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The 5th International Electronic Conference on Foods

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The 5th International Electronic Conference on Foods

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Welcome from the Chair

Dear Colleagues,

We sincerely appreciate all scholars for their participation in the last four international e-conferences of Foods since 2021. Once again, Foods is delighted to host **the 5th Electronic Conference—The Future of Technology, Sustainability, and Nutrition in the Food Domain**, in a virtual format on **October 28–30, 2024**. The conference will focus on critical themes such as cutting-edge food science and technology, nutritional health, and research to promote sustainable technological innovation in the food domain and address the challenges posed by food safety, food security, and nutritional/dietary demands.

The future of the food industry faces many challenges in a fast-paced world, including the disruptiveness of new technologies, the fragility of ecosystems, the instability of economies, and the reflection of humanity's higher demands for nutritional health and food safety.

Food sustainability is paramount in the future, so nutrition-oriented dietary needs have gradually led to nutritional trends, food cultures, and food policies. This transformational change in nutrition-oriented food sustainability requires innovative food science and emerging food technologies as the key to development in the food industry. Emerging food technologies can help materialize the fast-paced changing transitions in food processing, food production systems, food demand, food waste management, etc. Such technologies are taking shape in the food industry through digitized food science, such as Big Data, the Internet of Things (IoT), Artificial Intelligence (AI) and Machine Learning, Drones, new physical systems, and Genetic Technologies.

As a multidisciplinary, cross-fertilized field, the future of food science should be centered on emerging technologies oriented toward nutrition and sustainability. Combined with digital food science, the interaction between food nutrition and sustainability should be a priority. Therefore, we would like this Conference to focus on the following sections:

Session 1: Innovation in Food Technology and Engineering
Session 2: Food Nutrition and Functional Foods
Session 3: Sustainable Food Security and Food Systems
Session 4: Food Microbiology
Session 5: Chemistry and Physicochemical Properties of Foods
Session 6: Emerging Methods of Food Analysis
Session 7: Novel Preservation and Packaging Technologies
Session 8: Food Quality and Safety
Session 9: Food Cultures, Policy and Consumer Science
Session 10: Application of Artificial Intelligence (AI) and Machine Learning in The Food Industry

On behalf of the Organizing Committee, we cordially invite you to join us at the 5th International Electronic Conference on Foods.

We look forward to your contributions.

Prof. Dr. Arun K. Bhunia
Conference Chair
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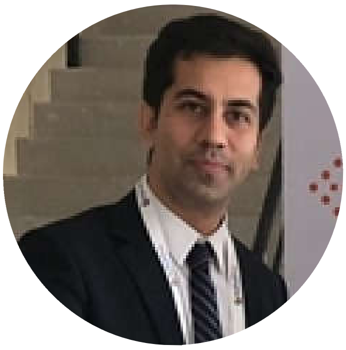
- **Journal Rank:** JCR - Q1 (Food Science and Technology) / CiteScore - Q1 (Health Professions (miscellaneous))
- **Rapid Publication:** manuscripts are peer-reviewed and a first decision is provided to authors approximately 14.3 days after submission; acceptance to publication is undertaken in 2.8 days (median values for papers published in this journal in the first half of 2024).
- **Recognition of Reviewers:** reviewers who provide timely, thorough peer-review reports receive vouchers entitling them to a discount on the APC of their next publication in any MDPI journal, in appreciation of the work done.

Impact Factor: 4.7 (2023); 5-Year Impact Factor: 5.1 (2023)

Keynote Speakers



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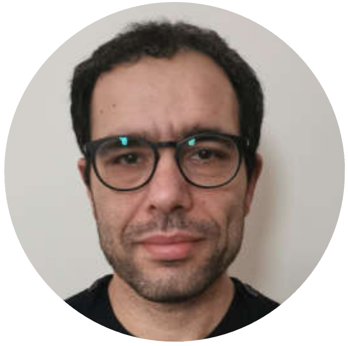

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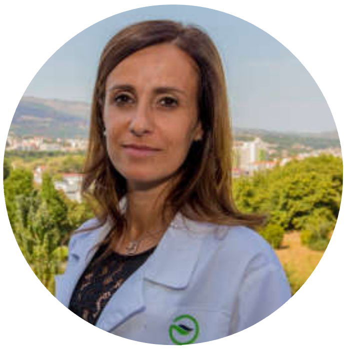
Invited Speakers



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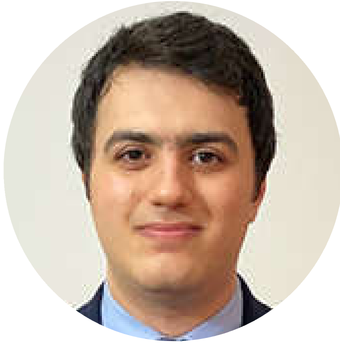

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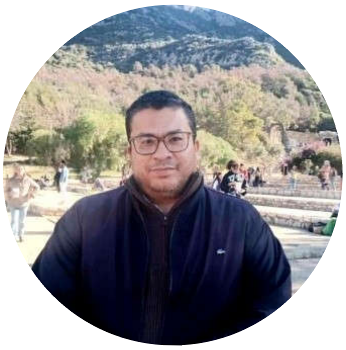

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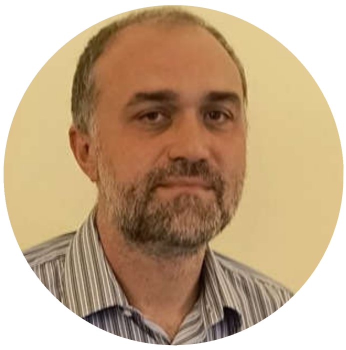

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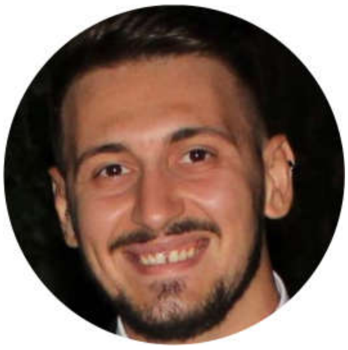

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Program at a Glance

	Day 1	Day 2		Day 3	
		Parallel Sessions			
Morning	**S3.** Sustainable Food Security and Food System 08:00 AM CET	**S4.** Foods Microbiology **S7.** Novel Preservation and Packaging Technologies 09:00–11:50 AM CET	**S2.** Food Nutrition and Functional Foods 10:00–11:30 AM CET	**S6.** Emerging Methods of Food Analysis 10:00 AM CET	
				Parallel Sessions	
Afternoon	**S1.** Innovation in Food Technology and Engineering 15:00 PM CET	**S8.** Food Quality and Safety 14:00 PM CET **S10.** Application of Artificial Intelligence (AI) and Machine Learning in The Food Industry 16:00 PM CET		**S5.** Chemistry and Physicochemical Properties of Foods 14:30–16:40 PM CET	**S9.** Food Cultures, Policy and Consumer Science 14:00–15:50 PM CET

Foods2024 Program

28th October 2024 (Monday)

S3. Sustainable Food Security and Food System

8:00 AM (CET, Basel) | 03:00 AM (EDT, New York) | 15:00 PM (CST Asia, Beijing)

CET Time	Speaker	Title
08:00–08:10	**Prof. Dr. Arun K. Bhunia** Conference Chair	*Welcome from the conference chair*
08:10–08:15	**Prof. Dr. Theodoros Varzakas** Session Chair of S3	*Welcome from the session chair*
08:15–08:40	**Prof. Dr. Theodoros Varzakas & Professor Slim Smaoui** Keynote Speaker & Invited Speaker	Global food security and sustainability: the road to 2030 and forward
08:40–09:00	**Professor Maria Papageorgiou & Dr. Andriana Skendi** Invited Speakers	High protein substitute in gluten free bread as a means of food security and sustainability
09:00–09:20	**Professor Sofia Agriopoulou** Invited Speaker	Occurrence, detection and control strategies of mycotoxins in fruits and vegetables as a means of food security and sustainability
09:20–09:35	**Jocelyn C. Lee** Selected Speaker	Case Studies of Small-Medium Enterprises Around the World: Major Constraints and Benefits from the Implementation of Food Safety Management Systems
09:35–09:50	**Hui Cao** Selected Speaker	Study on the effect of flavonoids on the formation of polycyclic aromatic hydrocarbons in barbecued food and its mechanism

S1. Innovation in Food Technology and Engineering

15:00 PM (CET, Basel) | 10:00 AM (EDT, New York) | 22:00 PM (CST Asia, Beijing)

CET Time	Speaker	Title
15:00–15:10	**Dr. Mohsen Gavahian** Session Chair	*Welcome from the session chair*
15:10–15:30	**Prof. Dr. Vida Šimat** Invited Speaker	Challenges and opportunities of using by-products for innovative technological and functional food applications
15:30–15:50	**Dr. Elsa M. Gonçalves** Invited Speaker	Innovation and Technological Challenges in Plant-Based Food Products
15:50–16:05	**Diana Pinto** Selected Speaker	From Salt Marshes to the Plate: Could Salicornia ramosissima By-Products be a Promising Functional Ingredient for Foods and Nutraceuticals?
16:05–16:20	**Laleh Mozafari** Selected Speaker	Effect of the carotene fortification of a cucumber juice on shelf life with extracts from tomato by-products
16:20–16:35	**Alessandro Bianchi** Selected Speaker	Exploring Alternative Maceration Techniques: Nitrogen vs. Carbonic Maceration in Gamay Variety Wines

29th October 2024 (Tuesday)

S4. Foods Microbiology
S7. Novel Preservation and Packaging Technologies

9:00 AM (CET, Basel) | 04:00 AM (EDT, New York) | 16:00 PM (CST Asia, Beijing)

CET Time	Speaker	Title
09:00–09:10	**Prof. Dr. Antonio Bevilacqua** Session Chair	*Welcome from the Session Chair*
09:10–09:35	**Prof. Dr. Antonio Bevilacqua** Keynote Speaker	Food Safety and Risk Assessment
09:35–09:55	**Prof. Dr. Antonio Bevilacqua & Mr. Alessandro De Santis** Invited Speakers	A Case study on risk assessment
09:55–10:15	**Dr. Lorenzo Nissen** Invited Speaker	Risk Assessment of xenobiotics-gut microbiota exposure: an in vitro approach to study food-derived microplastics.
10:15–10:35	**Dr. Alessandra Barlaam** Invited Speaker	Foodborne parasites: rising concerns in food safety, epidemiological trends in Europe and Italy, and future outlooks
10:35–10:50	**Antonio Peña-Fernández** Selected Speaker	Human-related microsporidian spores in farm chickens from Makeni, Sierra Leone
10:50–11:05	**Adriana Silva** Selected Speaker	Sustainable antimicrobial strategies: Exploration of grape phenolic extracts for combating foodborne pathogens
11:05–11:20	**Filipa Soares** Selected Speaker	The Effect of Vacuum Storage on the Preservation of Extra Virgin Olive Oil After Opening
11:20–11:35	**Loreta Šernienė** Selected Speaker	Microbial Spoilage Mitigation in Biodegradable Cheese Packaging via Protective Lactobacillus Coating
11:35–11:50	**Manfred Tacker** Selected Speaker	A Comprehensive study including polyethylene-based food packaging and its substitutes on the European market focusing on GWP, water scarcity and fossil energy.

