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Oral Session 1_ Sustainable Agriculture, Soil and Plant Science

ABS4441: Weed detection in agricultural fields using machine vision

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Abstract. Weeds have the potential to cause significant damage to agricultural fields, so the development of weed detection and automatic weed control in these areas is very important. Weed detection based on RGB images allows more efficient management of crop fields, reducing production costs and increasing yields. Conventional methods of weed control can often be time-consuming and costly, and can also cause environmental damage through overuse of chemicals. Automated weed detection and control technologies enable precision agriculture, where weeds are accurately identified and targeted, minimising chemical use and environmental impact. Overall, weed detection and automated weed control represent a significant step forward in agriculture, helping farmers to reduce production costs, increase crop safety and develop more sustainable agricultural practices. And thanks to technological advances, can expect more efficient and environmentally friendly solutions for weed control in the future. The development of technologies for weed detection and automated control is crucial for enhancing agricultural efficiency. Employing RGB images for weed identification not only lowers production costs but also mitigates environmental damage caused by excessive chemical use. This paper explores automated weed detection systems, emphasizing their role in precision agriculture which ensures minimal chemical use while maximizing crop safety and sustainability.

Keywords: Computer vision, Machine learning, Weed detection, Precision agriculture, Weed mapping, UAV

ABS4436: Effects of caesalpinia decapetala invasion on soil physical properties in vhembe biosphere reserve in Limpopo Province of South Africa

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Abstract. *Caesalpinia decapetala* is a thorny climbing shrub that is invasive in South Africa. It effects on natural ecosystems, particularly soil has hardly been studied, yet the shrub is dominant in moist areas of Eastern Cape, KwaZulu-Natal, Mpumalanga, and Limpopo Provinces of South Africa. Here, we assessed the effects of *C. decapetala* invasion on soil physical properties by collecting topsoil from beneath three replicated invaded and uninvaded sites and measuring soil

gravimetric moisture, water repellency, penetration resistance, infiltration, and hydraulic conductivity over three austral summer months (November – January) in Vhembe Biosphere Reserve, Limpopo Province of South Africa. Results showed that gravimetric soil moisture content and hydraulic conductivity varied between invasion conditions ($P < 0.05$). In contrast, soil penetration resistance levels and infiltration rates showed not significantly ($P > 0.05$) different across invasion conditions for all the three months. Monthly differences ($P < 0.001$) were observed for all measured soil physical properties, except for hydraulic conductivity. Soils from both the *C. decapetala* invaded and uninvaded sites were wettable for all the three months. It appears that *C. decapetala* invasion had little effect on measured soil physical properties, thus disputing the general claim that invasive alien plants change soil properties positively or negatively to their advantage.

Keywords: Biological invasions, Alien plants, Plant litter, Soil nutrients, Soil hydraulic conductivity

Acknowledgements: Thanks to the National Research Foundation (NRF: research grant UID number 137789) and Rhodes University for funding to conduct fieldwork. Also, thanks to the Department of Environmental Science at Rhodes University for providing the equipment. Thanks to University of Venda for laboratory space.

ABS4466: Nitrogen (N) species in marginal land soils: is N-fertilizer necessary for biomass production on marginal land in Ontario, Canada?

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Abstract. Nitrogen-fertilizer application is one of the most common agricultural practices that helps plant growth and increase crop yields. Plants, however, take up only a fraction of the N applied and the unused N can be carried into the surface environment with unintended consequences for water and emitted to air, as nitrous oxide, contributing to global warming. This research focuses N-species in soils during the sorghum growing season on marginal lands in Ontario, Canada. Soil samples were collected from agricultural and marginal land fields at three different times during the growing season: Before Planting (BP), After Fertilizer Application (AFA), At (biomass) Harvest (AH). Plant-usable (as water leachable N-species) and unusable N-species in the soil samples were analyzed using calorimetric and Kjeldahl methods. The results show that the plant-usable N-species only account for a small portion of the N content in the soil and that the concentrations of the plant-usable N-species in the soils varies with the land type and soil collection time. N-fertilizer significantly increased the level of the plant-usable N-species in the soils shortly after its application but the increase was not proportional to its rate of application and did not significantly enhance the biomass production. More research is needed to confirm the findings of this research and to develop techniques to make the plant-unusable N-species usable by plants.

Keywords: Nitrogen species, Soil, Marginal land, Nitrogen fertilizer, Sorhgum biomass

ABS4493: Assessment of soil erosion through spatial analysing of soil properties using statistical-based functions

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Abstract. The significant geomorphological hazard of collapsed cavities (CC) causes notable environmental transformations. To address this issue, the pipe collapse pattern was examined using two statistical methods, the Density Correlation Function (DCF) and the Mark Coloration Function (MCF). Key predictor variables like organic carbon (OC), sodium adsorption ratio (SAR), and exchangeable sodium percentage (ESP) were utilized to comprehend their impact on spatial distribution over time. The study was found that lower OC levels increase susceptibility to CC, while higher SAR and ESP amounts enhance the potential for collapsed cavities. The methodology and discoveries of this research can offer valuable insights for land managers, stakeholders, and researchers.

Keywords: Soil properties, Collapsed cavities, Statistical tests, Soil erosion

ABS4420: Methane emission and mitigation strategy of animal husbandry under low carbon background

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Abstract. Methane produced by animal husbandry is the main source of agricultural greenhouse gas emissions and reducing methane emissions has become the focus of studies in various countries. This article aimed to provide data support and scientific basis for promoting the process of methane emission reduction in animal husbandry and realizing the green and sustainable development of animal husbandry. The long-term statistical data of the FAOSTAT from 1961 to 2019 were used to analyze the changing trend of methane emission from global animal husbandry. The results showed that there were significant differences in estimated methane emissions from animal husbandry in various regions of the world from 1961 to 2019, and the overall trend was increasing. Methane emissions from ruminants increased from 68.0479 million tons in 1961 to 103.5291 million tons in 2019, accounting for 96.98% and 97.51% of the total methane emissions from animal husbandry. Among different species of ruminants, the top three methane emissions were

beef cattle, dairy cattle, and buffalo. Its emissions increased from 34.9887 million ton, 18.6156 million tons, and 5.2098 million tons in 1961 to 56 .6616 million ton, 19.9604 million ton, and 12.0833 million tons in 2019 respectively. India, China, Pakistan and other countries were major livestock producers, and the output of ruminants such as cattle and sheep ranked among the top 10 in the world. Its methane emissions are also increasing, and the increase is more and more rapid. On this basis, this article proposes that a multi-pronged approach can be taken to reduce methane emissions from animal husbandry. At the policy level, we should establish statistical data and measurement standards for methane emissions from animal husbandry, tax greenhouse gas emissions from animal husbandry or allow them to participate in the carbon market, establish an incentive mechanism to encourage farmers to reduce methane emissions from farms, and enhance the awareness of climate change among producers and consumers. At the production level, we should improve the quality of forage grass, adopt reasonable grazing management strategies, add feed supplements, optimize genetic selection, and improve the utilization level of livestock manure. At the consumer level, we should reduce the waste of meat and dairy and reduce or replace animal-based diets with plant-based diets as a combination of strategies to reduce methane emissions from animal husbandry.

Keywords: Ruminant, Methane emission from animal husbandry, Agricultural methane emission reduction, Low carbon, Carbon emission, Green development

ABS4430: Status of agricultural irrigation in Hungary

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Abstract. Some prediction models indicate that climate change will have a more pronounced impact on Hungary than previously anticipated. Traditionally, Hungarian agriculture is based on dryland farming, with irrigated farming practiced in a few areas. Land degradation is a significant concern. However, the loss of arable land due to water scarcity could be more widespread. One potential solution is to irrigate, which could maintain soil fertility for decades to come. The utilization of modern irrigation techniques is a crucial approach to making irrigation as sustainable as possible while ensuring yield and quality. This edition of the publication aims to provide an authentic picture of irrigation in Hungary, past and present. It also aims to provide suggestions for the near future, drawing on examples from abroad.

Keywords: Irrigation, Hungary

ABS4437: The impact of plant-based soil amendments on improving the value of mortgaged farmland

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Abstract. A field experiment was conducted in Guangdong, China to evaluate the effects of different plant-based soil amendments on soil quality, nutrient availability, plant growth, and land value. The increase in soil pH from 6.0 to 6.5 is optimal for most crops. The decrease in EC indicates a decrease in soil salinity. The TN content increased by 12.5%, while the AP and AK content increased by 23.8% and 17.6%, respectively. The SOM content increased by 32.4%. The availability of nitrogen increased by 106%, while the availability of phosphorus increased by 55%. The effectiveness of potassium, calcium, and magnesium also increased by 21%, 16%, and 16%, respectively. The application of plant-based soil amendments significantly increased the plant height, stem diameter, and biomass yield of corn, soybean, and rice crops. The greatest improvement was observed in corn crops, with a 12.6% increase in plant height, a 15% increase in stem diameter, and a 25.6% increase in biomass yield. Plant based soil amendments significantly improve soil quality, increase nutrient availability, and promote plant growth and productivity. Economic analysis shows that the use of plant-based soil amendments significantly increases the value of land, providing potential benefits for mortgage lenders and borrowers. This study emphasizes the importance of sustainable land use practices and the potential of plant-based soil improvement as an effective means of increasing land value.

Keywords: Plant-based soil amendments, Farmland value, Soil quality, Sustainable land use, Economic analysis

ABS4431: Effects of vinasse and zinc complex on the yield, crude protein, and gluten of winter wheat

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Abstract. The primary goal of agricultural production is to produce adequate quantity and quality of crops. One crucial aspect of this is providing the appropriate nutrients to plants. In recent times, there has been a growing emphasis on replenishing micronutrients beside macronutrients, as essential microelements, although in smaller quantities, are indispensable for the cultivation of our crops. In our three-year small-plot experiments, the effect of two foliar fertilizers, Vinasse, which is a by-product of alcohol production, and a zinc complex on the yield, crude protein, and gluten content of winter wheat, was investigated. The effects of these formulations when applied as foliar

fertilizers separately and together, at doses of 50, 100, 250 and 500 l/ha for Vinasse and 0.5 kg/ha for zinc complex, were examined. Based on the results of the small-plot experiments set up in the fall of 2020 and 2021 and harvested in the summer of 2021 and 2022, it can be concluded that using Vinasse + zinc complex treatments a higher yield and better content indicators were achieved compared to the control plots. The highest dose of Vinasse (500 l/ha) + zinc complex (0.5 kg/ha) had the greatest positive effect on yield values.

