used conventional PCR for detecting ASFV due to its speed, simplicity, and cost-effectiveness. The study aimed to address the problem associated with traditional PCR techniques through the development of a visual LAMP assay optimized and tested with the DNA of the African swine fever virus. A set of primers was developed based on the most conserved regions with the least mutation rates of ASFV. Six primers developed for the detection of African swine flu virus awaiting validation. This study offers promising approaches to enable preliminary and cost-effective surveillance measures for the prevention and control of African swine fever virus infection through the utilization of loop-mediated isothermal amplification technology.

Keywords: assays, African Swine Fever Virus, validation.

Acknowledgement: The research was funded through under the department of animal science and food processing

Formation of Useful Traits in Animals of the Ukrainian Black-and-White Dairy Breed by Absorptive Crossing

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Abstract: Over the past 10-15 years, Ukrainian farms that keep animals of the Ukrainian black-and-white dairy breed have been using the method of absorptive crossbreeding of animals of this breed with the world gene pool of the Holstein breed. Therefore, the purpose of our research was to study the effect of absorptive crossbreeding of domestic dairy breeds with improving ones. The research was conducted on animals from 14 farms, where cows of two breeds were kept: Holstein of 'domestic selection' - 4882 heads (animals were separated from the Ukrainian black-and-white dairy breed and classified as Holstein based on the increased proportion of conditional blood of the Holstein breed (96.8% and above)) and Ukrainian black-and-white dairy breed - 5730 heads (conditional blood of the Holstein breed 75.0-93.75%). For 305 days of the last completed lactation, the advantage of Holstein cows of 'domestic selection' over animals of the Ukrainian black-and-white dairy breed in terms of milk yield was +34.6 kg. No differences were found in the fat and protein content of milk between animals of both breeds. However, the reproductive capacity of Holstein cows of the 'domestic selection' breed was significantly lower. Absorptive crossbreeding of Ukrainian black-and-white dairy cows with Holsteins with a conditional proportion of blood of 96.8% and above (Holstein breed of 'domestic selection'), under the feeding standards and rationing norms prevailing in most Ukrainian farms, does not ensure further increase in milk production and is accompanied by a decrease in their reproductive capacity.

Keywords: absorptive crossbreeding, genotype, Holstein breed of 'domestic selection', yield of milk, reproductive ability.

Novel Chicken Explant Model for Ethical Research Practices

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Abstract: Gut explants, which consist of fragments of the gut and its mucosa cultured under ex vivo conditions, reflect the key characteristics of the organ in living animals. A major advantage of this model over gut epithelial cell cultures is its polarised and layered structure, which facilitates important cell-to-cell interactions. The aim of this work was to establish a chicken ileal explant model that reflect the complex mechanisms in the intestine and to study the enteropathogenic effect of the serovar *Salmonella* Enteritidis by assessing gene expression for selected cytokines and microscopic examination of H&E-stained histological sections. A 21-day-old male Ross 308 broiler was humanely sacrificed by decapitation under CO_2 anaesthesia, followed by opening of the coelomic cavity to obtain the ileal segment. Explants were obtained using disposable 1.5mm plunger biopsy punches. Bacterial culture and qPCR were performed using standard methods. The results showed that all H&E stained sections of chicken ileal explants cultured in a 96-well plate had a normal tissue architecture after a total incubation period of 6 hours. Infection of the explants was reflected by increased gene expression for IL-8, IL-18, TNF-α and IL-1β ($P < 0.001$) after 2 h incubation with *Salmonella* Enteritidis, demonstrating the ability to respond to enteropathogen infection. In the present study, we have mimicked the in vivo environment of the chicken intestine by creating a new model that includes all its layers and is suitable for studying host-pathogen interactions in the gut. By sourcing intestines from poultry slaughterhouses, we would be able to reduce the number of animals used for research purposes, creating a more ethical research method.

Keywords: chicken; intestinal explant culture; inflammation; qPCR;

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Prevalence of *Malassezia* spp. in Dermatologically Diseased Dogs in Slovakia

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Abstract: The genus *Malassezia* includes 18 lipophilic species, which may be isolated from normal ear canal and also from healthy skin in dogs. Under certain conditions (weakened immunity, moist skin environment, antibiotic treatment), the otitis externa or dermatitis can be created by these pathogens. The presence of *Malassezia* spp. was investigated in group of 300 dogs with clinical manifestations of the disease. The samples were collected from affected body sites (external ear canals, interdigital areas, cutaneous lesions, anal sacs). The isolates of *Malassezia* were identified by using phenotypic (biochemical-physiological and morphological characteristics) and genotypic methods (PCR, RFLP - AluI, BanI and MspA1I). *Malassezia* yeasts were isolated from 82 specimens obtained from 76 positive dogs. M. pachydermatis was the most frequently isolated species (79 isolates) in the dermatologically diseased dogs. M. furfur was identified in four dogs and M. nana in one dog. The prevalence of isolated *Malassezia* spp. was 25.3% in dermatologically diseased dogs. 36.0% of examined dogs had otitis externa, 24.5% of dogs suffered from dermatitis, 16.4% of dogs were diagnosed with interdigital dermatitis and 14.3% of dogs with inflammation of the anal sacs.

Keywords: *Malassezia*; dogs; occurrence; skin; PCR

Quantitative Determination of Deoxynivalenol in Dry Dog Food

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Abstract: The presence of deoxynivalenol in dog food can cause health complications in animals, manifesting as acute or chronic poisoning. The primary clinical symptoms in dogs are vomiting and reduced feed intake. The toxicity of deoxynivalenol depends on the time of exposure, the dose, nutritional status, age and sex of animals. Regular monitoring of mycotoxins in animal feed is essential for ensuring health safety and appropriate animal nutrition. The procedure and samples preparation were performed according to the RIDASCREEN FAST DON protocol. The ELISA method was used to determine the concentrations of deoxynivalenol in dry dog food samples (n=16). In all samples of dry dog foods, deoxynivalenol was present in amounts below the detection limit of the test used (<0.2 mg/kg). The samples of commercially produced dog foods examined by us are safe and do not pose a risk of acute mycotoxicosis in dogs.

Keywords: dogs; food safety; mycotoxins; nutrition; vomitoxin

Acknowledgement: This work was supported by scientific grant agency VEGA, project no. 1/0698/24 and KEGA project no. 006UVLF-4/2022.

The Impact of Supplementing Plant Tannin on the Milk Yield and Milk Quality of Lactating Dairy Cows

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Abstract: Tannins are natural polyphenolic compounds that can be included in a dairy cattle diet in order to overcome problems related to low-quality protein in forages, especially in a dry season. Using plant tannins as a feed supplement could be beneficial in protecting the protein from degradation in the rumen and, therefore, efficiently increasing bypass protein, which may result in improved animal performance and production quality. However, little is known about their effect on milk production and quality. This study aimed to evaluate the impact of dietary tannins on milk yield and milk composition of dairy cattle. The experimental trial was performed on the dairy farm Velké Opatovice, unit Uhřice, Czech Republic, and lasted 21 days. In this experiment, 20 Holstein cows in the late lactation phase were divided into two groups (n = 10). The first group (CON) was fed a total mixed ration (TMR) diet consisting of maize silage, clover-grass silage, hay, straw, and grain concentrate with mineral and vitamin supplements. The second group (TAN) was fed TMR supplemented with chestnut wood (Castanea sativa) and Quebracho tannin extracts. Cows were milked daily at 5:30, and the milk yield of the individual cows was recorded daily throughout the experiment. Milk samples for measurement of milk composition parameters were collected in the last week of the experiment and were analyzed for fat, proteins, lactose, somatic cells, urea, non-fat milk solids content, casein, citric acid, acetone, free fatty acids, β-hydroxybutyrate. Our results didn't show a significant (P = 1,17) effect of tannin supplementation on the milk yield. The weighted average milk yield was estimated to be 36,8 kg/day in the control group and 40,4 kg/day in the experimental group supplemented with tannin extracts. However, dietary tannins significantly affected milk composition parameters (P = 0,001). Protein and fat percentage were significantly (P < 0,01) lower in the experimental group compared to control. The concentration of SC and urea were markedly increased (P < 0,01) with tannin supplementation. In conclusion, the tannin extracts can be recommended as a feed supplement for dairy cattle after considering the type of tannins and dosages. Further research related to the impact of tannins on milk production is necessary.

Keywords: animal feed; tannin supplementation; dairy cattle; milk production; milk quality

Acknowledgement: This study was supported by the Ministry of Agriculture of the Czech Republic, institutional support MZE-RO1224 and Project No. SS06020190 " Development of an anti-methanogenic feed supplement to mitigate the environmental impact of livestock farming" co-financed with the state support of the Technology Agency of the Czech Republic as part of the Program Environment for Life 6.