S2. Food Nutrition and Functional Foods

10:00 AM (CET, Basel) | 05:00 AM (EDT, New York) | 17:00 PM (CST Asia, Beijing)

CET Time	Speaker	Title
10:00–10:10	**Prof. Dr. Antonello Santini** Session Chair	*Welcome from the Session Chair*
10:10–10:30	**Dr. Michael Netzel** Invited Speaker	Halophytes – “Salty Champions” for a Healthy Nutrition(?)
10:30-10:45	**Vanesa Sánchez-Martín** Selected Speaker	Coffee leaves: a natural source of compounds for reducing body fat accumulation
10:45-11:00	**Rafik Balti** Selected Speaker	Enzymatic strategy to valorize two red macroalgae species for bioactive peptide production as promising nutraceuticals
11:00-11:15	**Tatiane Cristina Gonçalves de Oliveira** Selected Speaker	Circular economy in the agri-food sector: valorization studies of vegetable by-products
11:15-11:30	**Christophe Espírito Santo** Selected Speaker	Innovative dehydrated snack using low-value horticultural products: Beetroot, apple and orange, a crispy combination

S8. Food Quality and Safety

14:00 PM (CET, Basel) | 09:00 AM (EDT, New York) | 21:00 PM (CST Asia, Beijing)

CET Time	Speaker	Title
14:00–14:10	Prof. Dr. Antonello Santini Session Chair	*Welcome from the Session Chair*
14:10–14:30	Dr. Dirk W. Lachenmeier Invited Speaker	Acrylamide in Ultra-Light Coffee Roasts: A Safety Assessment
14:30–14:45	Mojca Jevšnik Selected Speaker	Food hygiene behaviour improvement with nudge tools
14:45–15:00	Yara Bulha Loforte Loforte Selected Speaker	Modelling the microbial competition of Listeria monocytogenes and selected lactic acid bacteria strains in reconstituted milk
15:00–15:15	António Pereira Selected Speaker	Olive Oil Authenticity: A Critical Issue in Non-Regulated Markets
15:15–15:30	Aida Dama Selected Speaker	Origanum vulgare essential oil from Southern Albania: preliminary results.
15:30–15:45	Ariana Macieira Selected Speaker	A case study about the perception of food safety in consumers of fresh produce from local and small farms in the North of Portugal

SHORT BREAK

S10. Application of Artificial Intelligence (AI) and Machine Learning in The Food Industry

16:00 PM (CET, Basel) | 11:00 AM (EDT, New York) | 23:00 PM (CST Asia, Beijing)

CET Time	Speaker	Title
16:00–16:10	Assoc. Prof. Yonghui Li Session Chair	*Welcome from the Session Chair*
16:10–16:35	Assoc. Prof. Yonghui Li Keynote Speaker	Use of machine learning in predicting protein solubility
16:35–16:55	Prof. Dr. Minwei Xu Invited Speaker	Predictive Modeling of Tofu Quality: Leveraging Protein Subunit Profiles and AI
16:55–17:15	Assoc. Prof. Davood B. Pourkargar Invited Speaker	Physics-Informed Machine Learning Modeling for Characterization and Control of Plant-based Meat Processing Systems
17:15–17:35	Dr. Zhang Dachuan Invited Speaker	Deep Learning Enables Rapid Identification of Food Contaminant-Degrading Enzymes
17:35–17:55	Dr. Lorenzo Guerrini Invited Speaker	Advances in Computer Vision for the Food Industry
17:55–18:10	Azdem Driss Selected Speaker	The application of artificial intelligence and machine learning in the food industry
18:10–18:25	Nandan Kumar Selected Speaker	pLM4CPPs: Protein Language Model-Based Predictor for Cell-Penetrating Peptides
18:25–18:40	Hyukjin Kwon Selected Speaker	Bioinformatical characterization and machine learning classification of seed storage proteins

30th October 2024 (Wednesday)

S6. Emerging Methods of Food Analysis

10:00 AM (CET, Basel) | 05:00 AM (EDT, New York) | 17:00 PM (CST Asia, Beijing)

CET Time	Speaker	Title
10:00–10:10	**Prof. Dr. Susana Casal** Session Chair	*Welcome from the Session Chair*
10:10–10:30	**Dr. Roberta Foligni** Invited Speaker	Potential Of Edible Insect Hydrolyzed to formulate innovative food products: effect on Tecno-functional properties and exploring “remote home tasting
10:30–10:45	**Dr. Sónia Soares** Invited Speaker	DNA-Based Approaches for Evaluating Honey Quality and Authenticity: Advances and Future Directions
10:45–11:00	**Bruna Carbas** Selected Speaker	Detection of Fumonisins in Maize Using Near-Infrared Spectroscopy
11:00–11:15	**Agata Fabiszewska** Selected Speaker	The use of the ft-ir technique to predict the content of oleaginous yeast biomass
11:15–11:30	**Sureerat Makmuang** Selected Speaker	Quantitative and qualitative evaluation of microplastic contamination of shrimp using Vis-NIR multispectral imaging technology combined with a modified self-organizing map

S9. Food Cultures, Policy and Consumer Science

14:00 PM (CET, Basel) | 09:00 AM (EDT, New York) | 21:00 PM (CST Asia, Beijing)

CET Time	Speaker	Title
14:00–14:10	**Prof. Dr. Igor Tomasevic** Session Chair	*Welcome from the Session Chair*
14:10–14:30	**Dr. Maurice O’Sullivan** Invited Speaker	Senory Driven Nutritional Optimisation of Foods
14:30–14:50	**Dr. Luís Miguel Cunha** Invited Speaker	New perspectives on the use of insects as food: findings from a decade of consumer studies, from attitudes to hedonics and behaviour
14:50–15:05	**Sofia Sousa** Selected Speaker	Determinants of cow’s milk and plant-based milk substitute consumption: cross-cultural study of Portuguese and Irish young adults
15:05–15:20	**Mirian Elva** Selected Speaker	The Living History Connoisseur—an unexpected consumer of traditional fermented products
15:20–15:35	**Pascal Ohlhausen** Selected Speaker	Evaluation of food waste reduction in German private households— Development of an app approach
15:35–15:50	**Anastasia Fountouli** Selected Speaker	Unveiling consumers’ awareness, attitudes and motivations behind entomophagy in Greece: A Theory of Planned Behavior approach

S5. Chemistry and Physicochemical Properties of Foods

14:30 PM (CET, Basel) | 09:30 AM (EDT, New York) | 21:30 PM (CST Asia, Beijing)

CET Time	Speaker	Title
14:30–14:40	**Dr. Joana S. Amaral** Session Chair	*Welcome from the Session Chair*
14:40–15:00	**Professor Ana Novo Barros** Invited Speaker	Untapped goldmine: unlocking the potential of phenolic compounds in food matrices
15:00–15:20	**Dr. Sandrina A. Heleno** Invited Speaker	Innovation in foods and beverages through bio-based active agents
15:20–15:40	**Dr. Veronica Maria Busch** Invited Speaker	Development of Food Ingredients from Neglected and Underutilized Species (NUS) in Argentina
15:40–15:55	**Aline Benard** Selected Speaker	Functionality and structure of protein isolate from decolorized moringa leaf
15:55–16:10	**Demissie Shimelis Gebiba** Selected Speaker	Antioxidant, anti-inflammatory, anti-diabetic, and cytotoxic potential of ethanolic leaf extracts from *Englerina woodfordiodes* M. Gilbert and *Oncocalyx fischeri* (Ebgl.) M. Gilbert
16:10–16:25	**Antonella Lamonaca** Selected Speaker	Proteomic profiling of lentil varieties by discovery high-resolution tandem mass spectrometry: nutritional, safety and authenticity perspectives
16:25–16:40	**Shakrirah Azeez** Selected Speaker	Effect of growth stages on polyphenols and secondary metabolites of haskap leaf varieties

Session 1. Innovation in Food Technology and Engineering

sciforum-099225: Optimization of Extraction Technologies for obtaining bioactives from Schinus molle

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All countries have wild or semi-domesticated neglected species, limited to local markets. Recovering valuable components from these species by sustainable extractions can add value to these underutilized resources. Among these, *Schinus molle* (SM) stands out for its resilience and adaptability to climate change since it is resistant to drought and poor soils. The objective of this work was to optimize the conditions for obtaining antioxidant extracts from SM using ultrasound (US) and microwave (MW) techniques by applying response surface methodology and comparing them with traditional infusion methods (T). The design variables were time, % ethanol, temperature, and amplitude/frequency, evaluating antioxidant capacity (mmoles Trolox/100 mL -CA-), polyphenol content (GAE/100 mL -CPT-) and total flavonoids (mg quercetin/100 mL -FT-). Variable ranges for US: time: 1-15 min, ethanol: 0%-100%, and amplitude: 20%-100%; for MW: ethanol: 0%-100%, time: 10-40 min, and frequency: low, medium, and high; for T: ethanol: 40%, 65%, and 90% and time: 20 days, weighing 5 grams of powder/100 mL in all cases. The obtained optimal conditions were US [100% amplitude, 45% ethanol, and 15 minutes] and MW [low frequency, 50°C, 10 minutes, and 50% ethanol]. For maximum CA and CPT, the significant US variables were % ethanol, time, and temperature; and for MW, they were temperature and % ethanol. Significant differences among treatments were observed in CA: US>MW>T (6.43; 1.07 and 0.76 mmoles Trolox/100 mL), CPT: MW>T>US (24.1; 20.1 and 15.8 GAE/100 mL), and FT: T>MW>US (3.22; 2.33 and 1.82 mg quercetin/100 mL), indicating an inverse correlation with CA. The optimization designs identified the critical parameters to maximize the antioxidant activity of the extracts and allowed us to obtain extracts that surpass the traditional process in CPT (MW) and CA (US). These findings highlight the importance of carefully selecting the method according to specific extraction objectives, opening new opportunities for practical applications as an additive based on unexplored sources adapted to climate change and favoring biodiversity.

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sciforum-099432: *Quercus pyrenaica* acorn flour: characterization after tannin removal optimization

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The acorn is a wild fruit widely distributed throughout the world and commonly used as animal feed. This natural product has emerged as an alternative source of flour for human food due to its nutritional value and content of bioactive compounds, as well as its gluten-free nature, making it an advantageous alternative for the diet of celiac patients. However, the presence of tannins gives it an astringent flavor, making it difficult to digest and absorb nutrients. In this context, the aim of this study was to characterize *Quercus pyrenaica* (Q. *Pyrenaica*) acorn flours with different tannin removal processes. To this end, the acorns were peeled and separated into four groups (three with tannin removal treatments and one without): untreated, blanched, soaked and roasted. After each treatment they were processed into flour and assessed for different nutritional parameters, such as moisture, ash, protein content, total lipid content, fiber, starch, fatty acids, sugars and phenolic compounds. The results showed that the blanching treatment is more advantageous for human consumption. All treated acorn flours exhibited favorable carbohydrate levels (45.8 – 63.8%), including substantial starch content (17.0 – 50.7%), along with noteworthy quantities of lipids (3.5 – 5.4%) and protein content (5.1 – 5.7%). Q. *Pyrenaica* acorn flour showed a rich nutritional profile that, in combination with the fact that it is a gluten-free product, can bring new innovative applications of the acorn flour in the food industry.

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sciforum-099406: Utilization of Chickpea Cooking Water for the Production of Polymeric Foams

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Foams have been widely studied across various disciplines, including biomedicine, cosmetics, food, agriculture, and construction. Although foams are extensively used, many of them rely on petroleum-based polymers, thereby contributing to environmental pollution. However, foams exhibit remarkable mechanical properties, such as thermal and physical resistance, and they can be manufactured using polysaccharides or proteins. For example, sodium alginate, a linear anionic polysaccharide composed of α-L-glucuronic acid and β-D-mannuronic acid, and water-soluble vegetable proteins can be used to form emulsions and foams. This study aimed to develop and characterize the stability of a polymeric foam based on chickpea protein and sodium alginate for potential use in biodegradable packaging materials. To prepare the foams, a 2.5% sodium alginate solution, aquafaba (chickpea cooking water), and an equimolar solution of calcium chloride–sodium citrate as a chelating agent were used. Various ratios of alginate to protein (1:1, 1:0.5, 1:5, and 1:0) were tested, and the pH was adjusted to optimize the foam's stability and mechanical properties. Micrographs were taken every 30 min to evaluate air loss and bubble size. The results showed that foams could not be obtained using alginate alone, and excess protein led to excessive air incorporation and poor gelation. Decreasing the protein content improved the texture but reduced the amount of entrapped air. The most stable foams with a homogeneous bubble size were achieved at a 1:1 alginate-to-protein ratio and a pH between 5.5 and 6.5. The foam's stability improved with a reduction in pH, and its firmness increased between a pH of 5.5 and 6.5. Additional optimization of the formulation by varying the speed, time, and alginate–calcium ratio is necessary. This study demonstrates the potential of protein–alginate foams as an environmentally friendly option for packaging materials and other industries.

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sciforum-099765: Development of lentil aquafaba-based emulsions with the addition xanthan gum or corn starch for food technology applications

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Introduction: Currently, there is an increasing trend towards the use of functional w/o emulsions for food applications based on plant proteins from aquafaba legumes.

Goal: The evelopment of stable w/o emulsions containing 30 and 60% sunflower oil for applications in emulsion-like functional foods. Lentil aquafaba with 0.5 and 0.8% protein was used as a vegetable emulsifier, and xanthan gum (0.1 and 0.2%) or cold-soluble corn starch (1 and 2%) thickeners were added to physically stabilize the emulsion.

Methods: The stability of the emulsions was assessed based on both the volumetric droplet size distribution and the apparent viscosity measured by laser diffraction and rotational viscometry, respectively.