Keywords: Winter wheat, Yield, Crude protein, Gluten content

ABS4445: Effect of asbestos cement contamination in irrigation water on physiological and germination parameters of *Trifolium pratense* and *Solanum lycopersicum* seeds

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Abstract. The aim of this study is to examine the plant stress responses induced by the water transport of matrix materials from the eroded and degraded of asbestos cement materials. The paper includes a general assessment of the exposure and risk factors of the plant-water-soil system to asbestos cement products. Furthermore, the results of the experimental analysis provide empirical support for the plant stress response results according to physiological and germination parameters of the tested plants. The background to the topic is that the contamination of irrigation water by asbestos cement raises serious environmental concerns, with toxicity to plants and soil contamination potentially having negative consequences for vegetation health and soil quality. In the presence of asbestos in water, plants are exposed to toxic stress, which can inhibit photosynthesis and nutrient uptake, but can also affect germination processes. The growth, reproduction and flourishing of plants also be at risk, as asbestos has adverse effects on cell division and metabolism. In addition, environmental stress can make plants more susceptible to disease and insect attack. In this paper, were analysed the effects of pre-set dose concentrations of irrigation water containing asbestos cement matrix on the germination and physiological parameters of *Trifolium pratense* and *Solanum lycopersicum* in a germination experiment. The research area of the paper was influenced by the lack of minimum international practice, standards and methodology. Therefore, the used methodology provides an opportunity for methodological development. The results can be used as a situation analysis for environmental plant protection and analytical professionals.

Keywords: Asbestos cement, Germination, Irrigation water, Trifolium pratense, Solanum lycopersicum

ABS4468: Control of western corn rootworm with entomopathogenic nematodes in maize monoculture

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Abstract. Western corn rootworm is one of the most dangerous pests of maize, and both the larvae and the imagoes thereof may cause significant damage to the plants. The options of controlling these pests have recently become highly limited, thus creating a great demand for new control methods complying with sustainable plant protection. These requirements are met by the natural enemies of these pests, such as entomopathogenic nematodes (e.g. Heterorhabditis bacteriophora, Gerritsen, 1994). The objective of this study was to determine whether the viability and larvicide effect of a single injection into the soil of 2 billion nematodes using various amounts of water (50, 100 or 200 L/hectare) was maintained even with the lower quantities. Our studies proved that the entomopathogenic nematodes retain their viability and larvicide effect when applied using 50 L/ha of water. The efficacy of the biological agent did not differ from that of Force 1.5G, a product containing Tefluthrin as active ingredient, which was used as positive control. *Keywords*: Western corn rootworm, *Diabrotica virgifera virgifera*, EPNs; biological control methods.

Keywords: Western corn rootworm, *Diabrotica virgifera virgifera*, EPNs, Biological control methods

ABS4507: Influence of seed rate and row spacing across on two different maturity groups of sorghum grain yield and quality characteristics

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Abstract. The aim of the research is to determine the optimal seeding rate and row spacing for two different maturity groups of sorghum hybrids, RGT Icebergg (early) and RGT Huggo (mid-early). In this context, we examine the maximum achievable yield and quality characteristics. The goal is to develop cultivation practices that optimize the economical cultivation of sorghum, taking into account current environmental factors. The experiment involved different plant densities: 210,000,

240,000, 270,000, and 300,000 plants/ha, and three different row spacings: 25, 45, and 76 cm. Through conducted experiments, significant differences have been observed in harvest moisture content, hectoliter weight, protein content, head size, and plant height. Significant differences were observed in the average number of head per square meter. Although similar average protein levels were measured for different genotypes, there were differences in their stability. Increasing row spacing decreased hectoliter weight, while increasing seeding rates increased it. Harvest moisture content was significantly higher with wider row spacings, while increasing plant density resulted in a slight decrease in moisture content. Looking at the average of the tested hybrids, the row spacing of 45 cm and the amount of seed of 300,000 plants/ha are the most ideal combination to achieve the yield.

Keywords: Sorghum bicolor, Seed rate, Row spacing, Grain yield

ABS4580: Does barley and horse-bean grain quality depend on intercropping and nitrogen fertilization?

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Abstract. Sustainable intensification implies higher agricultural production with lower environmental impact and is mandatory to meet the global demand for food and feed. Intercropping, i.e., the cultivation of two or more crops on the same field at the same time, is an agronomic strategy for crop diversification which allows lowering inputs while achieving higher crop yields.

Overyielding of intercropping on sole cropping is generally recognized because of resource complementarities between species but may also be related to increased tolerance to weeds and/or pest and disease resilience. However, from a farmer's perspective also the quality of the products should be maximized, and this would be even more imperative if the grains are used as bulk for the feed or food industry. To the best of our knowledge only few studies have addressed this aspect of the intercropping performance. To fill this gap, in this two-year field study we aimed to assess the grain quality of a barley (*Hordeum vulgare* L.) and horse-bean (*Vicia faba* L. var *minor*) intercropping (IC) compared to sole crop (SC). Both IC and SC were cultivated in alternate rows in an additive design and fertilized with five nitrogen (N) fertilization rates (i.e., 0, 50, 100, 150 and 200 kg N ha-1) in Central Italy. We found that the protein and fiber concentrations of the grains were significantly modified by the mean effect of the cropping system (i.e., SC vs IC) as it was higher in intercropped crops than in sole crops. However, the changes found in the bromatological characteristics of the grains of pure crops and of intercropping depended almost exclusively on the variations in barley grains, because in field bean the quality of the grain remained almost unchanged. N fertilization slightly improved the grain quality of both systems and increasing N rates decreased acid-detergent fiber (ADF) concentration which in turn augmented neutral-detergent fiber (NDF).

However, when considering the protein and fiber yields, we concluded that intercropping can allow for a decrease in nitrogen fertilizers, without compromising the quality of the intercropped barley

compared to the monocrop.
We believe that our results will be useful to encourage the adoption of cereal/legume intercropping by European farmers, because they permit overcoming the barriers that farmers perceive about market opportunities of products obtained in intercropping systems.

Keywords: Crop associations, Cereals, Legumes, N fertilization, Yield quality

ABS4506: Possibilities of rapid generation cycling of hemp (*Cannabis sativa* L.) for the stabilization of recessive traits

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Abstract. This study describes the development of a novel hemp germplasm using an accelerated breeding method. Two hemp varieties, 'Balaton' (green stem, very early female flowering) and 'Chamaeleon' (yellow stem, early maturing), were chosen for breeding. The breeding method involved crossing the varieties, manipulating light conditions to induce flowering, and performing artificial pollination. Yellow stem colour, a recessive trait from 'Chamaeleon', was successfully incorporated into the progeny within four generations in only twelve months overall. This demonstrates the effectiveness of the accelerated breeding method for introducing new traits and highlights the advantages of this method for rapid development of new hemp varieties compared to traditional breeding techniques. However, limitations such as potential inbreeding depression and the need for outdoor testing, are acknowledged.

Keywords: Hemp, Plant breeding, Accelerated breeding, Recessive yellow stem

Oral Session 2_ Food Science and Animal Science

ABS4474: The uric acid lowering effects and utilization of *Artemisia Selengensis Turez*

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Abstract. Hyperuricemia is a metabolic disorder caused by purine metabolism imbalance. This study aimed to develop an *Artemisia Selengensis Turez* functional beverage with uric acid-lowering effects. Firstly, the nutritional composition, antioxidant capacity, and xanthine oxidase (XOD) inhibitory activity of different varieties of Artemisia were evaluated. Then, an *Artemisia Selengensis Turez* composite beverage was prepared using *Artemisia Selengensis Turez* leaf as the main raw material, and its intervention effect was assessed *in vivo*. Results showed that caffeoylquinic acid was the active component in Artemisia leaves that inhibited XOD activity and alleviated gout inflammation. Among the Artemisia varieties tested, Artemisia No. 8 exhibited the highest nutritional content, antioxidant capacity, and XOD inhibition rate. The optimal extraction process for Artemisia was found to be a solid-liquid ratio of 1:40 (w/v), extraction time of 40 minutes, and extraction temperature of 95°C, resulting in a maximum XOD inhibition rate of 74.21%. The *Artemisia Selengensis Turez* beverage reduced serum levels of uric acid, creatinine, blood urea nitrogen, alanine aminotransferase, and aspartate aminotransferase in model mice, and also decreased XOD activity in the liver. Histopathological changes in liver tissues indicated a certain reparative effect of the beverage on liver damage caused by hyperuricemia. This study contributes to the comprehensive utilization of *Artemisia Selengensis Turez* resources, enhances their added value, and provides a theoretical basis for the development of functional *Artemisia Selengensis Turez* products.

Keywords: *Artemisia Selengensis Turez,* Functional beverage, Anti-hyperuricemia

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ABS4502: Citrus flavonoids (naringin and hesperidin) as functional ingredients in dairy products

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Abstract. Recently, the development of functional foods enriched with plant phenolic compounds attracted the attention of researchers due to their favorable health properties. Naringin (NAR) and hesperidin (HES) are two main bioflavonoids available in high concentrations in citrus (CTS) fruits, including juice processing by-products like peel, membranes, and seeds. In general, NAR and HES offer potential health benefits in various diseases including diabetes mellitus, certain types of cancer, and obesity. However, to take advantage of the benefits of flavonoids in CTS, researchers must consider various factors since the development of enriched food is valueless if the bioactive compounds are not stable in the food matrix or are not absorbed appropriately throughout the digestive system. This study presents the sensory, physicochemical, and organoleptic properties of CTS-enriched dairy products produced by different technologies. This paper also includes the extraction methods, encapsulation technologies, and beneficial effects of NAR and HES. Overall, results supported that incorporating HES and NAR improves the antioxidant properties and, in some cases, the consumer acceptance of dairy products. In the future, the application of encapsulation technologies will probably come to the fore in the functional industry, since encapsulation is used to mask unpleasant feelings during eating, such as the bitter taste of CTS flavonoids.

Keywords: Citrus flavonoids, Encapsulation, Extraction, Hesperidin, Naringin

ABS4488: Application of atomic spectroscopy for trace element analysis of fruit juices: a review

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Abstract. Trace elements are crucial for human nutrition, requiring their precise analysis in fruit juices to ensure product quality and assess contamination risks. Atomic spectroscopy techniques including inductively coupled plasma mass spectrometry (ICP-MS), inductively coupled plasma optical emission spectrometry (ICP-OES), graphite furnace atomic absorption spectrometry (GFAAS), flame atomic absorption spectrometry (FAAS), atomic fluorescence spectrometry (AFS), X-ray fluorescence spectrometry (XRF), and glow discharge optical emission spectrometry (GD-OES) offer sensitive, selective and versatile tools for trace element analysis in various solid and solution samples. Matrix modifiers, sample introduction and sample preparation methods are pivotal for accuracy and mitigating matrix interferences. Further advancements in instrumentation are essential. This review provides a comprehensive overview of these techniques, highlighting their principles, advantages, limitations and future research directions in fruit juice analysis. It explores their global applications, focusing on As, Cd, Co, and Pb along with sample preparation

methods, element concentrations, detection limits, and recovery values.