Human – Wildlife Conflict in Wondogenet College of Forestry and Natural Resources, Ethiopia

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Abstract: The study was conducted in Wondogenet College of Forestry and Nturaltural Resources in Wondo Genet, Ethiopia from December 2019 to January 2020. It aimed at an investigation of human wildlife conflict in and around the college. Questionnaire survey, focus group discussion, key informant interview, direct observation and review of literature were employed to collect the data. Data was analyzed using statistical package for social sciences (SPSS), especially chi-square test, one way ANOVA and Microsoft Excel was used. A total of 31 households (20 males and 11 females) were selected for the questionnaire survey. The number of wildlife, shortage of food for wildlife, habitat disturbance and waste management system are the main cause of human wildlife conflict in the study area. *Phacochoerus*, *Papio Anuibs* and *Crucuta Crucuta* are identified as wild animals causing human wildlife conflict. There was statistically significant difference (X2=14 df=28 p=0.000) in the attitude of respondents towards of their interaction with wildlife.

Keywords: conflict; attitude; wildlife

Preparation of Epididymal Boar Sperm for Artificial Insemination

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Abstract: In cases while in vitro fertilization of oocytes is impossible, an alternative method is intracytoplasmic sperm injection (ICSI). Epididymal spermatozoa of two Ukrainian meat breed of pigs were used in the research (Bank of Animal Genetic Resources of the M.V. Zubets Institute of Animal Breeding and Genetics of the National Academy of Sciences). This biological material has genetic value and is limited in quantity. We use 10% polyvinylpyrrolidone (PVP) and 10% polyvinylalcohol (PVA) solution for our study. Studies of motility were performed immediately after injection, after 10 minutes and 20 minutes of incubation in the test solution. Such a period of time is required for performing ICSI in one dish. Sperm activity after thawing averaged 25.9±5.1%. Immediately after injection, the motility of epididymal spermatozoa in a 10% PVP solution was on average 6.7%±1.2, and in a 10% PVA solution it was 7.7%±2.3. After a 10-minute incubation, the mobility decreased in both solutions and was 4.7%±0.6 and 5.7%±0.6, respectively. After another 10 minutes of incubation, the mobility decreased to 2.3%±0.6 in a 10% PVA solution, which is 3.3 times lower than the mobility recorded immediately after injection into the PVA solution. Also, the mobility decreased after 10 minutes of incubation in a 10% PVP solution and amounted to 1.7±0,6%. It was established that in the case of using a 10% PVP solution, epididymal deconserved boar spermatozoa lose 93.5% of their initial motility, which makes it impossible to select a suitable spermatozoon for fertilization by the ICSI method. Research continues.

Keywords: ICSI, sperm motility, polyvinylpyrrolidone, polyvinylalcohol, boars sperm

Biological Methods of Processing Organic Waste as Sustainable Raw Materials with Increased Disinfection Efficiency

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Abstract: Manure from agricultural enterprises is a valuable substrate for organic fertilizers. However, its irrational use can lead to the contamination of natural ecosystems with pathogens of infectious and parasitic diseases of animals. There is a growing number of developments to improve the efficiency of its use in organic farming. One of the most common is biological methods of processing in the context of managing sustainable raw materials with the production of useful bio-basic products. A systematic approach was used regarding the advantages and disadvantages of existing biological methods of manure disinfection according to the data from the Scopus database. Experimental studies, disinfection of manure during anaerobic fermentation. an overview of the advantages and disadvantages of the most common biological methods of decontamination of organic waste using anaerobic microflora, aerobic microflora, earthworms, fungi, fly larvae, microalgae, etc. was carried out. The areas of improvement of the decontamination process have been determined, and the increase in its efficiency by adding phosphogypsum in the process of anaerobic conversion has been theoretically substantiated. In anaerobic conditions at a temperature of 37°C, more than 90% of the nematode eggs of agricultural animals stop their development for three weeks without reaching the larval stage. It was determined that the most promising method of processing manure as a sustainable raw material is anaerobic fermentation with stimulation of the development of sulfate reducers to suppress the development of pathogens and achieve the highest level of disinfection, and the simultaneous production of biofertilizer and biofuel.

Keywords: waste decontamination; anaerobic fermentation; anaerobic microflora; sustainable raw materials; bio-basic products

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TECHNOLOGY AND INNOVATION

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Bridging the Agricultural Knowledge Gap: Fine-Tuning LLama3 for Farm Management Assistance
INNOVATION

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Abstract: The agricultural sector, particularly in less developed regions, often struggles with limited access to practical farming knowledge and education. This gap in resources can limit effective farm management and reduce productivity. The advent of open-source large language models (LLMs) like LLama3 offers a promising solution to address these challenges. This study explores the potential of fine-tuning the open-source large language model LLama3 to serve as a farmer's assistant. By training the open-source large language model LLama3 with agricultural manuals and relevant information, the model's ability to provide accurate, context-specific advice was enhanced. The study compared the fine-tuned model to the original and available alternatives, focusing on its effectiveness in assisting with routine farm management tasks. Results showed that the fine-tuned model delivered significantly more accurate and relevant responses, providing practical, contextually appropriate advice for farmers. These findings suggest that such a model could be a valuable tool for improving decision-making and productivity, especially in regions with limited access to formal agricultural education and resources. By leveraging such localized AI solutions, the agricultural sector can benefit from improved decision-making and management practices, ultimately contributing to increased productivity and sustainability. This study highlights the potential of integrating advanced AI technologies to empower the farming community and enhance agricultural practices.

Keywords: large language models; farming innovation; generative AI; open-source

A Call for Modernisation of Science, the Case of Anaerobic Digestion: A Scoping Review

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Abstract: 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. Therefore, a large scoping review was performed, using adapted PRISMA protocol, aims to provide a comprehensive overview of the anaerobic digestion process, from pretreatment to gas utilisation, and the research conducted in each step. In addition, this research serves to highlight issues in the current research environment as to identify limitations. The review involved analysing 4660 articles and exhaustively identifying the different methods for following research parameters: pretreatment (1279), reactor design (923), temperature (907), H_2S cleaning (893), and biogas upgrading (658). There is a large number of methods employed in all the parameters explored, with a lack of standardisation in reporting and no clear definition for certain terms leading to confusion and issues classifying. A problem exacerbated by an exponential growth in published research. This also compromises comparisons and reviews accuracy and leads to tedious work to recover information and the inevitability of missing crucial information. As a result, we observed a lack of exhaustiveness in this work. This highlights the urgent need for harmonisation of research to facilitate knowledge transfer and avoid redundant work or the overlooking of potential breakthrough research, while also indicating to researchers where focus should be orientated. Modern databases and centralisation could help bring standards, simplified reviews and updatable work hampered by traditional reporting. Research needs to be more accessible and rigorous using the open science framework, as to promote transparency, reproducibility and cooperation. This work has been published in Energy Conversion and Management, Volume 316, September 2024.

Keywords: biogas; anaerobic digestion; PRISMA protocol; review; standardisation

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AI-Driven Educational Tools: Transforming Biology Education through Generative Neural Networks

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Abstract: Integrating advanced technologies into education is increasingly important for enhancing learning outcomes. This study explores using generative neural networks to create artificial insect images for evaluating grammar school students' ability to distinguish species. It assesses the effectiveness of AI-generated tools in biology education, highlighting their potential to innovate teaching methods and advance technology-focused learning. This study utilizes the open-source AI generative toolkit, Stable Diffusion, with various self-produced and community-created models to generate artificial images of 10 common insect species. Both AI-generated and real-life images are used in the testing. First-year grammar school (in Czech: čtyřleté gymnázium) students (who have not yet studied insect biology) and third-year students (who have completed the course) are asked to identify the species and highlight any unusual descriptive elements that may suggest a different species. The findings show that generative AI, like Stable Diffusion, can effectively create innovative educational tools. AI-generated images enhance teaching materials and evaluations, with the potential to replace traditional methods. This highlights AI's transformative role in modernizing education. The analysis concludes that generative AI, such as Stable Diffusion, holds significant potential for revolutionizing educational systems. AI-generated images can effectively enhance learning by providing innovative teaching and evaluation tools. This approach not only supports current educational practices but also suggests a future where traditional methods may be supplemented or replaced by advanced AI technologies. These findings advocate for further research and integration of AI in education to maximize its potential benefits.