Results: Preliminary studies of the technological properties of lentils, such as swelling and boiling coefficients, seed strength before and after heat treatment, and the diffusion coefficients of soluble solids in water, allowed us to optimize the aquafaba production process. Emulsions with lentil aquafaba as an emulsifier show a bimodal droplet size distribution. The average volumetric size depends on the thickener concentration and changes for emulsions with 60% oil from 8.2 μm (with 0.2% xanthan) to 29.3 μm (with 2% starch). The same trend is observed for emulsions with 30% oil. Rheological studies allowed us to classify the samples as non-Newtonian fluids with a pseudoplastic flow pattern. Fitting the flow curves to the Herschel–Bulkley model allowed us to calculate the yield shear stress for the emulsions, which varied from 0 to 6.8 Pa depending on the oil content and the nature and amount of the thickener. For emulsions with 30% oil and starch as a thickener, instability was visually observed over time, and afterwards the emulsion was degraded.

Conclusion: Food emulsions obtained using plant proteins of lentil aquafaba as an unconventional emulsifier are promising ingredients in the formulation of emulsion-based foods.

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sciforum-103125: Effect of post-harvest UV-C radiation application on resveratrol and tannin concentrations in table grapes

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Table grapes (*Vitis vinifera* L.) are among the most consumed fruits due to their antioxidant power, which is based on their high concentration of compounds such as tannins and resveratrol. However, the application of post-harvest treatments is necessary to increase the shelf life of this fruit, as well as to improve its organoleptic and nutritional properties. The objective of this work was to determine the effect of UV-C radiation on the resveratrol and tannin content of different table grape cultivars during the storage period. For this purpose, table grape fruits of the Red Globe and Muscatel varieties were subjected to different doses of UV-C radiation (0.3, 0.6, and 1.2 kJ/m^2) and subsequently stored for 24 h. To evaluate the effect of UV-C radiation on the two grape varieties, the Bate--Smith reaction was used to determine the tannin content, while the resveratrol concentration was quantified by HPLC after extraction (80:20 v/v), maintained at 60°C for 30 min. The effect that UV-C radiation had on the organoleptic and nutritional quality of table grapes was highly dependent on the variety. When UV-C radiation was applied at doses of 0.3 and 0.6 kJ/m^2, the ripening process of the berries was slowed down, increasing the shelf life of these fruits. For the Red Globe variety, the 0.3 kJ/m^2 dose was the most effective in terms of tannin and resveratrol content, increasing from 92.50 to 122.83 mg/kg and from 11.94 to 30.34 mg/kg, respectively. Regarding the Muscatel variety, the most effective dose was 1.2 kJ/m^2, even with a reduced shelf life, with an increase of 257.5% in tannins and 238.2% in resveratrol compared to the control (0 kJ/m^2). It was concluded that further studies on radiation doses, times, and storage conditions are necessary to establish scalable results.

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sciforum-091435: Exploring Alternative Maceration Techniques: Nitrogen vs. Carbonic Maceration in Gamay Variety Wines

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In the carbonic maceration process, a sealed tank is utilized to place entire grape bunches, with carbon dioxide either naturally occurring or intentionally created. The physical and chemical metabolism of berry cells is significantly altered by this CO_2 saturation, which results in a change in the range of volatile organic compounds (VOCs). As an alternative to traditional carbonic maceration (CM), the use of nitrogen (NM) in the maceration process to create anoxic conditions in the Gamay teinturier variety was investigated in this study. It is hypothesized that during the two methods of maceration, the two gases will operate differently in the grape berry cell, thereby leading to changes in the wine's VOC patterns in addition to other grape and wine characteristics. The chemical analysis revealed that NM wine has higher levels of anthocyanins and polyphenols. While NM wine had a slightly higher total alcohol concentration, CM wine had the highest ester content in terms of volatile organic compounds. The highest concentration of volatile medium-chain fatty acids was likewise found in CM wine. The color of the wine was affected by the different concentrations of anthocyanins; NM wine had the lowest tonality and the greatest color intensity value. The samples were clearly separated according to E-nose measurements, and the PCA computation showed that the analyses of E-nose data andVOCs overlapped. NM demonstrated promise as an environmentally friendly method, helping to produce a unique style of macerated and aromatic wines

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sciforum-099126: Incorporation of ash during traditional black olive processing: Effects on bioactive compounds and antioxidant activity

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Introduction

In addition to the conventional styles of table olive processing, there are some ancestral methods rarely used, for which the data are almost limited. Olive table composition is closely related to the applied technique, which is responsible for significant modification. Consequently, the choice of a suitable method should take into consideration several parameters, in particular the use of natural ingredient that preserve their quality; hence, the purpose of this study is to determine the effects of the incorporation of ash during olive processing on the bioactive compounds and the antioxidant activity of three Algerian olive cultivars.

Methods

Harvested olives were prepared via two methods using the dry salt and ash as an ingredient. Spectrophotometric methods were performed for the analysis of fresh and treated olive extracts.

Results

The results indicate that processing has a significant effect on the contents of the bioactive substances as well as antioxidant activity. The method using ashes showed a better yield: significant increases were recorded in phenolics contents, as well as antiradical activity reaching an inhibition rate of 80% in Chemlal olives treated with ash; hydrogen peroxide inhibition activity was at a rate of 75%.

Conclusion

This investigation confirms the quality of such products prepared with natural and inexpensive ingredients, which preserve their nutritional quality.

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sciforum-101819: Nanoencapsulation of bioactive compounds extracted with "green" methods from plant by-products for food applications

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By-products deriving from the distillation of medicinal and aromatic plants (MAPs) following the principles of a circular, sustainable, and ecological economy, may be regarded as a valuable resource for various applications. A novel operational approach to retrieve bioactive compounds from solid by-products of MAPs that remain post-processing is presented in this study. The utilization of nanoencapsulation technology is proposed to enhance the bioactivity of the recovered compounds at minimal extract concentrations by encapsulating them, aiming at the development of environmentally friendly nanotechnology suitable for various food applications. A total of four specific MAPs, generating by-products post-distillation and/or post-harvesting, is examined: Saffron (*Crocus sativus*) petals, Chamomile (*Matricaria chamomilla*), Golden Root (*Rhodiola rosea*) aerial parts, and Lavender (*Lavandula angustifolia* vera). Best-practice technologies are being disseminated, with research focusing on emerging developments in recovery techniques as well on the nanotechnological application of the bioactive compounds or mixtures. Upon the completion of the production of plant by-product materials, the subsequent stage will involve the collection and stabilization of specific biomass. Various emerging drying technologies, including vacuum, microwave, and freeze-drying systems, will be evaluated through experimental and parametric analysis. Extraction methods for bioactive compounds will encompass the use of supercritical fluid extraction, microwave-assisted extraction, ultrasonic-assisted extraction, deep eutectic solvents extraction while for extraction and subsequent purification and fractionation preparative column chromatography may be employed as well. Metabolite profiles of specific plant by-products will undergo analysis using hyphenated techniques like UPLC-DAD-MS/MS, GC-MS/MS, and conventional phytochemical approaches to identify main and minor components in the obtained fractions.

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sciforum-103328: The Development of a method for disintegrating the yeast cell wall aimed at obtaining microbial proteins

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In recent decades, the global production of ruminant meat has doubled. Animal production has significant environmental consequences, mainly due to significant greenhouse gas emissions, arable land use, and freshwater withdrawal. It is estimated that the production of feed for farm animals accounts for 41% of total water consumption in agriculture. On account of the increasing popularity of vegetarian and vegan diets, as well as the significant increase in protein deficit in the world, attempts are being made to develop unconventional methods of nutrition. In recent years, there has been increasing interest in the production of microbial proteins (single-cell proteins), mainly as feed for domestic and farm animals. SCP biosynthesis is approximately 500 times faster than the production of beef protein and is more efficient than that of animal protein. Microbial proteins, also known as single-cell proteins, are proteins that have been extracted from cultivated microbial biomass. Microorganisms commonly used for microbial protein synthesis include *Saccharomyces cerevisiae, Fusarium venenatum* and *Candida sp*., according to EU Commission Implementing Regulation 2023/938, and *Yarrowia lipolytica* yeast biomass is considered a novel food.

The aim of this study was to compare combined (enzymatic and physical) methods of disintegration of the *Candida kefyr* yeast cell wall in order to increase the efficiency of protein extraction from biomass.

Enzymatic methods were used in combination with ultrasonic treatment and mechanical grinding with zurconium--glass beads. Combined methods proved to be more effective for the disintegration of the *C. kefyr* yeast cell wall than the enzymatic or physical method only. An increase in the efficiency of single-cell protein extraction was demonstrated, which can be used on an industrial scale to obtain microbial proteins.

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sciforum-102984: A Comparative Study on the Ultrasound- and Microwave-Assisted Extraction of Bathua (Chenopodium album) Starch and its effect on Physicochemical, Functional, Thermal, structural, and Morphological Properties

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This study aimed to explore the impact of ultrasound (US) and microwave (MW) treatments at varying power levels (200W-500W for ultrasound; 400W-800W for microwave) and durations (10–30 minutes for ultrasound and 20-40 seconds for microwave) on the extraction, physicochemical, techno-functional, and intermolecular characteristics of bathua starch. It was found that both ultrasound-assisted and microwave-assisted extraction significantly altered the functional, thermal, physicochemical, and morphological properties of the starch. The extraction yield increased with higher power levels during ultrasonication, with the highest yield being 49.91% (w/w) at 350W for 30 minutes. The control method without pretreatment had the lowest yield of 42.55%, showing a significant difference (p 0.05). For microwave extraction, the highest yield was 49.12% at 800W for 30 seconds. Pretreatments of US (350W for 30 minutes) and MW (600W for 30 seconds) resulted in higher L* values for the extracted starch (97.06 and 96.62, respectively) compared to the control (96.15), which was statistically significant (p 0.05). Ultrasound-assisted extraction (UAE) generally exhibited higher solubility (SP) than the control, except for the sample treated at 200W for 10 minutes. The highest water absorption capacity (WAC) and oil absorption capacity (OAC) for ultrasound-extracted starch were 1.97 g/g and 2.39 g/g (at 350W for 30 minutes), with both statistically significant (p 0.05) compared to the control. Additionally, UAE starches showed decreased relative crystallinity. Based on these findings, the sample treated at 350W for 30 minutes is recommended for extraction due to its superior functional properties, beneficial for applications like emulsion and food product formulation.

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sciforum-098945: A new method of hulling oil seeds in Ukraine

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Introduction

The stages of seed dehulling, such as sunflower or safflower, do not meet the requirements for a high degree of target product preservation (kernel) and high purification selectivity. Hulling the seeds using the single oriented strike method is characterized by a degree of hulling of no higher than 80-85%; therefore, it leaves a noticeable amount of hulls in the cake and meal. This, in turn, results in a low degree of utilization of their nutritional potential, which is up to 65-70%. The purpose of this study is to find a new method of seeds dehulling when the seeds are cooled to sub-zero temperatures.

Methods

Physical–chemical, technological, and structural–mechanical parameters of seeds were studied as per ISO standards.

Results

A method of dehulling sunflower seeds at negative temperatures of -30...-42 °C was developed. This method allows us to obtain a dehulling rate of up to 99-100% in cases where the moisture content of the seeds is not more than 3.0%. For the sunflower hybrid Ukrainian F1, the maximum dehulling rate was achieved when the seeds were dried to a final moisture content of 3.0-0.5%. The dehulling rate for safflower seeds, when the seeds were frozen, increased by 3.6-4.0 times, from 19.7-23.0% (at 20°C) to 83.0-85.0% (at -40...-42 °C). This new hulling method allows us to obtain a reduced yield of oilseed dust by 2-6 times.

Conclusions

The new method of oil seed dehulling in a frozen state not only allows us to overcome the main drawback of the existing technology, but also to obtain a hull-free kernel in one pass through the seed crusher (hulling degree 99-100 %) with a minimum content of oilseed dust of 2.4-3.8% and a safety factor of the whole kernel of 0.96-1.00 units.

