21st WELLMANN INTERNATIONAL SCIENTIFIC CONFERENCE

BOOK OF ABSTRACTS

18th April 2024

Hódmezővásárhely

University of Szeged Faculty of Agriculture Hódmezővásárhely (Hungary)

Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timisoara

Faculty of Management and Rural Turism (Romania) Hungarian Academy of Sciences Regional Committee in Szeged (Hungary)

Foundation for Agricultural Modernization and Rural Development, Hódmezővásárhely (Hungary)

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Published by: University of Szeged Faculty of Agriculture Andrássy út 15.

6800 Hódmezővásárhely, Hungary

Responsible publisher:

Edit Mikó dean

ISBN 978-963-306-980-6

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RELATION BETWEEN AGROBIODIVERSITY, WATER AVAILABILITY AND MICROCLIMATE CHARACTERISTICS IN THE OASES OF KEBILI, TUNISIA

Haïfa Benmoussa[1], Nabila El Kadri[1,2], Aymen Ben Ahmed[1], Nadhira Ben Aissa[3], Mehdi Ben Mimoun[1*]

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Oases are unique desert locations where plants and trees thrive due to water availability and have been traditionally classified in Tunisia based on their agro-biodiversity levels. Initially, "traditional" oases have three-layeres of date palms, fruit trees, and annual crops, while "modern" oases since their establishment consisted of only date palms. Nevertheless, our results showed that this classification has shifted over time, with "traditional" oases chang-ing towards monoculture due to water constraints, while "modern" are diversifying into poly-culture setups when water is available. Moreover, discussions and interviews with oasis far-mers have revealed noticeable variations in date fruit yield and quality traits between these oasis types. To explore these distinctions, two weather stations were established in El Bargho-uthia oasis, located in the Kebili region of southern Tunisia—one in a one-layer plot and the other in a three-layered plot—to assess their microclimate characteristics. Over three years, records on temperature, humidity, wind speed, and gust were collected at 10-minute intervals from each station. Comparative analysis of the records disclosed that three-layered plot exhi-bited lower temperatures, higher relative humidity levels, and lower wind speed and gusts compared to the one-layered plot. These variations highlight unique microclimate conditions attributed to the dense vegetation in the three-layered plot. Our findings emphasize the sig-nificance of conserving and overseeing agro-biodiversity levels within oases. This can poten-tially foster more favourable microclimates for palm date pollination, health, and fruit quality, enhance the adaptive ability of these unique ecosystems to confront climate change threats and confirms the growers' insights.

TECHNOLOGICAL CHALLENGES AND PARADIGM SHIFTS IN WASTEWATER TREATMENT AND SLUDGE UTILIZATION

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Because of water shortage of last decades, the protection of drinking water resources, and the development of efficient wastewater purification technologies has been come into the limelight. The fluctuation in quantity (e.g., diurnal and spatial variations) and the diversity of components present new technical, technological, and economic challenges for both research and development (R&D) and operators, respectively. The continuously increasing expectations of society and future tightening of environmental standards and legislation necessitate detailed investigations into the effects of contaminants of emerging concern (CECs), such as endocrine-disrupting substances (EDSs), pesticide and pharmaceutical residues, and microplastics, on human health and the environment. Some of these pollutants cannot be removed with conventionally used wastewater treatment technologies. Therefore, there is a need for the development of novel and more efficient processes (such as membrane filtration, advanced oxidation processes, biotechnological methods, and their combinations) that can be scaled-up and implemented into municipal wastewater treatment plants (WWTPs) and industry-scale wastewater purification technologies. It can be noticed that water suitable for drinking quality is one of the most commonly used raw materials and processing aids in the food industry (for dilution, heating, cooling, disinfection, cleaning, etc.). Therefore, the increased efficiency of water and wastewater treatment can help to achieve improved food safety, as well. The availability of fresh and safe water, both in quantity and quality, is one of the key elements for maintaining economic development. Regenerated (reutilized) wastewater can be an alternative water resource that ensures water availability while reducing pressure on water bodies. These technological solutions help to meet the principles of the circular economy (CE). Wastewater, including municipal and industrial wastewater, is rich in valuable organic and inorganic compounds for recovery. During the mechanical treatment and separation stages of secondary and tertiary wastewater purification processes, a significant amount of pollutants are concentrated into the sludge. Global wastewater sludge production is estimated to be around 45 million dry matter tonnes annually. In recent years, problems in the supply of materials and energy have led to a renewed emphasis on the recovery of sludge components (e.g., nitrogen, phosphorus) or the use of the whole material streams through biological processes (e.g., biogas production by anaerobic digestion or composting). Several technologies are known to achieve better water recovery (e.g., closing the water loop in industry-scale manufacturing processes) or to produce energy from wastewater and sludge (e.g., controlled anaerobic digestion). These efforts and technological developments will also contribute to the achievement of the Sustainable Development Goals (SDGs) of the United Nations. The effectiveness of technologies for wastewater and sludge treatment and utilization can only be assessed on the basis of complex criteria, which may include technological and economic indicators as well. Improving the efficiency of wastewater and sludge treatment and utilization processes and developing monitoring methods to optimize these processes are of great importance due to the high operational costs of wastewater treatment. There are specific expectations for industry-scaled monitoring methods applied to wastewater and sludge treatment, mainly regarding robustness, minimum chemical need, reduced measurement time per sample, and, suitability for non-destructive, on-line, in-line, and real-time analysis in real wastewater and sludge matrices. In addition to conventional non-destructive analytical methods used in analytical practice (e.g., AFS, FTIR), novel monitoring methods based on electrical

measurements, such as dielectric measurements, are highly relevant not only for science but also for practical use. The research is financed by National Research, Development and Innovation Office FK 146344 project and supported by the Bolyai János Research Scholarship of the Hungarian Academy of Sciences (BO/00161/21/4).

ENVIRONMENTAL CHALLENGES OF EUROPEAN FRESHWATER AQUACULTURE AND POSSIBLE ANSWERS TO BE GIVEN ON POLICY LEVEL

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The freshwater finfish aquaculture dominates production with a share of 85.4% by volume on global level, where the low food chain, herbivorous and omnivorous fish species contribute to the decisive part (67.3%) of aquaculture production. Cyprinid species give about 48% of the global aquaculture production, of which Common carp is the third most abundant species with 4,236.3 thousand tonnes in production. At the same time, the share of Cyprinid production is 7.2% in the EU, while all together only 20.6% of the aquaculture production comes from freshwater. Besides the low level of quantitative development of the EU aquaculture, which remaines under 2 % the most remarkable weakness of the EU aquaculture that the production is covering only the 15% of the domestic market needs. 85% of aquaculture products imported from developing countries is a major challenge for both sustainability and food security point of view. The freshwater aquaculture sector in the EU is dominated by two main families, Salmonids and Cyprinids. Their production represents 83% of the EU freshwater aquaculture production. The rearing of these two species groups show great regional differences. Nowadays carp farming is mostly located in the Central Eastern European (CEE) region. Although carp production operates both in different intensive and extensive (semi-intensive) systems the typical carp farming means a traditional, extensive production. It is based on the natural nutrient cycle typical of natural wetland ecosystems. It operates as an open ecological system, where natural and technological processes are built on each other inseparably. Thanks to the extensive and seasonal production method pond aquaculture has high economic resilience. The sector runs with low operational expenditures (OPEX), and it is free from fish meal dependency and xenobiotics use. The species produced in this system belongs to low food chain ones. The EU pond aquaculture ensures yearly 80,000 tonnes of carp production that is 26% of the total EU freshwater aquaculture production in volumes and 260,000,000 euro in value. Pond aquaculture operates in rural areas employing up to 13,000 people. Beyond the direct economic values, the traditional pond aquaculture has diverse and complex environmental benefits. The most important value of pond aquaculture is that it maintains 250,000 ha man-made wetlands in the EU. Pond farms highly contribute to preserve biodiversity maintaining the populations of more than 400 bird species, substantial part of the otter population in Europe, numerous wetland related plant and animal species with European significance. In the latest years more and more scientific information has become available on the positive interaction between freshwater finfish aquaculture and the environment including its complex ecosystem services, as well as on its role in climate change mitigation, despite the EU's underestimated support practice concerning freshwater aquaculture. Although the scientific evidences are increasing on the complex social, economic and environmental benefits of pond farming together with the international recognition of carp production in Europe the sector still faces many challenges. Most of them are directly related to climate change from the environmental point of view, such as decreasing renewable water resources and predictability of water regime, increasing water blooming, emerging new pathogens and new invasive competitor species. Overall, the declining environmental conditions cause decreasing non-specific immune status of farmed fish species. The impact of wildlife is a complex ecological issue, but the deteriorating status is also linked to climate change. The lessons learnt from traditional low trophic pond aquaculture could be better exploited in the

development of circular bio-based farming in the EU. Lower trophic freshwater finfish aquaculture should be an important component of freshwater blue bioeconomy, not only as an efficient and sustainable biomass-producing sector, but also due to its potential for waste minimization and its complex natural services. Together with this recognition more emphasis should be put on the development of freshwater aquaculture in the EU. This could be achieved through focused research and innovation activities for more sustainable, competitive and resilient production, implementing a consistent and complex policy on the basis of blue bioeconomy. However currently these are not visible enough neither in research policy and in the aquaculture strategic guidelines nor in the European aquaculture support schemes.

AGRICULTURAL PRODUCTION

Regular presentations

CAPON AS A NOVEL PRODUCT IN NATIVE CHICKENS

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Since the appearance of poultry hybrids, the importance of our old traditional breeds is gradually decreasing. Nowadays, economic production has completely pushed our indigenous breeds of chickens into the background, since the products of these old breeds cannot be produced in large-scale farming technology. At the Pilot Farm of University of Szeged we have been keeping two indigenous breeds of chickens since 1977. The products of our Speckled Hungarian Chickens and Speckled Transylvanian Naked Neck Chickens are popular among the local population, but due to the fact that they can be sold on a wider scale, curious products are needed. In addition to the gene preservation program, one of our tasks is to produce suitable, saleable, marketable products that increase the economic importance of the varieties. Caponization is one such possibility, in making our indigenous chicken breeds better marketable. In our tests, we want to investigate at what age it is easiest to perform caponization in our native breeds.

CHARACTERIZATION OF AGROECOLOGICAL PRACTICES IN TWO ARID AND SEMI-ARID REGIONS OF MOROCCO AND ANALYSIS OF THE CONDITIONS FOR THEIR DEVELOPMENT

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The arid and semi-arid regions of Morocco are faced with issues of land degradation, low water productivity, and high rainfall variability, commonly associated with the impacts of climate change. Agroecology is emerging as an innovative approach capable of addressing several challenges arising from these effects. The present study aims to identify agroecological practices in two specific regions, namely, the central and southeastern parts of Morocco. It seeks to pinpoint the technical, economic, natural, and other factors influencing agricultural production system in these areas. Data were collected from a survey involving 214 farmers through field trips and observations. The collected data were processed using quantitative and content analyses. Key results indicate that crop diversification, agroforestry, livestock farming, agriculture-livestock integration, crop rotations and associations, organic fertilization based on animal manure, and phytosanitary protection based on traditional knowledge are already integrated into current practices. However, these practices are not perceived as agro-ecological; instead, they are often viewed as irrelevant ancestral traditions. Recognizing the scientific value of these agro-ecological adoptions presents promising opportunities for enhancing the traditional conventions in the two studied territories. Nevertheless, for this agricultural system to succeed, it must overcome various economic, social, and productive challenges. To maximize its benefits, there is a need for financial and technical support, continual awareness efforts, favorable policies, and collaboration initiatives among stakeholders. Implementing these measures is crucial to fully harness the potential of agroecology in these regions.

CONTRIBUTION OF POND FISH FARMING TO THE SUSTAINABLE DEVELOPMENT GOALS SYSTEM IN HUNGARY

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The Hungarian aquaculture fish farming sector can be divided into 4 main units: farmed fish production, intensive (precision) fish production, fish processing and recreational fisheries. Of these, the most economically important is the pond farming sector, which is also the pillar of several supply and service sectors. The Sustainable Development Goals (SDGs), adopted by the UN General Assembly in autumn 2015, aim to set the world on a sustainable development path, which is articulated and encompassed in 17 SDGs. In line with international trends, the National Sustainable Development Framework Strategy for the period 2012-2024 has also been published in Hungary. The elaboration of a new framework strategy to follow the current strategy has already started and consultations are ongoing. In Hungary, the sustainability of aquaculture is being developed and adapted to expectations by the organisations involved: fish producers, fish processors, anglers' organisations, sectoral stakeholders, and governmental bodies. Joining this coalition, we believe it is important to review the role and potential of the domestic pond fish farming sector in the process of achieving sustainable development. Our study will examine the impact of pond farming and its link to the Sustainable Development Goals from an integrated approach, considering production technology, ecology, economics, innovation, marketing, and communication aspects. This will be done with the aim that sustainable practices in Hungarian pond fish farming can be an inspiration for other countries to achieve similar development goals.

EFFECT OF BIOSTIMULANTS APPLICATION IN CULTIVATION OF WINTER BARLEY

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Biostimulants as alternative methods can play a significant role in supporting plant growth, and in reducing negative effects of abiotic and biotic stresses. A field experiment with winter barley (cv. SU Ellen) was conducted in Hungary to assess the response of grain yield, yield components, plant fresh and dry weight and SPAD index and grain quality of two different commercially available biostimulator preparations (Aminocomplex and Főnix). The foliar application of Aminocomplex at a rate of 3 L ha^{-1} was done at end of tillering (BBCH29). The Főnix at rate of 0.25 L ha^{-1} at end of tillering (BBCH29) and in two times 0.12 L ha^{-1} at end of tillering (BBCH29) and flag leaf stage (BBCH39). The application of Aminocomplex significantly increased the SPAD index which caused higher grain protein content. The biostimulant Főnix in two times resulted in 27.5% yield increase compared to the control. The research indicated that the application of biostimulants could help to maximize yield and increase grain quality.

EFFECT OF THE PARTIAL SUBSTITUTION OF CORN SILAGE BY HYDROPONIC BARLEY IN DAIRY COWS' DIET DURING THE EARLY LACTATION ON PRODUCTION AND REPRODUCTIVE PERFORMANCE

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The objective of this work was to evaluate the effect of partial substitution of corn silage by hydroponic barley in Holstein dairy cow's diet during early lactation on production and reproductive performance. Sixty Holstein dairy cows, in early lactation, were randomly assigned to two homogeneous groups, thirty per each: the control group (T0) where cows received the diet usually used by breeders and the treatment group (T1) where cows received the same ration with a 40% substitution of corn silage by hydroponic barley. A 15-day diet adaptation period came before the trial, which lasted 90 days. The partial substitution of corn silage with hydroponic barley did not affect the milk production (41.04 *vs* 42.17 kg of milk), the milk fat (4.25 *vs* 4.02%) and the protein (2.86 *vs* 2.89%) for T0 and T1, respectively. In addition, the feed conversion ratio of milk was 0.63 and 0.61 kg DM/kg milk for T0 and T1, respectively. The partial substitution of corn silage by hydroponic barley had a significant effect on the body condition score (3.15 vs 2.84) for T0 and T1 group, respectively and did not influence the calving-first service interval ($P>0.05$). However, the hydroponic barley based diet increased the coital ratio to 1.9 for T1 compared to T0 (1.66), and the calving-conception interval was increased by 9 days for cows receiving the T1 diet. The results showed that corn silage might be partially replaced by hydroponic barley during the early lactation period without having a negative effects on production or reproductive performances.

EFFICACY OF BTH AND NEEMAZAL AGAINST AN AGGRESSIVE ISOLATE OF SUNFLOWER DOWNY MILDEW CAUSED BY *Plasmopara halstedii* (FARL. (BERL. ET DE TONI)

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Sunflower is an important oilseed crop, but its yield is highly affected by devastating diseases such as sunflower downy mildew caused by Plasmopara halstedii. The high variability of this pathogen compromises the effective management of sunflowers; therefore, IPM including alternative methods is a promising tool against downy mildew. The goal of our study was to assess the effectiveness of BTH (benzothiadiazole in Bion 50 WG) and NeemAzal as inducers of resistance against sunflower downy mildew. Sunflower seedlings were treated with BTH and NeemAzal before inoculation with varying concentrations of Plasmopara halstedii sporangia and incubated overnight at 16°C. Disease severity was assessed using a 0- 4 scale, and plant height was measured twice. Histological analysis of sunflower hypocotyls was conducted to examine pathogen structures and host reactions. Both BTH and NeemAzal treatments reduced disease development, with BTH showing greater efficacy in inhibiting pathogen growth and reducing plant height compared to NeemAzal. Histological examination revealed decreased presence of pathogen structures and increased necrosis in treated plants. Further experiments with inducers are recommended. Preliminary results indicate that NeemAzal and BTH reduce the progression of disease symptoms. Plant inducers offer an ecofriendly approach to disease management, including the control of sunflower downy mildew.

EVALUATION OF BEETROOT VARIETIES FOR DIFFERENT USES

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Beetroot has been consumed in significant quantities in recent decades, mostly due to its anti-oxidant-active colouring matter. Nowadays, semi-finished or ready-made products are becoming increasingly popular among consumers. With the experiment, we want to give an answer to what kind of product the given beetroot variety is suitable for production. We evaluated the content of some bioactive substances (total polyphenol, flavonoid, betanin, vulgaxanthin) of fresh beetroot samples, as well as the effect of different drying temperatures (42 and 52 °C) on the colour content of the product. Varieties with a high content of colorants and water-soluble solids, and without an earthy aftertaste, are recommended for the production of beetroot juice. *Bonel* and *Akela* showed the best results on chalky chernozem soil, while on sandy soil the *Carillon* variety showed the best results. Beetroot has an excellent health-preserving effect, which can partly be explained by its high total polyphenol and flavonoid content. *Akela* and *Lomako* showed the highest values for these parameters on both soil types. As a result of drying, the varieties reacted differently, and at the higher temperature (52°C) we experienced a greater decrease in the color content. Varieties with a high colour and low water-soluble dry matter content are recommended for the production of beet chips.

INBREEDING AND INBREEDING DILEMMA IN INDIGENOUS GOATS UNDER EXTENSIVE PRODUCTION SYSTEMS: A REVIEW

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In developing countries, indigenous goats make up approximately 90% of the total goat breeds. These goats are important to the livelihoods of rural households and the country's economy. They are raised mostly under an extensive production system. This system exposes them to inbreeding, inbreeding occurs when closely related breeds mate leading to autozygosity (two identical alleles at the same locus). The review aims to understand inbreeding and its effect on indigenous goats and recommend ways to control it based on available peer-reviewed papers, country reports and surveys. The review shows that indigenous goats' production system is characterised by small population size, intensive selection, lack of animal data, random mating, and uncontrolled breeding this exposes them to the risk of inbreeding depression that arises due to continuous inbreeding. Inbreeding depression affects reproductive and growth traits and even leads to reduced fertility (reduction in kidding interval), stunted growth, increased mortality and morbidity while necessitating the spread of inherited diseases across generations., ultimately affecting the general performance and conformation of these goats. Various studies have assessed the long-term effect of inbreeding on different livestock breeds and revealed that inbreeding is a prevalent problem in livestock under extensive production systems. Unfortunately, controlling it in such a system is so challenging. Hence the use of single nucleotide polymorphism (SNPs) has been proposed as a strategy to help control and conserve inbreeding within indigenous goat populations, thereby conserving their genetic potential and reducing the inbreeding rate.

INFLUENCE OF NITROGEN FERTILIZATION AND HYBRIDS ON CHLOROPHYLL CONTENT AND CONSEQUENT MAIZE GRAIN YIELD

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Maize (*Zea mays* L.) contributes greatly in global agri-food systems as food, feed, and raw materials for industries. In many countries, particularly in SSA, Latin America, and a few countries in Asia, maize is a well-established and significant crop for human consumption accounting for approximately 20% of food calories. However, its production is constrained by abiotic stresses such as drought and soil fertility. Among the amelioration techniques are fertilization which maintains optimum nutrition, leverage nutrient deficiency conditions, optimize maize growth and consequent yield. A tetra-plicate split-plot designed experiment was conducted in 2023 spring at the Látókép research site of the University of Debrecen to evaluate the effect of nitrogen fertilization and maize genotypes on the agro-physiological parameters and grain quality. The treatment consisted whole plot three nitrogen regimes (i.e. 0, 90, and 150 Kg/ha) and subplot three maize hybrids from Pioneer, Bayer, and GK- Szeged (P9610, DKC4590 and GKT376). The results showed a significant ($p < 0.05$) correlation coefficients were obtained between normalized difference vegetation index, leaf area index, grain yield, and protein content with chlorophyll content, revealing the importance of chlorophyll content in enhancing crop growth performance and subsequent yield.