Keywords: Food safety analysis, Analytical techniques, Micronutrient analysis, Sample preparation, Analytical method validation

ABS4534: Sensory, consumer preference, and willingness to pay analyses comparing predominantly *angus* and *santa gertrudis*-influenced beef

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Abstract. Cattle breeds can be categorized into one of two main breed types: Bos Taurus (BT) and Bos Indicus (BI). BT cattle have many well-regarded attributes such as superior carcass characteristics, early attainment of sexual maturity, and a gentle demeanour. Angus (AN) is the most popular cattle breed within the BT breed type in the United States. In contrast to BT cattle, BI cattle have demonstrated a temperament that tends to be more spirited, resulting in heightened management complexities. Nevertheless, BI-influenced cattle possess a shorter and sleeker hair coat that bolsters their ability to endure elevated temperatures and humidity. Moreover, BI cattle have exhibited reduced water consumption, heightened resilience to nutritional stress, and enhanced resistance to parasites. These advantageous characteristics may be exploited by producers, while addressing the less desirable traits through crossbreeding initiatives involving BT cattle. Santa Gertrudis (SG) is a one such crossbreed combining Brahman (BI breed type) and Shorthorn (BT breed type) breeds (3/8 Brahman and 5/8 Shorthorn). While BI x BT crossbred cattle such as the SG breed have potential to capture desirable production traits from both breed types, little is known about the effect on consumer palatability and willingness to pay (WTP) for meat produced from such crossbreeds. This study conducts sensory analysis and assesses consumer preferences and willingness-to-pay (WTP) for beef steaks from predominately Angus cattle (AN) relative to Santa Gertrudis-influenced (SG) cattle. We find comparatively lower consumer ratings of appearance of SG beef relative to AN. Ratings for other common sensory attributes including aroma, flavour, tenderness, juiciness, and overall acceptance are similar for AN and SG. Analysis of WTP suggests no difference across treatments, yet we find consumers are 1.75 times more likely (P-value= 0.021) to select the SG treatment as their preferred steak. The results from this study can complement existing production research of such crossbred cattle enabling producers and other stakeholders to make more informed decisions regarding breeding and marketing. A greater understanding of consumer preferences and WTP for beef derived from SG-influenced cattle can help maximize value in the beef value chain as well as provide a final product that more fully meets the demands and preferences of the end user.

Keywords: Beef steak preferences, Bos indicus cattle, Bos taurus cattle, Sensory analysis

ABS4489: Investigating the technology of Short Period of Incubation During Storage (SPIDES) to mitigate damage caused by mechanical impact

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Abstract. Transporting hatching eggs on plastic setter trays is common due to the reduction in packaging materials compared to paper trays, favouring sustainability. However, the plastic setter trays convey mechanical effects more strongly, negatively impacting eggshell integrity and blastoderm viability. On the other hand, Short Period of Incubation During Storage (SPIDES) proven to increase the liveability of the blastoderm, if applied at the right time. This experiment investigated the mitigating effects of SPIDES during modelled egg transport conditions on vibration machine. Data showed that moderate mechanical effects, simulated by a vibrating modelling machine, resulted in better hatchability of live embryos compared to setups where SPIDES was also applied.

ABS4452: Exploring disparities in the generation of food waste from a spatial and sustainability perspective

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Abstract. In the near future, food production will encounter numerous challenges. The world's population, per capita intake of calories, protein, and cereals is growing, and expected to continue increasing in the future. According to the World Resources Institute, feeding 9-10 billion people by 2050 will require a 70% increase in food calorie compared to 2006 levels. The expansion of crop and livestock production, the increasing use of fertilisers and pesticides at global level, and the growing adoption of precision farming methods may not be appropriate in the light of problems such as soil degradation, the impact of climate change on yields, the depletion of fish stocks and the reduction of arable land per capita in certain areas. Mitigation of food waste can be a possible way to sustainable food supply but it alone cannot solve the problem. The paper focuses on examining disparities in the generation of food waste from a spatial and sustainability perspective within EU-countries. Data related to food waste and various environmental, social and economic indicators are collected for EU countries. Correlation between these parameters is investigated to find possible connections. Cluster analysis is applied to food waste data to find the groups of countries with similar characteristics. The distribution of environmental, economical, and social

parameters is calculated for these groups, and statistical methods are applied to investigate their differences.

Keywords: Food waste, Sustainability, Conscious consumption, Zero waste, SDG indicators

ABS4554: The effect of transportation stress on fish muscle quality

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Abstract. Live fish transportation is an important link in the entire freshwater fish industry chain, which can achieve cross regional resource allocation and supply-demand balance. At present, freshwater fish mainly rely on live transportation with water and high-density transportation. During the transportation of live fish, due to various stressors such as ammonia nitrogen stress, temperature stress, and squeezing stress, the fish body undergoes stress responses, which in turn affect the survival rate, processing characteristics, food quality, and consumer acceptance of the fish. Under stress, changes in muscle mass are the result of fish's spontaneous regulatory strategy, which mobilizes energy to resist environmental changes and maintain basic life activities, involving gene expression, metabolism, and immunity. This report first briefly introduces the stressors and stress responses during fish transportation, and then focuses on the research conducted by the aquatic product processing team of Huazhong Agricultural University in recent years on the impact of transportation stress on the muscle quality of freshwater fish. This report will provide ideas for maintaining and improving the muscle quality of fish after transportation.

Keywords: Fish, Muscle quality, Transportation

ABS4487: Effect of dietary butyrate supplementation on the production performance and parasitology of growing rabbits

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Abstract. The effect of a dietary butyrate supplementation on the production of fattening rabbits

was examined. The control group (n=70 rabbits) was fed with granulated diet whereas the diet of butyrate group (n=70 rabbit) was supplemented with 0.2% of butyrate. The mortality rate was examined on a larger population (n=1050 rabbits/group). Butyrate group had lower weight gain at the ages of 46-52 and 60-66 days (-20 and -17 %, respectively; P>0.001) but higher weight gain at 53-59 days of age (+13%; P<0.05). Butyrate group consumed less feed than the control group between 38-45, 46-52 and 60-66 days (-2.4%, P<0.001; -5.7%, P<0.01; -4.9%, P<0.05, respectively). The feed conversion ratio of the butyrate group was worse between 46-52 days of age (+19%; P<0.01) but favourable at the ages of 53-59 and 67-73 days (-15% and -9%, respectively; P<0.05). Concerning the whole fattening period the weight gain, the feed intake and the feed conversion ratio of the groups did not differ. In the larger examined population, 4.0% and 6.3 % mortality were observed in the control and butyrate groups, respectively. The parasitological tests resulted only negative samples independently of groups. It can be concluded that dietary butyrate supplementation has not improved the performance of the growing rabbits.

Keywords: Growing rabbit, Butyrate, Production performance, Parasitology

ABS4464: Effects of dietary resveratrol supplementation during late pregnancy on reproductive performance, and placental function in shaziling sow

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Abstract. Local swine resources were widely used in modern breeding system due to its typical characteristics such as meat quality and diseases resistance however it always accompanied by some weak traits like fatty carcass and lower birth weight which result in slow growth rate and poor feed efficiency. A large number of research have shown that Excessive fat deposition is an important factor affecting placental function and leading to low birth weight in piglets. Resveratrol (RES), as a polyphenol with many positive properties, such as alleviating gestational diabetes, promoting foetal growth, and improving maternal metabolic homeostasis, has been widely studied. This study aimed to elucidate the effects of dietary 500 mg/kg RES supplementation during late pregnancy for normal (NBT) or high backfat thickness (HBT) on reproductive performance, and placental function in Shaziling sow. Results showed that resveratrol had limited effects on backfat thickness of Shaziling sow (P>0.05). HBT sow had lower total litter weight, average weight of total births, live litter weight, average weight of live births and placental efficiency (P<0.01, P<0.001, P<0.001, P<0.001, P<0.05). The supplementation of RES can significantly increase the average weight of total births, live litter weight, average weight of live births and placental efficiency (P<0.01). The average process of farrowing and stillbirth in HBT sow significantly higher than that in NBT sow (P<0.0001, P<0.01), the supplementation of RES can reduce the average process of farrowing (P=0.0773), significantly decrease the stillbirth (P<0.05). The mRNA

relative expression in Shaziling sow indicated that the relative expression level of ACC mRNA related to fat synthesis in placental of HBT sow was significantly higher than that in NBT sow (P<0.05), the expression levels of LPL, HSL, and CPT-1 mRNA related to fat metabolism were significantly lower than that in NBT sow (P<0.01, P<0.05, P<0.0001). Dietary supplementary of RES can significantly increase CPT-1 mRNA expression (P<0.001). Relative expression levels of iNOS and FGF related to placental angiogenesis, SNAT1 related to animo acid transport, CD36 related to fatty acid transport were significantly lower in HBT sow (P<0.05, P<0.01, P<0.05, P<0.01). RES can significantly increase HIF-1α, VEGF-A, PlGF and FGF relative mRNA expression related to placental angiogenesis (P<0.01, P<0.05, P<0.0001, P<0.05). RES can significantly increase the relative expression levels of GLUT3 and GLUT4 mRNA related to placental glucose transport (P<0.001, P<0.05), SNAT2 and CAT-1 mRNA related to placental animo acid transport (P<0.05, P<0.01), FABPpm mRNA related to fatty acid transport (P<0.01). The fluorescence intensity of placental CD31 in HBT sow was significantly lower than that in NBT sow (P<0.01), which can be significantly increased by dietary supplementation RES (P<0.01). The fluorescence intensity of placental p-p50/p50 and p-p65/p65 in HBT sow were significantly higher than that in NBT sow (P<0.0001, P<0.0001), which related to placental inflammation status, were significantly decreased by dietary supplementation RES (P<0.001, P<0.0001). Given the significant differences between HBT and NBT sow mentioned above, and the significant regulatory effects on reproductive performance and placental function of RES on HBT sow, we further elucidated the protein expression related to angiogenesis in placenta using a high-fat mouse model. The relative protein expression of eNOS was significantly decreased under high-fat induction (P<0.001), which can significantly increase after supplementation of RES (P<0.05). And phosphorylation of PI3K, AKT, and mTOR was significantly reduced under high-fat induction (P<0.01, P<0.001, P<0.05), which can be increased by the supplementary of RES (P<0.05, P<0.05, P<0.05). The direct binding activity of RES to PI3K was measured by ex vivo pull-down assay and computational docking analysis, results showed that the binding rate of RES and PI3K reaches 70.2%, RES bound to the SH2 domain on the regulatory subunit P85 of PI3K, hydrogen bonds were formed between RES and Pro395, which can further improve the phosphorylation ability of PI3K. In conclusion, excessive backfat thickness of Shaziling sow had negative impact on reproductive performance, dietary supplementation of RES can improve reproduction performance by regulating genes expression of placental angiogenesis and nutrient transport. RES can directly bind to the PI3K protein, promote its phosphorylation, further increase the expression of downstream proteins of placental angiogenesis.

Keywords: Shaziling sow, Resveratrol, Placental function, Reproductive performance

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ABS4566: Influence of different storage temperature and duration on incubation traits, hatching performance and embryonic development in chukar partridge eggs

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Abstract. The purpose of this study was to investigate egg traits during incubation, hatching performance and embryonic mortality of chukar partridge eggs under different storage duration and temperature conditions. A total of 640 eggs were allocated to equal two batches and stored for 7 and 14 days. The equal number of eggs for each storage time group were stored in 4 chambers with different temperatures (3, 9, 15 and 21 °C). After storage, 30 eggs from each subgroup were examined to determine stage of blastoderm development. The remaining eggs (50 eggs from each subgroup) were set into the same incubator and transferred to hatcher set on 21st day. All egg weight parameters (initial, before incubation, transfer), hatch weight and hatching parameters were recorded. The results indicated that weight loss during storage increases with extended duration, particularly above 9°C. Storage time didn't significantly affect hatch weight. Incubation periods were significantly longer for the eggs stored for 14 days compared the those stored for 7 days. Significant interactions between storage duration and temperature were noted for hatch weight and incubation time. Even though blastoderm development of the eggs stored at 21 °C were significantly at higher stages compared to other groups, almost all eggs from the treatment groups were below at gastrula stage. Mid-term embryonic mortality rate was significantly higher for the eggs stored at 21 °C and 7 days. The results suggested that chukar partridge eggs can be stored at temperature ranges from 3 °C to 21 °C without any significant negative effects. In the light of these results; further investigation into the effects of various storage temperatures under long-term storage period, particularly more than 21 days, is recommended to improve storage conditions and optimize hatching results in partridge eggs.