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sciforum-102526: Advancements in Legume Processing: A Comprehensive Review of Non-Conventional and Emerging Technologies

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Legumes are widely grown and consumed all over the world. Legumes are crucial in global agriculture and nutrition due to their high protein, fiber, and micronutrient content. Beyond these nutritional factors, legumes are rich in plant bioactive compounds like phenolic and flavonoid content, which have very beneficial impacts on human health. However, traditional processing methods often result in nutrient loss and suboptimal product quality. Novel food processing technologies have arisen as a result of consumers' desire for safe, tasty, fresh, and mildly processed food products with long shelf lives and maintained quality. Ultrasound technology involves the use of ultrasound waves to disrupt cell walls and enhance the extraction of bioactive compounds, such as proteins, from legumes. High-pressure processing can alter protein structures, improving digestibility and functional properties such as emulsification and gelation. This process also helps in reducing anti-nutritional factors, enhancing the bioavailability of nutrients, and extending the shelf life of legume-based products. Ohmic heating is a direct heating method that minimizes energy loss compared to that observed in traditional methods. Supercritical fluid extraction utilizes CO2 at a high pressures to extract compounds from legumes, yielding high-quality extracts without leaving solvent residues. It is valued for its selectivity, efficiency, and environmental friendliness in extracting bioactive components from legumes. Enzyme-assisted extraction harnesses the function of enzymes to enhance the extraction of bioactive compounds from legumes, improving yield and purity while reducing processing time and energy consumption. Plasma processing modifies legume surfaces to enhance functional properties and microbial safety, leading to promising food packaging and preservation applications. Emerging technologies like 3D food printing, vacuum frying, and nanotechnology offer innovative ways to create novel legume-based products with precise structures, enhanced flavours, and improved nutritional profiles, catering to diverse consumer preferences for sustainability. These novel techniques prolong the shelf life, enhancing or maintaining the quality, and regulating the freshness of legume products.

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sciforum-100832: An alternative to the conventional extraction method for the recovery of bioactive compounds from Bentong ginger

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Recently, there has been a shift in utilizing Supercritical Carbon Dioxide (scCO2) as a ‘green solvent’ for extraction instead of conventional extraction due to the large consumption of hazardous organic solvents and of energy, which contributes significantly to environmental problems. The unique properties of supercritical conditions, including high diffusivity, low density, and the easy tuneability of conditions even at mild temperatures have made scCO_2 popular in the industry. The main objective of this study is to compare the yield extracts and bioactive compound recovery from Bentong ginger (*Zingiber officinale Roscoe var. bentong*) between Soxhlet and the scCO_2 extraction method. Extraction using scCO_2 was carried out at a pressure of 25 MPa, temperature of 40 °C, and a particle size of 300 m. Both methods were used to analyse the content of the compound 6-gingerol, total phenolic content, total flavonoid content, and antioxidant activity using 2,2-diphenyl-1-picrylhydrazyl (DPPH). The highest yield extract, 4.76±0.08 %, was achieved using the Soxhlet method. Nevertheless, the unique properties of scCO2, such as high diffusivity, low density, and ability to be operated at mild conditions, promote its advantages in the extraction of bioactive compounds, whereby all bioactive compounds recovered using scCO_2 were higher than those recovered using the Soxhlet method. This shows the effectiveness of scCO_2 as an extraction tool for recovering bioactive compounds compared to the Soxhlet method.

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sciforum-102826: Assessing 3D Printability and Glycemic Indices of Marzipan with Different Natural Sweeteners

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Introduction

Food 3D printers can design foods that would be challenging to shape normally. Customization for nutritive value, color, texture, aesthetic appeal, or others, is performed based on specific requirements achieved through printing. However, little is known about developing low glycemic index (GI) foods structured with 3DP.

Materials

This work focuses on low-GI 3D-printed Marzipan, a popular sweet, conventionally made from almonds. Different natural sweeteners were studied and their impact on printability as well as sensorial acceptance was assessed. Specifically, rheological (static, dynamic, and three-interval thixotropic test (3ITT)), textural, and crystallinity tests were performed to understand the printability nature of the samples.

Results and Conclusion

The rheological results revealed that the flow behavior indices (n) of all formulations ranged from 0.3 to 0.5, indicating their shear-thinning behavior. The 3ITT tests revealed the time-dependent recovery (63.2-70.5%) for all formulations. All material supplies had crystallinity ranging from 38 to 58%, and GI values ranging from 45.06 to 53.33. The optimal printing conditions to print a 3D chalice model were 1.22 mm nozzle size, 3 bar compressed air pressure, 15 rpm motor speed, and 800 mm/min printing speed. Stability assessment of the printed constructs at varying infill densities (25, 50, and 75%) and time intervals (6, 12, 18, 36 h), alongside sensory evaluation, highlighted that the sugar formulation was the best, followed by monk fruit. This work's findings will be significant in studies involving the development of low-GI 3D-printed foods.

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sciforum-103025: Assessing the properties of gluten-free flour for composite dough formulation and parametric analysis for the development of 3D-printed cookies

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Three-dimensional printing technology can be used to develop futuristic novel functional foods. This study was conducted to formulate a multigrain dough and to establish optimal conditions through a detailed assessment of printability parameters for the development of 3D printed snacks. Multigrain flours were formulated using black rice flour (BRF), amaranth seed flour (ASF) and little millet flour (LMF) in varying proportions (w/w) of 50-80%, 10-30% and 10-30%, respectively. The composites were characterized using rheological analysis and in terms of their functional properties. A statistical design was used to determine the optimal 3D printing parameters, including nozzle diameter, extrusion rate, print speed and layer height. K-mean clustering and Pearson correlation analysis were conducted to study the interaction among printability factors and printing parameters. In rheological studies, the multigrain flours displayed a linear viscoelastic region of 0.1% to 1% shear strain, which suggested carbohydrate-instigated dilution of gluten protein. The composite with a BRF/ASF/LMF ratio of 50:30:20 was found have the most solid-like and enhanced elastic behaviour, which would be less susceptible to breakage and more extrudable. The 3D printing parameters significantly affected print fidelity (51.64%-99.68%), geometric deviations (0.79%-111.15%) and print weight (4.26 g-19.68 g). The optimum print was achieved at a 1.6 mm nozzle diameter, 120 pulse/μl extrusion rate, 7mm/s print speed and 1.2 mm layer height. This study holds promise for the mass customization and efficient extrusion of other gluten-free multigrain formulations with high dietary fiber and protein content.

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sciforum-104341: Automated wine quality assessment using metal-oxide semiconductor sensor arrays and machine learning methods

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Wine quality analysis is a vital component of the wine industry, ensuring that the product meets safety and sensory standards. Traditional assessment methods often rely on subjective human judgment and can be inconsistent and time-consuming. This study explores the use of metal-oxide semiconductor (MOS) sensor arrays for an automated and objective analysis of wine quality, focusing on distinguishing fresh wine from spoiled samples. The aim was to identify the presence of acetic acid in wines to prevent spoilage and assess their overall quality. A total of 36 fresh wine samples and 32 spoiled wine samples were continuously monitored for five minutes using the sensor array. The data collected from the sensors underwent noise reduction using discrete wavelet transform, which effectively filtered out irrelevant fluctuations and enhanced signal clarity. For dimensionality reduction, Kernel Principal Component Analysis (KPCA) was applied, reducing the data's complexity while preserving essential information. The reduced data set was then classified using three machine learning algorithms: Support Vector Machine (SVM), k-Nearest Neighbors (KNN), and Decision Tree (DT). The classifiers' performances were evaluated using a 10-fold cross-validation technique to ensure robustness and generalizability. Among the tested models, the SVM classifier exhibited the best performance, achieving an average accuracy of 92.63% in distinguishing between fresh and spoiled wines. The results indicate that the combination of MOS sensor arrays, advanced signal processing, and machine learning algorithms can provide an effective and efficient method of wine quality assessment. The reliability of the results may be affected by the limited number of samples used in this study. This e-nose-based approach offers a reliable alternative to traditional sensory evaluation methods, providing consistent, objective, and rapid analysis, thereby improving quality control processes in the wine industry. The findings suggest that such technological integration could enhance product quality assurance and consumer satisfaction.

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sciforum-099425: Characterization of the properties of cereal cookies with reduced ochratoxin content

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The scientific community and food sector companies have been increasing their focus on cereal microflora and its toxic metabolites in recent years, which is primarily due to the requirement to meet the higher quality standards and legal regulations that have been imposed on food companies. Mycotoxins are secondary metabolites of filamentous fungi. Fungal toxins, such as ochratoxins, are responsible for reducing the quality of cereal grains. The content of mycotoxins in grain depends on many factors, such as the type of grain, climatic conditions, harvesting and storage conditions, and the conditions of technological processes. Contamination with ochratoxins may lead to tremendous economic losses, as well as potentially resulting in serious health consequences.

Taking the above into account, the aim of the research carried out as part of this project was to reduce the ochratoxin content by using an innovative technological method and to determine the impact of this method on the properties of cereal cookies. The applied technological modification consisted of conditioning the flour in the presence of sodium bicarbonate before the actual extrusion process. The following parameters were tested in the obtained cereal cookies: ochratoxin A content, color, texture, acid, and peroxide values. The modified technology resulted in cookies with a ten-fold lower ochratoxin content than those produced using the traditional method, as confirmed by the obtained results of ELISA test. The brightness of the cookies (L*) was about 50-70, and the subsequent chromatic coordinates a and b were from about 5 to 12 and from about 14 to 27, respectively. Analysis of the texture of the cookies showed that oat cookies were characterized by high brittleness. The fat extracted from the analyzed cookies was characterized by its good hydrolytic and oxidative qualities, as evidenced by low levels of acid and peroxide.

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sciforum-099444: Creating plant-based fish alternatives: Flavor formulations, texture mimicking, and nutritional highlights

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The increasing demand for sustainable and ethical food sources has driven the development of plant-based alternatives to conventional animal products. Fisheries have historically led to the serial depletion of fish populations, which has been masked by technological advancements and geographical expansion. This pattern has resulted in declining global catches since the late 1980s, and current trends suggest a future supply shortfall that aquaculture may not be able to compensate for [1]. Studies show that up to 33% of global fish stocks are overfished, with an additional 60% are fished to their maximum sustainable yield [1]; therefore, alternatives to fish consumption must be sought.

This paper explores the creation of plant-based fish alternatives, focusing on three critical aspects: flavor formulations, texture mimicking, and nutritional highlights. Achieving authentic fish-like flavor in plant-based products involves the utilization of novel flavoring agents, fermentation techniques, and precise ingredient combinations to replicate the complex taste profile of fish [2]. Texture mimicking is addressed through innovative use of plant proteins, hydrocolloids, and mechanical processing to achieve the fibrous and flaky consistency characteristic of fish [3]. Nutritionally, there is a high importance of balancing macronutrients and incorporating essential omega-3 fatty acids to match the health benefits of traditional fish. By integrating advanced food science technologies and a comprehensive understanding of consumer preferences, this study presents a framework for producing high-quality plant-based fish alternatives that meet the sensory and nutritional expectations of modern consumers.

References:

1. Pauly, D., Christensen, V., Guénette, S., Pitcher, T., Sumaila, U., Walters, C., Watson, R., & Zeller, D. (2002). Towards sustainability in world fisheries. Nature, 418, 689-695. https://doi.org/10.1038/nature01017.
2. Kazir, M., & Livney, Y. (2021). Plant-Based Seafood Analogs. Molecules, 26. https://doi.org/10.3390/molecules26061559.
3. Dekkers, B.L.; Boom, R.M.; van der Goot, A.J. Structuring processes for meat analogues. Trends Food Sci. Technol. 2018, 81, 25–36.

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sciforum-101508: Development and Analysis of Stevia- and Sucralose-Based Chocolate-Chip Cookies

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In recent years, there has been a growing consumer demand for healthier alternatives to traditional sugar-laden products. This trend is driven by an increasing awareness of adverse health effects. Stevia is a natural sweetener known for its zero-calorie content and high sweetness intensity. Sucralose, an artificial sweetener, offers a similar sweetness profile with minimal caloric contribution. The experimental process involved formulating chocolate-chip cookies with varying concentrations of stevia and sucralose, comparing them to a control batch made with sucrose. The cookies were prepared using the classic creamery method. Stevia, sucralose, and control cookies have been made with the following concentrations: 1.4g/100g, 21.5g/100g, and 4.2g/100g, respectively.

Physicochemical tests measured pH, water activity, weight, thickness, diameter, and spread ratio. Nutritional and proximate analysis were carried out, and the cookies made of sucralose and stevia had a moisture content of 4.86±0.07g and 4.64±0.05g, respectively. Ash content analysis was found to be 2.11±0.07g and 2.73±0.04g. The pH of the samples was seen to be 7.13±0.02, 7.43±0.03, and 7.52±0.02, respectively. The water activity of all samples was found to be 0.4, which indicates that the samples have a good shelf-life at ambient storage conditions. A panel of 18 people evaluated the cookies using a hedonic scale for taste, texture, aroma, and flavor.