INTEGRATED AGROECOLOGICAL PRACTICES TO SUPPORT WEED MANAGEMENT AND IMPROVE PRODUCTIVITY: CASE OF LENTIL *(Lens culinaris* Medik.) AND FAVA BEAN (*Vicia faba* var. minor L.) IN MEKNES REGION, MOROCCO

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In order to protect human health and the environment and to prevent the occurrence of weed ecotypes, global efforts are being made to reduce the world's high dependency on synthetic herbicides for weed control. In this perspective, a field experiment was conducted at the educational farm of the National School of Agriculture of Meknes (Morocco) to evaluate mulch effect of black plastic, oat straw and sycamore leaves on both faba bean and weed growth at flowering and harvest stage. The experiment was performed according to a randomized complete block design (RCBD) repeated four times. The results showed that the highest weeds infestation was recorded in weedy check (Control). Sycamore leaves, oat straw and black plastic mulches have significantly reduced weeds density and biomass, thus provided efficiency by 84.8, 80.6 and 86.8% respectively. In addition, the oat straw, black plastic, and sycamore leaves have improved faba bean yield by 42, 52.9, and 43% respectively. In lentil crops the effects of manual weeding, plant extract, black polythene, and mulching were tested. The weed flora inventoried was very diverse, with 22 different species. Our treatments provided an effective weed control compared to the control, especially black polythene, mulching and manual weeding. As for the plant extract treatment, the weed control efficiency was lower than the other treatments. It was concluded that, the agro-ecological practices tested in this study showed the highest yield and yield components of lentil crop compared to the weedy check.

MOUNTAIN AGRICULTURE: DIVERSIFICATION OF ACTIVITIES AND RESILIENCE TO CLIMATE CHANGE

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Mountain agriculture in Morocco encounters faces specific challenges due to the unique geographical, sociodemographic, and climatic conditions of these regions. Historically, mountainous areas have functioned as refuges and settlement spaces for indigenous populations. These areas have long remained enclosed, isolated spaces compartmentalized by their reliefs, housing agrarian societies that have adeptly adapted to subsist with limited resources. The management of scarcity and the determination to overcome various constraints have spurred ingenuity and creativity in local resource governance, grounded social structures, and tailored production systems. However, mountainous areas encompass the majority of expansive natural spaces extensively shaped by human activities over the centuries. Mountains provide extensive pastoral surfaces for large-scale livestock farming and are conducive to family farming adapted to mountain ecology. These mountainous regions also present appeal for emerging economic activities such as ecotourism/agrotourism, environmental services, landscape values, specific local products, and craftsmanship. Serving as custodians of living traditions and expertise, mountain agriculture carries a robust image of authenticity that merits appreciation and preservation in diverse, yet resilient forms in the face of climate change, all while safeguarding resources and traditional agroecological practices.

NUTRIENT MANAGEMENT PRACTICES FOR ENHANCING PRODUCTIVITY, NUTRITIONAL COMPOSITIONS, AND QUALITY IN DURUM WHEAT

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This study investigates the multifaceted impacts of genetic variation, nitrogen rate, foliarly applied zinc, and sulphur fertilizers on key agronomic and nutritional parameters of durum wheat. Through field experiments conducted for three consecutive years, various genetic variations, nitrogen rates, and combinations of zinc and sulphur applications were evaluated for their effects on protein content, hectoliter weight, yield metrics, and grain nutritional composition. Results reveal significant ($p < 0.001$) interactions between genetic backgrounds and nutrient management practices, highlighting the importance of tailored approaches for optimizing durum wheat production and quality. Increased nitrogen rates generally led to higher protein content but also influenced other yield metrics, emphasizing the need for balanced fertilization strategies. Applying a sulphur-containing fertilizer directly to the leaves during the flag leaf stage preserved the grain yield of drought sensitive varieties, such as Tamadur, while enhancing it by approximately 12.23% (from 4.8 to 5.4 t ha-1) compared to tolerant varieties. Combined application of zinc and nitrogen resulted in an approximate 15.49% enhancement in grain zinc content and improved drought tolerance of durum wheat varieties (i.e. Duragold) by about 21.3%. This means that integrated nutrient management could exhibit nuanced effects on stress tolerance and grain nutritional composition, with potential implications for food quality and human health. This research universally underscores the complex interplay between genetic factors and agronomic practices in shaping the nutritional profile and productivity of durum wheat, providing valuable insights for sustainable crop management and breeding programs.

PRODUCTION OF PEPTAIBOLS BY *TRICHODERMA* STRAINS BELONGING TO CLADE HARZIANUM AND THEIR BIOACTIVITIES

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Extreme weather conditions and emerging plant pathogenic microorganisms urge the search for new methods of biological plant protection. Peptaibols, secondary metabolites produced by filamentous fungal species of the genus *Trichoderma* have several favourable properties, due to which they may play an important role in biological control in the future. Peptaibols are short peptides containing biologically active, proteinogenic and non-proteinogenic amino acids in an extremely diverse composition. Peptaibols are able to attach and create ion channels in biological membranes, thus exerting cell-destructive effects and providing protection against phytopatogenic microorganisms. During our work, peptaibol production of 8 *Trichoderma* strains belonging to clade Harzianum were determined by HPLC-MS method. Peptaibol extracts were prepared using large-scale extraction and the minimum inhibitory concentration (MIC, mg ml^{-1}) values of each extract against Gram-negative and Gram-positive bacterial strains were examined. The effective concentration (EC, mg ml^{-1}) values of the extracts were also determined against 4 phytopathogenic fungal strains. Based on our results, the strains produced several new 17- and 18 residue peptaibol sequences belonging to the Trichokindin and Trichorzin peptaibol groups. Furthermore, peptaibol extracts were capable of inhibiting several Gram-negative bacteria in addition to Gram-positive bacterial strains, and also had a growth-slowing effect against plant pathogenic fungal strains. The comprehensive examination of peptaibols can promote a deeper understanding of their background mechanism of action, which can facilitate the rapid selection of strains producing active sequences for their practical application. The research is supported by the ÚNKP-23-4 -SZTE-544 New National Excellence Program of the Ministry for Innovation and Technology from the source of the National Research, Development and Innovation Fund and this study was supported by the Hungary-Serbia IPA Cross-border Co-operation Programme project FERTILEAVES (HUSRB/23S/11/027).

RELAY CROPPING AS A TOOL FOR IMPROVING THE RESILIENCE AND SUSTAINABILITY OF THE ENVIRONMENT: A BIBLIOGRAPHIC ANALYSIS

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The environment is increasingly encountering a major test of climate change effects in contemporary crop growing. Fundamentally, several choices or systems are applied in the global campaign of managing such tests. Relay cropping has been tried as a multiple-crop-dependent tool to deal with the consequences of drought, and soil erosion, among others. It is imperative to discover how relay cropping has recently contributed to the environment as a tool for improved resilience and sustainability for high farm returns. This paper reveals the latest worldwide focus on relay cropping with respect to its contribution to a healthier environment. The available literature was searched in Scopus Database covering a data range of 2019-2024. Thirty-nine documents were retrieved, comprising articles, reviews, book chapters, and books, before exporting and analysing data using VOSviewer Software. Countries that dominated the search results were United States, India, Bangladesh, Czech Republic, Kenya, and Slovakia. Major funding of the research initiative came from North America and Asia continents. The most common areas linked to relay cropping included ecosystem environment, agronomy, and land degradation and development. Soybean, corn, cotton, and wheat are the major crops that support resource conservation, ecological biodiversity, and nutrient recycling. Notable limitations in the use of relay cropping, however, were; resultant lower yields and resource competition through crop overlap. In general, relay cropping intensifies soil quality, and averts soil degradation to expand farm profits. Consequently, it is recommended that countries adopt more sustainably intensified systems that are geared towards a flexible, user-friendly, and feasible environment.

REPRODUCTIVE FAILURE REMOVAL AMONG NURSE SOWS

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Due to hyperprolificacy in modern pig production, nurse sows are used to nurse surplus piglets. Additional stay in lactation results in loosing back fat thickness which is associated with poor reproductive performance. Therefore, the aim of this research was to characterize and quantify causes of Reproductive Failure (RF) removal and the risk of removal associated with parity. Archived reproductive data was retrieved from a large company database between 2016-2022. Records of 37852 nurse sows culled due to reproductive failure before reaching their next parity were analyzed using SPSS statistics software and Chi-square test used to test between the group differences. The major RF causes were; failure to conceive 30.7%, no heat 23.0% vaginal discharges 19.3%, abortion 11.4%, failed to farrow 8.0% and retained pigs 7.5%.The risk of removal due to fail to conceive was significant ($\chi 2$=352.480, P0.001was detected for abortion among parities. RF is an unplanned sow removal reason that requires decision making in an attempt to control it. Understanding the risk associated with each cause of RF removal could help producers plan how to decide on selecting a nurse sows.

STRAIN MAINTENANCE AND SPAWN PRODUCTION OF WHITE BUTTON MUSHROOM

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Located near Eger, in Demjén, one of Hungary's largest mushroom farms operates, encompassing composting, mushroom cultivation, canned mushroom production, and the production of spawn for various mushrooms. This presentation focuses on our efforts in mushroom spawn production, particularly emphasizing our experiments concerning strain maintenance of the white button mushroom that most extensively cultivated mushroom in Europe and Hungary. Our experiments prioritize sustainability and economic viability, leading us to develop a protocol for both the production and strain maintenance of white button mushroom mycelium. The process initiates with propagation in Petri dishes, where strains, stored in tubes, are cultured on compost-containing mediums. Strains exhibiting optimal performance in mushroom cultivation are subsequently transferred to millet-based mediums. In the final stage of scale-up, white button mushroom spawn is cultivated in a spawn production facility using a rye-based medium. The spawn is then utilized during the third phase compost production in the compost plant to facilitate bulk spawn run. Acknowledgement: This research was supported by grant 2020-1.1.2-PIACI-KFI-2020-00100 from the National Research, Development and Innovation Office, Hungary. Additional backing came from the Doctoral Student Scholarship Program of the Co-operative Doctoral Program of the Ministry of Innovation and Technology, funded by the National Research, Development and Innovation Fund (grant No. KDP-2023-C2298833 to J. Bajzát).

CLIMATE FREQUENCY ANALYSIS FOR CEREAL YIELD FORECASTING IN MOROCCO

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Abstract: The agronomists usually use descriptive statistics to assess various climatic risks and forecast cereal yields. In Morocco, there is an important need to develop early forecasting models to predict cereal yields for accurate crop management. The present research aims to evaluate the possibility of forecasting wheat production, as early as possible in two cereal areas of Morocco using the climate frequency analysis. (2) Two major cereal areas were prospected: Zair and Sais. The annual average rainfall is 396 mm for Zair and 460 mm for Sais. The climate DATA (monthly rainfall and temperatures) and the corresponding wheat yield were analyzed for 22 seasons for Zaer and for 33 seasons for Sais. (3) The regression analysis revealed that the prediction of grain yield in the Zaer region is related to the accumulated precipitation from September to January ($\sum_{\text{sept.}}^{jan.} rainall$) and the distribution of rainfall (Coefficient of variation: CV) between October and November: Grain yield (q ha^{-1}) = 24.53 ln ($\sum_{\text{Sept.}}^{Jan.} rainfall$) + 0.16 * ($CV_{\text{Oct.-Nov.}}$) – 108.76 ($R^2$adjusted = 0.73). Concerning, the Sais area the grain yield prediction was related to the accumulated precipitation from October to February and the distribution of rainfall between these months: Grain yield (q ha^{-1}) = 0.08 * ($\sum_{\text{Feb.}}^{Oct.} rainfall$) – 13.70 * ($CV_{\text{Oct-Feb}}$) + 15.71 ($R^2$adjusted = 0.7). (4). The results of this study will help cereal producers to predict earlier the yield, thereby adopting the best crop management according to the earlier prediction of the grain yield.

COMPARATIVE ANALYSIS OF TWO-ROW WINTER BARLEY VARIETIES IN A SMALL-PLOT TRIAL

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During the 2022/2023 growing season, we conducted a small-plot field experiment to assess three two-row winter barley (Hordeum vulgare L.) varieties. Instrumental measurements were taken four times throughout the growing season, and post-harvest assessments were conducted. Significant differences were observed among the varieties of terms of protein content, NDVI (Normalized Difference Vegetation Index) values, and LAI (Leaf Area Index) values. Among the yield components, only thousand kernel weight showed significant differences. NDVI and LAI values were closely related to the protein content of barley varieties, and LAI and NDVI values measured at the BBCH 61-79 stages exhibited a strong correlation with a thousand kernel weight. NDVI values measured at BBCH 39-55 stages correlated with the number of ears per square meter. We confirmed a negative correlation between yield and protein content. Significant differences in LAI values among varieties were only evident in later stages of vegetation, while NDVI values differed consistently throughout the vegetation period. The Casanova genotype demonstrated the highest yield, while the KH Korsó yielded the lowest. The Mv Fáta genotype had the highest protein content, whereas the KH Korsó had the lowest.

EFFECT OF DIFFERENT SOWING DATES ON YIELD OF FOUR HYBRIDS OF SWEET CORN (Zea mays L.) SACCHARATES

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Sweet corn (*Zea mays* L. var. saccharata [Sturtev.] L.H. Bailey) is a one variety of corn whose morphological characteristics and cultivation technology are generally similar to those of other varieties –with some differences. Good cultural management is tailored to suit cultivars, with special attention given to harvesting technologies, establishment, plant population, fertilizer, irrigation, soil management, and pest and disease control. The experiment was conducted at the Látókép Plant Cultivation Research Center of Debrecen University In season 2022. The experiment was conducted in a randomized complete block design with four replications of sweet corn. To investigate the effect of different sowing dates on the yield of sweet corn four hybrids. Based on the results obtained from the sowing date experiments with sweet maize, it was concluded that the crop stand had a more favorable course of development and outstanding yield in the case of the second sowing date. On the other hand, Hybrid Messenger is best in yield (20133kg/ha) at a different sowing date. However, the earliest hybrid in time of tasselling and silking scored by Gss6924 can be exploited in the improvement of this crop of any plant breeding program.

INFLUENCE OF BREEDING PRACTICES AND SEASONS ON THE QUANTITY AND QUALITY OF RAW MILK PRODUCED IN NORTHEASTERN ALGERIA

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The present study aimed to evaluate the effects of breeding practices and seasons on the quantity and quality of raw cow milk. Data were recorded from 12 intensive dairy farms composed of 32 to 115 Holstein cattle breeds (47 on average). A total of 144 milk samples were analyzed for daily yield (kg/day), total production (kg/cow/lactation), and composition, including the percentage of fat, protein, non-fat solids, lactose, ash, density (g/cm3), and freezing point (°C). Results showed that fat, protein, lactose, and density were affected by breeding practices ($p < 0.01$). The effects of the lactation stage on all traits were significant ($p < 0.01$). Fat and protein levels were higher at the end of lactation ($p < 0.01$), as were those of lactose ($p < 0.001$) and mineral matter ($p < 0.05$). Thus, the stage of lactation had an effect on the quantity of milk produced, which was generally negatively correlated with the physicochemical quality of the milk. Differences by season were observed in milk fat and protein contents, acidity level, and cryoscopy. In general, the highest fat content was observed in July, followed by August and September, with averages above 41 g/kg. Additionally, a significant drop in fat concentration was observed in March. The protein content showed a notable decrease in the summer and spring seasons compared to other times of the year ($p < 0.01$). Lactose levels showed significant variation across seasons over the year ($p < 0.01$), decreasing from winter to summer. Breeding practices and seasons clearly affected milk's physicochemical.

INTERACTION STUDIES BETWEEN WINTER WHEAT AND WINTER PEA IN INTERCROPPING

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Intensive agriculture enables the use of high-yielding varieties with a short growing season in a large area. Fluctuating market demands, extreme weather events and increasing environmental awareness lead us to open up to novel cultivation methods. Intercropping is a special type of plant association, that can be used to mitigate these negative effects. Our investigation was carried out for three growing seasons (2020/2021, 2021/2022, 2022/2023) with a seed mixture of three winter wheat varieties (GK Szilárd, Cellule, GK Csillag) and a winter pea variety (Aviron) in three sowing densities. In effective intercropping, the companion plants avoid competition, due to the complementary use of the available resources. Competition indices, such as land equivalent ratio (LER), aggressivity (A), competitive ratio CR), actual yield loss (AYL), monetary advantage index (MAI), and intercropping advantage (IA) can refer to the interaction between winter wheat and pea. In the case of A, CR and AYL, the partial values indicate that wheat is more dominant than pea. In terms of MAI, the best profitable combination was the Cellule/Aviron 75:50 in the first two years. Overconcentration of the parcels was more beneficial for wheat yield, while pea avoided many cultivation criteria (weeds, disease, pest, lodging). Our results draw attention to the choice of the appropriate sowing density, which can contribute the success of this cultivation method.

OPTIMIZING COMPOST INGREDIENTS FOR WHITE BUTTON MUSHROOM (AGARICUS BISPORUS) PRODUCTION: EVALUATING CALCIUM SULFATE SUBSTITUTES

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The cultivated mushroom *Agaricus bisporus* is a predominant choice in Europe's mushroom consumption. The cornerstone of industrial-scale mushroom production is mushroom compost, a selective substrate crafted through controlled chemical and microbiological processes. Essential components of mushroom compost include horse manure, wheat straw, chicken manure, gypsum as an additive, and substantial water. Depending on regional practices, the base mixture might predominantly consist of horse manure with added straw, possibly straw with a bit of horse manure, or even straw without horse manure. This base is then blended with a specific quantity of chicken manure and gypsum. This study explores various potential substitutes for gypsum in the production of compost for white button mushrooms (*Agaricus bisporus*). During compost preparation, calcium sulphate was partially replaced with calcium carbonate, ammonium sulphate, and monocalcium phosphate. Compost parameters were observed to be similar in scenarios where calcium sulphate was supplemented with calcium carbonate in 8:2 and 6:4 ratios, both with and without the presence of ammonium sulphate, and in 3:1 and 1:1 mixtures of calcium sulphate and monocalcium phosphate, when compared to traditional gypsum-based processes. All experimental compost mixtures yielded comparable mushroom crops in cultivation trials. Notably, the 8:2 mixture of calcium sulphate and calcium carbonate demonstrated superior performance in cultivation trials relative to the 6:4 mixture. However, supplementing these mixtures with ammonium sulphate resulted in similar crop yields. Monocalcium phosphate also emerged as a promising partial gypsum substitute, showing comparable crop production in both 3:1 and 1:1 ratios to control samples. Complete replacement of gypsum with calcium carbonate led to a significant pH increase during the second phase of composting, adversely affecting mushroom mycelium growth. This research was supported by grant 2020-1.1.2-PIACI-KFI-2020-00111 from the National Research, Development and Innovation Office, Hungary. Additional backing came from the Doctoral Student Scholarship Program of the Co-operative Doctoral Program of the Ministry of Innovation and Technology, funded by the National Research, Development and Innovation Fund (grant No. KDP-2021-C1764158 to A. Misz).

THE EFFECT OF mTOR AND RELATED SIGNALING PATHWAY ON AGEING IN BIRDS - A REVIEW

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An organism's lifespan is governed by the mechanistic target of rapamycin (mTOR) and insulin-like insulin growth factor signaling (IIS) pathways. This review seeks to explore the influence of mTOR and its related signaling pathways on the ageing process in avian species. In birds, this pathway plays a crucial role in regulating physiological effects, longevity, and the ageing phenomenon. Both rapamycin and dietary restrictions have demonstrated the ability to inhibit mTOR, leading to an extension of the maximum lifespan in model organisms. Ageing is characterized by a gradual decline in physiological function, impacting overall performance, increasing susceptibility to death, and diminishing life expectancy. Addressing this issue through mTOR inhibition via dietary restriction and rapamycin administration, as observed in model organisms, presents a potential solution. Despite similarities, a physiological paradox exists between mammals and birds. Additionally, it is reasonable to infer significant differences in the physiological systems of birds compared to mammals. Variations in how sexes allocate resources to different aspects of reproduction can contribute to differences in longevity and ageing, driven by trade-offs in life history. Despite the limited research conducted on birds ageing, the potential impact of mTOR modulation through interventions remains an intriguing area for further exploration.