Keywords: artificial intelligence; generative AI; Stable Diffusion

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The Role of Artificial Intelligence in Evolving Global Leadership Concepts

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Abstract: Contemporary global challenges demand new approaches to leadership, particularly through the integration of advanced technologies such as artificial intelligence (AI). The evolution of the concept of global leadership in the digital innovation era is taking on new forms due to the application of AI. This study examines how AI influences the transformation of traditional approaches to global leadership, shaping new strategies of management based on data and analytics. The aim of the proposed research is to identify the key changes in leadership influenced by technological advancements. A multidisciplinary approach was employed for the study, including a review of the literature on leadership and artificial intelligence, as well as the synthesis of best practices regarding the use of AI in management processes. Additionally, specific case studies on the application of AI for decision-making in global organizations were analyzed. The findings indicate that AI facilitates the evolution of the concept of global leadership, providing leaders with new tools for management. It not only enhances decision-making processes but also opens new possibilities for strategic forecasting, adaptation to rapidly changing conditions, and the personalization of leadership approaches. Artificial intelligence is becoming an integral part of modern leadership, influencing the development of new models of interaction, decision-making, and organizational management in the global context. This study underscores the necessity of integrating technological innovations into leadership processes to increase their effectiveness and adaptability to global changes.

Keywords: artificial intelligence; global leadership; innovations; management; decision-making

Technological Innovations and Health Care

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Abstract: This article reviews technological advances and global trends in the diagnosis, treatment and monitoring of cardiovascular diseases, related to the environment, environmental conditions and care schemes. A bibliometric analysis was carried out using the SCOPUS database, following the PRISMA-ScR guidelines, to identify relevant publications on technologies applied in the diagnosis and treatment of diseases. An increase in scientific output from 2018 was observed, reflecting a growing interest in the technologies available for the treatment of disease. Significant trends are identified such as the use of artificial intelligence in precision medicine and machine learning algorithms to analyse data and predict risk. A transdisciplinary approach is presented as a new direction in cardiovascular health, with an emphasis on individualised care and improved clinical outcomes. The integration of technologies into clinical practice has important implications for public health. Early detection and personalised treatment of diseases can significantly reduce disease-related morbidity and mortality.

Keywords: diseases; artificial intelligence; bibliometric analysis

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Reduction of Negative Air Ion Concentration Depending on the Location of the Ionizer in the Vehicle Interior

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Abstract: The ever-worsening situation and the increase in aerosol pollution of atmospheric air in densely populated and traffic-congested and industrially congested areas has a negative impact on human comfort and health. Aerosol pollution naturally enters the interiors of vehicles, in which a person spends a relatively large part of his life. This research deals with improving the interior microclimate and crew comfort by implementing an air ionizer. To find the ideal location for the air ionizer in the vehicle interior, several concepts were developed based on the airflow through the vehicle interior, air conditioning modes and installation options. The negative ion concentrations generated by each concept were measured in a general position (in the middle of the vehicle interior) and in the facial area of all passengers. The results of the measurements confirm the theoretical basis of the research. The concentration of negative ions measurable in general position and facial areas depends on the location of the ionizer itself, the air distribution mode, the setting of the air vents, interior materials and other factors. The most suitable location of the ionizer is in the primary air flow, without obstacles in the air path and regarding the materials present. Further research activities will focus on materials and their effect on ionized air and on a computational model of the distribution of air ions through vehicle interiors.

Keywords: ionization, negative air ions, car interior, comfort, air quality

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Computational Fluid Dynamic Analysis of Air Vortex Generation by Vehicular Traffic for Wind Energy System Applications

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Abstract: The global energy market is undergoing a crucial transition toward sustainability. Recently, the adoption of renewable technologies has increased significantly, particularly for small-scale applications. Wind energy has emerged as a key player due to its relatively low transmission costs and adaptability. Small-scale wind energy systems are a promising solution for decentralized energy generation. Their versatility is highlighted by their potential for deployment across diverse environments, contingent upon favorable wind conditions. The wind generated by vehicular traffic presents an opportunity for energy production in urban environments. As vehicles move at different speeds, these create significant airflows that can be converted into electricity at locations like roadways, bridges, or tunnels. This study focuses on assessing the air vortices generated by vehicular traffic to design an effective wind energy system. A Computational Fluid Dynamics analysis was performed to estimate the velocity ranges of the wakes produced by moving vehicles. A detailed 3D-model of a specific vehicle type was created at real scale, and a finite volume analysis was used to study its aerodynamic effects. The results reveal low-pressure zones created when air is deflected around the vehicle, which causes the airflow to accelerate. Additionally, turbulence from low-pressure recirculation zones considerably slows the flow when a vehicle passes through them. Although the airflow remains relatively uniform along the vehicle's sides and top, a noticeable recirculation zone forms at the rear. These findings suggest that wind generators could harness traffic-induced airflows to produce electricity, presenting an opportunity to integrate renewable energy sources into urban settings.

Keywords: air vortex; CFD simulation; urban highways; vehicular traffic; aerogenerator design

Development and Analysis of Lightweight Three-Dimensional Woven Jute/Glass Hybrid Composites with Enhanced Acoustic Insulation Properties

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Abstract: This research investigates the effect of an inclusion of natural fibers and biomass into glass-reinforced composites in terms of their acoustical performance. Polymer-based composites reinforced with three-dimensional spacers were studied. The ability to improve the acoustical insulation characteristics, along with mechanical properties of the composites, were tested using natural fibers and biomass. The study examined how an addition of natural fibers and biomass to glass-reinforced composites influences their acoustic performance. The research specifically analyzed polymer-based composites that are reinforced with three-dimensional spacer structures. The focus was on improving the acoustic insulation and mechanical properties of these composites by strategically incorporating natural fibers and biomass. The results of the study identified that natural fibers considerably improved sound absorption. Moreover, the use of biomass had a significant impact on the composites' acoustic insulation properties. The air trapped between the spacer and three-dimensional structures provided a good thermal insulation and contributed further to sound attenuation. Use of synthetic fibers in natural fibers improved the mechanical and acoustic properties. A combination of composition, thickness, density, and ratios of mixing will contribute to the achievement of desirable thermal-acoustical, and mechanical properties simultaneously. Using natural polymers and biomass improves recyclability, while guaranteeing the performance of polymer composites for acoustical insulation, making them appropriate for sustainable architecture.

Keywords: eco-friendly construction materials, sustainability, biomass utilization, 3D spacer panels, acoustic insulation

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Comparison of Biogas Production Rate when Mixing Cow Manure with Food Waste or Cow Manure with Poultry Waste at the Optimal Mixing Ratios

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Abstract: Anaerobic digestion of animal waste and food waste is affected by a number of factors, the most important of which are mixing ratios and the kind of substrate. Therefore, the purpose of this study is to obtain the largest amount of biogas by comparing several types of substrates used with a fixed mixing ratio by comparing several types of substrates used with a fixed mixing ratio by a laboratory reactor to compare the biogas production rate from fermenting cow manure at a rate of 85% with food waste at a rate of 15% and cow manure at a rate of 85% and poultry manure at a rate of 15% at a temperature of 25°C for 30 days so that the measured parameter values ranged on average pH = 6.99, moisture = 91.20%, COD = 13246.83 gr/l, C/N = 40.30 for the cow manure substrate with poultry manure, while the parameters of cow manure with food waste were pH = 6.24, moisture = 92.11%, COD = 15981.93gr/l, C/N = 31.0, respectively. Therefore, mixing cow dung with poultry manure produces an optimal biogas production rate because the carbon to nitrogen ratio of the substrate is optimal.

Keywords: biogas, cow manure, poultry, anaerobic treatment method

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Effective Policy Approaches for Promoting Biogas Technology Dissemination. Case for Uganda

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Abstract: Energy poverty in Africa remains a significant challenge, with millions of people lacking access to electricity and clean cooking facilities. In Uganda, the utilization of small-scale biodigesters has shown potential as a sustainable solution for clean cooking. However, the production of biogas in Uganda is still limited, highlighting the need for further development and expansion of this technology. Therefore, this study examines the strategies employed by institutions to promote biogas technology in Uganda. Interviews and survey methodology were used. Data was collected from household heads, government officials, and NGO representatives. Data was later coded and analyzed using Microsoft Excel and SPSS. Descriptive statistics, charts and tables were used for data presentation. The study found that institutions do not effectively support the dissemination of biogas technology, with only 53% of respondents agreeing with their efforts. Awareness campaigns and community involvement were the most common strategies used while consultation of the community before implementation was the least adopted. There was a gender disparity in the promotion and adoption of biogas technology in rural communities, with the majority of respondents being male. Additionally, there was a lack of representation from younger age groups, and a lack of community involvement in decision-making processes. The study also found that current policy strategies for promoting biogas technology are not sustainable, with the majority of respondents indicating they are not effective in a long-term. Thus, highlighting the need for reevaluation of current policy strategies to be more sustainable and inclusive of community input.