Keywords: Chukar partridge, Storage temperature, Storage period, Embryonic development, Hatchability, Embryonic mortality

Oral Session 3_ Biological Science and Microbiology

ABS4422: Construction and catalytic study of oriented photo-crosslinking immobilized enzyme by affinity peptide

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Abstract. Oriented immobilization is conducive to preserve the catalytic activity of enzyme compared with random immobilization. Photo-crosslinking reaction with high temporal and spatial resolution was often used in oriented covalent immobilization protein. Herein, sucrose isomerase (SI) was selected as the model enzyme. Molecular simulation was performed to select the targeted immobilization region, which was far from the SI active site, and thus basically does not affect the enzymatic activity. Subsequently, a short peptide (H_2N-VNIGGX-COOH, VG) with high affinity to this region was rational designed, and the non-natural amino acid 4-benzoyl-L-phenylalanine (Bpa) with the photosensitive group of benzophenone was introduced into its carboxyl terminal of the peptide VG. And then, the affinity between the ligand and the SI was validated. Thereafter, SI was immobilized on the surface of epoxy resin (EP) guiding by VG. The enzymatic activity, thermos-stability, and reusability of affinity directional photo-crosslinked immobilized sucrose isomerase (hv-EP-VG-SI) were systematically studied. The oriented immobilization enzymes were significantly improved in recycling and heat resistance. Moreover, hv-EP-VG-SI remained more than 90% of the original activity and 50% of activity after 11 cycles. The excellent reusability and stability of hv-EP-VG-SI can significantly reduce the cost of enzymes in practical applications. It has high value in industrial production operations. This research provided a reference to produce isomaltulose by the industrial enzymatic method and also supported ideas for novel oriented immobilization enzymes.

Keywords: Oriented immobilization, Affinity peptide, Photo-crosslinking, Stabilization, Rational design

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ABS4433: From complexity to clarity: unraveling the potential of large genomic datasets

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Abstract. The generation of large genomic data sets often involves complex, multi-step processes prone to errors such as sample mislabeling, identifier manipulation, and documentation inconsistencies. Such errors, if undetected, can lead to incorrect analyses and conclusions. Conversely, the increasing availability and affordability of large genomic data sets in academic research offer unprecedented opportunities for insightful discoveries. This presentation focuses on the genotypic data set from the 1000 Bull Genomes Project, showcasing strategies for managing extensive data (~6000 animals and 115 million SNPs) on an ordinary PC. Key topics include the detection of outliers, inconsistencies, and incorrect labeling, efficient data handling in R using a virtual matrix approach, and the consideration of sample size in typical analyses, including the construction of phylogenetic trees. This work highlights practical methods for ensuring data integrity while leveraging the full potential of large genomic data sets in research.

Keywords: 1000 Bull Genomes Project, Efficient data handling, Sanity checks

ABS4551: Molecular mechanisms of eugenol as an anti-tumour bioactive compound: A comprehensive review

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Abstract. Eugenol, a naturally occurring phenylpropanoid compound found in several plant species, has garnered significant attention for its remarkable anticancer properties. This comprehensive review provides a detailed overview of the current knowledge on the molecular mechanisms underlying eugenol's antitumor effects. Notably, eugenol induces apoptosis through both intrinsic and extrinsic pathways, promotes cell cycle arrest, exerts antioxidant and anti-inflammatory effects, inhibits angiogenesis and metastasis, and modulates various signaling pathways, including PI3K/Akt/mTOR, MAPK/ERK, and JAK/STAT. Moreover, eugenol exhibits synergistic effects when combined with chemotherapeutic agents, natural compounds, and radiation therapy, thus enhancing its therapeutic potential. The molecular targets of eugenol encompass specific proteins, genes, epigenetic modifications, and microRNA regulation, underscoring its multi-faceted anticancer mechanisms. However, more research is necessary to fully elucidate its molecular underpinnings and to translate these findings into clinical applications. And, in light of its promising anticancer potential and favorable safety profile, eugenol warrants further investigation as a novel therapeutic agent for cancer prevention and treatment.

Keywords: Angiogenesis inhibitors, Antineoplastic agents, Apoptosis, Cell cycle, Signal transduction

ABS4479: Mechanism of the solubility increase of rice protein-ovalbumin co-assembly and its great potential as an emulsifier in high internal phase emulsion

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Abstract. The functionality (e.g., emulsifying ability) of rice protein (RP) is restricted largely by its low solubility. The formation of a co-assembly with RP and an exogenous protein through pH-cycle is one promising method, but the mechanism behind this has not been revealed. This study utilized ovalbumin (OVA) to improve the solubility of RP and investigated the effect of OVA on the physicochemical characteristics of RP, the interactions between RP-OVA co-assembly and water, the RP-OVA interactions, the key subunits related to the solubility improvement of RP, and the emulsifying capacity of the co-assembly. The formation of RP-OVA co-assembly considerably improved the solubility of RP (up to 73.12%), and the multi-level structure and surface property of RP were altered by OVA. The mechanism for the solubility increase was the hydrophobic interactions between OVA and RP, resulting in the exposure of some hydrophilic amino acids to protein surface and further generating a low surface hydrophobicity that allow more water molecules to permeate. Eight subunits in RP were critical for its solubility increase. The RP-OVA co-assembly prepared in this study showed an emulsifying ability even better than whey protein isolate (a commercial emulsifier) in high internal phase emulsion. This study may guide the solubility improvement of RP and widen the application of RP in the food industry as an emulsifier.

Keywords: Rice protein, Ovalbumin, Solubility improvement, Emulsifier

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ABS4559: Structure of amelogenin gene in a frog, xenopus tropicalis and its molecular evolution

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Abstract. Amelogenin is one of essential proteins for tooth enamel formation. Therefore, it is important to analyze the amelogenin gene in order to know how tooth evolved in vertebrate animals. In various mammalians, a couple of amelogenin genes lie on each sex chromosome and it is known that different types of mRNA are transcribed from each gene, AMEX and AMELY respectively in males. Although we have found two types of amelogenin mRNA in a frog, Xenopus tropicalis, but their expressions were not depended on its sex, both types of mRNA were detected in both sexes. It is known that X. tropicalis amelogenin is an autosomal gene and diversification of their transcriptome must be caused by the alternative splicing. One of the characteristics of X. tropicalis

amelogenin gene structure, two exons were contained in 5'-UTR of the gene which consists of eight exons in total whereas only a single exon is known in all the other animals' amelogenin 5'-UTR. Further, the homology between their first exon and a pair of X. tropicalis exons is still not clarified because of lower similarity of base sequences. Then we attempted to find out homologous sequences to the first two exons of X. tropicalis amelogenin with detailed transcriptomic and genomic data analysis.

Keywords: Amelogenin, Frog, Evolution

ABS4434: Planthopper diversity on coconut and putative vectors of lethal yellowing in Jamaica

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Abstract. Lethal yellowing is an economically important phytoplasma disease of coconut in Jamaica. It causes death in infected plants and has resulted in significant economic losses in Jamaica. Recent efforts have focused on studying planthoppers diversity on coconut in an attempt to identify the vector(s). Herein the general planthopper diversity at three sites in Jamaica is reported and initial screening of putative vectors for the presence of lethal phytoplasma. So far, five new species of the insect have been discovered on the coconut palms Three species are currently considered potential vectors; *Haplaxius crudus*, *Oecleus mackaspringi*, and *Cedusa inflata*. These findings are critical steps in understanding epidemiology of LY in Jamaica and once a vector is confirmed, will inform the development of a comprehensive management program.

Keywords: Cixiidae, Lethal yellowing, Palm, survey, Jamaica

ABS4518: The new age sensorics- biological and bioinspired structures

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Abstract. The new age sensorics looks into biological structures from nature in search of inspiration. The biotechnology of sensor systems in nature has been shaped by the harsh criteria of

evolution, over thousands and even millions of years, which makes it very mature, elaborate and proven functional. Many sophisticated structures from nature have been functionalized or imitated, for numerous applications - shark skin, geckos grip, spider silk, are just some of the examples. It is particularly interesting when biosenzors are not manufactured as an imitation of natural ones but taken directly from nature and modified or used in an unchanged form. The research field of the Laboratory for Biophotonics, Institute of Physics Belgrade is dedicated to biomimetics, biofunctionalization, biosenzors, biomaterials. Here will be presented a short summary of our work in the field of biosensing: functionalization and biomimetics of biostructures, their use in security and protection; biological structures as a senzors of infrared radiation (natural microcantilevers), application of microfluidic techniques for biosensing – development of suitable Lab-on-a-Chip (LoC) technology integrated with quantum holography ("BioQantSense" project). Acknowledgment: This work was supported by Horizon WIDERA 2021-ACCESS-03-01 grant 101079355 "BioQantSense"

Keywords: Biostructures, Biosensing, Biofunctionalization

ABS4439: Examinations on the cultivated bacteria from the drinking water system of a healthcare building

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Abstract. The aim of our research was the identification of nosocomial pathogens found in the internal drinking water network of healthcare facilities which can cause infections in hospitals. In this study, the composition of bacterial communities from the internal water network of a health institution in Győr (Hungary) was examined using standard culture-based methods. Identification of the bacterial isolates was performed using Analytical Profile Index (API). Members of 13 bacterial taxa were recovered from a multi-storey healthcare institution. 10 species were identified via API20E and API20NE testing, out of which isolates of genera *Aeromonas*, *Pseudomonas* and *Sphingomonas* were found in the highest proportion on different media. These bacteria can cause nosocomial infections in clinical environments, leading to serious illnesses mainly in patients, as they may have multiresistance genes. In addition, *Legionella* species were also identified in the water samples, which are also known to be nosocomial pathogens, since they can be spread with aerosols in hospital environments and can cause severe respiratory diseases in immunocompromised individuals.

Keywords: Microbiology, Drinking water, Background microbiota, Analytical Profile Index, Antibiotic resistance, Aeromonas, Pseudomonas, Sphingomonas, Legionella

ABS4481: Utilization of bamboo biochar in improving the performance of sediment microbial fuel cells from benthic coastal sediment of oyster mariculture

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Abstract. The sediment microbial fuel cell (SMFC) is a bioelectrical device that helps in generating sustainable bioelectricity while remediating anaerobic sediment. Bamboo, which is processed into biochar, has a high electrical conductivity that improves electron transfer in the SMFC system. To improve SMFC performance, this study investigates the use of bamboo biochar in different amounts to improve bioelectricity generation of SMFC performance to remediate of coastal benthic sediment from oyster mariculture in Tongyeong, South Korea. The highest recorded voltage in the SMFC was 65 to 70 mV and was achieved by SMFC-P10 with 10 g of biochar. In the other cases, SMFC-P20 (SMFC with 20 g of biochar), SMmFC-P5 (SMFC with 5 g of biochar) and SMFC-P0 (SMFC with no biochar), the voltages remained constant below 30 mV during the entire operating time. A high maximum power density is achieved by a low internal resistance of the system, as shown by the polarization curve of SMFC-10, which reached 20 mW/m^2. SMFC-P10 also maintained superior redox activity over 60 days compared to other systems, suggesting that an optimal amount of raw biochar is important for the catalytic activity of the anodic biofilm in the SMFC system. The installation of SMFC system with the addition of bamboo biochar suppressed the migration of nutrients to the overlying water as it successfully increased the redox potential (ORP) of the overlying water from 141 mV in the control case without SMFC to 146-194 mV in all SMFC cases.