Posters

EFFECT OF MEDIA COMPOSITION ON THE MULTIPLICATION RATE OF VARIOUS SWEET POTATO GENOTYPES

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Besides improper, not site- and/or cultivar-specific production technology, the uncontrolled quality and hygienical status of planting material can contribute to yield stability problems. Micropropagation has been suggested as a reliable technique for ensuring rapid propagation of healthy propagules. This work, therefore, sought to assess the multiplication rate of several sweet potato genotypes in different compositions of culture media. The experiment was laid in a Completely Randomized Design (CRD). In vitro multiplication rates were the following in the case of the genotypes involved, achieved on the MS0 and the MS1BN media: 'Boribon' (479 vs. 343), 'Emmur' (607 vs. 661), 'Beauregard' (549 vs. 170), 'Covington' (80 vs. 0), 'Norangel' (557 vs. 710), 'Ásotthalmi12' (475 vs. 325) and 'Purple' (867 vs. 111). The results suggest that a hormone-free medium tends to be most appropriate for sweet potato micropropagation. The research was supported by the "VP3-16.1.1-4.1.5-4.2.1-4.2.2-8.1.1-8.2.1-8.3.1-8.5.1-8.5.2-8.6.1-17" Rural Development Program, in connection with the grant document with the identification number 1924527185.

EXAMINATION OF THE EFFECT OF SILICON AND SULPHUR FOLIAR FERTILIZATION ON SPAD AND NDVI VALUES IN TWO YEARS IN WINTER OATS

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Oats are valuable crops due to their excellent nutritional parameters for both human consumption and animal feed. Although they are not popular in domestic conditions. In our research, we studied 5 and 6 winter oat varieties over two years, treated with silicon-, and sulfur-containing foliar fertilizers at various phenological stages. SPAD and NDVI can provide a comprehensive picture of plant physiological status, from water and nutrient deficiency to various stress factors. Measurements were taken 5 times during the growing season. Due to weather conditions, we were able to compare an extremely dry year (2022) with a year to have favourable water availability (2023) in the course of the experiment. In the year of 2022, we measured significantly lower SPAD values for Mv Imperiál, and significantly higher values for Mv Kincsem compared to other varieties. Regarding treatments, plants in the control plots performed the best. There were no significant differences in NDVI values among varieties or treatments. In 2023, we also measured the lowest SPAD value for Mv Imperiál, while the sulfur-treated plots had significantly the highest values among treatments, but all treatments performed better than the control. Regarding NDVI values, we did not find strong correlations, although Mv Istráng and Mv Hóka had noticeably lower values. Comparing the two parameters, we found that in 2022 both SPAD and NDVI values were the highest for the Mv Kincsem variety, and the sulfur treatment had the lowest values. However, in 2023, there was no match between the extremely high or low values for the two parameters.

EXPLORING THE INTERPLAY OF PACAP, cAMP, AND UBIQUITIN SIGNALING PATHWAY IN POULTRY

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The complex regulation of physiological processes in animal production involves the orchestrated action of biologically active molecules, including peptides, proteins, and hormones. Within this complex framework, pituitary adenylate cyclase-activating polypeptides (PACAP) emerge as key players, and exerts pivotal control over crucial aspects of avian physiology, such as feed intake, stress response, and immune function, primarily through the stimulation of the cAMP signaling pathway. Interestingly, the downstream effects of cAMP signaling extend to the modulation of gene expression, particularly influencing key members of the ubiquitin system. The ubiquitin signaling pathway plays a vital role in protein degradation, concurrently regulating oxidative stress and immune responses. Studies across various models have substantiated the regulatory roles of PACAP, cAMP, and the ubiquitin pathway, but this role in poultry remains unclear. We gathered findings from diverse research studies, shedding light on the potential interaction between the novel polypeptide PACAP and the ubiquitin signaling pathway in poultry. Through the mediation of cAMP, this exploration encompasses diverse molecular and physiological parameters, presenting a holistic perspective on the regulatory mechanisms governing PACAP and ubiquitin in poultry species.

MONITORING FIELD PATHOGENS AND STORAGE DISEASES OF SWEET POTATO IN THE SOUTHERN GREAT PLAIN REGION OF HUNGARY

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The introduction of sweet potato cultivation to Hungary in the last decade has left a gap in information regarding the fungal and bacterial diseases affecting domestic production. Consequently, this study aims to investigate field pathogens and storage diseases of sweet potatoes in the Southern Great Plain region of Hungary. The methodology involves culturing sweet potato tuber samples on selective media for bacteria and fungi, followed by DNA extraction from the resultant pure cultures. Molecular identification employs partial sequencing of the DNA gyrase alpha subunit (*gyrA*) gene for bacterial identification and the internal transcribed spacer (ITS 1-4) region for fungal identification. To date, we have isolated nearly a hundred bacterial and fungal strains from sweet potato tubers showing disease symptoms, sourced from various plantations. Recent efforts have focused on the molecular identification of fungal isolates, which include species of *Fusarium*, *Aspergillus*, *Geotrichum*, *Alternaria*, and *Lichtheimia*. Future work will aim at identifying bacterial isolates and continuously collecting diseased tubers from various stored sweet potato batches. Based on the data collected, we plan to develop a pathogen map for sweet potatoes in the Southern Great Plain region and compile a guide for farmers on sweet potato pathogens. The research is supported by the ÚNKP-23-3-SZTE-431 New National Excellence Program of the Ministry for Innovation and Technology from the source of the National Research, Development and Innovation Fund and to the Interreg VI-A IPA Hungary-Serbia Interreg Programme (grant number HUSRB/23S/11/027).

PRODUCTION OF WHITE BUTTON MUSHROOM (*AGARICUS BISPORUS*) COMPOST USING DIFFERENT BASE MATERIALS

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The cultivated mushroom *Agaricus bisporus* remains a predominant choice in Europe's mushroom consumption, with industrial-scale production relying on mushroom compost, a substrate crafted through controlled chemical and microbiological processes. Essential components include horse manure, wheat straw, chicken manure, gypsum, and water, with regional variations in base mixture composition. Our study investigates the effect of alternative straw types as substitutes for wheat straw in the composting process. We examine compost chemical properties, vegetative mushroom mycelium growth, and identify alternative materials for large-scale white button mushroom production. Experimental materials included baled corn stalks (at 15% alongside wheat straw), rye straw (as a full replacement), and rapeseed straw (at 30% and 50% alongside wheat straw). Results show that corn stalks may pose infection risks due to tube residues, while a 50% ratio of rapeseed straw is not ideal due to rapid structural degradation. An optimal ratio of 10-20% rapeseed straw enhances compost moisture without excessive fragmentation. Rye straw can fully replace wheat straw but requires proper preparation, including longer pre-moistening cycles and mechanical processing for ideal volumetric weight. Additional benefits of rye straw utilization include higher straw yields per hectare and its traditional use in mushroom spawn production, potentially supporting domestic spawn production plants.
This research was supported by grant 2020-1.1.2-PIACI-KFI-2020-00111 from the National Research, Development and Innovation Office, Hungary. Additional backing came from the Doctoral Student Scholarship Program of the Co-operative Doctoral Program of the Ministry of Innovation and Technology, funded by the National Research, Development and Innovation Fund (grant No. KDP-2021-C1764158 to A. Misz).

SEASONAL EFFECT ON BLOOD METABOLIC INDICATORS IN HOLSTEIN FRIESIAN COWS

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One of the significant challenges in the dairy sector is the decline in milk production during hot seasons compared to cold seasons. Given that milk production is closely associated to the well-being of cows, the primary objective of this study is to determine effects seasons on metabolic indicators in dairy cows, specifically blood parameters considered as homeostasis indicators. The study involved 789 observations obtained from 400 healthy cows in mid-lactation with similar body weights. Blood samples were obtained between 2019 and 2021, covering winter, spring, summer and autumn. Using a linear mixed model for analysis, results indicate a significant ($p < 0.05$) seasonal effect on insulin and prolactin. Insulin levels exhibited significant differences among seasons. In spring, levels were (9.52 mIU/L), significantly higher than in winter (6.08 mIU/L) and autumn (6.17 mIU/L). Similarly, during summer, insulin levels reached (8.75 mIU/L), also significantly higher than those in winter and autumn. However, no significant difference was observed between spring and summer and between winter and autumn. Prolactin levels were significantly different among all seasons, with the highest levels in summer (10.95 ng/ml), followed by spring (8.82 ng/ml), winter (6.51 ng/ml), and the lowest levels observed in autumn (3.78 ng/ml). In contrast, no significant difference was found between seasons for the level of NEFA. In conclusion, hot seasons have a negative impact on prolactin and insulin levels, as these metabolic indicators follow the increase in the temperature humidity index (THI) during seasons. This confirms that heat stress adversely affects the homeostasis of cows. The research was funded by the National Research, Development and Innovation Office (VKE-1.3.1-2018-00033, “A novel research of using lecithin and substituting palm fat with domestic raw material in the diet of high yielding dairy cattle, with special regard to improve the reproduction parameters and the possibilities of producing functional milk”).

SEASONAL EXAMINATION OF THE POLLEN CONTENT OF HONEY BEE COMBS IN AN AGRICULTURAL LANDSCAPE

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Insect pollination is becoming more and more critical worldwide, as the diversity and number of wild pollinating insects is significantly decreasing. If they can, honeybees visit bee pasture with a diverse species composition, thereby not only ensuring a balanced food supply for the bee colony, but also optimal conditions for its reproduction. The aim of the research was to investigate the pollen and nectar collection habits of honey bees in an agricultural area with unfavourable ecological conditions, with particular regard to the amount of food available during the growing season. The research was carried out in Ludas settlement and its outskirts located in the northern part of Serbia close to the Hungarian border, where a family of honeybees spontaneously moved into a previously used beehive in 2023. The settlement is mainly surrounded by agricultural areas, while the extent of natural or semi-natural vegetation is minimal. Based on the results of the pollen analysis of the honey comb samples, it was established that the bees were able to collect nectar and pollen both from the plants grown on the agricultural fields and from the plants found in the kitchen gardens and small plough lands of the settlement. Rapeseed and sunflower pollen were dominant in early summer and early August. The significant increase in the number of non-arable plants in the autumn samples shows that other wild or ornamental plants can also play an important role in the autumn food supply of bees.

AGRICULTURAL ECONOMICS, FOOD PROCESSING & SAFETY

CAMEL HERD AS FOOD SECURITY BIORESOURCES IN ARID LAND UNDER CLIMATE CHANGE CONTEXT: SURVEY INVESTIGATION AND HYGIENIC ASSESSMENT OF RAW CAMEL MILK IN TAMANRASSET REGIONSOUTHERN ALGERIA

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Camels serve as a crucial food source in Tamanrasset, a hyper-arid region in southern Algeria, known for their ability to provide sustenance in challenging environmental conditions. Traditionally, camels in this region were raised in nomadic pastoral systems. However, a shift to peri-urban camel production is now evident, characterized by herds located close to urban markets. We conducted a survey to explore this transition and assess the sale of raw camel milk. Our findings reveal that peri-urban camel farms consist of around 30 camels, evenly split between males and females, with 75% of raw camel milk designated for family consumption. The daily quantity of raw camel milk sold in stores averages 337 liters (± 29), with a minimum and maximum of 206 and 263 liters, respectively. Microbiological analysis revealed that only 21% of the analyzed samples meet the required hygienic standards, namely for the count of reverifiable aerobic mesophilic flora (RAMF) at log CFU/ml 5.13 ± 0.28. However, all samples displayed a very high total coliform load, with an average value of log CFU/ml 5.85 ± 1.16. Additional microbiological parameters were also examined, indicating that raw camel milk produced in peri-urban farms often falls short of the desired hygienic quality. Therefore, there is a clear need, to focus on improving milking practices and animal healthcare to enhance the safety and quality of raw camel milk production in peri-urban areas.

FERMENTATION OF APPLE JUICE BY PROBIOTIC BIFIDOBACTERIA

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Probiotics are living bacteria that, when given in sufficient doses, have positive effects on the host. And the main commercially available probiotic products are dairy, for this reason in this study the focus was on the fermentation of commercial, unfiltered apple juice by 5% inoculum of 6 *Bifidobacterium* monocultures for 24 hours at 37 degrees in anaerobic circumstances before being stored for eight weeks at 4 degrees. Afterwards, two nitrogen sources were utilized to investigate its possible effect on the viability and metabolism of the bacteria, and three distinct types of *Bifidobacterium* strains were selected from the first six. pH, viability of the bacteria, Total phenolic compound and antioxidant capacity was measured at 0, 8 and 24h hours of fermentation and at 2, 4 and 8 weeks of storage. Apple juice was found to be a promising medium for cultivating various *Bifidobacterium* strains. This substrate met the requirements for probiotic products to exert health properties and proved to be sufficient for strong propagation of probiotics, despite differences in growth and fermentation among the different strains. The addition of nitrogen sources also showed potential in promoting microbial growth, with varying effects on total phenolic content and antioxidant capacity depending on the specific strain and nitrogen source. At week 4, all strains still revealed a population number over log 7 CFU/mL, which means the juice had in its composition enough probiotics to have health benefits. After week 8, only *B. longum* Bb46 population was lower than log 7 CFU/mL.

HETEROLOGOUS EXPRESSION OF HYDROPHOBIC CELL SURFACE PROTEINS OF *MUCOR LUSITANICUS*

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Mucor lusitanicus is recognized for inducing postharvest decay, in addition to its capacity to trigger infections in humans, referred to as mucormycosis. In the fall of 2013, a spoilage incident led to a national recall of Chobani yogurt contaminated with this fungal species. Previous studies have linked spore wall proteins (CotH) and hydrophobic surface binding proteins (HsbA) to virulence, indicating their involvement in the disease's pathomechanism. We aimed to produce these proteins in large quantities using *Pichia pastoris* and *Penicillium chrysogenum* model organisms. We constructed expression plasmids with His-tags specific to the producing strains, using psk275paf for *P. chrysogenum* and pPICZαA for *P. pastoris*. *P. pastoris* received the plasmid constructs through electroporation, whereas PEG-mediated transformation was employed for introducing the constructs into the filamentous fungus *P. chrysogenum*. The transformant cells were selected on medium supplemented with zeocin and pyrithiamine, respectively. For the *P. pastoris* expression system, transformant colonies that emerged on the selective culture medium underwent screening using colony PCR technique, revealing numerous transformants carrying the *cotH4* and *hsbA1-5* genes. Chromatographic purification of recombinant cell surface proteins is currently in progress. The CotH4 protein had been previously generated in large quantities by the research team with assistance from the *P. chrysogenum Δpaf* strain. The desired protein was successfully purified using a multi-step chromatography procedure. Verification of the recombinant CotH4 protein was carried out using SDS-PAGE and visualised by Coomassie blue and silver staining. Conformation of the presence of the 65.31 kDa CotH4 protein was obtained *via* MALDI-TOF MS analysis. The research was supported by the projects NRDI K131796, ELKH 2001007 and NRDI TKP-2021-EGA-28 and supported by the ÚNKP-23-4 -SZTE-649 New National Excellence Program of the Ministry for Innovation and Technology from the source of the national research, development, and innovation fund.

HOW DOES THE TRUNCATION OF THE BIOSYNTHETIC PATHWAY OF ERGOSTEROL AFFECT THE PHISYOLOGY OF MUCOROMYCOTA?

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Mucorales fungi are used for the production of certain types of cheese and soy products. Mucorales species produce a broad spectrum of enzymes and are used for the biotransformation of several medically and pharmaceutically important compounds. They are also considered as agricultural and storage pests responsible for „storage decay". However, there are some opportunistic human pathogenic species among them, which are capable of causing a life-threatening infection in immunocompromised individuals, known as mucormycosis. The mortality rate is very high, up to 90-96%. Ergosterol is the main sterol component of the fungal cell membrane. It influences several important processes and plays a crucial role in the adaptation to stress conditions. The different sterols all have unique properties and confer specific properties to the membrane into which they are incorporated, thus the sterol composition of the membrane has a significant influence on the adaptation ability of fungi. In order to truncate the biosynthesic pathway of ergosterol, we knocked out the erg3 gene, which encodes the C5-sterol desaturase, using CRISPR-Cas9. The role of the Erg3 is to convert the episterol into 5-dehydroepisterol in the common late pathway. In the alternate pathway it converts the 14α-methyl-fecosterol into 14α-methylergosta-8,24(22)-dienol. The knock out of the gene resulted in significantly reduced stress tolerance. Changes were observed in the hyphae micromorphology. However, the germination capacity is significantly increased. These results may be in close correlation with the significantly altered sterol composition of the mutant strains. The study was supported by the grants NKFI K131796, ELKH 2001007 and NKFI TKP-2021- EGA-28.

IMPACT OF ARZEW AIR POLLUTION IN SITU AND METALLIC TRACE ELEMENTS IN GREENHOUSE CULTIVATION ON PHENOLIC COMPOUNDS OF *OLEA EUROPEA*

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This work primarily aims to investigate the impact of abiotic stress resulting from two types of pollution on polyphenols in olive trees (Olea europaea). The study was conducted in two parts. Initially, olive leaves were collected from various stations in the Arzew petrochemical region to assess in situ impact. Subsequently, in second part, Oléastre olive shrubs were subjected to contamination with lead and copper at different concentrations within a controlled greenhouse environment. This research aims to study how simulated abiotic stress from pollution affects the phenolic compounds of olive trees. with a focus on two types of plant materials: fruits and leaves of Sigoise variety collected in the field and young Oléastre olive plants subjected to metal contamination in greenhouse. Phytochemical screening revealed the presence of various flavonoids such as rutin, quercetin, and luteolin in samples analyzed both in situ and in the greenhouse. Biochemical assays demonstrated a significant increase in total phenolic compounds and flavonoids in olive trees located near the petrochemical rejection zone. In the greenhouse, the content of polyphenols and tannins was notably higher in samples contaminated with 8000 parts per million of lead compared to controls. Conversely, flavonoid levels were significant in samples contaminated with 4000 parts per million of lead. Analysis of copper contamination indicated that the highest flavonoid contents were associated with lower copper concentrations, suggesting a potential chelation effect in reducing the metal in olive tree leaves. The findings suggest that polyphenols can serve as ecophysiological markers, particularly in disturbed ecosystems.

OPTIMIZATION OF CARBON SOURCES FOR PRODUCTION OF β-GALACTOSIDASE BY LIMOSILACTOBACILLUS FERMENTUM LF08

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β-galactosidase is an important enzyme in various biological and industrial processes. This enzyme can be obtained from diverse sources, with a special accent given to the microbial ones. The aim of our study was to investigate the effect of different carbon sources on the β-galactosidase activity from Limosilactobacillus fermentum LF08 strain. Three carbon sources (glucose, galactose, and lactose) were supplemented in the medium in different ratios with maximal concentration of 1(w/v) %. Cell lysis to get intracellular β-galactosidase protein was performed by using CTAB (cetyl-trimetyl-ammonium bromide) lysis buffer. The enzyme fermentation was carried out using modified De Man, Rogosa and Sharpe (MRS) medium. Optimal fermentation time was determined to be 16 hours with inoculum size of 1%. Highest β-galactosidase activity was detected when glucose and galactose were used in ratio of 1:3, respectively, and lactose and galactose at ratio of 1:1. Increased carbon source concentration from 0.5 to 4% did not result higher activity, suggesting that 0.5% is optimal for both tested combinations. The results confirm the importance of the type and the amount of the carbon sources used in the fermentation medium. The results serve as good base for further optimization and better understanding of the enzyme system from probiotic Limosilactobacillus fermentum LF08 bacterium. This work was supported by the New Széchenyi Plant Project No. EFOP-3.6.3.-VEKOP-16-2017-00005, by the NKFIH Project No. TKP2021-NVA-22. Kristijan Hristovski is a PhD student at Doctoral School of Food Science and got the fellowship from Stipendium Hungaricum Program.

THE FEASIBILITY STUDY OF A PROGRAM TO SECURE CEREAL PRODUCTION FOR FOOD SOVEREIGNTY IN THE SAÏSS PLAIN: THE CASE OF SOFT AND DURUM WHEAT

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This study assesses the feasibility of a program to secure cereal production in the Saïss plain. In a crucial agricultural context, the main objective is to determine the technical and financial feasibility of the program. The methodology involved estimating wheat growers willingness to pay for a cubic metre of water using a logit model, a technical analysis of production and irrigation costs, and an in-depth financial analysis. The results show strong farmer support, with 100% approval and 92% willing to contribute financially. In financial terms, the total investment cost is around 650 million dirhams, with positive profitability indicators (IRR of around 11%, NPV of 708 million dirhams, payback period of seven years), confirming the project's feasibility. The implementation of this program could significantly boost the region's food security and economic development.