Keywords: policy strategies; biogas; biogas technology; Uganda; sustainability

Acknowledgement: I would like to acknowledge the support of the BioResources and Technology members under the Department of Sustainable Technologies, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, for their unwavering support and advise. This research was funded by the Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, grant number IGA (20243111).

Effects of Torrefaction on Biomass and Solid Biofuel Properties

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Abstract: Biomass, as a promising energy source on which the future of clean and sustainable energy depends, is used not only for direct combustion but also in the production of different energy vectors (solid, liquid and gaseous biofuels). As characterized by low calorific value and high moisture absorption, the energy properties of biomass can be improved through the torrefaction process, which involves subjecting the biomass fuel to higher temperatures in the absence of air. Torrefaction was carried out using Thermogravimetric analyser, LECO 701 at four different temperatures of 200, 300, 400, and 500 ^{o}C. The increase in the calorific value is associated with the ash content of the biomass. At a torrefaction temperature of 300 ^{o}C, the calorific value of corn cobs and peanut shells with an ash content of 1.8% and 3.4% were discovered to increase by 20.8% and 20.5%, respectively. While that of rice husks with 20.9% ash content rises by 9.8%. One of the negative effects of torrefaction is increasing ash content of the biomass fuel. At the same torrefaction temperature, the ash content of corn cobs, peanut shells, and rice husks raised by 72. 8%, 50% and 24%, respectively. Despite the increase in the ash, the process improves the biomass fuel properties through an elevation of calorific value, weight reduction, increase in shelf life and decrease in hygroscopy.

Keywords: torrefaction; pyrolysis; thermogravimetry; biomass conversion; fuel quality improvement.

Acknowledgement: The study is supported by the Internal Grant Agency of the Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague [grant number 20243101].

Design and Evaluation of a Seeder and Fertilizer Applicator for a Combustion-Powered Walking Tractor

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Abstract: Colombia's agribusiness sector has faced several challenges over time, and small producers have faced a lack of accessible technologies due to the mountainous lands that present challenges to traditional agricultural mechanization. To support economic revival, especially in rural areas where poverty levels are highest, the national government seeks to provide solutions to smallholder farmers and increase productivity while reducing reliance on manual labor. In line with this objective, this work presents the design, optimizing and implementation of a prototype of agricultural tools adaptable to a combustion power tiller, which is a common agro-industrial machine utilized by farmers for a variety of agricultural activities, including soil preparation and sowing The design and implementation of this agricultural technology offers an effective solution for small farmers in the Eje Cafetero of Colombia, particularly in hilly terrain, while constituting an affordable and accessible option for farmers. This development contributes to present a great potential for improving local agricultural technologies that could help improve several productive factors in the Colombian agricultural sector. The study highlights the importance of providing adequate and accessible tools for small farmers, which could improve their production and reduce labor costs. It is concluded that the prototype has the potential to increase productivity in complex agricultural regions such as the coffee-growing region, thus contributing to the economic development of the Colombian agro-industrial sector.

Keywords: agricultural mechanization; walking tractor; fertilizer applicator; rugged terrains; small farmers

Evaluating Coffee Trunks as Sustainable Biofuel for Coffee Drying Processes

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Abstract: The use of coffee trunks as a biofuel for hybrid solar dryers presents a sustainable alternative to coffee husks, which are scarce and primarily found at hulling facilities. This study aims to evaluate the effectiveness of coffee trunks, a by-product of crop renewal, in two different configurations of hybrid solar dryers during the coffee drying process. Coffee trunks were assessed for their net calorific value (NCV) and biomass consumption rate during the coffee drying process. The NCV was determined to be approximately 18 MJ/kg. Two configurations of hybrid solar dryers were tested, with an average biomass consumption rate of 2000 g/h. The study found that coffee trunks, due to their higher density, provide a longer burn time compared to coffee husks, which can consume up to 4000 kg/h. The use of coffee trunks ensures a more sustained heat output, enhancing the efficiency of the coffee drying process. Utilizing coffee trunks as a biofuel on the farm offers logistical and practical advantages over coffee husks. This approach not only makes use of readily available agricultural waste but also improves the sustainability and efficiency of hybrid solar drying systems, contributing to better resource management in coffee farming.

Keywords: coffee trunks; biofuel; hybrid solar dryer; coffee drying; sustainability

Acknowledgement: This research was supported by funding from Cenicafé Project POS103010.

Enhancing Efficiency and Profitability in Colombian Coffee Processing through Solar Energy and Integrated Sustainable Practices

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Abstract: Coffee processing in Colombia requires substantial electricity to operate machinery that transforms coffee cherries into dry parchment coffee. In recent years, rising electricity costs and unreliable supply in rural areas have created significant challenges for coffee producers. Since 2014, Colombia has enacted policies to promote alternative energy sources, making solar panels a viable option for generating electricity. This study aims to explore the potential of solar energy in enhancing the sustainability and profitability of coffee farming. Cenicafé has investigated the implementation of solar panels to power coffee processing equipment. The research involved evaluating various solar power system configurations suitable for coffee farms, analyzing their technical and economic feasibility, and assessing potential cost savings. The processing facility includes a hydraulically classified washing station using filtered rainwater, motors powered by photovoltaic (PV) systems, compost bins for processing pulp and mucilage, and a vetiver grass wetland for evaporating remaining wastewater. The findings indicate that solar panel systems can effectively supply electricity to coffee processing equipment, reducing dependence on the traditional electricity grid. Different configurations of solar power systems have been identified as feasible for coffee farms, each offering varying levels of efficiency and cost-effectiveness. Additionally, the integration of sustainable practices, such as using filtered rainwater and composting, further enhances the environmental benefits. The adoption of solar energy presents a significant opportunity for Colombian coffee farmers to lower electricity costs and improve the sustainability of their operations. Solar panels align with the goals of the National Federation of Coffee Growers to enhance coffee farming profitability and achieve 100% sustainability. The use of additional sustainable practices, such as rainwater filtration, composting, and wastewater management, further supports these objectives.

Keywords: coffee processing; renewable energy; solar energy; sustainability; wastewater management.

Dehydration Kinetics of Cassava Tubers: Enhancing Solar Drying Efficiency and Product Quality

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Abstract: Solar drying has gained prominence as an environmentally sustainable method for food preservation, offering advantages such as reduced processing time, improved energy efficiency, and minimal environmental impact. Cassava, a staple crop in tropical regions, presents unique challenges in drying due to its high moisture content and susceptibility to rapid postharvest physiological deterioration (PPD). Understanding the dehydration kinetics of cassava tubers is crucial for optimizing solar drying processes, ensuring product quality, and enhancing the efficiency of the drying operation. This review focuses on the dehydration kinetics of cassava tubers in solar drying systems. The study highlights the influence of various drying process parameters, including sample preparation, pretreatment techniques, thermal air medium temperature, and air velocity, on the drying rate and duration. Additionally, an extensive analysis of optimal drying kinetic models tailored for cassava tubers is provided. The study highlights that the choice of drying parameters directly impacts the efficiency and quality of dried cassava products. Optimal models for predicting drying kinetics have been analyzed, providing insights into the relationship between drying conditions and product quality. Understanding the dehydration kinetics of cassava tubers in solar drying is essential for designing efficient drying systems and improving product quality. The findings underscore the importance of selecting appropriate drying parameters and modeling approaches to enhance the profitability and sustainability of cassava drying operations.

Keywords: dehydration kinetics; cassava tubers; solar drying

Assessment of Usability and Ergonomic Design of Luggage Compartments in Passenger Cars: Dimensions, Health, and Safety Considerations

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Abstract: This paper addresses the analysis of luggage compartments in current passenger cars, focusing on determining the optimal dimensions to minimize potential health risks associated with handling loads. Given the critical role of luggage compartments in vehicle design and their impact on user safety, this study seeks to improve the ergonomic design of these compartments to better protect users. The study begins with an overview of the design, accessibility, and technical solutions related to luggage compartments, including an analysis of basic measurable parameters and their interpretation according to relevant standards. It then conducts a comprehensive questionnaire survey to collect user preferences regarding the use and dimensions of luggage compartments. The gathered data is evaluated using computer simulation software, specifically Tecnomatix Jack, to verify and refine the optimal dimensions for these compartments. The findings indicate that current luggage compartments often fall short of optimal ergonomic dimensions, which can lead to health risks during load handling. The computer simulations revealed specific dimension parameters that could significantly reduce these risks and enhance user comfort. The study also identified gaps between user preferences and existing designs, providing clear evidence of where improvements are needed. The paper concludes that incorporating user feedback and simulation results into the design of luggage compartments can substantially improve safety and health protection. The optimal dimensions identified through the study offer valuable insights for vehicle manufacturers aiming to enhance the functionality and ergonomic standards of luggage compartments.