The results indicated that stevia and sucralose could effectively replace sucrose without compromising the taste and texture of the cookies. The amount of sucralose and stevia was found to be 0.036g/100g and 0.090g/100g, respectively. The amount of sucrose content being reduced in the final product is due to the process parameters of the experiment. The results obtained were in line with those of Handa C. et al (2012). The study also confirms that stevia-based cookies have a better overall acceptance. This study contributes to the expanding literature on sugar alternatives in confectionery, emphasizing their potential in the food industry.

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sciforum-099452: Development of a Predictive Model for Total Solids in Beer Based on SRM Color

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The measurement and control of physicochemical properties in beer production processes are essential to guarantee product quality and consumer satisfaction. Total solids concentration is a key quality indicator as it affects product sensory attributes such as flavor, body, and texture. The color of the beer, measured in SRM units (Standard Reference Method), is another determining property in product quality and is associated with the concentration and presence of melanoidins resulting from the malting processes. This study focuses on developing a predictive model that uses SRM color to estimate total solids in beer, providing an efficient and non-invasive tool for the brewing industry.

Samples of various commercial and craft beers were collected, covering a wide range of SRM colors. Color measurements were performed using a spectrophotometer, and total solids were determined by gravimetric analysis. Multiple linear regression techniques were applied to develop the predictive model, integrating SRM color and other relevant variables. The model was validated using an independent dataset.

The analyses showed a strong correlation between SRM color and total solids in the evaluated beers. The developed multiple linear regression model exhibited a high coefficient of determination (R^2) values between 0.886 and 0.997 were obtained for six different styles of beer with concentrations between 0.51 and 8.42% w/w of total solids, indicating significant predictive capacity. Validation with independent data demonstrated the robustness and generalizability of the model to different beer styles.

The predictive model allows for rapid, non-destructive estimation of total solids based on the SRM color of the beer. This offers significant advantages to the industry, such as real-time production monitoring, improved quality control, and the efficiency of monitoring new process technologies such as freeze concentration.

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sciforum-103010: Development of chewy snack bars from mechanically dehulled toasted African breadfruit (*Treculia africana*) grits.

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African breadfruit (*Treculia africana*) is a multipurpose tree species, thriving in tropical climates, evergreen throughout the year, holding a significant place in Nigerian traditions as an edible fruit tree, and offering substantial nutritional value to humans. Expanding the utilization of African breadfruit could contribute to its conservation and reduce the risk of extinction. The acceptability of chewy snack bars made from toasted African breadfruit (*Treculia africana*) grits was investigated. *Treculia africana* seeds were toasted, mechanically dehulled, reduced to grits and flour, blended in different ratios, used to produce chewy snack bars, and coded as TB1= 500g grits, TB2= 450g grits/50g flour, TB3= 400g grits/100g flour, TB4= 350g grits/150g flour, and TB5= 300g grits/100g flour/100g shredded coconut. The proximate composition, energy value, dietary fibre, vitamins, minerals, anti-nutrients, physical properties, and sensory quality of the snack bars were determined using standard methods, revealing the moisture content (8.11-8.82%), ash (1.21-2.49%), crude protein (18.45-27.32%), fat (18.72-26.51%), crude fibre (1.88-3.69%), carbohydrate (31.9-50.95%), energy value (445.95-475.45 kcal/100g), total dietary fibre (5.43-8.89%), and anti-nutrients (tannin: 0.40-0.73%, phytate: 1.13-1.37%, hydrogen cyanide: 2.68-3.06%, oxalate: 0.17-0.40%, saponin: 0.92-1.28%, trypsin inhibitor: 11.60-14.92%, flavonoid: 1.38-1.84%). Vitamin and mineral contents were significantly p0.05 elevated with an increase in the proportion of toasted African breadfruit flour in the blends. The compositions of the product samples revealed values up to the recommended ratios for healthy diets. The sensory evaluation results revealed that the chewy snack bars produced had acceptable scores across all attributes, with sample TB5 (300g grits/100g flour/100g shredded coconut) receiving the highest overall acceptability score of 7.13. It is evident from the study that acceptable chewy snack bars of high nutritive value can be produced from toasted African breadfruit grits. This will increase the utilization of this locally grown crop, thereby contributing to the conservation of this valuable species.

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sciforum-103076: Development of ice cream cones from cassava flour and corn starch: production and optimization

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The high market prices of wheat flour in recent years have provoked the need to explore potential markets of other cereal flours as a substitute to wheat flour in ice cream cone production. Cameroon's agricultural sector currently employs over 68% of the active labor force, which makes its economy highly dependent on agriculture (Emmanuel, 2013). Maize (Zea mays) and cassava (Manihot esculenta) are two of the most cultivated crops in Africa, Cameroon in particular, with maize being the third most consumed staple food in Cameroon after cassava and plantain, respectively (Kagouanbe et al., 2017; Njukwe et al., 2010). This study was aimed at producing and optimizing ice cream cones from cassava flour and corn starch. Central composite design was used as a response surface methodology tool to study the effect of process parameters (time, temperature and blend ratio) of the cassava flour and corn starch on some of the physical and chemical properties of the cones. The optimized processing conditions of cones were found to be process time (11. 39 min), a process temperature of 178.14°C and a blend ratio of 80% cassava flour and 20% corn starch. The cone samples produced under these optimum conditions had a water absorption capacity of 81.67±1.15%, an ice cream permeability of 26.67±1.53min and a breaking strength of 2529±13.75N/m2, while the commercial sample had values of 64.67±0.58% for water absorption capacity, an ice cream permeability of 6.33±0.58min and a breaking strength of 1279±2.08N/m2.

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sciforum-101851: Development of mushroom-fortified soy meat by the application of extrusion-based 3D food printing

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Plant-based meat analogues have gained much interest in recent years and are considered a sustainable approach to overcoming protein malnutrition that is caused by increasing population numbers and decreasing animal-based meat production day by day. Plant-based meat alternatives were produced by applying several techniques, including high-moisture extrusion, twin-screw extrusion, electrospinning, and the application of soft-matter physics, but 3D food printing gave better results in terms of texturization and nutritional profiles. In this research, 100 g of soy protein isolate (SPI) was mixed with distilled water (30%, w/w) and oyster mushroom (*Pleurotus ostreatus*) powder was added at 4, 8, and 12% to obtain three samples. All the samples were blended to obtain a homogenous paste. An 80 mL syringe of extrusion-based 3D printer was filled with developed paste samples and the printing process was carried out to produce 3D chicken-nugget-shaped soy meat with 1.6 mm of nozzle size at room temperature. The printing performance, microstructure, texture, moisture distribution, and rheological properties were all assessed. The inks enriched with SPI showed good viscoelastic properties with pseudoplastic behavior. The mushroom powder gave a fibrous texture to the final product obtained. The addition of 8% mushroom powder gave the best results in terms of texture and rheological properties, as compared to all the samples under study. The sample with 4% mushroom powder had a less fibrous texture and the sample with 12% mushroom powder gave a more fibrous texture, but the product became too hard and was disliked.

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sciforum-097203: Drainage kinetics of pulque foams prepared with egg white protein

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Pulque is an ethnic and traditional beverage produced and consumed by the Mexican population; it is obtained from a fermentation process of certain varieties of Agave, and its final alcohol content is around 4 to 7 %. It is rich in protein and its carbohydrate content brings it a characteristic flavor; it has also been reported that there are some probiotic bacteria present in pulque. Due to its intrinsic nature, pulque undergoes a rapid fermentation with a non-pleasant odor and flavor. On the other hand, foams are a colloid system where the air bubble phase is dispersed in a continuous liquid phase. The foaming of liquids has been recognized as a method that shortens processes such as drying and preserves quality attributes. The present work studied the drainage kinetics of different pulque foams prepared with egg white in order to obtain a product suitable for further drying. Different egg white and pulque concentrations were evaluated, as well as whisking times. The drainage volume was recorded for a duration of 120 min, and foam density was determined among different experiments. It was found that the least volume was drained when whisking for 20 min, and the lowest foam density was obtained when egg white and pulque were mixed in a 2:1 ratio. The drainage kinetics of foam determines important information for its further use in a new product with pulque.

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sciforum-092230: Drying kinetics of apple pomace by-product using refractance window

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Apple pomace is a product obtained by pressing apples to obtain juices and other food products. The valorisation of this by-product is interesting to study because of its composition of bioactive compounds such as dietary fibre and phenolic compounds. The objective of this work was to study the kinetics of drying by the refractance window of apple pomase with a focus on the development of ingredients from this by-product. For this purpose, refractance window drying experiments were carried out with a thickness of 3 mm at three temperatures (70, 80, and 90°C) until reaching a moisture content of 10%. Drying curves, a calculation of effective diffusivity, and the activation energy were constructed. Drying data were modelled using the usual equations for the study of drying kinetics. Drying times varied according to the temperatures applied and times of 420, 330, and 270 minutes were obtained, respectively. On the other hand, the effective diffusivity data were within the usual thin film drying of vegetable products with values of 1.48, 1.85, and 2.92 × 10-10 m2/s. Finally, regarding the modelling of the drying data, the best fit was obtained using the Weibull model. In conclusion, refractance window technology allows the processing and valorisation of apple pomace resources that can be used in different food formulations by contributing its bioactive compounds.

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sciforum-098831: Effect of Different Gas Nanobubbles on Fermentation Pattern of Yoghurt Starter Culture

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Nanobubbles (NBs) have attracted great attention recently, offering a wide range of applications across various disciplines due to their unique properties. Fermentation is an age-old practice carried out for the preservation of milk and milk products, stirred yoghurt being one such product. In the present study, it was attempted to understand the effect of the incorporation of nanobubbles on the fermentation pattern of yoghurt starter culture (YSC) i.e., *Streptococcus thermophilus* and *Lactobacillus bulgaricus*, and the quality attributes of yoghurt thus prepared. Different types of NBs were prepared using compressed purified air, CO_2, O_2, and N_2 in water and milk systems using a bulk nanobubble generator. Average bubble concentration was found to be ~10^7 mL^{-1} while mean size was found to be 176.0 ± 3.5nm to 217.6 ± 6.9nm. It was observed that the types of NBs had a significant effect on the metabolism and microbial growth of the starter culture. Among the four different types of NBs, CO_2-NBs had a significantly positive effect on bacterial cell mass growth besides increasing viability in fermented milk. Our findings suggest that NB in general and CO_2-NB in particular have the potential to alter the fermentation pattern in fermented dairy products. Further, concerning the quality attributes of NB-incorporated stirred yoghurt, notable changes were observed in terms of viscosity, mouthfeel, and shelf life. A significant increase in viscosity of the NB-incorporated stirred yoghurt was observed as compared to the control sample, which may be attributed to milk protein–polysaccharide interaction at the interface of NBs. It is therefore concluded that NB technology has the potential to be applied as a new processing tool to easily tweak the fermentation pattern and physicochemical properties of fermented dairy products to meet the increasing consumer demand for innovative products with variable consistency and functionality.

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sciforum-099404: Effect of different non-conventional betalain extraction techniques on bioactive compounds and antioxidant properties of fresh and dried *Opuntia stricta* fruit

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A Tunisian cactus pear cultivar was studied for its betalains as a colorant- and health-promoting compound. Maintaining the stability of betalains during dehydration processes is crucial for their utilization in the food industry. This research supports the use of betalains as a natural alternative to synthetic colorants. The extraction procedure primarily focused on the purple fruit of *Opuntia stricta*, involving a total of nine techniques, encompassing both conventional and non-conventional approaches. Non-conventional methods involved microwave (MW) or ultrasound (US), either alone or in combination. In total, there were eight non-conventional methods and one conventional approach used for the extraction of betalains. Among these, four methods utilized a combination of MW (1 or 2min) and US (10 or 20min), while four methods employed either MW (1min) and MW (2min) or US (10min) and US (20min). The experimental conditions were optimized to maintain a constant temperature of 50°C for the extraction procedure, and water was utilized as a solvent. The extraction procedure used both fresh and dried plant material at two different drying temperatures, 40°C and 60°C, in order to evaluate the stability of betalain molecules. The potential of the colorant was assessed by examining the content of betalains and total phenolic content. The antioxidant properties were evaluated through the measurement of total ABTS radical scavenging. Among the fresh *Opuntia stricta* samples, the highest content of betalains was found in the MW (2 mn) and MW (2 mn)+US (10 mn) extraction methods, with 48.54±0.29 mg/100 g FW and 51.01±0.16 mg/100 g FW, respectively. However, the MW (2 mn) extraction method exhibited the greatest ABTS scavenging, with 128.78±4.32 mmol Trolox/100 g FW. Furthermore, the results indicated a significant decrease in betalain content when the plant material was dried at 40°C and 60°C, representing a reduction of 53.75% and 24.82%, respectively, compared to the content of betalains for fresh material.