USE OF FOOD SUPPLEMENTS AMONG VEGETARIANS

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Over the last one or two decades, more and more people have become aware of the vegetarian diet. With the rise of social media, more and more people are considering to try this diet. As well as the many known health benefits of vegetarianism, it is also well known that particular attention needs to be paid to the intake of essential amino acids and minerals. Thus, the present research aims to present the different types of vegetarianism, their benefits and risks. The relationship between supplementation and sport is also very important in this context, as many people switch to this diet for health reasons and to improve their performance. In our online questionnaire survey, we investigated the ways in which vegetarians and vegans in our study supplement their protein needs. We also looked at their exercise and supplementation habits. Is it difficult to be a vegetarian nowadays? Is it worth following this kind of diet? Does this diet really improve performance? Is this diet sustainable in long-term? How can athletes and non-athletes meet their protein and mineral needs? These are some of the questions that our research has sought to answer, and the answers are very positive.

BIODEGRADABLE STARCH-BASED FILM INCORPORATED WITH VANILLIN AGAINST FOOD-CONTAMINATING BACTERIA

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Natural phenolics can be excellent preservative agents in foods owing to their diverse bioactive activities against microorganisms. Edible film technology is a frequent approach for the development of bioactive compound-based natural products in current food preservation technologies. Our previous investigations revealed high antimicrobial effect of vanillin and cinnamic acid against spoilage microorganisms. Here, comprehensive microdilution assays were conducted to reveal the antimicrobial potential of these phenolics. This study also aimed at determining the antimicrobial efficacy of a starch-based film incorporated with phenolic compounds, specifically vanillin and cinnamic acid, against nine common foodborne pathogen and food spoilage bacteria, including *Escherichia coli*, *Staphylococcus aureus*, *Salmonella enterica*, *Pseudomonas putida*, *Pseudomonas aeruginosa*, *Bacillus subtilis*, *Bacillus cereus*, *Listeria monocytogenes*, and methicillin-resistant *Staphylococcus aureu*s. Antimicrobial screening tests were set up in 96-well microtiter plates, while the casting method was used for preparation of the edible films containing phenolics. Vanillin demonstrated superior antimicrobial activity with a minimum inhibitory concentration of 2 mg/mL than cinnamic acid. In addition, vanillin exhibited the highest susceptibility against *E. coli*, *S. aureus*, *S. enterica* and *L. monocytogenes*. The inclusion of vanillin in the starch-based film exhibited a reduction in bacterial counts determined in 24-well microtiter plates compared to the control. Starch/vanillin films also demonstrated diminished bacterial colony numbers on solid media, emphasizing the potential of vanillin for enhancing the antimicrobial properties of starch-based films. The developed bioactive films can be a good basis for future food preservation technologies. This research was supported by the projects NKFI FK 134886 and TKP2021-EGA-28.

INFLUENCE OF BREEDING PRACTICES AND SEASONS ON THE QUANTITY AND QUALITY OF RAW MILK PRODUCED IN NORTHEASTERN ALGERIA

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The present study aimed to evaluate the effects of breeding practices and seasons on the quantity and quality of raw cow milk. Data were recorded from 12 intensive dairy farms composed of 32 to 115 Holstein cattle breeds (47 on average). A total of 144 milk samples were analyzed for daily yield (kg/day), total production (kg/cow/lactation), and composition, including the percentage of fat, protein, non-fat solids, lactose, ash, density (g/cm3), and freezing point (°C). Results showed that fat, protein, lactose, and density were affected by breeding practices ($p < 0.01$). The effects of the lactation stage on all traits were significant ($p < 0.01$). Fat and protein levels were higher at the end of lactation ($p < 0.01$), as were those of lactose ($p < 0.001$) and mineral matter ($p < 0.05$). Thus, the stage of lactation had an effect on the quantity of milk produced, which was generally negatively correlated with the physicochemical quality of the milk. Differences by season were observed in milk fat and protein contents, acidity level, and cryoscopy. In general, the highest fat content was observed in July, followed by August and September, with averages above 41 g/kg. Additionally, a significant drop in fat concentration was observed in March. The protein content showed a notable decrease in the summer and spring seasons compared to other times of the year ($p < 0.01$). Lactose levels showed significant variation across seasons over the year ($p < 0.01$), decreasing from winter to summer. Breeding practices and seasons clearly affected milk's physicochemical.

TRADITIONAL RAW CAMEL MILK FERMENTATION KNOWLEDGE AS FOOD SECURITY ALTERNATIVE IN TAMANRASSET REGION AS HOT AND REMOTE AREA, SURVEY INVESTIGATION AND METAGENOMIC STUDY OF THE MICROBIAL CONSORTIA

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For centuries, humans' lives have been affected by many factors, including socio-economics, politics, and climate change, placing food security at the top of the concerns' list, especially in arid and semi-arid areas where the scarcity of nutritious resources persists. However, some animals, such as dromedaries (Camelus dromedarius), can withstand harsh conditions and provide milk to desert dwellers. These people have developed methods to extend the shelf life of this valuable source of life through fermentation. In this study, we aim to explore the knowledge of camel milk fermentation in the region of Tamanrasset and study the microbiota of camel's milk with high acidification potential through a metagenomic approach, which is expected to be more adapted to the hot, dry climate conditions in this region in southern Algeria. The initial findings of the survey study revealed that 76% of the population affirms the possibility of camel's milk fermentation, while 67 % of them are familiar with different ways of transforming camel milk, contributing to the lifestyle of the nomadic people and their adapted methods of extending the shelf life of camel milk. Furthermore, the metagenomic analysis is planned to dive into species-level analysis and provide the best consortium in terms of acidification capacity, which can be nominated for biotechnological purposes. The ancient tradition of using camel milk as a food security resource encourages us to discover the key to this adaptation to severe conditions and highlights camel milk as a strategic bioresource in the face of environmental challenges.

APPLICATION OF BEESWAX OLEOGELS AS FAT REPLACERS IN PORK LIVER PÂTÉS

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The composition of pork liver pâté includes meat, liver and pork back fat, characterized by a high content of saturated fatty acids. It is generally recognized that consuming foods rich in saturated fats poses some health risks, including cardiovascular diseases, obesity and oxidative stress. In recent years, the challenge for the meat industry has been to develop new meat products with reduced saturated fat and improved nutritional characteristics. Oleogels represent a feasible alternative in this sense. This study aimed to investigate the effect of different oleogel formulations used as back fat replacers on some physicochemical and sensory properties of pork liver pâté. Beeswax oleogels were prepared using pumpkin seed and rapeseed oils in different ratios (1:0; 3:1). Five pâté samples were formulated by substituting 25% and 50% of the animal fat with the mentioned oleogels. Emulsion stability, pH, oxidative stability, texture and sensory attributes were analyzed. Regarding the physicochemical properties, there were no significant differences from the control sample. Lipid oxidation showed increased values during storage due to fat substitution, but oxidation values were below the acceptable limit. Regarding sensory analysis, the results showed that replacing 25% of animal fat with beeswax oleogel had a less significant modifying effect on the evaluated parameters. The sensory attributes of all reformulated samples were considered acceptable. The results showed the feasibility of oleogels as animal fat replacers in meat products and the possibility to obtain pork liver pâtés with improved content of unsaturated fats and superior nutritional value. This work was supported by a grant from the Ministry of Research, Innovation and Digitization, CCCDI - UEFISCDI, project number PN-III-P2-2.1-PED-2021-3240, within PNCDI III.

EFFECTS OF HIGH HYDROSTATIC PRESSURE ON THE TEXTURAL PROPERTIES OF COOKED WILD RED DEER MEAT

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Game meat could be considered a good alternative for red meat for human consumption. Meat sourced from wild animals raised under natural environment become increasingly popular with consumers in recent years. This study aimed to assess the effect of high hydrostatic pressure (HHP) on the textural properties of cooked wild red deer (*Cervus elaphus)* meat. Samples of raw deer meat were treated with different pressures ranging from 150 to 600 MPa for 5 min and stored at 4°C. The samples were cooked on days 1, 7, and 14, and after cooking the textural properties were measured using Texture Profile Analysis (TPA) and the Warner–Bratzler (WB) methods. The decision to measure cooked samples is based on the fact that the product will be consumed by the consumers in a cooked form. The results of this study showed that the significant changes in texture attributes, including hardness, springiness, cohesiveness, chewiness, and shear force, in response to HHP treatment and storage duration. These results provide valuable information about the influence of HHP on the textural quality of cooked wild red deer meat, informing food processing practices aimed at increasing consumer satisfaction and product acceptability.

EXPLORING *IN VITRO* INTERACTION EXPERIMENTS WITH SPORE SURFACE MUTANTS OF *MUCOR LUSITANICUS*

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The majority of species belonging to the order Mucorales primarily exhibit a saprophytic lifestyle, in which they mainly utilize decomposed plant and animal matter. However, there are also plant-pathogenic species among them, primarily responsible for damaging agricultural crops. Furthermore, certain species can be considered opportunistic human pathogens, capable of inducing life-threatening infections known as mucormycosis. The objective of our study was to conduct *in vitro* interaction experiments involving the *hsbA* mutant strain of *Mucor lusitanicus*. The HsbA protein family comprises antigenic proteins present on the fungal cell wall, which play roles in adhesion to surfaces and penetration, particularly in the early stages of infection. During the interaction experiments, we employed J774.2 mouse macrophage-like monocytic cells, in which we performed phagocytosis and pre-treatment killing assays. The efficiency of phagocytosis was determined using flow cytometry and monitoring the number of phagocytosed cells, while during the pre-treatment killing assays, we assessed the effectiveness of fungal spore killing by counting colony-forming units (CFUs). The phagocytosis index and phagocytosis capacity of the MS12-*ΔhsbA5+pyrG* mutant strain varied significantly from those of the control strain, while the pre-treatment killing results showed a higher survival rate of the MS12-*ΔhsbA5+pyrG* strain compared to the control strain. Our results could significantly contribute to understanding the immune response elicited by mucormycosis, uncovering pathogenic mechanisms, and potentially aiding in the development of more effective therapeutic methods. The research was supported by the projects NRDI K131796, ELKH 2001007 and NRDI TKP-2021-EGA-28 and supported by the ÚNKP-23-4 -SZTE-649 New National Excellence Program of the Ministry for Innovation and Technology from the source of the national research, development, and innovation fund.

EXPLORING SUGAR REPLACEMENTS IN ICE CREAM: A FOOD INDUSTRY RESEARCH PERSPECTIVE

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The food industry is continuously seeking innovative strategies to cater to the growing demand for healthier alternatives while maintaining the sensory experience consumers crave. In this context, the quest for sugar replacements in ice cream presents both a challenge and an opportunity. This abstract delves into the research perspectives within the food industry regarding sugar replacements in ice cream formulations. Firstly, the detrimental health effects associated with excessive sugar consumption have prompted a paradigm shift towards healthier options. Consequently, researchers are exploring various sugar substitutes, including natural sweeteners like stevia, monk fruit extract, and erythritol, as well as artificial sweeteners like aspartame and sucralose. Each of these alternatives offers distinct advantages and challenges in terms of taste, texture, and stability in ice cream formulations. Secondly, sensory perception plays a crucial role in consumer acceptance of sugar-reduced or sugar-free ice cream products. Thus, understanding the intricate balance between sweetness, mouthfeel, and flavor profile is essential for successful product development. Advances in sensory analysis techniques, coupled with consumer insights, guide researchers in formulating ice cream products that meet both health and taste expectations. Moreover, technological innovations, such as encapsulation techniques and flavor enhancers, contribute to overcoming the limitations associated with sugar replacements, thereby improving the overall quality of sugar-reduced ice creams. Researchers are exploring sugar replacements in ice cream to meet consumer demands for healthier options while maintaining taste and quality, utilizing a multifaceted approach. The work presents these possibilities for replacing sugar in the ice cream manufacturing recipes.

INVESTIGATION OF LOW TEMPERATURE HEAT TREATMENT AND UV IRRADIATION OF DIFFERENT CULTIVATED MUSHROOMS

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Heat treatment of food at low temperatures for extended durations is a well-established technology in food production. The essence of the "sous vide" technique involves heat treating food in sealed, preferably vacuum-sealed, heat-resistant plastic bags at low temperatures for extended periods, sometimes up to 50-70 hours, significantly lower than traditional cooking temperatures. The sous vide method for preparing mushrooms is widely recognized for enhancing flavour and aroma profiles in ready meals. In this study, we explore the effects of heat treatment and UV irradiation on mushroom powders, focusing on their vitamin D and ergosterol content. Specifically, we investigate changes in the vitamin D and ergosterol content of mushrooms during sous vide processing as a result of heat treatment. Additionally, we develop UV irradiation techniques to enhance the vitamin D content of mushrooms. We establish suitable sample preparation methods and liquid chromatographic procedures for quantifying the vitamin D and ergosterol content of mushrooms. Our findings indicate that sous vide processing of mushrooms at temperatures of 70 °C or lower does not result in significant changes in their vitamin D and ergosterol content. However, at 105 °C, or baking temperatures, we observe a decrease or stagnation in ergosterol content alongside an increase in vitamin D content. Furthermore, we demonstrate that the vitamin D content of mushroom powders can be significantly augmented using UV-B or UV-C light sources. By optimizing the irradiation conditions, including UV source power and the quantity of irradiated mushrooms, we can maximize the vitamin D content of mushroom powders. Acknowledgement: This research was supported by grant 2020-1.1.2-PIACI-KFI-2020-00100 from the National Research, Development and Innovation Office, Hungary. Additional backing came from the Doctoral Student Scholarship Program of the Co-operative Doctoral Program of the Ministry of Innovation and Technology, funded by the National Research, Development and Innovation Fund (grant No. KDP-2023-C2298833 to J. Bajzát).

INVESTIGATION OF SPORE SURFACE PROTEIN ROLES IN THE OPPORTUNISTIC HUMAN PATHOGEN *MUCOR LUSITANICUS*

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Mucor lusitanicus, a member of the order Mucorales, an opportunistic human pathogen causing mucormycosis in immunocompromised individuals, is the subject of our investigation. Spore surface proteins named CotHs are considered a virulence factor for establishing an infection. To better understand the pathogenicity of *M. lusitanicus* this study aims to investigate the role of these CotH proteins. These proteins are involved in adhesion, host recognition, and evasion of host immune responses in various Mucorales species. In our study, 4 *cotH* mutants have been generated using CRISPR-Cas9 system, namely *cotH13*, *cotH15*, *cotH16*, and *cotH17*. The growth ability of the mutants under various conditions, including exposure to different stressors (Congo Red, Calcofluor White, KCl, NaCl, SDS), and cultivation at different temperatures (18 °C, 25 °C, 37 °C) was investigated. The germination and sporulation abilities of the mutants were examined using light microscopy. Viability subsequent to *cotH* gene disruption was assessed using the colorimetric XTT assay. The survivability of mutant spores was analyzed following interaction with J774.2 macrophages. Simultaneously, pathogenicity of the mutant strains was analyzed in an *in vivo Drosophila melanogaster* infection model. Our results show distinct roles for CotH13, CotH15, and CotH16 protein in growth and adaptation to varying temperature. the MS12+*pyrG*-Δ*cotH17* mutant exhibited heightened sensitivity to the osmotic stressor KCL compared to the MS12+*pyrG* control, while the MS12+*pyrG*-Δ*cotH13* strain demonstrated increased resistance to CFW and SDS. The CotH protein family appears to have a diverse role in the biological processes in Mucorales, particularly in spore wall development and maintenance. The research was supported by the projects NRDI K131796, ELKH 2001007 and NRDI TKP-2021-EGA-28 and SUPPORTED BY THE ÚNKP-23-4 -SZTE-649 New National Excellence Program of the Ministry for Innovation and Technology from the source of the national research, development, and innovation fund.

INVESTIGATION OF THE METABOLOMIC PROFILE OF *PSEUDOMONAS* STRAINS

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Phytopathogen fungi can produce secondary metabolites that pose serious health hazards to animals and humans. Various strategies have been applied to control these fungi, encompassing field management practices, breeding of resistant plant varieties, utilization of synthetic chemicals, using of competitive atoxigenic strains or environmentally friendly biocontrol agents. Certain bacteria in the rhizosphere, such as *Bacillus*, *Streptomyces* and *Pseudomonas* have demonstrated efficacy as biocontrol agents in the management of fungal diseases. In a previous study, we assessed and characterized the antagonistic activity of 50 *Pseudomonas* strains isolated from corn rhizosphere. Our findings revealed that five strains, belonging to the groups of *P. chlororaphis*, *P. putida*, and *P. fluorescens*, demonstrated less than 5% accumulation of AFB1 and successfully inhibited fungal growth, rendering them suitable candidates for biocontrol agents. The aim of our investigation was to examine the metabolomic profile of these 50 *Pseudomonas* strains in order to identify the main secondary metabolites and gain insight into their antagonistic behavior. To explore the metabolomic profile of the isolates, we applied a high-performance liquid chromatography-hybrid quadrupole-orbitrap mass spectrometry method. Through this approach, we were able to identify a diverse range of metabolites that play a role in the biological regulation of plant pathogens. This research has been supported by the NKFI K139312 project.

ISOLATION AND IDENTIFICATION OF LAB FROM DOMESTIC ANIMALS AS POTENTIAL ANTIFUNGAL AND DETOXIFY AGENTS

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The increasing reliance on commercial animal feeds highlights the urgent need for new solutions to address the harmful effects of toxins contained in feed. Mycotoxins are harmful substances produced by mold fungi that can cause damage to the health of animals, agricultural productivity, and can ultimately impact human health through our food consumption. Mycotoxins are well-known for their capacity to cause serious health problems and result in significant economic losses around the globe. Addressing the issue of mycotoxin contamination in food and animal feed has become an urgent and significant challenge that requires immediate action. Our investigation focuses on exploring the use of lactic acid bacteria (LAB) derived from domesticated animals as a novel and eco-friendly method to purify animal feeds that have been contaminated with harmful substances. The aim of this approach is to offer a safer alternative that enhances the nutrition and well-being of animals. This method addresses the various aspects associated with mycotoxin contamination, including its impact on health. To accomplish this, the samples were isolated using classical microbiological methods, the identification of the isolates was done by molecular microbiological methods (genomic DNA extraction, repetitive PCR (rep-PCR), 16S rDNA PCR). In the upcoming stage of my PhD research, we'll conduct a comprehensive analysis of the LAB that we have isolated and identified from the different types of strains we have. Systematic research is required to identify the most potent strains that can hinder the growth of mycotoxin-producing molds like Aspergillus flavus, Aspergillus clavatus, and Fusarium species. The research was supported by project 2020-1.2.4-TÉT-IPARI-2021-00001 – „Mikotoxinok egészségi kockázatának csökkentése élelmiszerekben mikrobiológiai megelőzéssel, lebontással és mentesítéssel" and Tempus Public Foundation –Stipendium Hungaricum Scholarship. The authors acknowledge the Hungarian University of Agriculture and Life Sciences's Doctoral School of Food Science for the support of this study.

METHODS OF IMPROVING FREEZING RESISTANCE OF BAKER'S YEAST

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Frozen dough technology is widely used and could effectively extend the shelf life of bread by ensuring its freshness. However, a variety of issues, including the restriction of yeast activity and damage to the dough structure, may arise during the production and storage of frozen dough, ultimately resulting in a loss of quality. After fermentation, the bread's ability to retain CO2 and the yeast's ability to produce CO2 determine the quality of the frozen dough. Ice crystals are thought to be the primary cause of both decreased yeast viability and the breakdown of the dough network structure, which two significant elements are contributing to the decline in dough quality. Several factors affect yeast's resistance to freezing and thawing, such as its physiological state before freezing; for instance, yeast cells in growth standstill are more resistant to freezing than those in the exponential growth phase Numerous strategies and methods have been developed to increase the freezing resistance of baker's yeast and, consequently, the quality of frozen dough. These strategies include the addition of additives like hydrocolloids and antifreeze proteins (AFP), genetic engineering, optimizing the freezing time and storage conditions, and developing new freezing technologies like ultrasonic freezing. The paper summarizes these methods for improving the freeze resistance of baker's yeast.