Keywords: ergonomic design; luggage compartment; user preferences; technomatix jack; load handling.

Acknowledgement: It is important to note that this paper was not funded or supported by any external organizations or grants. This independence ensures the objective nature of the research and its findings.

Characterization of Biochar Produced from Biogas Digestate: A Case Study from Vietnam

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Abstract: In this research, the biogas digestate is evaluated as a potential feedstock to produce biochar at different processing temperatures ranging from 500 – 700 ^{0}C. The derived biochar was characterized by analysis of metal elements, nitrogen adsorption/desorption isotherms, energy-dispersive X-ray spectroscopy and elementary mapping, scanning electron microscopy, and X-ray diffraction. Biochar with a high surface area consists of porous structures with a diameter range of 1 to 20 μm. The N_2 adsorption and desorption isotherms revealed that the porous properties and surface area of the biochars gradually increase with the pyrolysis temperature, with a corresponding surface area of 15.45; 58.79, to 87.89, respectively. Furthermore, iron (Fe), magnesium (Mg) and zinc (Zn) were found to be significantly concentrated in the raw samples and biochar. The results of this research open up a new recycling route for the disposal of biogas digestate waste and its application as a sustainable fertilizer and soil conditioner.

Keywords: biogas; Vietnam; biogas digestate biochar; biogas digestate

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Increasing the Durability of Working Tools of Agricultural Robots

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Abstract: The world of robotics is actively integrating into agriculture. The progress in the sector of agricultural machinery, especially motor vehicles, tractors and combines, is aimed not only at increasing productivity and operator comfort, but also at significantly increasing the time of uninterrupted operation of machines without the need for regular maintenance. Modern manufacturers of agricultural machinery, such as John Deere, CNH, Amazone, NEXAT and RAVEN are actively developing autonomous energy systems aimed at performing a range of crop cultivation operations. The introduction of agricultural robots in agriculture is characterized by the reduction of human resources involved in the technological process. However, there is a problem: agricultural machines offered by manufacturers for aggregation with agro-robots remain susceptible to wear and require regular maintenance. This, in turn, requires additional human resources. For example, Raven's Robot Autonomous Agrobot is combined with a Seed Master seeder with traditional design solutions. This reduces the actual productivity of the machine. Conducted an analysis of scientific articles, the agricultural robot market, and consulted with company representatives. The work solved the problem of creating designs for agricultural machinery, especially seeders, that do not require regular maintenance. At the same time, the accuracy of the sowing depth is increased. Promising ways to improve the design of agricultural machinery based on the concept of "free-maintenance" are presented.

Keywords: agricultural robots; agricultural implements; wear and tear; maintenance.

The Shift in Allergy-Related Search Language in Ukraine: Impact of War on Public Access to Pollen Forecasts

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Abstract: Internet technologies make it possible to quickly find information on various aspects of a person's social life. The availability of the evidence-based medical information in the language of search queries largely determines the rapid availability of data needed by the population to prevent the development and exacerbation of many diseases, including allergies. The war in Ukraine has not only affected daily life but also transformed the way people access vital health information. This study examines the role of data science and digital tools in tracking Internet trends and improving access to allergy forecasts. We used Google Trends data from 2022 to 2024 to analyze changes in language use for allergy-related searches. The data were compared across all Ukrainian regions, focusing on key terms related to pollen forecasts and key allergenic species. It was established that search for "pollen forecast" dominates in August which coincides with active ragweed (Ambrosia) pollination. Prior and in 2022, most pollen forecast and ragweed-related searches in Ukraine were conducted in Russian. However, in 2024, Ukrainian-language searches for allergy-related information surpassed Russian in all free regions, driven by national identity and technological adoption. This suggests a growing preference for Ukrainian-language resources. Only in Russian-occupied territories did Russian remain dominant. The war has significantly impacted language preferences for allergy-related searches in Ukraine, with Ukrainian becoming the primary language of inquiry. This highlights the importance of providing comprehensive allergy information in Ukrainian to meet the growing demand across the country ensuring timely access to allergy forecasts.

Keywords: pollen forecast; Google trends; ragweed; Ukraine; language shift

Liquid Phase of Digestate Treatment Causing More Effective Utilization of Nutrients

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Abstract: Anaerobic digestion of organic waste produces liquid phase digestate (LPD), which contains high levels of ammonia (NH_4^+). Untreated LPD can cause nitrogen loss and environmental harm due to NH_4^+ volatilization. Nitrification, converting NH_4^+ into nitrate (NO_3^-), mitigates these issues while enhancing nutrient recovery for agricultural use. Two continuously stirred tank reactors (CSTRs) were used to assess nitrification in LPD. Reactor M1 treated raw, diluted LPD, while M2 handled pre-treated, stripped LPD. Both reactors were inoculated with nitrifying bacteria from activated sludge, and parameters including chemical oxygen demand (COD), NH_4^+, NO_3^-, pH, and dissolved oxygen were monitored to evaluate performance. M2 exhibited superior nitrification efficiency compared to M1, as the pre-treatment of LPD reduced inhibitory compounds, such as excess ammonia and organic matter, which can negatively affect the nitrification process. The conversion of NH_4^+ to NO_3^- was more efficient in M2, highlighting the importance of LPD pretreatment in enhancing nitrification and nutrient recovery. Conclusion: The study demonstrates that pre-treatment of LPD significantly enhances nitrification, optimizing the conversion of NH_4^+ to NO_3^-. This improved efficiency not only makes the digestate more suitable for use as a fertilizer but also contributes to reducing nitrogen emissions from LPD storage. The findings suggest that this method can provide a sustainable approach to managing LPD, supporting nutrient recycling and reducing the environmental impact of biogas production.

Keywords: liquid phase digestate (LPD), nitrification, continuous stirred tank reactor (CSTR), ammonia removal, nutrient recovery, activated sludge, aerobic digestion, sustainable fertilizer, greenhouse gas emissions, digestate pre-treatment, ammonia, nitrate conversion, environmental impact of digestate.

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Public Management Mechanisms in Sustainable Development of Rural Areas in the Conditions of Socio-Environmental and Economic Losses Caused by the Russian-Ukrainian War

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Abstract: The Russian-Ukrainian war has become a huge challenge and threat to achieving the goals of sustainable development of rural areas in Ukraine. The immense social, ecological and economic losses caused by military actions, are accompanied by the deepening of the demographic crisis and comprising a significant decrease in the birth rate, mortality increase as well as forced emigration, temporary internal displacement of millions of residents, mainly women and children, from dangerous territories. The research is focused on justification of a new approach to the implementation of the concept of sustainable development of rural areas aimed at achieving resource-balanced ecological and socio-oriented economic growth in the context of modern world trends through effective mechanisms of public management, using a combination of historical, statistical and theoretical methods of analysis, surveys of rural population. The mechanism of public management in the sustainable development of rural areas consists in the implementation of a set of economic, administrative and organizational, as well as social, motivational, legal, and political means of influence of public authorities as a subject on rural areas and settlements management. It aims to solve social, ecological and economic tasks, preserve natural resource potential, with an emphasis on the peasants interests protection, meeting the needs of current and future generations. The key areas of sustainable development of rural areas in the conditions of a full-scale war are to be aimed at preserving the efficiency of the "production - processing - storage - supply of food products to the population" chain.

Keywords: rural areas; sustainable development; demographic crisis; migration; state policy

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Climate Smart Agricultural Practices Program at MVE Operational Areas: Case Studies of Atewa Forest & Wechau Hippo Sanctuary.

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Abstract: There have been several attempts by the MVE International Consortium Program to help address problems confronting communities in Ghana and abroad since the year 2006. These interventions of the MVE International Consortium Program focus much on Circular Economy with Oyster Mushroom Project which was funded by AMPLE USAID. This project was geared towards achieving the principles which the MVE International Consortium Program works, and it includes environmental sustainability, economic empowerment, and social services. This action research project, therefore, seeks to find out the effectiveness of the MVE International Consortium Program. The main methods are desktop literature review, focus group discussions and knowledge mobilisation exercises with stakeholders of the MVE International Consortium Program in-person and online-virtually. In this action research project, 55% of waste generated, especially in mining communities closer to Atewa Forest, was improperly disposed of. This ends up at the shores of water bodies in Accra Labadi Beach Sea. Financial support is urgently needed to curtail these problems and climate change effects in our communities in Ghana.

Keywords: climate change adaptation; food security; agroforestry.