Keywords: Sediment microbial fuel cell, Bioelectricity generation, Reediation, Oyster mariculture, Benthic coastal sediment

ABS4509: Quantitative comparison of some faecal bacterial communities in groups of Mangalica and commercial pigs

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Abstract. Different housing technology, breed, age and nutrition can contribute to changes in the composition of microbial communities in pigs. Faecal samples from groups of Mangalica and commercial pigs were collected and analysed by qPCR in order to identify changes and differences regarding the quantity of total faecal bacteria, *Prevotella* genus, *Lactobacillus* spp., *Bifidobacterium* spp., *Enterococcus* spp. and the family *Enterobacteriaceae*. In both Mangalica and commercial pig samples, quantities of total faecal bacteria increased from weaner pigs to lactating sows. The relative quantity of total bacteria was larger ($p<0.05$) in Mangalica growers and

lactating sows compared to commercial pigs. The ratio of *Prevotella* genus in total bacteria was higher ($p<0.05$) in Mangalica growers and lower in Mangalica lactating sows compared to respective commercial groups. The ratio of *Lactobacillus* spp. was largest ($p<0.05$) in samples of Mangalica boars, whereas ratios of *Bifidobacterium* spp. were greater ($p<0.05$) in Mangalica weaners, growers, and boars. Faecal samples of Mangalica growers contained a higher ratio of *Enterobacteriaceae* in total bacteria, whereas *Enterococcus* spp. was more prevalent in commercial weaner pigs and boars ($p<0.05$). Considerable changes in faecal bacteria communities were observed in association with different age and utilization.

Keywords: Mangalica, total bacteria, *Prevotella*, *Bifidobacterium*, qPCR

ABS4483: Isolation and characterization of beneficial microorganisms from the soil of aromatic plants

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Abstract. The rhizosphere of medicinal and aromatic plants, including those belonging to the Lamiaceae family, serves as an important source of various microorganisms with bioactive potential. These microbes may be utilized as either biocontrol agents or microbial inoculants for the degradation and transformation of agro-industrial by-products. To date, numerous microbial products have been developed and employed to improve the sustainability in agriculture; however, their applicability and efficacy remains a controversial topic. The primary purpose of this study was to isolate beneficial bacteria from the soil of important herbs and evaluate their morphological, physiological, biochemical, and plant growth promoting characteristics. Furthermore, the antibacterial and antifungal activities of these isolates against phytopathogenic and foodborne pathogenic strains were assessed by the perpendicular streak method and dual culture assay, respectively.

The isolated bacteria demonstrated abundant growth on the used culture media, forming well distinguished, leathery colonies with varying sizes, colors, and shapes. The studied cultures were able to grow at a wide range of pH, while a few tolerated NaCl concentration up to 6%. Among the six isolates, multiple showed positive reactions for the production of catalase, nitrate reductase, pectinase, amylase, protease, esterase, lipase, and ligninolytic enzymes as well. Concerning the plant growth promoting properties, N-fixation, ammonia production, and phosphate solubilisation were observed. In terms of inhibitory effects against pathogenic bacteria and fungi, *Agrobacterium radiobacter* was the most sensitive against all tested strains. In addition, strong antagonistic activity was detected against *Escherichia coli* and *Salmonella* Typhimurium by three-three isolates. Overall,

the obtained results demonstrated that the isolated soil bacteria were rich sources of biologically active compounds that can be exploited in agricultural industries.

Keywords: Biodegradation, Antimicrobial activity, Beneficial bacteria, Lignocellulose

ABS4510: The fermentability of agricultural raw materials by probiotic bacterial strains

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Abstract. The objective of this study was to evaluate the fermentability of various agricultural raw materials using a novel Liquid State Fermentation (LSF) technique. The formulations were based on protein-rich plant ingredients, such as sunflower, wheat, and rapeseed, addressing the persistent issue of byproducts in the food industry by seeking alternative utilization methods. While the LSF method has been used in pork production, it remains a new technology in the poultry sector. Distiller's Dried Grains with Solubles (DDGS) and Corn-Gluten Feed (CGF) were chosen based on previous experiments. These mixtures were enhanced by inoculation with various bacterial strains to produce fermented feeds with probiotic properties. The bacteria played a crucial role in the entire fermentation process. The starters included a commercial culture and fresh sweet whey of a semi-hard cheese. Additionally, selected bacterial strains were used based on previous research and literature data. Solaris model bioreactor system were utilized to produce the fermented feeds. This approach aims to promote a healthier gastrointestinal system in farm animals, protecting them against pathogenic bacteria. The fermentation process was designed to generate beneficial molecules such as enzymes, organic acids, and bacteriocins, further supporting the health benefits of the final product. This is significant because such feed can reduce the need for antibiotics in farm animal breeding, aligning with the EU's stance on minimizing antibiotic usage. Throughout our research, we meticulously monitored the fermentation process, gathering data for a comprehensive comparison. Our analysis focused on changes in pH, the microbiological and hygienic properties of the feed, and the production of organic acids in the fermenting mixtures. The results consistently showed a decrease in pH values after 24 h of fermentation. DDGS with selected strains exhibited the highest LAB counts at 9.89 $\log_{10}$ CFU/cm³, whereas the combination of CGF and whey produced the highest lactic acid concentration at 28.86 mg/ml. These promising results warrant further investigation through animal trials.

Keywords: Microbiology, Probiotics, Lactic acid bacteria, Feed fermentation

ABS4563: Patho-morphological and immunohistochemical studies on bovine horn core carcinoma

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Abstract. Background: An investigation was carried out on twelve clinical cases of neoplasm of horn in Durg, Dhamtari and Rajnandgaon districts of Chhattisgarh, suspected of bovine horn core carcinoma (squamous cell carcinoma) revealed the cytology, pathomorphology and immunohistochemical (IHC) expression of Pan-cytokeratin (Pan- CK), p53 gene, epidermal growth factor receptor (EGFR) and p16 gene in tumourous growth at horn in bovines.

Methods: In this field-laboratory investigation conducted during January to June 2022, we explicate the cytological, pathological and immunohistochemical alterations in bovine horn core carcinoma from 12 tissue samples. Cytological studies include special papaniculaou staining and immunohistochemistry was performed through Benchmark automated staining system which included deparaffinization, antigen retrieval and immunolabeling performed on automated immunostainers. Immunohistochemical labelling for all markers (p53, p16, Pan CK and EGFR) were carried out on the Bench Mark Automated Staining System (Ventana Medical systems, Inc.). Antigen retrieval was performed using Ventana Medical Systems Retrieval Solution CC1 (Ventana Medical Systems for 60 minutes according to the method prescribed by Fornazari *et al*., (2017). The stained slides were examined under light microscope.

Results: Eight out of 12 cases (66.66%) were confirmed as SCC of horn on the basis of histopathological and immunohistochemical analysis. Cytological examination of tumours by Papanicolaou staining revealed variation in shape and size of cells and altered nuclear details. Grossly neoplasms of horn revealed unilateral large cauliflower like growths at the base. SCCs were classified as well, moderately and poorly differentiated types on the basis of histopathology and immunohistochemistry (IHC). Well differentiated SCCs (n=4; 50%) were characterized by severe keratinization of horn epithelium with concentric arrangement forming keratin pearls also called as “cell nests”. Tumour islands of irregular shape observed in the horn epithelium invaded deep into dermis layer. Moderately differentiated SCCs (n=2; 25%) characterized by small keratin pearl formations and mitotic figures. Poorly differentiated SCCs of horn (n=2; 25%) revealed absence of distinctive keratin pearls although deep invasion from primary site was observed. SCC of horn revealed strong immunohistochemical staining of Pan-CK, p53 and EGFR and negative to p16. Highest immunohistochemical expression was observed in Pan-CK which confirmed the tumours were of epithelial origin and EGFR immunoexpression was confirmatory for malignancy and degree of metastasis. Neoplasms were confirmed as SCC by immunoexpression of Pan-CK,

EGFR and p53 in malignant tumours including both well and poorly differentiated SCC of horn.

Keywords: Cell nests, EGFR, Immunohistochemistry, Keratin, Papaniculaou, Pan-CK, p53, P16, Squamous Cell Carcinoma

Poster Presentations

ABB1320: Survey on employee health and medical awareness for sustainable PHR services in health insurance in Japan

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Abstract. Background: Compared to other countries, Japanese healthcare services have been recognized for their cost-effectiveness and high quality. However, it is difficult to maintain the same level of service due to rising medical costs brought about by the declining birth rate, aging population, and increase in lifestyle-related diseases. Lifestyle-related diseases do not degrade the quality of life while the disease is mild, but the course of the disease becomes more severe as the population ages. As a result, medical costs are increasing year by year, especially in the medical care system for the elderly, which covers those aged 75 and over. In order to extend healthy life expectancy, it is important for individuals to manage their own health care. The PHR will accumulate the results of the individual's health check-ups as an infant or when attending school, results of specified health check-ups and test results when visiting the hospital, and then the history of immunizations, etc. The data can be used by the individual who is the subject of the data using his or her own my number card.

Objective: We believe that it is important to prevent lifestyle-related diseases from becoming serious before they worsen, and that the use of PHRs is effective for health management and health maintenance among workers. We decided to conduct a survey of employees to determine their health awareness and lifestyle trends.

Methods: We conducted a web-based survey of 10,000 employees aged 20 and older in 2018, in which we asked questions about their eating habits, exercise habits, attitudes toward health maintenance and health care, use of IoT devices and smartphones, motivation to work, and work environment.

Results: The survey results showed that many workers have minor illnesses and mental health problems. A variety of issues were highlighted, including work environment, relationship problems, mental illness, and headaches. We used presenteeism as a measure of labor productivity and analysed its relationship to health risks faced by employees. We divided health risks into three categories: mental illnesses such as depression, lifestyle-related diseases such as diabetes, and minor illnesses such as headaches and stiff shoulders. The results showed that employees' presenteeism was significantly affected by mental illness and minor illnesses, whereas lifestyle-related illnesses had no effect on presenteeism.