NUTRITIONAL CHARACTERIZATION OF MINOR CEREAL SPECIES

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This research investigates the potential of incorporating minor cereals (blue wheat, purple wheat, spelt wheat, sorghum, and common wheat) in food products to enhance nutritional benefits and promote diversity and sustainability in food systems. The study aims to analyze the nutritional characteristics of white and whole meal flour samples from each cereal type, comparing results between the 2021 and 2022 harvesting years. We have measured those parameters, which have an influence on product samples made from the flours. The color of the flour defines the crumb's appearance, the Hagberg-Perten falling number is related to amylase activity, which controls the crumb structure formation. The colorimetry results reveal a slight decrease in lightness (L*) in the 2022 samples. pH analysis indicates varying acidity levels, with the highest pH (6.42) in purple whole samples and the lowest pH (4.67) in blue white samples. Protein content, assessed using the Kjeldahl method, shows the highest values (14.0% and 13.8%) in blue and purple whole samples for 2021 and 2022, respectively, while sorghum 2021 records the lowest (8.0%). Moisture content varies, with blue white (2022) and common white (2021) having the highest at 12.7% and 13.03%, respectively. Sorghum whole showed the lowest moisture content in 2022 and 2021 at (9.7%) and (8.61%) respectively. The falling number analysis indicates with purple whole, purple white, and sorghum whole samples having the highest (425.00) in 2022 and sorghum whole (546.33) in 2021, while spelt white (262.67) and blue whole (264.67) record the lowest values in 2022 and 2021, respectively.

NUTRITIVE VALUE AND AFLATOXIN CONTAMINATION OF GLUTEN FREE FLOURS

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Celiac disease places a huge burden on patients and their families, since a lifelong, strict gluten-free diet is needed in order to maintain general wellbeing and prevent complications. There is a growing interest in making versatile gluten-free foods not only for patients, but also for health-conscious individuals who choose to keep a gluten-free diet. Since the base ingredient of gluten free baked goods is starch, the pseudo cereals and oil seed meals can be used for these products' enrichment. Aflatoxin is a dangerous compound of poorly stored raw materials, known for its carcinogenity and the potential of causing liver cell damage. We aimed to investigate gluten – free flours from natural sources and from minimal processing through comparative analyses of the nutrition facts from the labels, and the determination of total aflatoxin contamination levels. Of the 50 flour samples, 11 types were from pseudo-cereals and 15 types were from oilseed pressing residues. Aflatoxin content was determined using Neogen Q+ for Aflatoxin procedure after sample extraction with 75% aqueous ethanol solution. We found significant differences regarding the dietary fiber and protein content, the energy content was in the range 310 -360 kcal/100 g. With the exception of walnut flour and fatty cocoa powder, all the samples were qualified as safe ingredient as their aflatoxin content did not exceed the official aflatoxin limit. The studied gluten-free flours are safe and nutrient rich materials for food development.

OPTIMIZE AND COMPARE HEAT, MICROWAVE, AND ULTRASOUND-ASSISTED EXTRACTION TECHNIQUES TO OBTAIN BIOACTIVE COMPOUNDS FROM ANISE (PIMPINELLA ANISUM) SEED USING RESPONSE SURFACE METHODOLOGY (RSM)

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The purpose of this study was to optimize the extraction of phenolic compounds from anise seed using heat-assisted extraction (HAE), microwave-assisted extraction (MAE), and ultrasound-assisted extraction (UAE). Based on the response surface method, we examined the effects of process-independent variables on the dependent variables (the content of total phenolic compounds (TPC), the content of total flavonoids (TFC), and the antioxidant activity (AA). In HAE, the optimal conditions for measuring TPC, TFC, and antioxidant activity (FRAP, DPPH, and ATBS) in a single experiment were extraction temperature (37°C), extraction time (100 minutes), and sample-to-solvent ratio (7.3%). In MAE, the optimal conditions were the microwave power (480 W), the extraction time (120 seconds), and the sample-to-solvent ratio (8%). Among the UAE results, the optimal conditions of the extraction process were ethanol concentration (14.6 %), extraction time (11.8 minutes), and sample-to-solvent ratio (8 %). Additionally, MAE showed better results concerning the extraction yield of phenolic compounds and high antioxidant activity TPC and TFC (49.9+3.26 mg GAE/g and 20.86 + 1.62 mg QUE/g of DW, respectively) and AA by FRAP method (11.22 mg AAE/g DW), DPPH method (17.14%), and ATBS method (4.25%). Accordingly, the efficiency of the extraction method from anise seed was in order MAE > UAE > HAE.

OPTIMIZED PRODUCTION AND ISOLATION OF TANNASE ENZYMES FROM THE MUCOROMYCOTA FUNGUS *MUCOR CORTICOLUS*

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Tannases can cleave ester and depside bonds present in hydrolysable and complex tannins, and gallic acid esters. In the food industry, these enzymes can be used as a clarifying catalyst in wine and fruit juices. Tannases can release health-protective phenolic compounds from plant materials ensuring their bioavailability for the human body after consumption. Some extracellular enzymes in Mucoromycota fungi have already been thoroughly studied, but their tannases have been less examined so far. Our previous investigations, however, revealed a high tannase activity for the *Mucor corticolus* belonging to this fungal group. Here, the goal was to optimize the solid-state production and isolation processes of the *M. corticolus* tannase activity identified. Fermentation conditions testing grape pomace and wheat bran as substrates were used to optimize the tannase production yield, while the extraction efficiency was studied by various extraction buffers. Enzyme activity assays were performed following the methanolic rhodanine method. The fermentation system based on wheat bran and supplemented with tannic acid resulted in the highest enzyme production yield. The Tris buffer extraction and syringe filtration followed by anion exchange chromatography was the most effective purification method to obtain fractions with high tannase activity. Optimum temperature condition for the isolated tannase activity was 30 °C. In conclusion, the *M. corticolus* was a promising tannase producer on wheat bran; as we know, this was the first work to purify tannase activity from Mucoromycota.
This research was supported by the projects NKFI FK 134886, HUN-REN 2001007 and TKP2021-EGA-28.

RESEARCHES ON THE PREVALENCE, SURVEILLANCE, AND MONITORING OF *LISTERIA MONOCYTOGENES* SPECIES IN DAIRY PRODUCTS A MINI-REVIEW

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Cross-contamination with foodborne pathogens can occur throughout any stage of food preparation. The food industry has notable and ongoing issues due to *Listeria monocytogenes'* remarkable adaptability to a wide range of temperature and pH levels, as well as its ability to thrive at elevated saline concentrations. These factors also have a substantial impact on the final risk to consumers. *Listeria* is extremely rare in the general population, even though the microbe is widely present in the environment and is isolated in food quite frequently. The incidence of systemic listeriosis is notably greater in susceptible populations, including the elderly, expectant mothers, and individuals with compromised immune systems. Due to its ability to proliferate, *Listeria monocytogenes* is the most important species in the *Listeria* genus for food safety. It is also capable of adjusting to a constantly shifting environment. More outbreaks with fewer cases each epidemic have been identified as a result of recent advances in detecting technology. A successful environmental monitoring program is required to monitor and confirm the effectiveness of control measures. Setting up protocols for sampling and detection, determining when and how often to sample, designating sampling zones, and implementing remedial measures are just a few of the components that make up a robust, scientifically based environmental monitoring program. This study proposes reviewing the specialized literature on the prevalence, management, and surveillance of the *Listeria monocytogenes* species in dairy products.

THE EFFECT OF STORAGE ON PROTEIN FORTIFIED LIQUID WHOLE EGG RHELOGICAL PROPERTIES

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Liquid egg products are well known worldwide, the usage of it in bigger industries is becoming more common due to the fact that it's microbiologically stable and easier to handle. 100 g of liquid whole egg contains 76.15g of water, 9.5g fat and 12.56g protein. Egg proteins are high quality proteins, with an amino acid score of 100 and highest net protein utilization rate. Many studies investigated the characteristics and health benefits of egg white protein have found that consuming egg white proteins can increase muscle mass and strength, reduce visceral fat and blood cholesterol. Because of the health benefits of egg and egg white proteins this study was aimed to investigate the effect of adding powdered egg white protein on liquid whole egg to increase its nutritional values. The effect of adding egg white protein was assist by evaluating the rheological properties of liquid whole egg. Different percentages of egg white protein 3,5,10% were added to 200 g of raw homogenized liquid whole eggs then the product was heat treated at 65 °C for 15 minutes in water bath then stored for 21 days at 4°C. The rheological effect was tested on day 1, 7, 14, and 21 viscosity measurement was performed by MCR 92 rheometer (Anton Paar, Les Ulis, France) at 15 °C. Viscosity was affected through out the experiment it has changed with the change of egg white protein percentage and storage time. Acknowledgement: Our research was carried out with the support of the Hungarian University of Agriculture and Life Sciences's Doctoral School of Food Science which we would like to thank.

THE EFFECT OF THE TENDER FOR PRECISION CULTIVATION ON THE EFFECTIVENESS OF SUNFLOWER CULTIVATION

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By using precision farming systems, we can optimise the use of resources, reducing waste and wastage. The basis for well-functioning precision agriculture is the immediate and continuous recording of accurate data at the point of cultivation, and then processing and analysing the data. This requires a change of approach not only by developers and machine manufacturers, but also by farmers, to turn data into decision-support information that can be quickly made available without external assistance. In our work, we aim at an economic analysis of the production of winter oilseed rape using precision technology. The production of rapeseed is studied in an agricultural enterprise whose crop production sectors are considered to be at the forefront of the application of precision technologies at national level. The principle that the more intensive a cropping system, the more advantages there are in using site-specific technology, is fully realised in the enterprise under study. In our work we present the elements of precision technology applied in rapeseed production. On this basis, we calculate the costs of cultivation and the income that can be generated from rapeseed production. We determine the sectoral result with and without subsidies, which can provide information on the actual income-generating capacity.

UNDERSTANDING THE ROLE OF SPORE SURFACE PROTEINS TO MUCOR LUSITANICUS PHYSIOLOGY

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Fungal pathogens who belong to the order Mucorales, can reduce the agricultural productivity. These fungi are capable of causing human diseases like mucormycosis and also can cause serious postharvest decay in fruits and vegetables. The spore surface proteins play roles in adhesion, initiating germination, colonisation and establishing infections on plant surfaces. In our experiment we included *M. lusitanicus cotH* (Spore Coat Protein H) disrupted mutant strains to observe potential changes in the cell wall. To monitor these changes we used Calcofluor white, Concanavalin A-fluorescein isothiocyanate and propidium iodide dyes, and fluorescent images of the stained fungal cell were taken with Zeiss Axioscope 40 microscope and Axiocam Mrc camera. The changes in the viability of the spores were investigated using the XTT tetrazolium colorimetric method and the FUN1 assay. To investigate growth disorders and germination changes, we exposed the strains to stressors such as NaCl, SDS, Congo Red and various temperatures. In the absence of the CotH12 protein, the appearance of septa could be detected during the germination process. Cell wall stressors had fluctuating effects on the *cotH* mutants. Deletion of specific *cotH* genes causes variations in the structure of the inner spore coat, differences in spore size distribution, fungal growth and sporulation. Interestingly, at lower temperatures the CotH6, CotH9 and CotH12 proteins contribute to growth, as disruption mutant strains has increased growth. The presence of NaCl negatively affected the growth of the *cotH9* mutant. SDS and Congo Red cell wall stressors decrease the growth of the *cotH6* and *cotH9* mutants. The research was supported by the projects NRDI K131796, ELKH 2001007 and NRDI TKP-2021-EGA-28 and supported by the ÚNKP-23-4 -SZTE-649 New National Excellence Program of the Ministry for Innovation and Technology from the source of the national research, development, and innovation fund.

ENVIRONMENTAL PROTECTION, FORESTRY, NATURE CONSERVATION, WILDLIFE MANAGEMENT

Regular presentations

DIVERSIFICATION OF PLANT SPECIES FOR THE REHABILITATION OF THE GREEN DAM IN ALGERIA

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The Algerian Green Dam project, initiated in the 1970s, spans a width of 20 km and a length of 1,500 km from the East to the West border, covering an area of 3.7 million hectares between isohyets of 200 mm in the south and 300 mm in the north. However, it faces significant challenges jeopardizing its sustainability, including a lack of local adaptation, monoculture of *Pinus halepensis* Mill stands, management gaps, and the ever worsening negative effects of climate change. Rehabilitating the Green Dam involves species diversification for resilient ecosystems and local economic promotion. The methodology is based on a holistic approach that integrates knowledge from experiments, arboretums, and autoecological observations. Field surveys, phytoecological assessments, and analyses of monitoring plots are essential to determine which species can adapt to each zone of the Green Dam. Autoecological approach and typology of forest stations guide the targeted diversification of species. Field investigations and the utilization of arboretum records have enabled the selection of around thirty potential species for the rehabilitation of the Green Dam. The results indicate a significant improvement in biological diversity, the establishment of more resilient ecosystems, and the development of local economic opportunities through non-timber forest products. The species planting database contributes to advancing knowledge in the diversification of forest species. The observations presented above may also provide repatriation results in the drying habitat conditions of Hungary, where special attention will need to be paid to the invasiveness and frost tolerance of these tree species.

ECO-FRIENDLY SHEEP WOOL FILTERS FOR RETAINING HEAVY METALS FROM POLLUTED WATER

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Human activities have been causing harmful environmental changes, significantly challenging ecosystem health. Heavy metals are a significant concern among different pollutants due to their long-lasting nature and harmful effects. Heavy metals released by industrial processes can pollute water sources, creating hazards for both humans and habitats. Several research studies have been carried out to determine the efficiency of sheep's wool in retaining heavy metals. The experiments have shown encouraging findings, indicating that high retention rates have been achieved for various heavy metals, and sheep wool is an innovative solution. Because it is a natural fibre rich in keratin, it has impressive capabilities for retaining heavy metals. Using this fibre in filtration systems can efficiently retain heavy metals from industrial and contaminated water, helping to reduce environmental pollution. This innovative use of sheep wool filters demonstrates a way to turn sheep wool waste into a valuable resource for environmental remediation rather than just a by-product. Reusing sheep wool waste should help reduce pollution and enhance waste management practices, promoting sustainable resource utilisation. This study will discuss how sheep wool waste efficiently retains heavy metals from industrial and contaminated water sources, at some point protecting the environment and human health.

EXPERIENCE AND PERSPECTIVES ON THE REHABILITATION OF STEPPE ECOSYSTEMS IN ALGERIA

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The steppes of Algeria represent approximately 25% of the country's surface area and contain some forested but mainly rangelands territories made up of herbaceous plant ranges and with a central activity which is extensive sheep breeding. Algeria today suffers from the phenomenon of desertification and land degradation linked mainly to the decline in plant resources and the increase in animal numbers, thus creating overgrazing; this last; has caused the desertification of a large part of these territories and climate change has exacerbated the phenomenon of land degradation. To address this observation, a research project was set up aimed at the rehabilitation of degraded territories by the establishment of enclosure rangelands and pastoral plantations, diachronic monitoring was carried out on these territories over 10 years to understand the evolution of the vegetation after rehabilitation but also to study the behavior of the indigenous populations in the light of the new plantations brought by the project. The results of the monitoring have proven that the possibility of restoring degraded rangelands is possible even if the impact of climate change is very present in these areas but the new uses of enclosure lands and plantations have shown that a large majority of new pastures were once again devastated by overgrazing; and breeders have built new strategies based on increasing herd size. Ultimately, the developed rangelands are today experiencing the same practices of overexploitation and overgrazing, which questions us about the impact of these projects to combat desertification.

EXPERIMENTS ON THE DEMOGRAPHY OF THE NINE-SPOTTED MOTH (Amata Phegea) IN BÜKK NATIONAL PARK

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Amata phegea, commonly known as the 'nine-spotted moth,' is a prominent Erebidae species widely distributed in Europe. Recognized by its distinctive blue-black or green-black wings adorned with white spots and a metallic sheen, A. phegea plays essential ecological roles as a polyphagous moth and an effective pollinator. Despite its ecological significance, there is still limited published studies on its demography, especially in natural conditions. This research addresses this gap by conducting a mark-release-recapture method in Bükk National Park, Hungary. Over four days, 125 moths were marked and tracked across three distinct areas. The best-performing model indicates a constant survival rate (Phi) of 0.75. The overall detection probability (p) of 0.67 is influenced by time, with the second day exhibiting the highest frequency of captures and recaptures. The recruiting rate (pent) of 0.22 per day is influenced by sex, where male moths are being captured and recaptured more than female moths. A. phegea show a very restricted home-range in Area 1, significantly different from Area 2 (ANOVA P< 2.2e-16). Fundamental studies such as this is also very important, as if from this the ecological role of A. phegea known to be very important, this study can serve as a basis for future conservation policy-makin.

FREQUENCY AND ABUNDANCE CHANGES OF WILD BOAR ROOTING IN VÖRÖSKŐVÁR, BUDAPEST, HUNGARY

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The feeding behaviour of wild boar (*Sus scrofa*) encompasses trampling and rooting, impacting soil characteristics and the broader landscape, especially in valuable grasslands with erosion-prone regions. While these effects have been identified in both native and invasive ranges of wild boar, there is limited information in the literature concerning the precise frequency and extent of rooting behaviour in urban grasslands. This study addressed that topic by assessing rooting abundance over a 12-month period (from March 2023 to February 2024) in a grassy landscape under intensive shrub encroachment, in Vöröskővár, Budapest, Hungary. We analysed the intensity of rootings across both sloped and flat terrain areas. The results show a surge in rooting abundance between December and January, with a corresponding decline during warmer periods, i.e., July and August, particularly pronounced in the flat terrain section of our grid. Further analyses will incorporate factors such as vegetation abundance and type, alongside potential interspecies interactions to identify the long-term effect of the rooting behaviour on the soil. This analysis is conducted within the framework of a project funded by the National Research, Development and Innovation Office in Hungary (RRF-2.3.1-21-2022-00006).

LIVESTOCK EMISSIONS AND CLIMATE ACTION STRATEGIES: A COMPREHENSIVE OVERVIEW

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Livestock are indispensable for providing nutrition and supporting livelihoods worldwide. However, mismanaged livestock systems can pose environmental challenges, particularly regarding greenhouse gas emissions contributing to global warming. Addressing these emissions is critical, especially alongside efforts to reduce fossil fuel consumption. The FAO (Food and Agriculture Organization of the United Nations) emphasizes the importance of livestock sector engagement in climate action, aiming to balance growing global demand for animal products with emission reduction goals. This review presents updated, comprehensive assessments of global livestock emissions, detailing sources and gases. It offers future emission estimations and mitigation pathways, highlighting opportunities to reduce emissions through improved animal management practices and circular economy approaches. While interventions require investments, they promise increased efficiency and sustainability. Tailored strategies at the local level are crucial, but overall, the review underscores the potential for producing more with less by harnessing mitigation opportunities. Collaborative efforts are essential for transforming livestock systems and achieving goals of enhanced production, environmental health, nutrition, and societal well-being, ensuring inclusivity and leaving no one behind.

NANOCHITOSAN: SUSTAINABLE SOLUTION AND ITS APPLICATION FIELDS

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The rapid spread of technology not only improves the living standards of societies, but also provides a healthier and more sustainable living space by improving the environmental conditions in which society lives. Recently, nanotechnology has become a hot topic in almost every field since environmental pollution, especially caused by global warming and rapid population growth, is progressing rapidly and changing the balance of the entire ecosystem. For these reasons, nanotechnology can help reduce environmental problems through the use of technological approaches and can also contribute to the development of governments' circular economy. Chitosan, obtained by deacetylation of chitin, one of the biopolymers known to degrade in nature without harming the environment, has become a frequent research topic in environmental sciences because it is cheap and easy to obtain, has absorbent properties, and most importantly, has a good antimicrobial character. The aim of the study is to show that chitosan can be an alternative solution to reduce environmental pollution caused by global warming and anthropogenic activity through nanotechnological studies by taking advantage of its environmentally friendly structure, flocculant, and antimicrobial properties.