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Comprehensive Assessment of Surface Water Quality and Pollution Sources in Al-Muzaynah Dam Lake, Syria: Insights from Multivariate Statistical Analysis

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Abstract: This research comprehensively assesses water quality across artificial lakes in the Mediterranean environment. By analyzing the pollution process, this research aims to enhance our understanding of the pollution mechanism and establish recommendations to mitigate the impact effects and restore the vital role of lakes subjected to pollution risk. the dataset includes twenty-one physical, chemical, and bacteriological parameters. It was collected through monthly water sampling from five strategic sites cover the lake from 2018 to 2019. the collected data underwent rigorous analysis utilizing robust multivariate statistical techniques such as multivariate analysis of Variance (MANOVA), hierarchical cluster analysis (CA), principal components analysis (PCA), and Factor analysis (FA). The (CA) successfully identified two distinct clusters representing different pollution sources. Cluster 1 comprised three monitoring stations, which exhibited higher pollution levels attributed to sewage discharge from nearby villages and industrial and tourist activities proximal to the lake. In contrast, Cluster 2 consisted of two monitoring stations associated with lower pollution levels resulting from villages, sewage, runoff, and agricultural sources. The (FA) revealed three principal components that accounted for an impressive 86.5% of the total temporal and spatial variations observed in the water quality data. These findings offer valuable insights to water management authorities, empowering them to make informed decisions regarding the determination of a water quality index. The outcomes of this study serve as a crucial resource for policymakers involved in water resource management, facilitating effective strategies for pollution control and sustainable water management practices.

Keywords: water quality, multivariate analysis of variance, factor analysis, cluster analysis, Al-Muzaynah dam lake, water quality index (WQI).

Rise of the Pitahaya in the Philippines as a Result of Climate Change

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Abstract: Farmers on Guimaras island, Philippines are shifting from the traditional commodity (mango) towards a new plant on the island: Pitahaya. Climate change forced mango farmers to diversify their production to other crops, that are less prone to changing climate conditions. Data were collected through 10 semi-structured interviews with local Pitahaya farmers and local authorities. Thematic analysis was conducted in the Atlas.ti software. Graphic materials were obtained through drone mapping of the farms and program waypoint map automated mapping tool. Farmers are forced to diversify their crop production due to climate changes and are encouraged by government grants to focus on Pitahya. Local farmers are experiencing growing interest in Pitahaya farming, considering climate change and government support, but lack facilities for post-production processes. The involvement of the government of the Philippines shows potential to resolve current difficulties and to interest external investors in the Pitahaya production on Guimaras island.

Keywords: climate change, Pitahaya, diversification, government grant

Acknowledgement: This research is funded by the Faculty of Horticulture, Mendel University in Brno, which supported the IGA-ZF/2024-SI1-002 project. Special thank goes to the Guimaras State University, Philippines, who prepared perfect conditions for data collection.

Recycling Phosphogypsum into High-Value Bio-Products: Preliminary Findings

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Abstract: Phosphogypsum, a byproduct of phosphate fertilizer production, is on the rise globally, posing environmental challenges and opportunities for resource utilization. Current management practices are inadequate, necessitating innovative solutions. This research aims to use phosphogypsum as a mineral additive in bioreactors to enhance the quality and nutrient content of the digestate. Preliminary experiments were done to access phosphogypsum's impact on seed germination and biodigestion. Varying dosages of phosphogypsum were used in growing mustard seeds in agar medium, while initial co-digestion trials were done with sugarcane and cow dung to evaluate biogas production and digestate quality. Phosphogypsum at concentrations of 0.5 g and 1 g facilitated the growth of mustard seeds in agar media prepared with 25 mL of water. Additionally, the digestate exhibited enhanced germinative potential at a 5% concentration within the agar medium. The introduction of phosphogypsum to anaerobic digestion showed promise in supporting seed growth, though optimal conditions for efficiency are still being investigated. To mitigate contamination risks, crops with higher tolerance for heavy metals and fluoride are recommended. Using phosphogypsum-enriched digestate on non-edible crops reduces the risk of heavy metal uptake. Phosphogypsum shows potential as a valuable mineral additive in biogas production, enhancing digestate quality and supporting plant growth. Ongoing research aims to optimize conditions and mitigate environmental risks from heavy metal and fluoride contamination. Sustainable recycling of phosphogypsum can significantly contribute to waste management and resource utilization.

Keywords: phosphogypsum; anaerobic digestion; biotechnological strategies; digestate; sustainable recycling.

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Digestate Application for Pellet Fuel Production

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Abstract: Digestate as a by-product of the biogas production process presents a challenge as it is often considered an undesirable output. As waste, it requires appropriate treatment and utilization methods to reduce its potential negative impact and turn it into a valuable resource. This becomes even more important if other impurities are present. The main objective of the study was to examine the effect of phosphogypsum on the biogas production process and evaluate the calorific value of pellets produced from dried digestate sludge. In the experiment described, phosphogypsum was added in three samples with the following concentrations 5, 10 and 15 per cent. Two different samples were examined using calorimeter and XRF analyzer – common pellets and pellets with biochar addition. The results show that the calorific value of pellets combined with biochar exceeded those without biochar as expected with the following numbers: sample 1 – 18, 748 MJ/kg, sample 2 – 20, 437 MJ/kg. While further research is still needed, this current study suggests that pellet production is an effective method for digestate utilization. This approach addresses two issues: enables waste utilization and producing a valuable resource.

Keywords: pellet fuels, digestate, phosphogypsum, biogas production.

Bioenergy Innovations for Sustainable Post-War Recovery

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Abstract: Research aimed at using renewable sources and by-products as carbon substrates and sources of nutrients for various bioconversion processes is becoming more and more relevant worldwide. They can be used for anaerobic digestion and aerobic conversion with the production of bio-basic products. The issue of community-based waste management in Ukraine is not well understood under war conditions, but there are a few implemented bioenergy developments. The review was carried out using a systematic analysis of the literature. Biogas production and utilization embodies the idea of a circular bioeconomy, bringing the benefits of reduced greenhouse gas emissions, improved waste management, and increased resource efficiency. The study also analyzed the possibilities of integrating European practices of introducing biogas technologies in rural areas and industries to strengthen Ukraine's energy security. The directions of digestates implementation in the processes after the military restoration of soil fertility were determined. The use of digestate as a fertilizer requires strict attention to its quality and the quality of the raw materials that will be processed by the biogas plant to produce the digestate to be used as fertilizer. This is the only way to maximize environmental and economic benefits while ensuring sustainability and environmental safety. The quality management of the bioenergy and digestate should be integrated into the overall national environmental protection and nutrient management policy.

Keywords: bioenergy; digestate; waste management; European practices

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Balance, Logistics and Economics of Input Raw Materials in the Supply Chain of Energy from Renewable Sources in Transport

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Abstract: The production of biofuels from biogenic feedstocks plays a critical role in achieving the European Union's climate goals, particularly under the Renewable Energy Directive (RED II) and its revision, RED III. While conventional biofuels primarily rely on biogenic primary products, there is a growing emphasis on utilizing biogenic waste feedstocks, such as used cooking oil and animal fats, to meet ambitious greenhouse gas reduction targets. However, the potential of these waste feedstocks remains underexplored due to gaps in data availability and a lack of comprehensive analytical frameworks. This research employs a multi-faceted methodological approach, including life cycle assessments, economic viability analyses, and the development of an economic model to evaluate the commercial potential of biogenic waste feedstocks for biofuel production. Data is sourced from both secondary literature and in situ investigations in countries like India and Vietnam, focusing on supply-demand balances, emission factors, and market dynamics. The study identifies the significant potential of biogenic waste feedstocks to contribute to the EU's biofuel production targets. The developed economic model highlights the impact of emission factors on the cost of greenhouse gas savings and the effectiveness of penalties in enforcing compliance with RED II mandates. The findings underscore the viability of biogenic waste feedstocks as a sustainable alternative to primary products in biofuel production. The research provides a robust foundation for policymakers and industry stakeholders, facilitating informed decision-making and implementing innovation in the biofuel sector.

Keywords: biogenic waste feedstock, advanced biofuels, RED II, used cooking oil.

Acknowledgement: The study is supported by the Internal Grant Agency of the Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague [grant number 20243101].

Sustainability Dimension of Road Network in Ilorin

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Abstract: The purpose of the study is to examine the environmental impact of road network oneconomic activity and environmental sustainability, aiming to protect natural and financial resources for long-term stability and a livable future. This study uses graph theoretic techniques to analyze road networks in a study area. The Shimbel index and connectivity matrix are used to determine the connectivity and accessibility of nodal points in the network. The road map is converted into a linear graph, regardless of road width, quality, and standard. A connectivity matrix is then created to reveal the degree of accessibility of each node within the network. The result shows that road network promotes growth and new jobs in both rural and urban communities, promotes well-being by ensuring easy access to health care and medical facilities at all levels – nationally, regionally, and locally. Road networks significantly promote growth and job creation in both rural and urban communities, shaping society's economy, contributing to public finances through taxes, fuel subsidies, or insurance premiums, and contributing to poverty reduction.