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sciforum-099007: Effect of fermentation and legume flour incorporation on the structural properties of cassava starch (*Manihot esculenta*)

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The problems associated with wheat consumption have sparked a great deal of interest in the study of gluten-free flours, including sour cassava starch. Thus, the goal of this study is to determine the effect of fermentation, varietal difference and legume flour (*Arachis hypogaea* and *Vigna unguiculata*) incorporation on the structural modifications of starch granules. To achieved this, a structural analysis using Fourier-transform infrared spectroscopy (FTIR) and crystallinity determination using radiation diffraction were performed on native and modified starch, as well as legume flour and the composite flour. According to these analyses, there is a surface degradation of the granules characterised by an increase in the OH group and a decrease in the C-H, C-C and H-O-H groups, resulting in a decrease in the crystallinity of the starch responsible of the swelling ability on the 30th day of fermentation for varieties 96/1414 and YARA, and day 25 for variety TME15. There is also a decrease in crystallinity marked by an increase in C-H and -CH2/-CH3 groups, as well as the appearance of C=O groups with the incorporation of legume flours. This study suggests that genetic variation, fermentation and solar irradiation, as well as the incorporation of legumes, all have an impact on the structural properties of cassava starch in direct relation to their morphological, rheological and bread-making properties.

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sciforum-099149: Effect of hydro-extraction conditions on yields and physicochemical properties of refined sea salt

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Crude sea salt (CSS) is traditionally produced from evaporating the seawater in the saltpans where CSS crystalizes. In Cambodia, CSS has been dissolved and recrystallized using brine and by boiling the dissolved compound to produce refined sea salt (RSS). This method requires a long processing time and high energy consumption, and it may lose the chemical characteristics of the CSS, whereas hydro-extraction mainly focuses on mechanical washing without recrystallizing the CSS; therefore, this study employed the hydro-extraction method to investigate the effect of different CSS sizes (raw size, $2x \leq 3$, $1x \leq 2$, and $x \leq 1$ mm), salt-to-brine ratios (1:1, 1:2, 1:3, and 1:4 w/w), and washing duration (3, 5, 7, and 9 min) on the yields and physicochemical properties of RSS.

In the process, the particle size of the CSS was varied using a grinding and sieving machine. After that, the CSS was washed with different ratios of salt-to-brine and washing durations. The CSS after washing underwent a constant draining and drying process.

It was found that the CSS sizes had no significant effect on the yield, moisture, and whiteness of RSS ($p \geq 0.05$). In contrast, the salt-to-brine ratios differed significantly in yield and whiteness, while the moisture was not influenced. In addition, the washing significantly improved whiteness (p0.05), although it had no effect on the yields of RSS. The optimum conditions (raw CSS size, 1:2 (w/w) salt-to-brine ratio, and 5 min of washing time) obtained RSS with a yield of 92.27±2.64%, a moisture of 4.49±0.7%, and a whiteness of 85.84±0.25. The selected RSS was also detected using Ion Chromatography (IC) to determine its purity and chemical composition, including NaCl (97.47±0.13%), Ca (2.78±0.19%), Mg (1.28±0.06%), K (2.62±0.06%), NH_4 (0.93±0.06%), and SO_4 (2.92±0.42%).

These results indicate that hydro-extraction could improve the whiteness and purity of CSS and reduce impurities, while providing shortened processing times and minimizing yield loss. Consequently, the findings provide invaluable insights for the cost reduction and enhancement of CSS quality for food applications.

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sciforum-102877: Effect of soybean-to-water ratios on physicochemical properties, proximate composition, and sensory characteristics of soy yogurt

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Soy yogurt is made by fermenting aqueous extracts obtained from soybeans and is a type of plant-based dairy alternative withtextural sensory qualities and an ability to host viable lactic acid bacteria for long-term storage. This study aims to improve the quality of soy yogurt by investigating the effects of different soybean-to-water ratios on the physicochemical parameters, proximate compositions, and sensory properties of soy yogurt (SY). The shelf-life of selected SY was also determined at 4℃ for 14 days.

During soymilk making process, different ratios of soybeans and water (1:5, 1:6, and 1:7 w/v) under constant cooking conditions (100℃ for 20 min) were investigated. After cooking, the soymilk samples were cooled down, inoculated with commercial yogurt culture (L.acidophilus, Bifidobacterium amimalis, L. bulgaricus, and S. thermophilus), and incubated at 42℃ for 12h to obtain the SY for further analysis and sensory evaluation.

The ratios of soybeans and water significantly (p0.05) affected the pH, total acidity, total soluble solids, water holder capacity, and consistency of SY ranged between 4.13 and 4.39, between 0.26 and 0.59%, between 8.63 and 15.33 °Brix, between 37.83 and 73.68%, and between 7.83 and 18.15 cm/30s. The moisture, ash, protein, lipid, and carbohydrate content of SY had no significant
difference ($p>0.05$) between 83.22 and 89.39%, between 0.02 and 0.23%, between 2.81 and 4.94%, between 0.19 and 0.37%, and between 5.68 -and13.67%. However, the sensory evaluation of SY obtained from a 1:5 soybean-to-water ratio received the highest overall acceptance score of 6.38, compared to the SY using 1:6 and 1:7 ratios. The SY can also be safely consumed for up to 14 days of storage at 4℃ based on pH, total acidity, total soluble solids, and non-detectable microbial counts. Therefore, this study revealed that selecting a suitable amount of water in soymilk processing had a significant effect on nutritional, functional, and sensory qualities in SY with a long shelf life.

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sciforum-098915: Effect of the carotene fortification of a cucumber juice on shelf life with extracts from tomato by-products

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The food industry generates a great amount of tomato by-products, which are rich in health-promoting compounds. The extraction of such phytochemicals and their encapsulation is a promising alternative within a circular economy scenario that could be further used to supplement new foods. Therefore, the objective of this work was to fortify a cucumber juice with encapsulated carotenes from tomato by-products and study its shelf life. Tomato by-products were encapsulated with maltodextrin and extracts were obtained by spray-drying. They were incorporated into a fresh cucumber juice in a proportion of 5 g/L. The total antioxidant capacity (TAC) were measured weekly for 3 weeks at 4 °C using the frap method and epiphytic microbial load. High hydrostatic pressure (HHP) was used as the processing treatment (400 MPa for 4 min), while non-HHP-treated samples were used as the control (CTRL). The TAC in enriched samples increased from ~5 to ~25% compared to CTRL samples (HHP-untreated and without encapsulated tomato extracts); this observed increase was higher from the seventh day to the end of the study. The total vial count was reduced by ~ 56% log CFU/mL at day 0 and by ~69% log CFU/mL after 21 days at 4 °C in HHP-treated samples. No sensory alterations or physicochemical changes were perceived at any sampling time. Thus, carotene fortification with encapsulated extracts from tomato by-products can be a good tool to enhance the health-promoting compounds of vegetal beverages during a refrigerated shelf life.

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sciforum-099215: Efficient extraction and purification of cellulose from almond shell powder using natural deep eutectic solvents

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Introduction

One potential use of cellulose, abundant in lignocellulosic residues such as almond shells, is for bioplastic manufacturing. Natural deep eutectic solvents (NaDESs), non-toxic solvents, could be used to develop more sustainable methods for obtaining this polysaccharide.

Methods

The objective of this study was to purify the almond shell powder (0.5 mm) (ASP) into cellulose using an innovative process with a NaDES (chlorine chloride/urea 1:2) (4 h, 100 °C), followed by two $NaClO_2$ 1.3% (2 h, 75 °C) bleaching treatments and one H_2O_2 6% (1.5 h, 60 °C) bleaching treatment, to obtain enriched cellulose concentrates. Two control experiments were conducted: one using NaOH instead of NaDES as a conventional method and another applying only the bleaching treatments (blank). The ASP and the concentrates obtained were characterised in terms of composition (cellulose and lignin), colour (white index, WI), and FTIR spectra.

Results

The initial composition of ASP consisted of 19% cellulose and 33% lignin. The NaDES treatment yielded the highest cellulose (45%, p0.05) and lowest lignin content (7%, p0.05). Control experiments showed NaDES was more effective in delignification than NaOH (38% cellulose, 10% lignin) and underscored the necessity of the 4 h treatment as the blank showed the lowest cellulose (28%, p0.05) and highest lignin content (13%, p0.05). The WI was higher (p0.05) for NaDES (88%) compared to NaOH (70%) and the blank (67%). Additionally, the FTIR spectra for the NaDES and NaOH experiments showed the fading of the 1700 cm^{-1} peak corresponding to C=O bonds between lignin and hemicellulose.

Conclusions

The innovative use of NaDESs could represent an effective method for extracting and purifying cellulose from almond shell powder, offering a valuable approach for lignocellulosic waste materials upcycling.

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sciforum-103383: Efficient Extraction of Bioactive Compounds from Black Truffles: Comparing Supercritical Fluid and Pressurized Liquid Extraction Techniques

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Introduction

The black truffle (*Tuber melanosporum*) is a rich source of bioactive compounds, particularly polyphenols and antioxidants, which have been recognized for their potential health benefits. The high amount of by-products derived from truffle processing presents a valuable opportunity for obtaining bioactive compounds. This study focuses on the extraction of these bioactive compounds from black truffles using non-conventional extraction techniques, including supercritical fluid extraction (SFE) and pressurized liquid extraction (PLE). Moreover, the cytotoxicity of the obtained extracts is assessed.

Methods

The SFE parameters used in the present study were 30 MPa, 40°C, and 30 min of extraction at a flow of 16 ml/min and 10% EtOH. Regarding PLE, the parameters used were 100% ethanol, 3 cycles of extraction, and 120°C. Chemical characterization was performed through Total Phenolic Content (TPC), Trolox Equivalent Antioxidant Capacity (TEAC), and Oxygen Radical Antioxidant Capacity (ORAC) assays. Finally, PLE extract cytotoxicity was studied using human keratinocytes (HaCaT cells) through an MTT test at 24 h of exposure, in a concentration range from 0.0625% up to 1% (v/v) in medium.

Results

The PLE extract obtained higher values than the SFE extract in the TPC assay. Moreover, a higher antioxidant activity was detected for the PLE extract in comparison to the SFE extract: 402.80±84.85 μM TE vs. 31.67±15.16 μM for TEAC assay and 3531.36±906.84 μM TE vs. 1875.72±906.84 μM TE for ORAC assay, respectively. Finally, the cytotoxicity study revealed that none of the tested concentrations decreased cell viability by more than 25% compared to the control.

Conclusion

PLE is more effective than SFE in obtaining bioactive compounds from black truffles, providing higher antioxidant activity and phenolic recovery.

Acknowledgements

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sciforum-103451: Encapsulation of essential oil lemon and physicochemical characterization of the encapsulated powders

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Essential oils (EO) can be obtained from the waste products of lemon production, and are highly valued by the pharmaceutical and food industries. It should be noted that they are very susceptible to deterioration reactions, which is why spray encapsulation is frequently used.

The objective of this work was to obtain and characterize the EO obtained by hydrodistillation of the epicarp of fresh lemons (*Citrus limon* L.) and combine them with different matrices as a tool to improve the quality and physical stability of dehydrated systems. Maltodextrin, commercial saccharose and starch were used to prepare two emulsions containing EO. The powders were obtained by spray drying. The constant operational conditions were: inlet and outlet air temperature at 98 and 68 °C, respectively, flow rate 8 mL/min, air pressure 3.2 bar, and nozzle diameter 1.5 mm.

The physicochemical characterization´s EO was carried out by pycnometry (20°C) and by the refractive index (20°C).

The aroma composition´s EO was determined by GC–MS and FT-IR. The inclusion complexes were characterized by differential scanning calorimetry (DSC) and by their sorption properties.

The D'Arcy-Watt and GAB models were used to describe the data obtained. Both models were complementary for the best interpretation of the water sorption mechanisms and the structure of the wall material.

These data are necessary for a sustainable use of subproducts.

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sciforum-099212: Enhancing double-layer emulsion stability with ultrasound technology: application of citrus residues for improved sustainability

Mónica María Umaña Zamora *, Miguel Ángel Moreno Armijo, Valeria Eim, Esperanza Dalmau and Antoni Femenia

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Introduction

In the food industry, emulsions are crucial components of various products. The use of ultrasounds in the preparation of emulsions is gaining attention due to their ability to stabilize emulsions through cavitation effects. Double-layer emulsions stabilized using proteins and polysaccharides are particularly noteworthy due to the natural origin of these polymers. Natural polysaccharides, such as pectins, can be sourced from citrus industry residues, with oranges contributing approximately 50% of their weight as waste.