POLLEN CONCENTRATION DATA OF XANTHIUM SPP. BETWEEN 2017 AND 2019 IN THE SOUTHERN GREAT PLAIN REGION

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The species of *Xanthium italicum* and *X. spinosum* belong to the same subgenus group as ragweed (*Ambrosiinae*), they are both invasive, allergenic weeds. The *Xanthium* spp. pollen concentrations in the Southern Great Plain region (Bács-Kiskun county, Csongrád-Csanád county, Békés county) (Kecskemét, Szeged, Békéscsaba) were measured with 7-day Hirst-type (Burkard) pollen trap in 2017-2019. The main period of pollen dispersal was determined by the total annual pollen count 10 to 90% of the total annual pollen count. For technical reasons, in 2017 in Szeged and in 2019 in Békéscsaba there was no measuring. The main period of pollen dispersal of *Xanthium* spp. is between 31st July (2017, Békéscsaba) and 21st August. (Békéscsaba 2019, Kecskemét 2019), culminating on 24th August (Szeged 2019) and 2nd September (Kecskemét 2019), ending in a relatively wide period and the end was between 27th August (Szeged 2017) and 10th September (Szeged 2018). The 3-year average of total annual pollen counts was 48.9. The highest annual total pollen count (154) was recorded in Szeged in 2018, the lowest (16) in Kecskemét in 2017. The highest daily pollen count (16) was measured in Szeged in 2018, while the lowest (2) was measured in Kecskemét in 2017.

THE SPREAD OF THE TREE-OF-HEAVEN [*AILANTHUS ALTISSIMA* (MILL.) SWINGLE] IN THE NORTHEASTERN PART OF THE REPUBLIC OF CROATIA

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The tree-of-heaven [*Ailanthus altissima* (Mill.) Swingle] is a fast-growing deciduous tree originating from Asia. It was introduced in Europe in the 1740s as an ornamental plant. Nowadays, it invades various natural and anthropogenic habitats. The tree-of-heaven's harmfulness can be observed through its different functional, environmental, aesthetic, as well as health and safety types of damage. This study aimed to establish the baseline distribution, densities, and invasiveness ranking of the tree-of-heaven. The survey was conducted in the Vukovar-Syrmia county by comparing the presence and abundance of the tree-of heaven in urban and ruderal areas during the summer period of 2023. The obtained data was used for multivariate factor analysis by combining quantitative (the number of trees per plot) and qualitative (biological characteristics, ecological impact, dispersal abilities, distribution, and the difficulty of control) characteristics. The results indicated a slight deviation among the types of damage both in the urban and rural areas. In urban areas, the coverage and the number of trees with a diameter at breast height >20 cm are of great importance, posing a hazard of drainage channel clogging. Rural areas, however, are characterized by a vast number of trees with a diameter at breast height >20 cm, making the green public areas' maintenance more difficult with higher economic damages. The findings of this research shed light on the tree-of-heaven's population structure and will, therefore, aid in determining appropriate management tools and control measures to minimize the impact and spread along the leading edges of invasion.

HOW DOES NATURE CONSERVATION CITIZEN SCIENCE IMPACT POLICY AND DECISION-MAKING MAKING A REVIEW

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The necessity of expanding our understanding of how Nature Conservation Citizen Science (NCCS) projects contribute to decision-making is frequently emphasized in related scientific studies. A literature review was conducted on the impacts of NCCS projects on policy and decision-making. Peer-reviewed scientific papers published between 2014 and 2024 were used to identify the forms that NCSS projects impacted conservation policy, the strategies to measure that impact and the common challenges encountered. More than 50% of the reviewed publications mention that projects begin with aspirations to make a meaningful contribution to conservation policy by informing it, but they rarely share their data with authorities or official databases (e.g. official monitoring systems at the local, national, or global levels that inform governmental decision-making). Our results also show that NCCS projects tend to inform decision-making in the early policy stages (e.g. bringing information to policy agendas) and are less common in later phases (e.g. implementation). To truly impact national conservation strategies and policies, improving channels to communicate with decision-makers is needed and challenges with data management and scientific rigor also need to be addressed.

THE AFFECT OF CLIMATE CHANGE ON THE PREVALENCE OF NASAL BOTFLY (CEPHENEMYIA STIMULATOR) INFESTATION IN ROE DEER

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Climate change is affecting the prevalence of nasal botfly (Cephenemyia stimulator) infestations in roe deer through several interrelated pathways. Initially, an anticipated increase in roe deer numbers, due to enhanced environmental productivity linked to climate change, has been observed (Melis et al., 2009). Contrarily, the unchanged birthing patterns of roe deer amidst climate change, in comparison to other mammals, suggest a possible asynchrony with vegetation growth cycles, potentially impacting their population structure (Plard et al., 2014). The role of climate-induced shifts in vegetation growth is significant, indirectly impacting roe deer by altering the availability of their food sources, thus emphasizing the need to assess how climate change affects the food resources of these herbivores (Davis et al., 2016). Roe deer's adaptive behaviors to climate change, such as dietary adjustments based on available vegetation, might help them navigate the challenges posed by changing climate conditions, including heightened heatwaves and drought occurrences (Minder, 2011). The shift towards earlier birthing times in roe deer due to climate change reflects the evolutionary pressure favoring early births aligned with changing vegetation phenology (Hagen et al., 2021). These shifts in birth timing are consistently observed across roe deer populations, suggesting a capacity for evolutionary adaptation to climate-related stresses (Plard et al., 2013). Additionally, the influence of climate change on roe deer demographics is notably linked to springtime weather patterns, which may have significant consequences for their survival and population trends (Gaillard et al., 2013). Changes in cervid distribution, such as those involving red deer, could affect the spread and severity of myiasis from Cephenemyia stimulator in roe deer, altering the landscape of parasitic infections (Fontán et al., 2019). In areas where infestations are endemic, observed behavioral modifications in roe deer to evade parasites suggest possible adaptive strategies to lessen the burden of such infestations (Morrondo et al., 2021). In sum, climate change is profoundly connected to multiple facets of roe deer ecology, encompassing population dynamics, demographic changes, adaptive behaviors, and interactions with parasites like the nasal botfly. Grasping these intricate connections is vital for the formulation of effective strategies for wildlife conservation and management amidst ongoing environmental transformations.

URBAN TREE INVENTORIES IN ROMANIA

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While there isn't a centralized national inventory of urban green spaces in Romania, there are indications that efforts are underway at the local level and through research projects. Although not too many, in the last decade local initiatives have been launched. Some Romanian cities have taken the initiative to create their own urban green space inventories. For example, the city of Oradea has a program called "Oradea Green City" that aims to increase green space. Meanwhile, some research projects have been conducted to assess the state of urban green spaces in Romanian cities. A study on green spaces in Brașov used satellite imagery to analyse land cover changes and the growth of green areas between 2017 and 2021. Our study aims to map the actual situation of the urban green inventories in Romania. The challenges we encountered are related, on the one hand to the lack of centralized data. The absence of a national inventory makes it difficult to get a comprehensive picture of the state of urban green spaces across the country. On the other hand, even with local inventories, there might not be a standardized approach to data collection and classification, making comparisons challenging. The study is based mainly on secondary sources, data obtained from local administrations, NGO-s and private discussions. Overall, while there's no single national inventory of urban green space in Romania, local initiatives and research studies offer valuable insights.

Posters

AGRONOMIC AND FORESTRY SCIENCES, WHAT CHALLENGES FOR ALGERIA?

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In Algeria, the teaching of agricultural and forestry sciences is increasingly taking on a central role in the higher education related to global changes, scarcity of water, food security, Algeria's commitments related to ratified agreements, and especially the national strategy based on afforestation, regreening and rehabilitation of ecosystems and agro-ecosystems. Algeria covers an area of over 2.3 million km2. It is the biggest country in Africa but has only 3.5 million hectares of forests (less than 1.5% of the national area) and a useful agricultural area of around 8.5 million hectares, which represents only 3.5% of the total area of the country. Government strategies have been developed to boost agricultural activity, investment and reforestation. These strategies include setting up new resources and financial funds to support agriculture, tree cultivation and forestry, in particular by relaunching the Green Dam with new development approaches including all stakeholders and researchers from universities to deal with the problems of agriculture, forestry and local development. ENSA is involved in sector of development. it was awarded 4 National Research Projects (NRP). ENSA will soon be starting up 2 new NRPs in direct collaboration with big agricultural companies which will focus on the application of research results in the field, using considerable resources. Despite all these well-intentioned strategies, most of the programs taught at ENSA have become obsolete and do not adequately respond to the challenges and strategies that have been set in motion. The main challenges facing ENSA include the need to revise all its curricula and incorporate new specialties. These challenges can be met through new education and training programs which can emerge from international cooperation and the sharing of experience in the areas concerned.

APPLICATION POSSIBILITIES OF LOW-PRESSURE MEMBRANE SEPARATION PROCESSES IN THE DAIRY INDUSTRY

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The treatment of dairy wastewater characterized by high organic loads has become of utmost importance. Through the utilization of membrane processes in conjunction with traditional methods, significant alleviation of environmental burdens can be realized. In our research, we investigate the flow dynamics within different low-pressure membrane separation filter modules on the filtration process parameters. Our primary scope was to mitigate membrane fouling, a major drawback, by enhancing membrane surface shear rates. This was achieved through innovative methods involving mechanical vibration of the module and the incorporation of 3D-printed turbulence promoters within the modules. Integration of these promoters into modules allows for manipulation of flow dynamics, thus enhancing membrane separation efficiency. This results in accelerated operation, characterized by increased flux rates, and reduced membrane fouling, leading to lower resistance values. Dairy by-products, such as buttermilk and whey, abundant in dairy processing, are recognized for their nutritional richness and immune-supporting compounds. Our objective is to explore alternative, non-thermal food processing technologies, such as microfiltration (MF) to diminish initial microbial loads while concentrating milk components, and ultrafiltration (UF) for selective concentration of bioactive compounds. In cooperation with an industrial partner, they also test self-produced special cleaning agents with various compositions for cleaning membranes that are fouled in different ways in order to maintain the filtration of the membranes in as many cycles as possible and in compliance with the strict rules of green chemistry principles. The research is funded by the Hungarian National Research, Development and Innovation Office, NKFI-FK-142414 and 2022-1.2.6-TÉT-IPARI-TR-2022-00011 projects.

CAMERA TRAPS INVISIBLE TO MAMMALS AND BIRDS IN THE SERVICE OF NATURE CONSERVATION AND WILDLIFE MANAGEMENT
The new generation of wildlife cameras

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We have examined over 70 camera traps available in stores and online. We paid special attention to testing 1080p and 2K 4K resolution, 25,30,50,60 frames per second wildlife cameras. The results of the tests were startling because it turned out that there is no commercially produced wildlife camera series that would go unnoticed by the examined 27 mammal and bird species. We tested the latest wildlife cameras with 840 nm and 940 nm LED (light-emitting diode) specimens multiple times in their natural habitats. During the tests, only one camera trap was deployed at a time period. Based on the large sample size, we can conclude that these cameras consistently alter the behavior of mammals and birds. The detection of camera traps depends on the following factors:

- The camera emits electromagnetic waves not within the spectrum range specified in the manufacturer's data, but with a starting decay below 800 nm;
- The camera emits sound (filter switching, relays);
- Some components of the camera have a mild but unfamiliar smell in the given habitat.

To study the natural behavior of animals and for disturbance-free research and filmmaking, we have developed a series of wildlife cameras that are undetectable by the mentioned species according to the listed criteria. They do not emit

- noise,
- visible wavelengths,
- disturbing odors,

and minimize electromagnetic pollution. The camera is available in both daytime (without LED) and daytime-nighttime versions, and we also produce telephoto, wide-angle, and dual-camera versions.

CHANGES IN THE ECOLOGICAL STATUS OF THE BÖDDI-SZÉK SODA PAN IN A DECADE

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The monitoring of the natural habitats is essential to maintain favourable ecological conditions of protected areas as well as for the planning of nature conservation management and development. In 2021, our research repeated a survey implemented a decade earlier, aimed at assessing the ecological conditions of alkaline soda waters in the Carpathian Basin. Continuing the original examination of 8 limnological and 4 biological characteristic factors offers the opportunity to monitor changes in the basic ecological state of soda pans. Our present work analyzes data from 2010 and 2021 collected from the Böddi-szék soda pan in Dunatetétlen. The indices used for the evaluation show that the condition of the soda pan has improved slightly due to the reduction of arable land and the increase of grassland areas in the catchment area, as well as the increase in the number of characteristic bird species nesting in the area thanks to the appropriate grazing of the shoreline. In addition, the previously detected water pollution from scattered waste has ceased. Although the proportion of reed areas decreased slightly, the proportion of areas covered with *Bolboschoenus maritimus* increased in parallel. Significant change in the proportion of habitats in the soda pan bed has not been observed. Reallocation of a canal bypassing the pan that is planned within the ongoing Böddi LIFE project can have additional positive effects on the ecological state of the alkaline soda ecosystem.

FIRST RESULTS OF THE INTRODUCTION OF HUNGARIAN BLACK LOCUST (*Robinia pseudoacacia*) IN ALGERIA FOR CLIMATE CHANGE ADAPTATION

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This study examines the introduction of Hungarian black locust into Algeria as part of climate change adaptation efforts, stemming from cooperation between Algeria and Hungary. In January 2017, the National Institute of Forestry Research (INRF Algeria) received a batch of 100,000 selected seeds of Hungarian origin from the Hungarian Forest Research Institute (ERTI Hungary). These seeds were sown in nurseries between February and April 2017 to assess their viability and effectiveness in the Algerian context. Seedlings were transplanted between March and April 2018 into various bioclimatic zones, ranging from humid to Saharan. The initial results revealed an average germination rate of approximately 80%, indicating a positive response of the seeds to the provided growth conditions. However, transplantation success varied across bioclimatic zones, with success rates ranging from over 60% in subhumid and semi-arid zones to only 20% in arid to Saharan zones. This study provides valuable insights into the introduction of non-native species as a strategy for climate change adaptation in different geographical contexts. The experimental plantations conducted will refine the technical and silvicultural practices of Black locust in the coming years. If promising results are confirmed, communication efforts will be undertaken to promote this species among foresters and farmers. A thorough analysis of the evolution of Robinia's reproductive system appears necessary to clarify its potentially invasive nature. Additionally, establishing collections of Robinia could provide an interesting foundation for long-term research, breeding programs, thereby facilitating improved selection of clones or provenances, helping the practical use of the species.

FOULING MECHANISM IN DAIRY WASTEWATER ULTRAFILTRATION

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Membrane processes have been widely used in industrial wastewater treatment in the last few decades because they have several advantages over traditional separation systems: high separation precision, better selectivity, operational at room temperature, no chemical damage, high automation, easy operation, energy saving, reduced cost, comprehensive utilization of resources, and reduced pollution. A critical factor in membrane technology is membrane fouling. Membrane fouling is responsible for the reduction of the permeate flux and contributes to the reduction of the productivity of the processing industry. During our experiments, we investigated how membrane fouling changes during the ultrafiltration of model dairy wastewater at different transmembrane pressures (0.1, 0.2 and 0.3 MPa) and mixing speeds (100, 200, 300 and 400 rpm). With a resistance-in-series models, we examined whether the membrane fouling is reversible (the deposit can be easily removed by washing operations) or irreversible (irreversible fouling) for each measurement, and with the Makardij model, we investigated whether the rate constant of the fouling or the rate constant of the deposit removal is the larger. In the case of both fouling models, we obtained the result that higher mixing speeds could prevail at lower pressures, so in these cases the irreversible resistances were decisive, while in the other cases the reversible resistances were decisive. This study was financed by the Hungarian National Research, Development and Innovation Office, project NKFI-FK-142414.

IMPACT OF CONTROLLED MYCORRHIZATION ON THE GROWTH OF BLACK LOCUST SEEDLINGS (Robinia pseudoacacia L.)

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The Mediterranean basin is confronted with major environmental challenges such as the decrease in agricultural and agroforestry areas as well as the loss of biodiversity, exacerbated by human activities and climate change. A comprehensive strategic approach is needed to effectively manage these ecosystems by preserving natural habitats and preventing socio-economic crises. The introduction of black locust in Algeria for reforestation and soil rehabilitation represents a promising opportunity. The study aims to establish a symbiotic association between black locust and arbuscular mycorrhizal fungi (AMF) to enhance its ecological capacities. The objective is to innovate in nursery plant production by using controlled mycorrhization. In methodology, data were collected after five months of cultivation by comparing mycorrhized and non-mycorrhized black locust seedlings. Growth indicators such as height, root length, and biomass were evaluated. Assessment of root mycorrhization as well as microscopic observation and analysis of sporadic density were performed. The results showed that mycorrhization had a significant beneficial effect on black locust growth, with a strong dependence on this association. Mycorrhized seedlings exhibited improvement in height, root length, and biomass compared to non-mycorrhized ones. An abundance of specific mycorrhizal structures and a high diversity of AMF species were observed. In conclusion, the symbiotic interaction between black locust and AMF is crucial and could be utilized for the ecological restoration of degraded land. This approach offers sustainable management of agroforestry ecosystems in the face of current environmental challenges, thereby contributing to reforestation and soil rehabilitation in the Mediterranean basin.

IMPACT OF *PEDIOCOCCUS ACIDILACTICI, SACCHAROMYCES CEREVISIAE* AND YANG ON GROWTH, MORPHOMETRIC PARAMETERS AND INTESTINAL PARAMETERS OF THE COMMON CARP (*Cyprinus carpio* L.)

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This study was conducted to investigate the effect of commercial available probiotics (*Pediococcus acidilactici* CNCM I-4622 MA 18/5M and *Saccharomyces cerevisiae* var. *boulardii CNCM I-1079*) and prebiotic: YANG (inactivated yeast cells) on the growth parameters and morphometric features of the common carp. Fish were reared for 8 weeks in a recirculation system (RAS). A total of 120 fish of mean weight 28.5±5g were randomly distributed into four experimental groups having three replicates (n=10/fish tank) and fed with four supplemental diets: D1 (fish fed with control only), D2, D3 and D4 fed with supplemental diet with addition of 1 g/kg of *P. acidilactici*, *S. cerevisiae* and YANG, respectively, at 3% of their body weight. Growth parameters were determined in terms of final body weight (FBW), percent weight gain (WG %) and survival rate (SR%) of fingerlings. Morphometric parameters were measured including total body length (TL), width (W), head length (HL), dorsal fin (DF), pelvic fin (PF) and caudal fin (CF). Fish fed with D2 and D4 showed the highest FBW, HL, CF, and WG% compared to those fed with D1 and D3. Nonetheless, none of these differences were statistically significant at $p < 0.05$. In conclusion, *P. acidilactici, S. cerevisia* and YANG have no impact on growth or morphometric parameters of the common carp fingerlings in RAS. At the same time, we found that the mucus layer and villi parameters in the intestines show differences amongst the fingerlings of the different feeding groups. Villus width in fish fed with YANG were significantly ($p < 0,0001$) higher followed by *S. cerevisiae*, *P. acidilactici*, and the control respectively. Furthermore, the mucus thickness was significantly higher in fish fed with *P. acidilactici* followed by YANG, *S. cerevisiae* and the control, respectively.

MEASURING MICROCLIMATE REGULATION OF STEPPIC WOOD VEGETATION IN CENTRAL HUNGARY

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Microclimate regulation is an important ecosystem service provided by forests, including steppic woods. In our pilot study, the microclimate regulating effect of different vegetation types of sand steppic woods was assessed at three sites located in Central Hungary. During the study period (September-November 2023), sample plots for air temperature and air humidity were randomly selected from 7 predefined vegetation types (4 plots/type/site, in total 84 plots). Also, 6 soil moisture loggers were operated at two natural forest edges (outside the forest at 20 m distance from forest edge, forest edge, inside the forest at 20-30 m distance from forest edge), measuring soil humidity at 10, 40 and 80 cm depth. Our results show that all the woody vegetation types had significant microclimate regulating effects as monthly maximum temperatures were always significantly lower and monthly minimum temperatures were always significantly higher, compared to those measured in grasslands outside forests. No significant difference in monthly average temperature was revealed between vegetation types. Inner parts of forests and forest edges were characterised with significantly higher soil humidity in each soil layer, compared to woodless grasslands. Also, soil humidity measured at 80 cm depth was constant in the inner parts of the forest, even in the hot and dry summer period. We can conclude that during the study period, the microclimate of woody vegetation types was more balanced, compared to grasslands outside forests, indicating that steppic woods can provide shelter for wildlife in case of extreme weather.