Keywords: sustainability; road network; bio diversity; climate change; poverty reduction and health improvement.

A Critical Review of Structural Equation Modelling in Dealing with Unobservable Variables with Sustainable Development Goals

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Abstract: Sustainable development goals (SDGs) as a complex integrated set of goals with diversified targets and indicators are not always easy to statistically measure based on theoretically established relations with unobservable variables. Therefore, this investigation aims to analyse the evolving innovative concept of structural equation modelling (SEM) in measuring the impact and connection of unobserved variables with SDGs. This study applies a critical review to extensively examine and critically assess the literature searched from Google Scholar, Scopus, and Web of Sciences. Articles are selected based on their relevance to the aim of this study. SEM with a background from econometrics on prediction and psychometrics focussing on unobserved latent variables is a second-generation multivariate analysis that is built upon first-generation techniques of factor analysis, multiple regression analysis, and path analysis. The model's several alternatives comprise the latent growth curve model, Bayesian SEM, partial least square SEM, hierarchical SEM, and variable/model function in a first-hand model that measures the legitimacy and dependability of unobserved variables and the network among unobserved variables using the structural model. This makes the model favourable to analyse the causal relationship and gives the flexibility to make amendments for errors. SEM proved to be effective in maneuvering and measuring variables, especially latent/unobserved ones that are difficult to link directly with SDGs by constructing observed branch variables/indicators with sophisticated statistical data analysis procedures.

Keywords: Agenda 2030; confirmatory factor analysis; causal model; covariate structure analysis; sustainable development.

Acknowledgement: This research was funded by the Internal Grant Agency of the Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague (20243111).

Adoption of Technologies to Increase the Resilience of Smallholder Farmers in Zambia

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Abstract: This research study wishes to investigate the impact of Sustainable Intensification Practices (SIPs) promoted by the programmes and projects in terms of Productivity and Agrobiodiversity. Additionally, the study will investigate the adaptive capacity of the smallholder farmers in the selected districts (challenges and barriers to technology adoption). The study was conducted in Kalomo, Sinazongwe, Mazabuka and Lufwanyama districts of the southern and Copperbelt provinces of Zambia. Southern province lie in the agroecological zone I where rainfall is below 1000 mm These areas are most hit by droughts and floods, with agriculture being the main activity for the locals. As a control study, the study will be extended to one district in the Copperbelt region. The objective of this research is to analyze the impact of Sustainable Intensification practices (SIPs) in enhancing the smallholder farmers in Zambia to be crop diversified, sustainable, and food secure. Furthermore, I will assess how the promoted Agro technologies and improved seed variety are impacting and shaping the cropping systems. Preliminary results indicate a significant impact of project interventions regarding improved productivity and adoption of impactful agrotechnologies. Interestingly, there is uncertainty on the improved seed varieties with a lot of challenges in terms of accessibility and quality. Farmer resilience and food security need a concerted effort by the public sector and private sector to make Improved seed varieties as inputs available and of high quality. Policies surrounding this issue have to be addressed critically as they shape the agrobiodiversity of the farming system.

Keywords: sustainable intensification practices, crop diversification, resilience; technology adoption, climate change; food security; crop productivity

Acknowledgement: The study appreciates the support from the Faculty of Tropical Agrisciences, Czech University of Life Sciences (CZU) in Prague, for the funding under the Internal Grant Agency (IGA) Number: 20233102.

Farmers' Resilience and Adaptation Practice in Multi-Disaster Context: A Case Study of Indonesia

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Abstract: Disaster is a serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with exposure, vulnerability, and capacity conditions, leading to losses and impacts. Developing and least-developed countries with multiple geological and hydrological disaster threats were among the world's top-ranked disaster-risk countries. However, current studies primarily focus on single-hazard risks such as volcanic eruption, or flood, leaving research gaps in investigating agricultural practices among communities confronting multiple disaster threats. Therefore, this study explores the community's adaptation practices in agriculture in the context of multi-disaster threats: resources required, the benefits, and the enabling and limiting aspects, as well as how these contribute to resiliency. The study selects Indonesia as a research area due to its vulnerabilities to multi-disaster risks and its uniqueness in social, economic, and cultural diversity. Mixed quantitative and qualitative methods will be used, with 663 sample households in six districts, two districts per Province. Elinor Ostrom's theory of collective action and Institutional Analysis and Development (IAD) will provide a solid framework to analyze the driving factors of farmers' adaptation practices. Meanwhile, the study will use FAO's Food Security Index (FIES) and Resilience Index Measurement and Analysis (RIMA II) to analyze farmers' disaster resiliency. This is an ongoing study, and hence, results are pending. The findings will present the importance of local actors and social governance in achieving disaster resiliency and contribute to strategies for integrating DRR and agriculture policies for communities facing multi-disaster threats.

Keywords: resilience, adaptation practice, disaster risk reduction, food security

Acknowledgement: This research is technically and financially supported by the Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, under the grant number IGA 20243103.

Life Cycle Assessment: A Case Study of *Moringa Oleifera* Oil Production in Colombia

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Abstract: This study assesses the environmental impacts of *Moringa oleifera* oil production in Colombia, aiming to improve sustainability through Life Cycle Assessment. This study adheres to ISO 14040 and ISO 14044 guidelines, assessing refined *Moringa* oil production. It covers oil crop cultivation, milling, and refining, with by-products like protein meals and free fatty acids repurposed as animal feed. The study uses current inventory data from FAOSTAT and SuperPro Design software, with environmental impacts assessed via OpenLCA and the ecoinvent V3 database. The model evaluates impacts from cradle to gate, including upstream effects and product substitutions. The study evaluates various environmental impacts of *Moringa* oil production, including global warming, photochemical oxidation, eutrophication, carcinogens, land use, water use, solid waste, fossil fuel use, and mineral depletion. Key impacts identified are global warming potential, land ecotoxicity, water use, and human toxicity, while photochemical oxidation, eutrophication, particulate matter formation, and ozone depletion are minimal. Fossil fuel use and significant CO2 emissions result from agricultural machinery and the use of fertilizers, herbicides, and pesticides in *Moringa* cultivation. The post-harvest stage also adds to emissions from machinery. Notably, terrestrial ecotoxicity is affected by pollutant emissions during transportation, leading to toxic substance accumulation in soil and impacting terrestrial organisms. The study results offer a strong foundation for cleaner production in the edible oils sector. They support stakeholders in transitioning to *Moringa* oil by highlighting its environmental and health benefits, and provide a basis for detailed sustainable production modeling and improvement.

Keywords: *Moringa* oil; life cycle assessment; modelling software

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Environmental aspects of drilling waste disposal

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Abstract: The aim of the work is to develop and implement an environmentally friendly drilling waste management technology, namely the separation of drill cuttings into phases under centrifugal forces using coagulants and flocculants with the subsequent use of the resulting phases. Qualitative elemental analysis of drilling mud samples was performed using energy dispersive X-ray fluorescence ElvaX Light SDD spectrometers (ELVATEK LLC, Kyiv). The phase composition of drilling mud samples was determined by X-ray diffraction (DRON-4-07, Burevisnyk NPP). Quantitative content of mobile forms of heavy metals (iron, copper, cobalt, nickel, chromium) in drilling muds was determined by atomic absorption spectrophotometry. The optimal doses of coagulant and flocculant were determined; it was proved that the addition of coagulant aluminum sulfate at the level of 35 % by weight of the proportion of mechanical impurities and flocculant chitosan at the level of 0.4 % by weight with the maintenance of an acid reaction of the medium (pH at the level of 5–5.5 units) provides a degree of dewatering of the solid phase up to 95–98 %. The technological scheme of environmentally friendly drilling waste utilization technology was improved by using a high-efficiency centrifuge for separation of drilling waste and intensification of the process by adding optimal doses of aluminum sulfate coagulant and chitosan flocculant. An engineering calculation of the main equipment of the centrifuge based on energy consumption was carried out, which allows us to substantiate the feasibility and economic efficiency of its use in the developed technological scheme.