Methods

This study investigates ultrasound application by probe (154±10 W/L) or by bath (50±4 W/L) in the stabilization of double-layer emulsions containing sunflower oil (4% of the emulsion) in water, soy protein (0.3% of the emulsion), and either commercial pure pectins (Sigma Aldrich) (0.2% of the emulsion) or an orange residue rich in pectins (23±1 g/100 g dry base) (2.4% of the emulsion). The emulsions were analyzed by assessing their viscosity, creaming index, and microstructure and the best emulsion was spray-dried to microencapsulate the oil.

Results

The results indicated that applying ultrasound via a probe to emulsions with commercial pectin compromised its microstructure, causing flocculation. In contrast, ultrasound applied via a bath led to smaller droplets (31% smaller median droplet size) without damaging the microstructure. For emulsions prepared with the orange by-product, both ultrasound methods produced smaller droplets, reduced viscosity by approximately 10%, and the creaming indices were 93% and 50% lower for probe and bath applications, respectively, compared to emulsions without ultrasound, but the emulsion treated with probe showed some flocculation. The orange residue emulsion treated with bath was spray-dried and showed a high encapsulation efficiency of the oil (83%).

Conclusions

These findings highlight the potential of ultrasound treatments to enhance emulsion properties. Additionally, the use of citrus residues as a natural pectin source offers a sustainable solution for waste valorization in the food industry.

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sciforum-099808: Evaluation of the Efficiency of Continuous Refractance Window Drying on the Kinetics and Physical Properties of Apple Slices Compared to Hot Air and Sun Drying

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Refractance Window (RW) drying is a new drying system designed to produce high-quality dried or concentrated food products. In this study, continuous RW drying, designed and constructed at the Khorasan Razavi Agricultural and Natural Resources Research and Education Center, was used. To evaluate the efficiency of the RW system, thin slices of apple were dried using this system and compared with samples dried by hot air drying and sun drying methods. Subsequently, drying time curves and physicochemical tests (color, texture, vitamin C content) and sensory evaluations were conducted on the samples.

The results showed that the drying method had a significant effect on the physicochemical properties of the apple slices. The drying time in the RW method was significantly (p 0.05) shorter than in sun drying and hot air drying. The content of soluble solids increased after drying. The highest vitamin C content in apples dried by the RW method was 8.41 mg per 100 grams, which was 0.24% and 0.06% significantly (p 0.05) higher than in apples dried by sun drying and hot air drying methods, respectively . Additionally, the results indicated that the force required to break the texture of apple slices dried by the RW method was 0.38% and 0.12% less than in apples dried by sun drying and hot air drying methods, respectively. The brightness of the apple slices dried by the RW method was significantly (p 0.05) higher than those dried by the other two methods. Sensory evaluation results showed that the RW-dried product scored higher in terms of color, aroma and flavor, texture, and overall acceptance compared to the other two drying methods.

Keywords: Refractance Window, drying, apple, physicochemical properties, sensory evaluation

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sciforum-099290: Exploring Phenylalanine Gels: Innovations in Food Gelling Agents

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Gelling agents are critical food additives which are responsible for the texture, stability, appearance, and nutritional quality of many products. Usually, polymeric substances are used for this purpose. Low-molecular-weight (LMW) gelators, in particular phenylalanine (PHEN), yield supramolecular gels and have been investigated for their potential use in pharmaceuticals, bioremediation, and cosmetics. PHEN's structural properties allow for the formation of three-dimensional networks through hydrogen bonding and π–π stacking interactions. However, the derivatisation of amino acids and use of organic solvents limit their use in food products. This study proposes new formulations of PHEN gels using GRAS substances, making them suitable for consumption.

Sol-gel systems consist of a mixture of PHEN, water, and propylene glycol. A 1% PHEN solution in 1:1 water/propylene glycol gels when cooled or stirred. Rheological behaviour was analysed at varying PHEN or propylene glycol concentrations. Also, to assess reactivity towards non-enzymatic browning, 1% or 10% xylose was added and the mixtures were heated at 60°C.

Mechanical spectra and viscoelastic properties of the gels were analysed. Pseudogel behaviour improved with PHEN concentration. The sol-gel transition temperatures of various formulations increased linearly with PHEN concentration and decreased with increased propylene glycol. The 1% PHEN formulation in 1:1 water/propylene glycol presented a transition temperature of 58.7°C. Systems with 1% or 10% xylose presented transition temperatures of 44°C and 49.6°C, respectively.

PHEN gel viscosity increases with stirring, rendering upscaling costlier; low stirring speed, high temperature, or composition changes must be considered. Lower stirring delays maximum viscosity linearly, and non-enzymatic browning follows first-order kinetics. Thus, the combined effects of these variables should be analysed in processing design and product development.

When mildly heated, PHEN gels release a floral aroma that could enhance tea-like blends, making them promising alternatives for food products, either desserts or appetisers with special texture and flavour.

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sciforum-098826: Extraction of astaxanthin from shrimp (*Parapenaeus longirostris*) waste in sunflower oil

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Astaxanthin, a powerful antioxidant carotenoid pigment, occurs naturally in marine organisms, including shrimps, crabs and microalgae. It has a range of beneficial biological potentials, namely antioxidant, anti-inflammatory and anti-cancer activities. Astaxanthin can be extracted from the shells and waste of shrimp and other crustaceans by methods such as solvent extraction, enzymatic extraction, supercritical fluid extraction, etc. This study used three different methods to extract astaxanthin from shrimp (*P. longirostris*) waste. The shrimp waste was freeze-dried, ground and extracted in cold-pressed sunflower oil i) in a water bath at 40 °C and 60 °C for 1, 2 and 3 hours; ii) with continuous stirring at room temperature for 6 hours; and iii) using ultrasound-assisted extraction (UAE) at 40 kHz, 40 °C and 60 °C for 15, 30 and 45 minutes. After extraction, the oils were centrifuged and filtered to remove the shrimp waste. The amount of astaxanthin was measured by spectrophotometric analysis, and the results were expressed in µg astaxanthin/mL oil. The extraction efficiency values showed the highest amount of astaxanthin in the sunflower oil was extracted with UAE at 60 °C for 45 minutes (4,03 ± 0,00 µg/mL), followed by the sample extracted with the same method at 60 °C for 30 minutes (3,68 ± 0,01 µg/mL). The lowest amount of astaxanthin was found for water bath extraction and ranged from 1,97 ± 0,01 to 2,98 ± 0,15 µg/mL, while the amount of astaxanthin in the extract prepared by constant stirring for 6 h was 3,13 ± 0,03 µg/mL. This result indicates that UAE is more efficient and less time-consuming in extracting higher concentrations of astaxanthin from shrimp waste, which could improve the economic and environmental sustainability of shrimp waste's utilization.

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sciforum-098712: From salt marshes to the plate: Could *Salicornia ramosissima* by-products be a promising functional ingredient for foods and nutraceuticals?

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Salicornia ramosissima is an edible halophyte that has been commercialized in the European market as a promising crop rich in polyphenols, minerals, and vitamins [1, 2]. Despite the culinary uses of *S. ramosissima*, the leaves and shoots that it produces throughout the rest of the year are considered as biowaste. Nevertheless, this by-product is rich in pro-healthy compounds with interesting bioactivity. Hence, the repurposing of *S. ramosissima* by-product as a functional ingredient may be a valuable opportunity for agri-food industries [2].

The present study evaluates the influence of in vitro gastrointestinal digestion on the bioaccessibility, antioxidant/antiradical properties, antioxidant enzyme activities, and neuroprotective effects of *S. ramosissima* by-products (SPs) and its aqueous extract (SE), when prepared using an eco-friendly conventional technique. The cell viability was assessed on the same intestinal cells.

The phenolic and flavonoid concentrations of SEs and SPs increased during in vitro digestion, achieving 208% and 120% bioaccessibility, respectively. Likewise, the antioxidant/antiradical properties improved upon digestion, while the phenolic profiling unveiled that the polyphenols underwent metabolic biotransformation via the action of digestive enzymes and pH. Both SPs and SEs revealed radical scavenging potential, especially for $O_2^{\bullet-}$ (53% and 91% inhibition, respectively, for SP and SE), along with neuroprotective properties (31% and 22%, respectively) upon digestion. Additionally, SPs and SEs upmodulated the activities of superoxide dismutase (57% and 26%, respectively), catalase (53 and 43 nmol/min/g dry weight (DW)), and glutathione peroxidase (53 and 125 U/g DW), as well as protected against lipid peroxidation (1638 and 2164 nmol malondialdehyde/g DW). The extract safety was attested on the intestinal cells up to 250 µg/mL.

This study provides new insights into the influence of gastrointestinal digestion on the phytonutrients of *S. ramosissima* biowaste, sustaining its repurposing as a functional ingredient for foods and nutraceuticals endowed with promising health benefits.

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sciforum-098867: Green and Scalable Process for the Production of High-purity C-phycocyanin from *Arthrospira maxima*

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Food- and cosmetic-grade C-Phycocyanin leads to *Spirulina* (*Arthrospira*)-derived products with the highest potential commercial value, but its production is still a significant challenge due to economic issues and green metrics, with scalability at required purities. In this study, an efficient purification method for C-Phycocyanin of analytical grade in foods was developed. C-Phycocyanin was efficiently extracted and purified using ultrasonic extraction combined with pH shifting and purification with activated charcoal, achieving significantly increased purities from 0.45 to 3.31. Activated charcoal was used with the following optimal parameters: 4% (w/v), pH 5.0, and a mixing speed of 200 rpm for 2 min at room temperature (25 ℃). Further research was conducted to investigate the kinetic adsorption of C-Phycocyanin and total proteins on activated charcoal using the Langmuir, Freundlich, and Temkin isotherm models. The results indicated that the Langmuir isotherm model was suitable for the adsorption of C-Phycocyanin onto activated charcoal, while the Freundlich isotherm model was more appropriate for the adsorption of total proteins. These findings suggest that activated charcoal is more effective in removing heteroproteins other than C-Phycocyanins under the purification conditions studied. After purification with activated charcoal, the proportion of C-Phycocyanin in the total proteins increased from 31.2% to 51.5%. This study provides additional evidence that activated charcoal treatment is a viable purification step for C-Phycocyanin after the pH-induced precipitation of contaminants. This study presents a cost-effective and scalable preparation process for the efficient purification of high-purity grade C-Phycocyanin from Arthrospira maxima, which can be utilized extensively in the food and cosmetic industries.

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sciforum-099924: Green solvent extraction of pitaya (*Stenocereus* spp.) seed oil.

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Pitaya fruit (Stenocereus spp.) is recognized for its nutritional benefits and antioxidant profile. This fruit is usually consumed as fresh pulp. The seeds and peel are agroindustrial wastes and comprise between 22 and 29% of the fruit's mass. The oil derived from pitaya seeds is of great interest for various industrial applications. This study aims to evaluate the impact of different green solvents on the efficiency of pitaya seed oil extraction, thereby enhancing the valorization of these agroindustrial wastes. The green solvents evaluated included ethanol and supercritical CO2 (SC CO2), with hexane used as a reference. The extraction methods included the Soxhlet technique using ethanol and hexane, while SC CO2 extraction was conducted under two conditions: 180 bar at 50 °C (C1) and 250 bar at 35 °C (C2). Oil yield was determined by weight differences for each method, revealing yields ranging from 4.9% to 24.7%. Hexane showed the highest yield (24.7 ± 0.5%), followed by SC CO2 (C2: 15.3 ± 0.1%, C1: 5.0 ± 0.1%) and ethanol (6.8 ± 0.8%). These findings underscore the varying efficiencies of each solvent in extracting pitaya seed oil. By supporting the circular bioeconomy, this research promotes the utilization of agricultural by-products, aligning with current trends toward environmentally friendly practices. The subsequent phase involves evaluating the fatty acid profile of the oil obtained using green solvents.