RELATION OF NATURE CONSERVATION AND AGRICULTURE - A CASE STUDY FROM KISKUNSÁG NATIONAL PARK

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National parks play a pivotal role in safeguarding ecological integrity; however, many of these sanctuaries are subject to agricultural exploitation. Consequently, the interplay between these two sectors has manifested as a longstanding and intricate dynamic. In our investigation, we scrutinize these conflicts within the Sand Ridge region (Homokhátság), especially in the Kiskunság National Park (KNP). We elucidate the primary factors contributing to the antagonistic relationship between agriculture and conservation through a meticulous analysis involving in-depth interviews with local experts. Our findings underscore the paramount influence of agricultural subsidies on preserving natural habitats. Sustainable land use management is problematic, even in national parks, and the effectiveness of nature conservation is influenced by agriculture. Prominent experts posit a recent diminution in the conservation domain's influence, attributing a newfound determinative role to agriculture. The KNP, as an institutional entity, witnesses a waning impact on managing landscapes within protected regions. The scrutinized conflicts provide nuanced insights into landscape management and contribute novel perspectives to the broader discourse on society's interconnection with the environment. Joining other authors, we support the principle of cross- and multisectoral policy coordination, which allows for optimal land use and ecosystem services. As the case of KNP demonstrates, European eco- and agricultural policy need to be more collaborative and flexible to consider regional characteristics.

RESTORING HOPE: CONSERVATION EFFORTS FOR THE ENDANGERED DRAGONFLY (*Urothemis edwardsii* Selys) IN NORTHEAST ALGERIA

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The restoration of endangered relict populations is challenging in conservation biology because they require specific environmental conditions within an inhospitable regional climate. *Urothemis edwardsiiSelys* is the most endangered dragonfly in the Mediterranean with, until very recently, only one known relict small population (Lac Bleu) left in Northeast Algeria. With the absence of successful (re-)colonization over the last two decades, the restoration of the species, which became a top priority, was recently launched. To improve the status of the species in Northeast Algeria, we study the ecology and aspects of the biology of the species based on regular exuvia sampling and adult capture-mark-recapture. Here we present some preliminary results of our investigation.

SECONDARY METABOLITE PRODUCTION IN PSEUDOMONAS SPP.: A META-ANALYSIS ON ITS ABUDANCE AND EXPRESSIVITY PATTERN

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In recent decades, there has been an increasing focus on using *Pseudomonas spp.* as biocontrol agents due to its beneficial effects on plants as well as potential insecticidal properties against several pathogens. Secondary metabolites produced by these bacterial groups are one of major factors contributing to protecting crops from pest and disease attacks. In this study, a brief analysis was conducted to determine a broad spectrum of chemical products in genomes of three *Pseudomonas* bacterial species. Genbank files of 149 draft genomes from *Pseudomonas protegens, Pseudomonas fluorescens, Pseudomonas fragi* were downloaded from NCBI database, then submitted to anti-SMASH 7.0 (a web-based tool for secondary metabolite annotation). A list of annotated genes encoding different secondary metabolites were generated and subjected to comparison using R and Excel. *Arylpolyene, Betalactone, Hydrogen cyanide* were all highly expressed in three species. In *Pseudomonas protegens*, 2,4-Diacetylphloroglucinol (2,4-DAPG), enantio-pyochelin, pf5-overdine were predicted to be expressed with 100%; orfamide (94%); pyoluteorin (84%); pyrrolnitrin (78%); rhizoxin A and hserlactone (26%); methanobactin (18%); 3-thiaglutamate and alginate (16%). While in *Pseudomonas fluorescens*, a wider range of products were identified: pf5-overdine (100%) viscosin and lokisin (24%); ambactin and pyoverdine SMX-1 (22%); chitinimide (14%); tolaasin and histicorrugatin (12%); thanafactin A (10%); bacilliomycin D and acaterin (8%); syringomycin and nematophin (6%). These compounds might play certain roles in plant protection processes and thus can be tested for their pesticidal activities.

ULTRASOUND-ASSISTED EXTRACTION AS A NOVEL TECHNOLOGY FOR THE EXTRACTION OF BIOACTIVE COMPOUNDS FROM OLIVE POMACE

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Due to the high organic content, solid waste generated in the production process of olive oil presents a severe environmental problem. Keeping that in mind, different novel extraction technologies are used in industries and experiments since it has a great effect in combination with solvents. Moreover, compared to conventional methods, which may include drawn-out processes and large solvent consumption, they are more effective and environmentally friendly. This work explores the potential of using ultrasound-assisted extraction (USAE) to extract the polyphenols from the olive pomace, with a focus on assessing antioxidant activity (AA) and total polyphenol content (TPC). In the Design of the experiment, three independent variables were used: time (5-15 min), solid ratio (2-12 gr/100 ml), and head type of the ultrasonic device (S, M, and L), all of which were on three levels. Twenty-seven extracts were made with the ethanol-water mixture (52.7 v/v%), which was found to be the optimal ratio in previous experiments. TPC was determined by the spectrophotometric Folin-Ciocalteu method, while the AA was measured by the Ferric Reducing Antioxidant Power (FRAP) method. TPC value varied from 3.86 to 19.49 mg GA/ gdw, while the results for AA varied from 3.31 to 11.146 mg AA/ gdw. The results obtained showed a great antioxidant potential of olive pomace, where the USAE was proved to be the effective method for the extraction. Ultrasound head with a higher intensity shows that can lower polyphenol content in cases of longer treatment (more than 10 min).

USE OF CAMERA TRAPS TO MONITOR HUMAN-WILDLIFE INTERACTIONS AROUND THE NAIROBI NATIONAL PARK - KENYA

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With the human populations in Africa constantly increasing, protected areas are faced with the threat of encroachment. The areas neighbouring wildlife parks have been converted to human settlements with varied anthropogenic activities. Expansive conversion of land for agricultural practices and clearance of space for infrastructural development around protected areas have resulted in increased human-wildlife interactions and potential conflicts. This study employed the use of camera traps on 3 farms on the southern border of the Nairobi National Park-Kenya to find out which wildlife species stray into the community areas, how frequently do the species visit the area, what anthropogenic activities are practised and what potential conflicts can be associated with specific species. The images captured were analysed using the Timelapse software. The common species observed were ungulates (zebras and giraffes) and carnivores (lions and hyenas). The ungulates visited the area during the day while most carnivores were seen at night. The main human activity in the area is livestock grazing. Dirt road networks in the area are frequently used by humans and shared with the wildlife thus the potential conflicts were livestock predation, and threats to human lives. Based on our results additional camera traps are recommended to be installed in more locations and used over a long period of time to monitor human - wildlife interactions with the aim of finding better mitigation methods for their coexistence.

INNOVATION IN AGRICULTURE, RURAL & SUSTAINABLE DEVELOPMENT

APPLICATION OF LOOP-MEDIATED ISOTHERMAL AMPLIFICATION (LAMP) FOR PATHOGEN DETECTION IN FARM ANIMAL FECAL SAMPLES VIA eDNA: A REVIEW

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The growing concern surrounding infectious diseases in farm animals necessitates the development and optimization of rapid and efficient diagnostic techniques. This comprehensive review explores the utilization of Loop-Mediated Isothermal Amplification (LAMP) as a diagnostic tool for detecting pathogens in faecal samples from various farm animal species, focusing on the extraction and analysis of Environmental DNA (eDNA). LAMP, characterized by its simplicity, sensitivity, and rapidity, has emerged as a promising molecular diagnostic method for the detection of diverse pathogens. The review critically examines recent studies and advancements in the application of LAMP for pathogen identification, specifically within the context of eDNA extracted from faecal samples. Key considerations include the optimization of LAMP assays for different farm animal species, the challenges associated with eDNA extraction from complex faecal matrices, and the impact of various factors such as sample preservation and transportation on diagnostic accuracy. Additionally, the review highlights the potential advantages of LAMP over traditional diagnostic methods, emphasizing its cost-effectiveness, user-friendliness, and applicability in resource-limited settings. The integration of LAMP-based diagnostics into farm animal health monitoring programs could significantly contribute to early pathogen detection, thereby facilitating timely and targeted interventions to mitigate disease spread. In conclusion, this review underscores the pivotal role of LAMP in revolutionizing the diagnosis of pathogens in farm animals through the analysis of eDNA in faecal samples. The synthesis of existing knowledge and identification of future research directions provide a valuable resource for researchers, veterinarians, and policymakers aiming to enhance the efficiency of animal disease surveillance and management.

ASSESSMENT OF SOIL SALINITY USING LANDSAT-8 SATELLITE IMAGERY AND GEOGRAPHIC INFORMATION SYSTEM: A CASE STUDY OF THE IRRIGATED AREA IN THE LA MINA REGION OF ALGERIA

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Soil salinity is a soil degradation rocess in which an excessive concentration of soluble salts accumulates in the soil, negatively affecting its fertility and its ability to support plant growth. The objective of this research work is to assess soil salinity in the irrigated area of La Mina using remote sensing and geographic information systems (GIS). Several soil samples along with readings from electromagnetic induction (EM38) were collected in the field and geolocated using a GPS positioning system, Garmin Etrex 10 model. Furthermore, spectral indices (IS2, IS4, NDVI, and RVI) were calculated from the spectral bands of Landsat 8 OLI satellite imagery. The results showed a good correlation between the visible spectral bands and the measured electrical conductivity values (ECe) in the laboratory. The search for the best prediction model between spectral bands, spectral indices, and salinity values (ECe) revealed that the combination of spectral bands (green and red) and the salinity index IS2 are the relevant variables for mapping soil salinity variation ($r = 0.54$; $p < 0.01$). This model allowed identifying areas at high risk of salinization where appropriate management practices are needed. Finally, it is concluded that the use of Landsat 8 satellite imagery and GIS offers a promising approach and opens up interesting prospects for the potential use of multispectral remote sensing to map soil salinity status. These tools enable spatial-scale monitoring and a comprehensive understanding of the factors influencing soil salinity distribution in the study area.

ASSESSMENT OF THE IMPACTS OF CLIMATE CHANGE ON CEREALS IN SEMI-ARID REGIONS BY REMOTE SENSING AND ADAPTATION MEASURES IN AGRICULTURAL WATER MANAGEMENT

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The impact of climate change (CC) has prompted a gradual shift in cereal management practices within semi-arid regions (in the central area of Tunisia). This shift has seen a transition from predominantly rainfed cultivation to irrigated ones, with almost a generalization of irrigation since 2017. However, this transformation, particularly in the Kairouan plain, has predominantly relied on illegal drilling, exacerbating the overexploitation of the Kairouan aquifer, which has intensified annually. Against the backdrop of Tunisia's pressing needs for food and water security, which necessitate expanding cereal cultivation while concurrently reducing water consumption, we propose the utilization of drought indices derived from remote sensing data. These indices, including the Soil Moisture Anomaly index (SMA), Vegetation Anomaly Index (VAI), and Evapotranspiration Anomaly index (EAI), are instrumental in identifying critical periods of hydric stress impacting cereal yields, facilitating more precise irrigation management. Incorporating these indices enables the implementation of deficit irrigation strategies, optimizing water usage without compromising yield. By leveraging remote sensing technology alongside adaptation measures in agricultural water management, we aim to address the dual imperatives of enhancing food security and sustainable water resource utilization in semi-arid regions facing the challenges of climate change.

BUILDING BRIDGES WITH PEPTAIBOLS: CONSTRUCTING A UNIVERSAL DATABASE FOR ENVIRONMENTAL APPLICATIONS

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Trichoderma species are widely known in agricultural implications as biocontrol agents. They produce bioactive secondary metabolites, such as peptaibols, which are among their modes of action against phytopathogenic microorganisms. These non-ribosomal peptides exhibit an ability to form transmembrane ion channels integrating into both prokaryotic and eukaryotic cell membranes leading to cell death. Since their discovery in the mid-20th century, over 1500 peptaibol sequences have been identified, and the number of publications about their antimicrobial activity against plant pathogenic microorganism is increasing. In response to the increasing number of identified peptaibol sequences and publications about their properties, the "Peptaibol Database" and the "Comprehensive Peptaibiotics Database" were created in 1997 and 2013, respectively. However, the increase in peptaibol knowledge makes these databases outdated, which necessitates the creation of a new resource, the "Universal Peptaibol Library". This dynamic database, built on the MySQL open source platform, aims to bring together all existing peptaibol data while making it easier for researchers to add newly discovered sequences. Our team is developing a website to easily access the Universal Peptaibol Library. Key features include the ability to easily search for known peptaibol sequences and to access publication data. In addition, we integrate a peptaibol structure visualization feature based on previously published 3D structures using NGLview, an interactive molecular structure visualization software. Our future plans include the storage of known bioactive properties of peptaibols in this database. The universal peptaibol library aims to serve as a key tool for advancing molecular biology research, providing a central repository for exploring the diverse potential of peptaibols. This study was supported by ÚNKP-23-3- SZTE-501 New National Excellence Program of the Ministry for Culture and Innovation from the source of the National Research, Development and Innovation Fund, and by the Hungary-Serbia IPA Cross-border Co-operation Programme project FERTILEAVES (HUSRB/23S/11/027).

CONTRIBUTION OF POND FISH FARMING TO THE SUSTAINABLE DEVELOPMENT GOALS SYSTEM IN HUNGARY

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The Hungarian aquaculture fish farming sector can be divided into 4 main units: farmed fish production, intensive (precision) fish production, fish processing and recreational fisheries. Of these, the most economically important is the pond farming sector, which is also the pillar of several supply and service sectors. The Sustainable Development Goals (SDGs), adopted by the UN General Assembly in autumn 2015, aim to set the world on a sustainable development path, which are articulated and encompassed in 17 SDGs. In line with international trends, the National Sustainable Development Framework Strategy for the period 2012-2024 has also been published in Hungary. The elaboration of a new framework strategy to follow the current strategy has already started and consultations are ongoing. In Hungary, the sustainability of aquaculture is being developed and adapted to expectations by the organisations involved: fish producers, fish processors, anglers' organisations, sectoral stakeholders, and governmental bodies. Joining this coalition, we believe it is important to review the role and potential of the domestic pond fish farming sector in the process of achieving sustainable development. Our study will examine the impact of pond farming and its link to the Sustainable Development Goals from an integrated approach, considering production technology, ecology, economics, innovation, marketing, and communication aspects. This will be done with the aim that sustainable practices in Hungarian pond fish farming can be an inspiration for other countries to achieve similar development goals.

EXPLORING ENTREPRENEURIAL INTENTION OF YOUNG PEOPLE FROM ZAMBIA

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Located in southern Africa, with a population of more than 19 million inhabitants, the Republic of Zambia is among the countries that have recorded an increase in GDP in recent years. The recorded growth was 4.6% in 2021 and 3.0% in 2022, after falling by 2.8% in 2020. The GDP recovery is mainly due to wholesale and retail trade, agriculture and mining. The subject on which the article focused was the Zambian business climate and also the openness of young people to start businesses. The study presented in the article involved research methods: desk research and survey. Specifically, after the literature review and business climate analysis, the authors processed the 112 responses given by Zambian youth to the 10 questions related to business climate and their future entrepreneurial intentions. Using the responses obtained through the application of a questionnaire, the article explores the entrepreneurial intention of young people in Zambia.

ORGANIC FERTILIZERS MINERALIZATION AND THEIR EFFECT ON POTATO "SOLANUM TUBEROSUM" PERFORMANCE IN ORGANIC FARMING

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Nitrogen resulting from the mineralization of organic fertilizers is of great importance in organic farming. Two tests (incubation and pot test) were conducted on poor organic matter soil. The objective of the first test was the study of the mineralization under incubation conditions of four organic fertilizers commonly used doses (worm-compost: 5 t ha−1; compost: 5 t ha−1; sheep manure: 30 t ha−1; fishmeal: 3,5 t ha−1), while that of the second test was the study in pot experiment of the effect of adding worm-compost (0, 5, 10 and 15 t ha−1) and fishmeal (0, 1.75 and 3.5 t ha−1) on N mineralization, and growth and yield of potato. During incubation, N mineralized from the four organic fertilizers tested differ significantly. The maximum N mineralization apparent rates (NMAR) were 62.3%, 38%, 30% and 18%, for fishmeal, compost, worm-compost and sheep manure, respectively. For the pots test, the use of fishmeal had a significant effect on leaf number, plant height, plant dry matter, aerial nitrogen uptake, tuber number and tuber yield, while the addition of worm-compost had an effect, on leaf number and tuber yield only. The combination of these two fertilizers (10 t ha−1 of worm-compost and 1.75 t ha−1 of fishmeal) generated at harvest a maximum of underground N uptake (2.96 g plant−1; 123 kg ha−1) and total N uptake (3.26 g plant−1; 136.5 kg ha−1). This was favored by NMAR of 71% and 64.3% for fishmeal and worm-compost, respectively, generating the optimal yield (554.4 g plant−1; 23.1 t ha−1).

THE DEMOGRAPHIC OUTLOOK OF HUNGARIAN RURAL AREAS AND ITS IMPLICATIONS FOR THE AGRICULTURAL LABOR FORCE

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The paper presents the results of a spatially detailed demographic forecast using recent data from the Population Census of 2022. For creating the projections, agent-based methodology was utilized. Agents representing the inhabitants of Hungary, each assigned with an individual set of attributes (e.g. age, sex, residency, socio-economic background). In each cycle, every agent faces two possible natural movement events (child bearing, passing away), and may participate in one of the four possible migration decisions (employment related migration, university related migration, suburbanisation, counterurbanisation). In contrast to cohort-component method, agent-based methodology allows the simulation of different migration types, which is crucial to explore the demographic differentiation of the rural areas. The projected changes in the number and structure of the population will be analysed in different spatial scales. The results indicate a deepening divide in the demographic outlook of the rural areas. The projected changes in the number and structure of the population have direct implications for the future of the Hungarian agriculture, as the local populace is a key source of agricultural labour force. Depopulation can easily lead to labour shortage. Agricultural areas which especially labour-dependent but face significant depopulation will be highlighted as the most vulnerable. This work is supported by the János Bolyai Research Scholarship of the Hungarian Academy of Sciences (New horizons for agent-based modelling of the spatial processes of Hungary).

THE SPECIFIC ENVIRONMENTAL CONSEQUENCES OF THE SPRAWL OF RURAL CENTERS IN HUNGARY

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The urban sprawl of rural centers poses significant challenges in post-socialist Central and Eastern European countries (CEE), where rapid sprawl complicates spatial planning and development. This research aims to prove empirically that the significance of the process is much greater than it seemed based on the research, because certain characteristics hide the process in both statistics and GIS databases. The existing databases (HCSO census, Urban Atlas) were compared with the results of field sampling in the case of 4 Hungarian cities (Kecskemét, Győr, Szeged & Zalaegerszeg). Between 1990 and 2022, significant land use conversions occurred in selected cities, with notable increases in built-up areas driven by commercial, industrial, and residential projects. These transformations result in spatial differentiation, fragmented land use patterns, habitat degradation, and environmental concerns such as waste incineration and air pollution. Partly due to the fragmented nature, since opposite processes take place in the individual areas, and the pattern of land use is so complex that the size of the unified land use areas is smaller than the minimum polygon size of the GIS databases. Overall, understanding these dynamics is crucial for sustainable urban development in post-socialist rural centers. Issues like urban heat islands and conflicts in water management further compound residents' concerns. Ad-hoc development exacerbates territorial injustices and social inequality, making it challenging for local communities to function effectively.

IN OVO INJECTION OF ESSENTIAL OILS FOR ENHANCING POULTRY HATCHABILITY, POST-HATCH PERFORMANCE, AND WELFARE: A REVIEW AND FUTURE PROSPECTS

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In ovo technology represents a promising approach to improving the efficiency and sustainability of the poultry industry. Certain studies have explored other delivery methods, such as incorporating essential oils into water or diets after in ovo injection, to maximize their benefits. The main potential of in-ovo injection with essential oils is to enhance hatching parameters, chick quality, post-hatch performance, and welfare. Additionally, they exhibit antibacterial properties and can modulate the immune system. The success of this innovative method relies not only on the type of injected essential oil but also on various factors including the dosage, volume, timing, and formulation of these substances. The form in which essential oils are delivered, whether alone, with an emulsifier, or encapsulated, can significantly influence the hatchability rates and subsequently impact the benefits attained from its application. Interestingly, nanoemulsified thyme oil at a high concentration adversely affects the reproductive system and blood parameters, whereas nano-encapsulated thyme oil demonstrates an improvement in broiler chicken growth performance and conversion ratio. Regarding the hatchability rates which are a critical indicator of the success of in-ovo injection, rosemary essential oil is a beneficial additive in poultry production, particularly in improving hatchability and enhancing the quality of newly hatched chicks. Finally, ensuring the safe and effective utilization of essential oils in poultry production involves mitigating the risk of toxicityrelated adverse effects while maximizing their potential benefits.