Keywords: drilling waste; technogenic load; drilling sludge; drilling mud; pollutants

Conversion of digestate into organo-mineral fertilizers

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Abstract: One of agriculture's most important goal is finding the balance between sustainability and intensification of production. The exponential growth of the world population, climate variability, and soil degradation are essential factors that require the development of novel agricultural practices to achieve food security. In this context, the need of new types of fertilizers combining organic and mineral properties is extremely important addressing soil fertility. Digestate after biogas production possible to use for this goal. The study of its nutritional content makes the aim of this study. For the study digestate from the biogas plant (Teofipol energy company) was used. For pellets production, raw digestate was separated with the screw press. Then, the separated solid was dewatered to 80% DM content in a solar greenhouse drier, equipped with an electric mole (THERMO-SYSTEM). During the consecutive pelletizing, pan grinder rollers forced the dried substrate through a die (5–10 mm). Total carbon Ct was determined by elemental analysis. Carbonate content was determined with a Scheibler apparatus according to DIN EN ISO 10693. Organic carbon was calculated as difference between total and inorganic carbon. Total nitrogen Nt and $NH4^+$–N contents in the pellets were determined according to Kjeldahl and by steam distillation with titration, respectively. During the research, organo-mineral fertilizers based on digestate and monoammonium phosphate were obtained, studied and demonstrate good agricultural qualities. Application of the digestate as organo-mineral fertilizers can simultaneously solve the increasing of food production, and management of waste, which is consistent with the circular economy concept.

Keywords: digestate; organo-mineral fertilizers; biogas

Shifts in Tree Pollen Seasons may Impact Allergy Exacerbations in Central Ukraine

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Abstract: Pollen allergy is one of the most common ailments worldwide, affecting up to 30% of the European population. Tree pollen is a major environmental allergen, and its impact varies with the timing of the pollen season, which is increasingly influenced by climate change. Accurate forecasting of high pollen periods is crucial for preventing exacerbations of pollen allergy. Our study aimed to identify recent high pollen periods in Central Ukraine to inform the public and reduce pollen allergy symptoms. Pollen sampling was conducted at the National Pirogov Memorial Medical University, Vinnytsia using a volumetric method with a Burkard trap, from January to November. Samples were stained with basic fuchsin and analyzed under a microscope under the X400 magnification. Two high pollen periods were identified, corresponding to the flowering of alder (Alnus) and birch (Betula). The highest Alnus pollen load occurred from February 23 to March 13, while Betula pollen peaked between April 1 and May 5. In accordance with the historical data, obtained at the same pollen site, from 2010 to 2014 the key Alnus flowering was seen from March 24 to 30 and an active Betula flowering was recorded, on average, from April 2 to 26. Thus, Alnus flowering has shifted earlier, and Betula pollen periods have slightly extended. Established shifts highlight the influence of environmental changes and underscore the need for continuous pollen monitoring to manage airborne allergenic factors.

Keywords: tree pollen allergy; climate change; environmental impact; allergy prevention

Lengthened Poaceae Pollen Season Highlights the Extended Risk of Seasonal Allergy in Central Ukraine

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Abstract: Grass (Poaceae) pollen is a known trigger of severe allergies, especially during its mid-summer flowering period. Accurate pollen forecasts are essential for preventing the worsening of seasonal allergy symptoms. This study aimed to analyze the timing of Poaceae flowering in Central Ukraine to identify key periods of heightened allergy risk. Pollen sampling using volumetric method employing Burkard trap (Hirst type) was performed in Vinnytsia, Central Ukraine in 2019-2023. The pollen trap was located on the roof of National Pirogov Memorial Medical University, Vinnytsia. Sampling was made from January to November. Samples were stained using basic fuchsin and analyzed under the light microspore with X400 magnification. Obtained results were compared with the historical data for Poaceae for the same site from 2009 to 2013. The highest Poaceae pollen load was seen in 2019-2023 in average within May 25 to July 11. Historical data suggested slightly later start and earlier end of this period: in 2009-2013 it was shorter and lasted from June 2 to July 9. Pollen counts close to the symptom threshold (10 pollen grains/m^3) were constantly seen after active pollen period in recent years up to September 20 while in 2009-2013 Poaceae pollen levels did not exceed 8 pollen grains/m^3 after the key pollination and were seen up to September 9. These findings suggest an extension of the Poaceae pollen season, particularly its active phase, highlighting the need for enhanced allergy prevention strategies in Ukraine.

Keywords: grass pollen allergy; environmental impact; season extension; allergy prevention

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About Faculty of Tropical AgriSciences

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

The mission of the Faculty

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.

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About BioResources & Technology Division

The **BioResources and Technology (BRT)** is a research division in the Faculty of Tropical AgriScience (FTZ) at the Czech University of Life Sciences Prague (CZU). The BRT is dedicated to advancing sustainable solutions through rigorous research, innovative technology, and interdisciplinary collaboration.

BRT research and innovation objectives encompass a wide array of thematic, from the determination of the real impact of small biogas plants (both in developing and developed countries) on the environment, climate change and society to bioresources technologies, including bioenergy, environmental aspects, food security, waste management, biotechnologies and more.

The global shift towards renewable energy and sustainable practices has reinforced the importance of holistic approaches to resource management. This underscores our commitment to fostering collaboration across these disciplines, enhancing our ability to address complex sustainability challenges. Interdisciplinary research is at the core of the BRT.

Our team comprises environmental science, engineering, agriculture, and social sciences expertise.

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

The platform aims to enhance the capabilities and collaboration among universities in the area of AgriSciences and to improve the scientific capacities of young educators, researchers, and postgraduate students at select Ukrainian universities. This will be accomplished through the continued development of the AgriSciences Platform, which focuses on increasing expertise in key areas of agrarian sciences, crucial for Ukraine's post-war development.

Beyond traditional AgriSciences topics, the project addresses urgent issues specific to present-day Ukraine, including the environmental and social impacts of the war. Furthermore, the project will also foster the formation of multidisciplinary research teams and offer grant opportunities to address these emerging challenges. These initiatives are critical for addressing Ukraine's needs during and after the conflict.

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

OSIRIS: Open Science to Increase Reproducibility in Science

Reproducibility is crucial to the progress and impact of Research and Innovation (R&I) as it confirms or corrects the outcomes of single studies, resulting in higher quality research, more reliable and implementable outcomes, and a reduction of research costs. Embedding reproducibility in the strategy and design of research should thus be regarded as a key precondition to research quality.

OSIRIS aims to facilitate this shift by systematically gathering knowledge on the underlying drivers, testing effective evidence-based solutions, identifying incentives for reproducibility by stakeholders, and embedding reproducibility in research design.

The project involves a unique combination of expertise in Open Science (OS), reproducibility, implementation, and data sharing, along with a range of committed stakeholders.

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.

COMUNIDAD: Combined Use of EGNSS and Copernicus Data to Develop Innovative Downstream Services for Users from Chile and Colombia

The COMUNIDAD project aims to develop, test, and implement an innovative framework that leverages Copernicus data to support agriculture, forestry, and rural development in Chile and Colombia. By integrating multiple data sources on the COMUNIDAD Platform, the project will facilitate the use of EGNSS (European Global Navigation Satellite Systems) and promote collaboration with both public and private sectors in the target regions.

COMUNIDAD will drive the long-term development of sustainable agriculture and forestry practices by supporting policy strategy development through Pilot Applications in Chile and Colombia.

The project emphasizes information sharing, open access, and transparency, making it a significant resource for the target regions. The COMUNIDAD Platform will integrate existing services and solutions to address new regions with high potential for application.

More information: https://comunidad-project.eu/

The COMUNIDAD project is funded by the European Union under grant agreement No. 101131859

COMUNIDAD

UNICOM: Universities – Communities: strengthening cooperation

The 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.

The UNICOM project aims to foster cooperation between Ukrainian universities and their surrounding communities by incorporating best practices from EU states such as Italy, Germany, Sweden, Latvia and Czech Republic. The project activities include developing policies to enhance the third mission of universities, analyzing the needs of communities and universities across Ukraine, and capacity-building for university staff through exchange programs focused on resilience, sustainability, inclusion, entrepreneurship, environment, public health, and social cohesion.

The project is a promising step towards promoting the third mission of universities in Ukraine and strengthening university-community cooperation.

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

BIO-CAPITAL: Mobilising investments for protecting and restoring biodiversity by harnessing innovative financial solutions and advanced geospatial analytics

BIO-CAPITAL is an innovative project dedicated to addressing the critical challenge of biodiversity protection and restoration. By integrating technological advances within the field of geospatial analytics with sustainable financing solutions, the project aims to bridge the gap between ecological preservation and the need for increased private investment in conservation efforts.

The project adopts an interdisciplinary approach, combining expertise in biodiversity protection, the development of biodiversity-friendly financing mechanisms, and the application of advanced space technologies. These elements are brought together to create transformative solutions that enhance financial flows for biodiversity protection, restoration and sustainable utilisation.

More information: www.bio-capital.eu

This project has received funding from the European Union's Horizon Research and Innovation Programme under grant agreement No. 101135150.

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