Discussion: Mental problems and minor illnesses that the employees had were found to have an effect on presenteeism. On the other hand, lifestyle-related diseases, while mild, have little effect on presenteeism, so at first glance it would seem that they do not have a significant impact on the employing company. However, it is obvious that if diabetic patients, for example, do not control diabetic nephropathy properly by themselves in terms of living environment and medication, their

diabetic nephropathy will worsen and they will need artificial dialysis, and correct control of lifestyle-related diseases from the preliminary stage is considered important. The use of PHRs is effective in reducing the incidence of lifestyle-related diseases, and companies should actively promote the use of PHRs.
Conclusion: In Japan, people of all ages own smartphones, and medical institutions use a combination of PHR applications on patients' smartphones and Healthcare IoT devices to treat lifestyle-related diseases such as diabetes and prevent serious illnesses. Our research shows that mental health and minor illnesses of employees also require some kind of help, and health investments in employees will lead to continued healthy management in corporate health unions and companies that are financed by the companies, resulting in the continuation of Japanese healthcare services.

Keywords: PHR, IoT Healthcare device, web survey, healthcare management, presentism

Acknowledgements: This survey was conducted as part of the 2018 AMED Research Project, the Behavior Change Research Project Utilizing IoT, and the "Research on Service Models for Realizing Sustainable PHR for Corporate Health Insurance." We would like to express our gratitude to everyone involved.

ABB1322: Chrysin induces ATP-dependent thermogenesis in 3T3-L1 adipocytes

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Abstract. Earlier studies suggest that non-shivering thermogenesis in brown and beige adipocytes may effectively stimulate energy expenditure, thereby contributing to body weight reduction. Our previous report demonstrated that chrysin, a flavone found in honey and propolis, activates brown fat and induces beige adipocytes, to increase their uncoupling protein 1 (UCP1)-dependent thermogenic activity. However, the ATP-dependent thermogenic effect of chrysin on adipose tissues remains unexplored. In this study, we examined the effects of chrysin on thermogenic activity with a focus on the ATP-consuming futile cycles in 3T3-L1 adipocytes. Chrysin stimulated the expression of calcium regulatory proteins, including sarcoendoplasmic reticulum Ca^{2+} -ATPase (SERCA2b), ryanodine receptor 2 (RYR2), voltage-dependent anion channel (VDAC), mitochondrial calcium uniporter (MCU), and Ca^{2+} /calmodulin-dependent protein kinase 2 (CAMK2) in 3T3-L1 white adipocytes. In addition, chrysin stimulated thermogenesis by activating the creatine metabolism-related thermogenic pathway. Mechanistically, we found that chrysin induces UCP1-independent thermogenesis by stimulating the genes of creatine metabolism as well as α1-adrenergic receptor/SERCA-based calcium cycling through ATP-consuming futile processes. Combining the results of the current and our previous studies, it can be proposed that chrysin induces both UCP1-dependent and ATP-dependent (futile cycles) thermogenesis in beige adipocytes, suggesting its possible use for effective intervention for obesity.

Keywords: Chrysin, Obesity, 3T3-L1, Thermogenesis

ABB1330: Tissue microarray analysis of GDH1 and its expression analysis in normal vs colon cancer cells

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Abstract. Glutamate dehydrogenase 1 (GDH1) is a key enzyme involved in cellular metabolism and has been implicated in cancer progression. To investigate its potential role in colon cancer, we conducted a comprehensive analysis of GDH1 expression using tissue microarray (TMA) technology. TMA slides comprising samples from normal colon tissues and colon cancer tissues were subjected to immunohistochemical staining to assess GDH1 expression levels. The expression pattern was also evaluated in normal colon cells (CCD 841 CoN) and colon cancer cell lines (HCT-15 and HCT-116). Morphologies of CCD 841 CoN, HCT-15, and HCT-116 cells were compared to see the growth trend and identify any phenotypic variations linked to the development of the cancer. Our analysis revealed distinct patterns of GDH1 expression between normal and cancerous colon cells and tissues. Specifically, GDH1 expression was significantly upregulated in colon cancer cells compared to normal colon cells. This differential expression suggests a potential involvement of GDH1 in colon tumorigenesis and progression. Furthermore, our findings underscore the importance of GDH1 as a potential diagnostic and prognostic marker in colon cancer. Future studies elucidating the underlying molecular mechanisms driving GDH1 dysregulation in colon cancer could provide valuable insights into its therapeutic targeting and clinical management.

Keywords: GDH1, Tissue microarray (TMA), Colon cancer, CCD 841 cells, Tumorigenesis

ABS4427: Development and validation of an analytical method for cyclobutrifluram and dimpropyridaz in agricultural products

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Abstract. Cyclobutrifluram and dimpropyridaz were phenethyl pyridineamide and pyrazole carboxamide insecticides, respectively. These were required the development of an official anlaysis method for the safety management. In this study, we optimized the extraction and purification using the QuEChERS method by LC-MS/MS. For extraction, we used acetonitrile as the extraction solvent, along with $MgSO_4$ and PSA. The method has been validated by verifying the performance characteristics such as selectivity, linearity, limit of detection (LOD), limit of quantification (LOQ), accuracy and precision. All analytes were quantified with matrix-matched calibration assessed by the determination coefficient (R^2) of the range were >0.99. The limit of quantitation were 0.01 mg/kg. The accuracy and precision of the method were evaluated by recoveries with five replicates at three fortification levels (LOQ, 10 × LOQ and 50 × LOQ). The average recovery rates of cyclobutrifluram and dimpropyridaz were 81.6–115.4% and 80.5–106.6%, respectively. The

relative standard deviations (RSDs) were < 13.7% and < 10.9% for cyclobutrifluram and dimpropyridaz, respectively. These are within validation creiteria according to the Ministry of Food and Drug Safety guidelines and the Codex Alimentarius Commission guidelines for pesticide residue analysis. These results show that the method is effective and accurate for the analysis of pesticides in agricultual products.

Keywords: Cyclobutrifluram, dimpropyridaz, agricultural products, analytical method, LC-MS/MS

ABS4429: Development of ultrafast real-time PCR assay for identifying garlic, ginger, and onion in red pepper powder

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Abstract. Red pepper powder is one of the spices traditionally used in Korea, and is a very important spice in the production of traditional Korean foods such as kimchi and red pepper paste. In this study, an ultrafast real-time PCR assay with a microfluidic device was developed to detect garlic, ginger, and onion in adulterated red pepper powders. Primer sets for the identification of garlic, ginger, and onion were designed on targeting microsatellite, ITS1, and 18S-ITSI-5.8S-ITSII, respectively. Twenty red pepper powder products were evaluated to confirm the applicability of the PCR assay with a simple lysis step. The PCR assay can be finished within 30 min, including simple DNA extraction with direct lysis buffer (DLB) and real-time PCR reaction. Therefore, the developed assay is suitable to detect garlic, ginger, and onion in red pepper powders.

Keywords: Red pepper powder, Ultrafast real-time PCR, Direct lysis buffer

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ABS4432: Lactose intolerance: The most significant nutritional recommendations of lactose free diet

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Abstract. Background: Milk and dairy products play a key role in healthy diet. In case of lactose intolerance, the digestion of these products becomes difficult. It is associated with stomach and intestinal complaints.

Purpose: The purpose of the manuscript is to summarize the literature on lactose, lactose

intolerance, lactose-free diet and lactose-free products development opportunities. We hope that we can contribute to a more accurate understanding of the lactose-free diet and reveal connections between consumer expectations and consumption.
Methods: Electronic searches were conducted in Google Scholar, Medline, PubMed and Science Direct databases. We used 34 specialist literature and 3 URL to write our conference publication.
Results: We summarized the most important characteristics of lactose, the symptoms and treatment options of lactose intolerance, the importance of lactose-free diet and calcium supplementation in the therapy of lactose intolerance and the latest and most informative publications on the development of lactose-free functional foods.
Conclusion: Today, the consumption of lactose-free products is an outstanding way to treat the growing number of people with lactose intolerance. The food industry also pays special attention to the application of new technologies and product development. We hope to contribute to a wider understanding of lactose, lactose intolerance, the lactose-free diet and lactose-free product development opportunities with our conference manuscript.

Keywords: Lactose, lactase enzyme, lactose intolerance, lactose-free diet, lactose-free milk and dairy products, lactose-free product development, nutrition

ABS4440: Bio-stimulant effect of quantitative indicators of winter rape (*Brassica napus* L.) quantitative indicators

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Abstract. In recent years, one of the major challenges for plant breeders has been the control of abiotic environmental stresses (drought, UV stress, salt concentration, water pressure). Increasingly variable and unpredictable weather anomalies are a warning of the detrimental effects they have on the growth of our crops and prevent us from reaching the potential of our genetic potential and nutrient supply. To prevent and reduce losses, the potential to protect plant health and increase plant resistance to stress must be anticipated and applied in the future if we are to be successful in agricultural production. One element of this is plant biostimulation. Today, crop producers use biostimulants as a compliance pressure, to obtain more subsidies (Agri-ecological Programme). Biostimulants applied inappropriately (mixed with herbicides), targeted, and at the right time, can have the opposite effect. This also induce irreversible processes in the crop plant. Although the winter swede rape area has been significantly reduced in our country, there are those who persevere despite the difficulties of growing it. Rapes can be successfully grown today with great care and intensive technology, and the weather conditions of recent years have consistently shown that environmental anomalies have a significant impact on its yield. In rapes, the use of biostimulators and fertilising products is considered common. Our studies with Quantis in rapes have clearly

proven its effectiveness. In this article we would like to present the effect of biostiumulant (Quantis) on the production of rapes.

Keywords: Biostimulant, Stress, Quantis

ABS4461: Effects of heart failure drugs - sacubitril and valsartan on microbiome

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Abstract. [Background] In congestive heart failure (CHF), it has always been the principle of clinical treatment to control the water retention mechanism in the body to prevent excessive fluid retention. Early control of sympathetic nerves, Renin-Angiotensin-Aldosterone system (RAA system, RAAS), or strengthening of Atrial Natriuretic Peptide (ANP) was the point. In RAA system, related hormones such as angiotensin, or enzymes in the pathway such as ACE-I, can be used with corresponding inhibitors to reduce water content. [Aim] In recent years, clinical studies have pointed out that if different mechanisms are combined, the control effect seems to be better. For example, recent studies showed that, ENTRESTO, a combination of Sacubitril and Valsartan, is a good new drug for CHF. Sacubitril is a prodrug. After activation, it can inhibit neprilysin and act as a neprilysin inhibitor (ARNI) to reduce the breakdown of natriuretic peptides (ANP). Valsartan is a kind of angiotensin receptor blocker (ARB), both of which are used to treat heart failure at the same time, have excellent curative effects. [Materials and Methods] Considering the side effects of this drug, coughing and a few cases of diarrhea were observed. However, the effect of this drug on the patient's intestinal tract has not been confirmed. On the other hand, studies have pointed out that ANP supplement can improve the CHF and increase the inhibitory effect on cancer cells. Therefore, the purpose of this study is to use a special microbial detection method to prove that whether oral drugs have an effect on microorganisms. The experimental method uses Nissui Compact Dry to observe the situation in different types of microorganisms. After the drug is dissolved in water, it is implanted in a petri dish, and the presence of different microorganisms is detected through different antibody reactions to confirm whether the drug has some toxicology in the gut. [Results and Discussion] From the above experimental results, it can be known that among the effects of Sacubitril and Valsartan on the basic microbial flora of the human body, low doses had no significant effect on Escherichia coli or intestinal bacteria. If Sacubitril or Valsartan with a high concentration of 3mg/ml is used alone, or under the stimulation of a high concentration of the two drugs, it has a significant inhibitory effect on Escherichia coli. However, in terms of the effect on intestinal bacteria, high concentration of Sacubitril has a more significant inhibitory effect on intestinal bacteria, while high concentration of Valsartan has a less significant inhibitory effect on intestinal bacteria. The inhibitory effect of the combination of the two drugs on intestinal bacteria is also less significant. [Conclusion]The results of this study can be used as a further reference for the possible side effects of the clinical use of Sacubitril and Valsartan on the intestinal tract of patients.