PRESENTATION OF CAMPDEN BRI HUNGARY'S ACTIVITIES AND THE REWEEMAP PROJECT

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ReWeeMap project is an EIT Food co-funded innovation project which aims to develop a drone monitoring software which is able to specialised identification of weeds posing the greatest risk to the food industry. The prototype will be made for Datura Stramonium, and later it will be extended to other weeds and other functions as well. Drone technology is evolving significantly, but models need continuous improvement to increase their efficiency. The aim of the ReWeeMap project is to raise the overall monitoring activities to a level that can provide accurate findings and recommendations for intervention with a reduction in human resources. Campden BRI Hungary participating in several innovation projects through EIT Food, Horizon Europe and other EU co-funded grants as well. In addition, CBHU also puts significant effort in the digitalisation and technological progress of the food industry. The extensive experience and drive to innovate covers the entire supply chain, and thus all players in the agri-food sector. As a strategic partner of EIT Food in Hungary, the company is also responsible for generating research and innovation projects and assisting applicants in the project preparation and application processes.

Posters

AGRICULTURE FACING CLIMATE CHANGE: CHALLENGES, OPPORTUNITIES, AND ADAPTATION MEASURES IN ALGERIA

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"Agriculture facing Climate Change: Challenges, Opportunities, and Adaptation Measures in Algeria" provides a comprehensive examination of the specific impacts of climate change on agriculture in the Algerian context. We will explore the challenges that Algerian agriculture is facing, such as changes in precipitation patterns, temperature increases, water scaricity, and soil degradation due to salinization and erosion processes, as well as desertification. Simultaneously, we will explore potential opportunities for more resilient agricultural practices, such as crop rotation and precision farming technologies. Additionally, we will analyze specific adaptation measures, including crop diversification, improved irrigation practices, agroforestry, soil conservation techniques, climate-resilient crop varieties, water harvesting and storage, integrated pest management, and capacity building and awareness. These measures are vital for enhancing the sustainability of the agricultural sector and mitigating climate-related risks. Overall, this presentation provides a contextual insight and practical solutions to support Algerian agriculture in thriving amid a changing climate environment.

ANALYSIS OF SURFACTIN COMPONENTS PRODUCED BY BACILLUS STRAINS ISOLATED FROM ENVIRONMENTAL SAMPLES

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Surfactins produced by Bacillus species are lipopeptides with potential applications in environmental sustainability, agriculture and environmental protection. Investigating their structure could lead to the development of natural-origin alternatives to synthetic surfactants, thereby reducing environmental impact. In our study, we successfully performed the taxonomic identification of 25 Bacillus strains isolated from fungal compost, utilizing both molecular tools and gas chromatography based on fatty acid profiles. Following the taxonomic identification, we conducted a detailed investigation of surfactin production by these strains. Out of the 25, 16 Bacillus strains were found to produce surfactins, belonging to the B. subtilis, B. amyloliquefaciens, and B. licheniformis species. A total of 74 distinct surfactin variants were identified across the producer strains using our methods. Notably, the surfactin variant distributions varied among the isolates. For B. subtilis strains, the C16-[Sur] and C15-[Sur] variants were most prevalent. In contrast, B. amyloliquefaciens strains most frequently produced C14-[Sur] and C15-[Val7] surfactin variants. Meanwhile, B. licheniformis strains predominantly generated C15-[Sur] and C14-[Sur] variants in their fermentation broth, with this species uniquely producing a surfactin molecule featuring the longest fatty acid chain (C19-[Sur]), previously unreported in the literature. Our findings on surfactin production by Bacillus isolates lay a solid foundation for identifying promising candidates for future biocontrol applications. This study was supported by the Hungary-Serbia IPA Cross-border Co-operation Programme project FERTILEAVES (HUSRB/23S/11/027).

BIODIVERSITY, PREVALENCE AND SEASON DSTRIBUTION OF TICKS OF SMALL RUMINANTS IN NORTHWEST PART OF SERBIA

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Ticks are a widespread problem for livestock producers. They also spread a number of serious diseases, the most notable being anaplasmosis, babesiosis, theileriosis and etc. The study about tick biodiversity and season distribution of tick of small ruminants in Northwest part Serbia was performed in period 2017-2020 at 45 small ruminants flocks. Collecting ticks from hosts was done by manual extraction. The tick species were detected by morphometric characteristic. Ticks were found in a total of 125 animals (50.40%). The following ticks species were found: Ixodes ricinus (16,93%), Rhipicephalus bursa (15,98%), Haemaphysalis punctata (3,32%), Dermacentor marginatus(3,00%), D. pictus (1,10%), R. sanguineus (0,53%) and Ha. inermis (0,31%). During our research, the sex ratio of ixodid species was in favor of females and amounted to 61.02%:38.98%. In March, we established the presence of Ixodes ricinus, Rhipicephalus sanguineus, Dermacentor marginatus and Haemaphysalis punctata. Dermacentor marginatus, Haemaphysalis punctata and Haemaphysalis inermis reach their maximum abundance in April. Ixodes ricinus and Dermacentor pictus reach their maximum abundance in May. Rhipicephalus sanguineus and Rhipicephalus bursa are the most frequently found species in July and August. In September, we observe an increase in the population of Ixodes ricinus and Dermacentor marginatus, while in October we observe the appearance of Ixodes ricinus and Rhipicephalus sanguineus. In addition to the immediate harmful effects caused by the hemophagous diet and allergic manifestations, the toxins excreted by ticks transmit many infections, a large number of which are zoonotic in nature.

BREEDING PRACTICES FOR SALERS: OPTIMIZING MEAT PRODUCTION TRAITS

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This research introduces a specialized breeding program tailored for Salers cattle, with the primary goal of optimizing meat production efficiency. The program is strategically aligned with local agricultural initiatives and adheres to stringent animal care laws and industry standards, including ICAR and HAPIH regulations. Salers breed is recognized for their unique characteristics, including elongated bodies, slender joints, and compact heads. The breeding program aims to further enhance these traits to maximize productivity. Notably, official data underscores the urgency of this initiative, with a significant disparity between local beef production (4,000 to 5,000 tons annually) and demand (14,000 to 16,000 tons per year). A crucial objective of the program is to address North Macedonia's meat shortage relative to demand. By employing the SEUROP system for carcass quality assessment, the program ensures consistent adherence to industry standards. This study serves as a comprehensive manual for implementing Salers-specific breeding strategies. It provides valuable insights into effective methodologies, techniques for enhancing productivity, and strategies for regulatory compliance. Ultimately, the aim is to foster sustainable practices within the meat production industry in North Macedonia.

COMPARING THE ENVIRONMENTAL EFFECTS OF REGENERATIVE AGRICULTURE SYSTEMS WITH CONVENTIONAL AGRICULTURAL PRACTICES

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In the face of accelerating global environmental challenges, particularly within the agricultural sector, the pursuit of sustainable solutions has become imperative nowadays. This study explores to the pressing issues surrounding agricultural practices and their profound impact on the environment. Focusing on regenerative agriculture systems and conventional practices, to conduct a comparative analysis to distinguish the respective environmental effects. The degradation of soil health, loss of biodiversity, increasing of climate change, and pollution of water bodies are among the considerable challenges facing global agriculture. Conventional agricultural practices, characterized by intensive tillage, monoculture cropping, and heavy reliance on synthetic inputs, have been instrumental in exacerbating these environmental woes. Evidently, the pursuit of higher yields often comes at the expense of long-term sustainability, as witnessed in the depletion of soil fertility, loss of biodiversity, and emission of greenhouse gases. In contrast, Regenerative agriculture represents a new way of farming that focuses on using natural processes to improve the environment and farming methods. By prioritizing soil health restoration, biodiversity enhancement, and carbon sequestration, regenerative agriculture offers a promising avenue for addressing these pressing environmental concerns. Through minimal tillage, diverse crop rotations, cover cropping, and agroforestry, regenerative practices foster resilient agroecosystems capable of withstanding environmental stresses and mitigating the impacts of climate change. Drawing upon a comprehensive review of empirical studies and meta-analyses, our comparative analysis highlights the stark disparities between regenerative agriculture systems and conventional practices across various environmental dimensions. From soil health improvement to carbon sequestration, regenerative approaches consistently outperform conventional methods, offering tangible solutions to mitigate the adverse environmental impacts of agriculture. This study emphasises the urgent need for a transition towards more sustainable and regenerative agricultural practices to preserve the environment, ensure food security, and foster resilience in the face of a changing climate.

EROSION TESTS AND NUTRIENT SUPPLY ON A SMALL TRANSDANUBIAN FARM

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As a result of inadequate agricultural practices, climate change and rising energy prices led to increased load of the environment and the intensification of soil degradation. These processes have brought new challenges to farmers. In thisstudy we examined the main elements and results of arable crop cultivation in a small family farm with a slope between 5-12%. Soil tests were made on three sections of two strip-like, long arable fields, cultivated plants were winter wheat and fodder corn. Soil tests were made in the laboratory of the faculty, by standard methods. Based on the data obtained, it can be concluded that the sloping parts of the areas were eroded, mainly in the middle sections. The agricultural practices used so far must be modified, considering the economic cultivation and the environmental conditions. After examining the environment damaging factors caused by erosion, our goal is to select possible appropriate technologies and to develop proper agricultural practices at the small farm level. The basis of proper agricultural practice is primarily the improvement of soil structure and revitalization of the soil life. The use of green manure plants and mulching with stem residues is recommended and enforced by state as well. Finally, soil-saving cultivation systems and agricultural machines are recommended, with which we can successfully protect our fields against erosion.

EXPLORING TAMANRASSET WETLAND MICROALGAE: HIGH NUTRITIONAL POTENTIAL FOR HUMAN AND ANIMAL CONSUMPTION IN HOT AND REMOTE REGION SURVEY INVESTIGATION, MORPHOLOGICAL DIVERSITY AND METAGENOMIC STUDY OF MICROALGAE

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In arid and remote regions like Tamanrasset, the exploration of unique ecological niches is vital for sustainable nutrition sources. This study delves into the uncharted territory of Tamanrasset wetlands, investigating its microalgae population. Through a comprehensive survey, we unveil a plethora of microalgae species thriving in this extreme environment. Our research method integrates morphological diversity analysis, shedding light on the wide array of microalgae forms present. Beyond visual characterization, metagenomic studies unravel the genetic intricacies of these microorganisms, providing insights into their adaptive mechanisms in the harsh conditions of Tamanrasset. Remarkably, our findings emphasize the high nutritional potential of these microalgae for both human and animal consumption. Rich in essential nutrients, these resilient microorganisms could play a pivotal role in alleviating food scarcity in such remote and hot regions. Furthermore, their unique biochemical composition renders them valuable for various applications, ranging from dietary supplements to animal feed, potentially revolutionizing local agriculture and aquaculture practices. This research not only expands our understanding of microalgae biodiversity in extreme environments but also highlights their practical applications, emphasizing the urgent need to conserve and harness these invaluable resources. By bridging scientific exploration with real-world implications, this study paves the way for sustainable food security solutions in challenging climates, offering a beacon of hope for communities in similar harsh landscapes globally.

MEASURING THE NITROGEN SUPPLY CAPACITY USING ELECTRICAL BIOIMPEDANCE SPECTROSCOPY

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Accurate and timely monitoring and diagnosis of nutrient supply during plant growth is a key prerequisite for accurate nutrient management. This study presents an approach to leaf bioimpedance spectroscopy of lettuce plants exposed to different nitrogen (N) stresses. The experiment was carried out on lettuce plants (Lactuca sativa L.) 'King of May' variety, where four N doses were applied with Hoagland solution. The root fixing medium was rockwool cubes. The lettuce plants were kept in a light room with adequate illumination and constant temperature. The fertilization treatments were applied every two days after the cotyledons developed and the first leaves appeared. At the end of the pot experiment, the nitrate (NO_3^-) content of lettuce leaves was determined by the salicylic acid-sulphuric acid method and leaf bioimpedance spectroscopy was measured. Gold electrodes were used for high precision impedance measurements from 1Hz to 100 KHz and a comprehensive statistical evaluation was performed. The results showed that bioimpedance is able to distinguish between lettuce plants exposed to different N treatment. Lettuce leaves with reduced NO_3^- content had a higher impedance modulus than leaves with higher NO_3^- content. The bioimpedance modulus of the treatments decreased with increasing frequency. Bioimpedance in the low frequency ranges decreased with increasing NO_3^- deficiency suggesting a change in extracellular resistance. These results underscore the significant promise of bioimpedance measurement methods in the detection of different N levels in leaf samples.

REVEALING SECONDARY METABOLITE ALTERATIONS IN FUNGAL ENDOPHYTE SECRETOM

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Bioactive secondary metabolites produced by endophytic fungi hold significant promise for the pharmaceutical, food industries, and agriculture. Often, the genes responsible for these metabolites remain unexpressed under laboratory conditions due to the absence of specific nutrients found in their natural hosts. Nonetheless, the dormant biosynthetic pathways for these metabolites can be activated using epigenetic modifiers, which alter the chromatin structure of genomic DNA. In our study, we investigated the influence of valproic acid (VPA) and sodium butyrate (SB) as epigenetic modifiers to unveil the potential changes in the secondary metabolite profiles of an endophytic fungus. We employed mass spectrometric analysis to characterize the secondary metabolites of the treated fungal strains. The observed differences in metabolite production, induced by the epigenetic treatment, were rigorously analysed using statistical methods. Our findings suggest that epigenetic modification can serve as a potent strategy to unlock the biosynthetic potential of endophytic fungi, offering new avenues for the discovery of novel bioactive compounds. This work was supported by the bilateral project 2019-2.1.11-TÉT-2020-00148.

SZEGED MICROBIOLOGICAL COLLECTION: A HUNGARIAN MICROBIAL GENE BANK

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The Szeged Microbiological Collection (SZMC) holds membership in the World Federation of Culture Collections (http://www.wfcc.info/ccinfo/index.php/collection/by_id/987), underscoring its commitment to the rigorous stewardship of microbial resources. Central to its mission is the acquisition, preservation, taxonomy, and elucidation of bacterial, yeast, and mould strains. Presently, SZMC curates an extensive inventory exceeding 12,000 isolates spanning over 120 microbial genera, comprising approximately 2,000 bacterial and 10,000 yeast and filamentous fungal strains. This repository encompasses a diverse array of microorganisms, including those sourced from specialized ecological niches such as mycotoxin producers, plant pathogens, agents of postharvest decay, and organisms integral to biocontrol, bioremediation, and bioaugmentation endeavors. Notably, SZMC boasts substantial sub-collections particularly rich in taxa such as *Aspergillus*, *Fusarium*, *Mucor*, *Mortierella*, *Penicillium*, *Rhizopus*, *Rhizomucor*, *Trichoderma*, *Cryptococcus*, *Saccharomyces*, and *Candida*. Within the bacterial cohort, SZMC prioritizes strains cultivated for their roles in soil enhancement, bioaugmentation strategies, and biocontrol applications, exemplified by representatives from genera *Bacillus*, *Pseudomonas*, and *Streptomyces*. Preservation methodologies encompass state-of-the-art cryogenic techniques, utilizing both deep (-80 °C) and ultra-deep (-140 °C) freezers, as well as liquid nitrogen repositories to ensure long-term viability. Beyond mere archival stewardship, SZMC conducts molecular identification and comprehensive phenotypic characterization, including assessments of metabolite production and enzymatic activity. Over successive decades, this collection has evolved into an invaluable genetic reservoir, poised to support a wide spectrum of biotechnological, agricultural, and food industrial research endeavors.

THE IMPACT OF AI ON COMMUNICATION IN AGRICULTURE

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Artificial intelligence (AI) is revolutionising agriculture, bringing about a paradigm shift in how food is grown, harvested, and distributed. From precision farming to smart irrigation, AI-enabled technologies are not only making farms more productive but also more sustainable. Thanks to developments like this, we stand at the precipice of a new era where technology and nature will work in concert to feed our planet. At the heart of AI's agricultural adoption is the pursuit of increased yield. AI-driven technologies, such as machine learning models and predictive analytics, are used to assess and interpret complex agricultural data. Farmers can now predict the optimal planting seasons, select crops with the best genetic potential for yield and resilience, and make decisions that align with climatic and soil conditions. This approach not only boosts productivity but also contributes significantly to sustainable farming practices by conserving resources. AI's ability to continuously monitor crops and manage resources is transforming the traditional farming landscape. Drones equipped with advanced sensors fly over fields to collect data, which can then be processed to monitor plant health, soil quality and moisture levels. These aerial devices can identify areas of a field that are under stress from pests, diseases or lack of nutrients. The early detection capability of AI systems allows for timely intervention, potentially saving entire crops from failure.

THE IMPLICATIONS OF TOURIST ACTIVITIES IN THE DEVELOPMENT OF THE ROMANIAN RURAL SPACE

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Rural tourism represents a way that can save agriculture and cultural heritage, being an activity on the rise, with a positive impact on local development. The decrease of interest in traditional agricultural activities, the migration or permanent abandonment of rural areas and the increase in the aging of the population, problems related to infrastructure and the absence of services are the major aspects that mark many rural areas at the present time. The rural area can provide the necessary resources for the development of tourism activities, these activities can be the answer to some of the problems they face. The emergence of tourism as a way of exploiting the resources of the rural space represented an adjunct in the revitalization of the economies of these areas. The different forms of rural tourism could contribute to the sustainable capitalization of existing resources in the rural environment, thus supporting the desired goal: that of sustainable local and regional development, maintaining the natural, cultural and social diversity of the rural environment, while at the same time supporting the integration of services in supporting the community economy. Through the lens of tourist activities carried out in the rural environment, the connection between the rural and the urban environment is favoured, this aspect leading to an improvement in the quality of life because of the change in mentality, with a favourable impact on its cultural viability: reducing the rural-urban exodus, ensuring jobs, supporting investments in the countryside and improving rural infrastructure.

THE IMPORTANCE OF PLANT REGISTRATION IN TOMATO PRODUCTION IN DIFFUSE GREENHOUSE

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According to a market survey carried out by professional organisations, tomato production in Hungary has developed significantly in recent years. And thanks to greenhouse cultivation, environmental factors do not affect the quantity and quality of the harvest to the same extent as in the open air. It has been pointed out that table tomatoes are typically grown in greenhouses or in plastic tents. In recent years, subsidies and favourable credit facilities have increased the area under glasshouse tomatoes by more than 110 hectares, so that there are now more than 310 hectares under tomato production in the country. Crop registration is the process of registering data about the main parts of the crop. This requires a disciplined approach, because this crop data must be registered accurately and consistently on a weekly basis. This data gives you as a grower greater insight into the progress of crop growth and its impact on the constantly changing climate conditions. The output generated by crop registration ultimately contributes to better decision-making in your chosen growing strategy. The experimental area was in a diffuse glass greenhouse where 24 plants were included in the experiment. I measured the following data: flowering speed, setting speed, harvest speed, height flowering truss, weekly growth, youngest flowering truss, youngest setting truss, youngest harvested truss. This datas helps optimise your cultivation schedule. From these measurements, you will be able to see if the plant is in balance. A healthy and happy plant should be maintaining an optimum growth rate and the correct amount of vegetative biomass to support growth. The next step is comparing crop data with other factors such as climate and irrigation data. In practice, this data is often saved in different systems.

UNVEILING THE CIRCULAR BIOECONOMY: EU POLICY, ECONOMICS, AND NICHE MARKETS IN BALKANIC FOOD INDUSTRY

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The circular bioeconomy is the driving force behind sustainable development in the EU. This article examines the EU's circular bioeconomy trajectory, focusing on Balkanic food industry niche markets. Analyzing EU directives, policies, and initiatives, it unveils the regulatory landscape shaping circular bioeconomy agendas. The EU's Circular Economy Action Plan, Bioeconomy Strategy, and Sustainable Development Goals drive circularity. From an economic perspective, the study explores incentives and market mechanisms promoting circular bioeconomy principles, including subsidies and taxes. The study highlights six niche market examples in the food industry across Balkanic countries. For instance, in Romania, initiatives promoting circular agriculture practices for organic food production are gaining traction. In Greece, there is a growing market for circular packaging solutions for traditional food products like olive oil. In Bulgaria, circular supply chains for sustainable seafood are emerging as a promising niche market. In Croatia, circular initiatives in wine production and packaging are on the rise. In Albania, circular approaches to dairy farming and cheese production are being explored. In North Macedonia, circular strategies for preserving and processing fruits and vegetables are being developed. Through a comprehensive examination of EU policies and economic frameworks, this article contributes to a deeper understanding of the economic dimensions underpinning sustainable development for a circular bioeconomy in the EU context, with insights gleaned from niche markets in the Balkanic food industry. The insights provide crucial guidance for policymakers, economists, and stakeholders in promoting the circular bioeconomy, promoting economic growth, and preserving environmental integrity in the EU and beyond.

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