Keywords: Congestive Heart Failure (CHF), Renin-Angiotensin-Aldosterone system (RAA system, RAAS), Atrial Natriuretic Peptide (ANP), ENTRESTO (Sacubitril/ Valsartan)

ABS4476: Antioxidant dynamics in cajanus cajan and m.leucadendra: from plants to nanoparticles

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Abstract. This study marks a significant stride in nanotechnology, particularly in catalyst development, focusing on magnesium oxide nanoparticles and plant extracts from Cajanus cajan and Melaleuca leucadendra, noted for their antioxidant properties. We aimed to unravel how these substances, both as traditional extracts and as nanoparticles, perform in various applications due to their antioxidant potential. Utilizing DPPH and FRAP assays, the research revealed that Ascorbic acid consistently exhibited strong antioxidant capabilities, serving as a reliable benchmark. Interestingly, Cajanus cajan and M.leucadendra extracts varied in their antioxidant effectiveness. A key finding was the pronounced increase in antioxidant efficacy when these extracts, particularly from Cajanus Cajan, were transformed into nanoparticles, as reflected in elevated FRAP values. This observation underscores the potential of nanoparticles to significantly enhance the effectiveness of plant extracts. The implications of this advancement are far-reaching, opening new avenues in the pharmaceutical and nutraceutical industries for developing therapeutic agents and antioxidant-rich foods. This research contributes notably to pharmaceutical sciences, emphasizing the vital role of nanoparticle technology in enhancing the antioxidant qualities of plant-based substances. It lays a solid foundation for further exploration into the mechanisms underlying nanoparticle-mediated improvements, offering valuable insights into the application of nanotechnology in health and nutrition.

Keywords: Antioxidant properties, Cajanus cajan, DPPH and FRAP assay, Magnesium oxide nanoparticles, M. Leucadendra, Nanotechnology

ABS4485: Improvement of pore water flow in contaminated clayey sediments using pyrolyzed oyster shells

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Abstract. Clayey intertidal characterized often exhibit low permeability and sluggish pore water flow, hindering the transport and dispersal of oxygen, organic matter, and pollutants. Oyster shells, a fishery by-product, are known to enhance the permeability and pore water flow of clayey sediments. However, their impact on phenomena like tidal flow remains poorly understood, as research has primarily focused on vertical pore water flow. In this study, we conducted a mesocosm experiment to investigate the influence of oyster shells on contaminated clayey intertidal sediments, with a particular emphasis on horizontal pore water flow. Part of the sediment at the edge of the mesocosm was replaced with oyster shells which are pyrolyzed at 100 °C and 800 °C (POS100, POS800). To simulate intertidal system, seawater inflow and outflow were controlled by pump with 6-hour intervals. Subsequently, we analysed pore water discharge and porewater nutrient changes in the system over time. Our results demonstrate a decrease in the nutrient concentration around oyster shells, and it was significantly lower than initial levels. Notably, POS800 exhibited a phosphate concentration 75% lower than that of POS100. The leakage from POS800 was 7.2 times higher than that of POS100, indicating enhanced permeability of the intertidal sediment. This enhancement is attributed to the aggregation of clayey particles in the sediment due to the high calcium ion dilution in POS800.

Keywords: Clayey sediment, Pore water flow, Pyrolyzed oyster shell, Nutrients

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ABS4486: A picolinamide fungicide for controlling Cercospora-leaf spot (CLS) of sugar beet

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Abstract. Cercospora-leaf spot (CLS) of sugar beet, caused by Cercospora beticola Sacc., is a major foliar disease of sugar beet in all sugar beet growing areas, worldwide, causing up to 50% yield loss. The disease is now dominant in almost all sugar beet growing areas of Europe, including Hungary. The use of fungicides has been being an integral part of the control of CLS of sugar beet. In recent decades, resistance of C. beticola to fungicides belonging to different groups of active substances has been described in many countries worldwide, including Hungary. The picolinamides are a new distinct group of fungal respiration inhibitors (QiI – FRAC Group 21) promise to be a good alternative in the management of fungicide resistance in crops. The florylpicoxamid fungicide were tested and evaluated over two seasons, in vegetation period of 2020 and 2021 for controlling

CLS of sugar beet in Hungary. This fungicide was applied as straight formulated product at a range of dose rates, and they showed very effective control of CLS compared to the untreated control check plots and the reference fungicide products difenoconazole and epoxiconazole. All tested dose rates of florylpicoxamid provided effective control of against CLS of sugar beet. The area under the disease progress curve values (AUDPC) was significantly correlated with yield decrease, but AUPDC did not correlated with sugar content of the roots. Additionally, tThe results showed in two investigated years, the efficacy of florylpicoxamid for the control on CLS of sugar beet crop.

Keywords: Fungicides, New fungicides, Picolinamides, Florylpicoxamid, Cercospora beticola, CERCBE

ABS4491: Research on the valorisation brewer's spent yeast in the poultry nutrition

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Abstract. The second most valuable by-product of the brewing business, brewers wasted yeast, is a rich source of polysaccharides, mainly mannoproteins and glucans, which have a variety of potential applications in feed and food. One of the most important brewing by-products is spent brewer's yeast, which is produced annually at a rate of between 309,400 and 418,600 tonnes. Numerous circular economy-based strategies have been created as a result to help with its valorisation. It is therefore advisable to feed nutrient-dense by-products to animals in order to convert these wastes into products that are both environmentally friendly and beneficial. Brewer's wasted yeast (BSY) from industrial brewing operations was used in our study. In order to stop potential cell deterioration processes, the BSY was treated as quickly as feasible while maintaining the cold chain. The main methods involve microscopic analysis, physical-chemical characteristic evaluation, researching the composition and purification of bitter compounds, extracting and characterizing â-glucans. This research aims to harness the potential of BSY to produce feed that is high in nutritional content and has the potential to be antioxidant-rich, which is advantageous for animal nutrition. Non-traditional feedstuffs are increasingly frequently included to chicken diets as a way to support healthy growth and development while also enhancing poultry production without having any negative side effects.

Keywords: By-product, Circular bioeconomy, Functional feeds, Sustainability, Valorisation

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ABS4494: Possibilities of using *Triticale* in bread-making

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Abstract. *Triticale* grain have been created by crossing species of wheat and rye and presents the properties of both cereals. Even if it is mostly used as an animal feed, the interest of using it for bread-making have been increased due to it valuable nutritional composition (a high fibre content, lysine which is an amino acid deficient in wheat grains) and health effects. The aim of this study is to analyse different varieties of *Triticale* grains from the chemical and rheological point of view during biaxial extension (according to ICC 121) and fermentation (by using Rheofermentometer device). Through extension the fallowing dough rheological properties have been determined maximum pressure, dough extensibility, index of swelling, baking strength, configuration ratio of the Alveograph curve whereas through fermentation the maximum height of gaseous production, total CO_2 volume production, volume of the gas retained in the dough at the end of the test and retention coefficient have been analysed. From the chemical point of view, dough humidity, ash content and protein content have been analysed. According to the data obtained the protein content of the samples varied between 13.1 and 14.84 % which indicates that are sustainable for bread-making. The *Triticale* humidity presented low values around 12% which indicates that may have a long shelf life during storage. From the ash content point of view these values were quite high from 1.5-1.8% which indicates a high mineral content of the grains. Dough rheological properties during extension determined using the Alveograph device indicates a high tenacity and a low extensibility of the dough samples. This led to a low capacity of the dough to retain the gases formed during fermentation fact that was confirmed by the Rheofermentometer data. Even if the total CO_2 volume production presented high values for the *Triticale* samples the retention coefficient was low between 77.9-83.3% which indicates that the bread samples cannot present high loaf volumes. However, some *Triticale* grains varieties presented high values of total CO_2 volume production and even high values of the volume of the gas retained in the dough at the end of the test which indicates that some possibilities to obtain bread with good physical characteristics may exist. Finally, we may conclude that *Triticale* may be used in bread-making with good bakery physical characteristics depend on the varieties of *Triticale* used.

Keywords: *Triticale*, Chemical characteristics, Dough rheology

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ABS4495: *In vitro* starch digestibility assessing of maize-grape pomace extrudates

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Abstract. The rising popularity of extrusion-cooking in the agri-food industry, caused mainly by the practical character and lower processing cost of this method compared to other cooking and forming processing methods, guided autochthonous manufacturers to implement it an industrial scale, based on the local raw materials, such as maize. The integration of wine processing by-products, like grape pomace as an ingredient in maize extrudates is a solution to satisfy the market with nutritiously enhanced and innovative products. At the same time, it represents a pathway to diminish the accumulation of agro-industrial waste in the environment, promoting the achievement of the "zero-waste" desiderate. The use of grape pomace for fiber supplementation of maize extrudates affects the structure, texture and digestive properties of the final products. During the extrusion process, the raw materials undergo molecular transformations, such as starch gelatinization, protein denaturation, and complexes formation. Macro-molecular degradation and partial or complete destruction of crystalline structure of starch due to the high pressure-temperature and high shear implicated by the extrusion takes placed. This study focuses on investigating the effect of partial substitution of maize flour with grape pomace from white and red grape varieties on *in vitro* starch digestibility of extruded snacks produced from maize and grape pomace mix. The results revealed that extrusion cooking changed the *in vitro* digestibility of snacks. By increasing the level of grape pomace from both varieties to the reduction in starch digestibility occurred. This trend may be due to the increase in fiber, and also in protein and lipid content of the extruded snacks. The reduction of digestibility can be attributed to starch, retrogradation of gelatinized starch, or formation of some complexes, such as amylose-lipid, starch-protein that may reduce the susceptibility of starch to enzymatic attack. Another possible factor that can influence *in vitro* digestibility of maize-grape pomace snacks is the high temperature during the extrusion process. Reducing starch digestibility in developing nutritious snacks is desirable, but their acceptability by consumers from sensory and textural properties points of view must also be taken into account.

Keywords: Digestibility, Extrusion, Waste management

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ABS4496: The impact of seedless grape pomace addition on some quality parameters of maize-based snacks

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Abstract. The progress in various foods production has revealed information about the need for nutrients of consumers. In latest years, innovative snack products that are ready for immediate consumption and also have a special nutritional value were created by manufacturers by using extrusion technique. Researchers have explored the incorporation of various vegetable by-products into extrudates. One of these is grape pomace, a valuable source of fiber and bioactive compounds. Extrusion-cooking represents a suitable method to better valorise by-products and manufacture dietary fiber-enhanced foods, affecting the expansion and functional properties of extrudates. Therefore, a thorough investigation is needed to evaluate the expansion of maize-grape pomace extrudates and their hydration properties. The maize flour was substituted with 10-40% whole grape pomace from white and red grape varieties. The extrudates were analysed in terms of expansion ratio (ER), water absorption capacity (WAC), and water solubility index (WSI). Different ER between the different levels and varieties of pomace incorporated samples obtained from the same processing conditions were attributed to the diversity in the composition of grape pomace. At higher concentrations of *seedless grape pomace,* a remarkable reduction in ER was observed. This change can be associated with increasing fiber content in the extrudates which disrupted the expanded starch structure, affecting the expansion phenomenon. In addition to fiber, the sugar present in grape pomace may have decreased melt temperature, reducing so the vapor pressure of water. Fiber-enriched snacks showed variations of WAC and WSI in function of addition level and grape pomace variety. The higher WAC values found in maize-grape pomace extrudates could explained by the fiber, carbohydrates, and protein content of seedless grape pomace that can provide more hydrophilic forces to compete for water than the starch. Fiber modification during extrusion cooking as a result of high shear and soluble sugars within the seedless grape pomace could increase the WSI. The high WAI and low WSI values are favourable for the extruded snacks, showing that GP can be valorised in the development of enriched maize snacks with crispier textures and longer bowl life.

Keywords: Extrusion, Expansion ratio, Hydration properties

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ABS4499: The use of biostimulant microalgae to influence the growth and development of ornamental plants

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Abstract. The article discusses the use of biostimulant microalgae, known for their bioactive

compounds. Understanding the positive impacts of biostimulants is essential for future applications. Research conducted in the Department of Plant Sciences at the Széchenyi István University has revealed that algae produce plant hormones and possess beneficial properties that influence the water, soil and plant systems. The effects of microalgae on various ornamental plants are being studied with a focus on improving root and general plant development. The methodology involves testing different algae extracts in ornamental plants in controlled environments. Data collection includes measuring plant height, leaf and bud numbers, chlorophyll content and other plant parameters through laboratory and destructive tests. The results indicate positive changes in plant parameters after treatments with biostimulant microalgae. In conclusion, biostimulant microalgae offer a promising and eco-friendly alternative to synthetic chemicals in the cultivation of ornamental plants. Continued research and innovation in this field is crucial to realise the full potential of biostimulants in sustainable agriculture.

ABS4501: Impact of the microalgae-bacteria interaction on maize (*Zea mays* L.) health and yield

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Abstract. Microbial biofertilizers, comprising microorganisms that improve soil nutrients and make them more accessible to crops, provide an eco-friendly alternative to chemical fertilisers, thereby promoting plant growth and supporting sustainable agriculture. The objective of this study was to evaluate how the combination of a specific cyanobacterium (MACC-612, *Nostoc linckia*) biomass and plant growth promoting bacteria (PGPB) can impact crop health (normalized difference vegetation index, NDVI) and yield. Using a factorial design within a randomized complete block setup, the research was conducted with four replications. The experimental setup involved testing three levels of microalgae (including a control, 0.3 g/L of *N. linckia* and 1 g/L of *N. linckia*) and two types of PGPB (including a control, *Azospirillum lipoferum* and *Pseudomonas fluorescens*). Field experiments were established for three years (2021, 2022, 2023). The findings indicated that the combined application of *N. linckia* and PGPB as soil treatment led to significant enhancements in both plant's health and yield attributes. Using *N. linckia* at 0.3 g/L along with *A. lipoferum* positively influenced plant's health (NDVI), number of seed per ear, thousand grain weight, and overall yield, leading to a significant increase in grain yield by 1.4-fold, 1.37-fold, and 1.39-fold in season 2021, 2022, and 2023, respectively. These findings highlight that the lower concentration of *N. linckia* (0.3 g/L) is effective when combined with *A. lipoferum*, offering a cost-effective solution without compromising benefits. Hence, integrating cyanobacteria and PGPB presents a promising approach to improve crop growth and increase yields while minimizing environmental impacts.

Keywords: Biofertilizer, Association, Productivity, Microorganisms, Yield

ABS4508: Factors influencing the leasing fees of hunting grounds in Hungary

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Abstract. Hunting customs and traditions, as well as game management, have a long history in Hungary and form an essential part of Hungarian culture. At the end of the 20th century, changes were introduced in the political and social structures, just like in the field of hunting. In Hungary, the right to hunt is an integral part of land ownership – the owners of a land that is classified as hunting land are entitled to exercise this right. Landowners may lease this right within the boundaries of the hunting area established by the hunting authority. The lease shall be concluded by a lease contract between the parties, namely the landowner and the hunters association. The decree on game protection, game management and hunting were modernised by the Hungarian Parliament in Act LV of 1996. This act also specifies, among other things, the essential elements of a hunting lease contract, however, it does not provide sufficient information on the leasing fee. Since 1996, for more than 25 years, there has been missing accurate and useable method for both the contracting parties and the public authorities to determine the leasing fee for hunting, which could provide realistic fees nationwide, simplify the process and reduce disagreements between the contracting parties. Based on literature review and the methodology, we have started a nationwide data collection among Hungarian hunters associations to determine which factors influence the leasing fees and to what extent. Using the hedonic price method that had already proven its worth in previous similar researches, a multivariate regression equation of national validity has been drawn up, suitable for examining the situation in all counties, which permits to establish whether the leasing fee used in the leasing contract of a particular hunting ground matches its characteristics. The aim of our research is to develop a general and clear model for the determination of leasing fees for hunting, based on national and international literature.

ABS4515: Sustainability reporting practices of agricultural and forestry companies in Hungary: a content analysis

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Abstract. To demonstrate the sustainability of companies, some companies have already produced sustainability reports, most of which have been published on their websites, while others have only produced and made public the reports and certifications required by law. In the European Union,

legislation as of 2014 required the preparation of non-financial reports for publicly relevant entities, companies and parent companies of large groups of companies considered to be entities and having an average number of employees of more than 500. However, in line with the European Green Deal and the Taxonomy Regulation, as of 2023, a new law has been introduced, which extends the sustainability reporting obligation to non-public large companies and public small and medium-sized enterprises. Agricultural enterprises should also be prepared for this reporting obligation. The aim of this study is to examine the ESG indices of the sampled companies and seek a correlation between the quality of the information disclosed and the financial characteristics of the companies. The results show that while forestry companies pay more attention to the disclosure of this type of information, there is some under-disclosure in both sectors.

ABS4529: Analysis of early warning signal of land degradation risk based on time series of remote sensing data

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Abstract. This study explores the spatio-temporal dynamics of the Normalized Difference Vegetation Index (NDVI) to detect early signs of land degradation. Utilizing high-resolution NDVI data from the Google Earth Engine, spanning from 2004 to 2023 with a 30-meter resolution, this research analyzes monthly variations. To illustrate these dynamics, the study focuses on Sabzevar County, located in northeastern Iran, which extends over 7,217 km² and is approximately 220 kilometers distant from Mashhad. Validation of the NDVI data was performed using field observations from strategically located vegetation plots. One square meter plots were systematically established along 100-meter transects (10 transects in total), where the vegetation coverage in each plot was quantitatively assessed by experts. Comprehensive statistical analysis incorporated Kendall's tie test, alongside measurements of autocorrelation, coefficient of variation, and standard deviation, using R software to assess the trends and intensities of NDVI changes. The findings revealed a critical breakpoint in 2020, with increases in all three statistical indices—autocorrelation 0.82, coefficient of variation 0.65, and standard deviation 0.58—indicative of accelerating degradation prior to this year. Furthermore, the intensity of NDVI changes varied significantly across the study area, ranging from 0.05 in central and northern regions to 0.76 in the western parts. This research underscores the value of integrating field data with remote sensing technology to provide a robust analytical tool for early detection of land degradation. This method

enables precise, timely assessment and proactive management of vulnerable ecosystems, particularly in arid regions.

Keywords: Land degradation, Remote sensing, Signal analysis, NDVI

ABS4470: The effect of crop rotation on agriculture and the environment

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Abstract. Crop rotation is an agricultural technique that involves planting various crops in the same field during a sequence of growing seasons. Continuous monoculture cultivation can enhance pests and pathogens specific to particular crops, leading to reduced agricultural yields and increase dependence on chemical inputs. This paper delves into the advantages of crop rotation, implementation strategies and their contribution to promoting sustainable farming practices and emphasizes the importance of sustainable techniques for maintaining soil fertility and agricultural resilience. By adopting a methodical crop rotation strategy, farmers can significantly improve soil fertility, optimize nutrient usage, boost crop yield, minimize resource depletion, and promote agricultural resilience and environmental sustainability. Moreover, crop rotation helps to diminish weed growth and reduces resilience on herbicides, controlling pests and diseases, reduces syndetic fertilizer requirements and greenhouse gas emissions. Several strategies can be adopted by farmers, such as diversification of various crops, legume integration, cultivation of cover crops, and rotational grazing to optimize crop rotation benefits. For instance, corn – wheat – soybean diversification of crop rotation that leguminous crop (soybean) in rotation cycles offers additional benefits such as nitrogen fixation, which reduces the need of synthetic fertilizers and enhances soil nitrogen levels. Through the adaptation of various crop rotation systems, farmers can enhance agricultural sustainability, alleviate environmental degradation, enhance soil health and agricultural output, and ensure food security for future generations.

Keywords: Crop rotation, Greenhouse gas emissions, Monoculture, Soil fertility, Sustainable practices

ABB1337: Cadmium based stress response of endophytes of Amaranthus cruentus

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Abstract. Metals and metalloids have become an important soil contaminant due to anthropogenic activity. Industrialization, urbanization, mining and agricultural practices associated with the application of fertilizers and pesticides are considered to be the most important activities in the background. Individual metals have different effects to plants. Non-essential metals such as cadmium, lead, mercury or arsenic are very dangerous for plants, as they do not exhibit any physiological or biochemical functions and their accumulation is associated with damage to individual structures. Essential metals are beneficial in low physiological concentrations, but also undesirable in high doses. The response of plants to the action of heavy metals is complex and includes several events at the level of physiological, genetic, transcriptomic and epigenetic mechanisms, but the level of metagenomics changes are of interest, too. Metagenomic analysis based on the 16S ribosomal DNA became a standard approach that provides a new type of relevant data to those obtained in culture-dependent biodiversity studies of bacterial communities. *Amarathus* was proved previously to have a phytoremediation potential, during what the interactions with endophytes is an inevitable part. The analysis of changes in occurrence of bacteria in the rhizosphere, soil, and root of *Amaranthus cruentus* was performed after Cd treatment and in control conditions. The core microbiome of untreated plant comprises in higher percentage from Deinococcales and Enterobacteriales. A very clear difference can be seen here in the bacterial community variability when comparing the control and stresses accessions. Variations in abundance were observed between the Cd treated and control samples confirmed by diversity indices. Key bacterial biomarkers were identified in roots of *A. cruentus* under the stress - *Chloroflexi, Armatimonadota, Deinococcota, Dependentiae, Patescibacteria, Spiochaetota, WPS-2* and *Fibrobacterota*. For rhizosphere – key bacterial biomarkers are *Chloroflexi, Gemmatimonadota, Planctomyceta, Nitrospirota, Deinococcota* and *Desulfobacterota*. The study showed the changes in the bacterial endophytes variability associated with cadmium based stress when growing.

Keywords: Amaranthus cruentus, Cadmium, Heavy metal stress, Endophytes

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Website

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