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sciforum-102804: Impact of cold plasma on the quality of peach juice

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Peach juice is a sweet and refreshing beverage rich in vitamins, minerals, and antioxidants, making it a popular choice for those seeking a healthy and delicious drink. Cold plasma, an innovative non-thermal technology, uses ionized gas to destroy bacteria, retain nutrients, and improve food products (including juices) all without compromising their flavour, texture, or nutritional content. This study focuses on how cold plasma, a unique non-thermal technology, affects peach juice quality in terms of colour change, antioxidant activity, phenolics, vitamin C, and Bacillus inactivation. The initial confirmation of the primary determinant for CP treatment, aside from treatment duration (4, 6, and 8 minutes), was the oxygen concentration (0, 1%, and 1.5%) of ionized gas. A longer treatment and higher oxygen concentration considerably accelerated the Bacillus death rate. When CP treatment was used instead of thermal treatment, phenolics were significantly higher, and the peach juice's original colour was better preserved. A comparatively lower exposure duration to CP was proposed regarding vitamin C. Increases in oxygen content in antioxidant tests led to rising trends in antioxidant activity in the DPPH and ABTS assays. This study demonstrates that cold plasma technology can effectively enhance the quality of peach juice by inactivating microorganisms, preserving nutrients, and maintaining its original colour and flavour, making it a promising non-thermal alternative to traditional thermal processing methods.

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sciforum-102991: Impact of the filtration process on the chromatographic, isotopic, and color profile of Tequila 100% Agave

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Tequila is produced by fermenting and distilling juice extracted from the Agave tequilana Weber blue variety. The distillate can undergo a maturation process in wooden barrels, affecting its sensorial properties, particularly the amber color that is characteristic of aged spirits. However, several consumers have sought a product with the same profile as an aged, extra-aged, or ultra-aged class but without its characteristic color. This has been obtained through a selective filtration process (using activated carbon and cellulose filters) that allows the color to be removed without losing the aromatic profile; in this process, the product has been named *Cristalino*. In the present study, there are six sets of samples, each set divided into two groups, as follows: 1 (aged or extra-aged) and 2 (aged or extra-aged filtered: *Cristalino*). The samples were analyzed to evaluate their physicochemical profile. The analyses consisted of isotope ratio mass spectrometry, gas chromatography, liquid chromatography, UV–Visible spectroscopy, and color study using digital image processing. The results corroborated that the chromatographic profiles (mg/100 mL A.A.)—higher alcohols (293.40), methanol (202.05), esters (33.07), aldehydes (5.74), and furfural (0.67)—do not present statistically significant differences between groups ($p>0.05$). In the case of isotopic ratios, $d^{13}C_{VPDB}$=13.07‰ and $d^{18}O_{VSMOW}$=20.91‰ exhibited values that corroborate that the sugar source was from *Agave tequilana* Weber blue variety, and it is not affected in the filtration process. On the other hand, the UV–Vis spectra show two absorption bands at 280 and 365 nm, which are related to the total polyphenols and total flavonoids (found only in group 1). The high presence of flavonoids in an oxidizing medium results in the formation of complexes that give the characteristic amber color of aged beverages, which can be quantified from the values of the RGB color model. It was concluded that filtration selectively removes color while preserving the chromatographic profile, confirming that Tequila Cristalino is a Tequila 100% agave aged or extra-aged without color.

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sciforum-102747: Improving energy gel technology: searching for solutions to create an environmentally friendly product

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There are many products on the market in relation to special sports nutrition. The main requirement for these products is the ability to quickly restore energy losses during high physical exertion, which is achieved by introducing maltodextrin into the formulation. In addition, it should have a pleasant taste and convenient eco-friendly packaging, be convenient for consumption on-the-go, and contain a high number of calories in a small volume. Improving the technology of energy gels, taking into account the above requirements, can be considered as a comprehensive solution in the following three domains: 1) replacing artificial sweetener with natural honey; 2) using plant-based powder as a source of natural dyes and flavors; and 3) using environmentally friendly packaging.

The purpose of this study was to discuss these solutions to improve technology to create an environmentally friendly product. The possibility of replacing artificial ingredients in energy gels with natural ones has been demonstrated. The latter discusses honey as a natural sweetener containing a combination of glucose and fructose. A new solution for creating this product could be the use of plant-based powders (for example, hibiscus, black rowan, etc.) as natural flavors and colorants.

Plastic foil makes up a significant part of the existing packaging of energy gels. A comprehensive solution for improving the energy gel and its sustainable packaging is the recycling of polyethylene film laminate with different structures. Non-recyclable packaging with aluminum foil has one positive point, namely its high barrier to oxygen, moisture, and UV radiation. Usually, polyolefin packaging does not have a barrier to oxygen and UV radiation. Our goal was to provide polyolefin barrier properties while maintaining the possibility of recycling. An additional requirement for packaging is the ability to print all the necessary information on it.

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sciforum-098916: Increasing the Oxidation Stability of Vegetable Oils

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Introduction. Vegetable oils always contain some amount of oxidation products. Primary oxidation products turn into secondary ones during oil extraction and refining, all of which worsen the oxidative stability and safety of oils. Therefore, for oils that have already accumulated noticeable amounts of oxidation products, it is necessary to expand the list of methods for their extraction. Fat oxidation products are chemically active compounds; their interaction with safe food reagents with the subsequent removal of reaction products is a cheap and effective method for improving the quality of oils.

Methods. Methods for determining acid, peroxide, anisidine, and epoxy numbers of vegetable oils, as well as kinetic and chromatographic methods of analysis were used.

Results. It was proven that under the influence of ethyl alcohol in the presence of an acid catalyst (sulfuric acid), 70-95% of peroxides were removed from oils. In this case, the smell and taste of oxidized oil completely disappeared. The kinetics of changes in the content of peroxides and aldehydes under different process conditions was studied. The optimum temperature of the process was 70 °C. As a result of using an aqueous solution of ammonium carbonate, 40-60% of peroxides were removed. Urea in the presence of an acid catalyst reduced the content of peroxides and epoxides by 60-92%. Aqueous solutions of sucrose and fructose, and glycerol with an acid catalyst also proved to be effective. The reaction products were removed by washing the oil with water, after which the oil was dried under conditions of a shallow vacuum.

Conclusions. The list of methods for reducing the content of oxidation products in vegetable oils has been expanded. As a result of processing oils with safe, inexpensive components, it is possible to increase the oxidative resistance of vegetable oils or restore their quality indicators after use as deep-frying fats.

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sciforum-098984: Innovative and sustainable plant-based solutions for geriatric health: Fermented plum surplus products to combat dysphagia, hydration, and strengthen the gut microbiota

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The institutionalised geriatric population faces challenges, such as prebiotic and probiotic deficiencies, dysphagia, and dehydration. The current widespread use of dairy derivatives to address these challenges has limitations, including lactose intolerance and overprocessing of foods, which can reduce or eliminate beneficial microorganisms and molecules in the digestive system. It is essential to provide foods with an appropriate texture to alleviate swallowing problems and with high water content for proper hydration that is lactose-free and rich in probiotics and prebiotics to support the gut microbiota. This highlights the need to develop plant-based alternatives to effectively address these specific needs.

To this end, in the controlled fermentation of surplus plum (*Prunus salicina* Lindl.), the use of natural gelling agents in combination with high-pressure treatment has been investigated as a potential strategy for stabilising, texturising, and producing non-dairy products.

After the controlled fermentation of plums with *L. plantarum*, the texturisation effect of high-pressure treatment (5 min at 600 barg) was assessed after the addition of potato starch (7.5% w/w) and soy lecithin (1% w/w) or aloe vera gel at increasing concentrations ranging from 10 to 20% by weight to obtain the same effect.

Qualitative analyses revealed that the combination of these gelling agents and high-pressure treatment produced a texturing effect comparable to that of traditional dairy-based products on the market. Our findings indicate that incorporating these plant-based food ingredients into food product formulations can improve their overall composition and provide an alternative to dairy-based products for lactose-intolerant individuals and the elderly population. This approach promotes sustainable food production practices and provides consumers with healthier options through the addition of bioactive phytochemicals.

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sciforum-101961: Innovative Confectionary Product with Nutritionally Improved Status

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Regarding the importance of sustainability, as well as the emphasis that is put on consumer health, the aim of this research study was to formulate some non-allergenic waffles by using chickpea can liquid (aquafaba) and an oleogel formed with glycerol monostearate (5%) and sunflower oil, as well as gluten-free oat flour. Aquafaba was standardized at different concentrations, namely 7%, 14%, and 21%, respectively, followed by whipping it. It was observed that the whipping time decreases whilst the aquafaba concentration increases. The foams obtained previously were used to formulate the waffles, observing that as the aquafaba concentration increases, the textural properties of the waffles, which were analysed by using the CT3 Brookfield texturometer, are negatively affected. In the end, eight different samples were formulated using an experimental protocol like that of DesignExpert, by varying two different aquafaba concentrations—7% and 14%—the whipping time of 3 and 9 minutes, and the fat used—oil or oleogel, respectively. By determining the mineral content using the calcination method and the protein content using the Kjeldahl method, it was proven that their contents increase with aquafaba concentration. After the instrumental analysis of colour using the NR0 (3NH, Shenzhen, China) colorimeter and the analysis of the texture parameters (such as hardness and cohesiveness), it was observed that there are no significant differences between the samples regarding colour and cohesiveness, whilst the hardness of the waffles was influenced by the presence or the absence of the oleogel in the recipe. The increase of aquafaba concentration offers a better nutritional value for the product by increasing the amount of minerals and proteins; however, other characteristics, such as colour and cohesiveness, are not significantly influenced.

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sciforum-099281: Innovative Technologies to Increase Bioactive Compounds in Carrots of the Chantenay Variety

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Carrots have become a functional food ingredient, providing various nutraceuticals such as carotenoids and phenols. Postharvest treatments (cutting and UV-C radiation) can increase the content of bioactive compounds in carrots, prior to their incorporation as an ingredient in food formulations. In this work, the effect of cutting (shredding) and different doses of UV-C radiation on the content of phenolic compounds and antioxidants, as well as the color of carrots of the Chantenay variety, was evaluated. Carrots, obtained from producers in Santiago del Estero-Argentina, were washed, disinfected in a chlorine solution (200 ppm, 5 min) and drained. The ends of the carrots were cut and grated using a food processor. The samples were then subjected to the different treatments: T1 (control): grated carrots; T2 (control + I): samples incubated at 25 °C for 24 h; T3-5 (UV-C): carrots with applied doses of UV-C: 10, 25 and 50 kJ/m2; T6-8 (UV-C + I): carrots incubated after being treated with the UV-C doses; T9-11 (I + UV-C): carrots incubated before UV-C. All treatments showed higher total phenol content with respect to the control (2.71 mg/g). UV-C treatments registered an increase of approximately 10%; however, when UV-C was combined with incubation, the increase was significantly higher, approximately 56 and 45% when performed before and after UV-C, respectively. I + 50 kJ/m2 treatment exhibited the highest value (6.97 mg/g). Antioxidant capacity presented similar behavior to total phenols. As for color parameters, no significant differences were observed without deterioration of visual quality. Thus, the application of stress by cutting followed by incubation and UV-C radiation would induce a higher accumulation of bioactive compounds, which would benefit the obtention of a carrot flour to be used as a new food ingredient with improved functional properties.

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sciforum-102489: Legume-based aquafaba as an ingredient in sponge cake formulation: physicochemical characterization and consumer acceptability

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In the current study, sponge cakes were developed by completely replacing eggs in a sponge cake recipe with legume-based aquafaba. Aquafaba (Af), the boiling water from chickpeas (AfC), soybeans (AfS) and lentils (AfL), was standardized at 13 ^{0} Bx. The protein content and total ash were determined according to AOAC-approved methods (950.48 and 923.03). In this study, 70% of Af was whipped for 10 min with sugar and 30% of Af was mixed with sunflower oil. The wet ingredients were mixed with the flour. The dough was poured in pans and baked for 45 min. at 180 ℃. The cakes were characterized in terms of water content (AOAC 925.09 method) and textural attributes (TPA test wit TA11/1000 probe, 40% compression), with a CT3 Texture Analyzer. The whiteness index was calculated from the LAB color parameters (NHR 300 colorimeter Shenzhen, China) and sensory acceptability was tested. The reference cake presented a 25.72±0.15% water content, while the cake with AfC presented 31.35±0.09%. The hardness of the cakes varied between 506.25 and 450.75, which is higher than what was registered for the reference containing eggs (389.75 g). Adhesive force was higher only for cakes formulated with AfL. The elasticity and cohesiveness of the samples can be improved. The crumb of the reference presented the highest value of whiteness index (60.29±0.99), followed by the sample with AfL (50.63±1.69). In the acceptability test, parameters such as color obtained a higher score than the reference for samples containing AfL and AfC, while for smell AfC scored similarly to the reference. Through the development of this technology, it is possible to obtain an egg-free sponge cake using a sustainable ingredient, leading to products with good textural properties, similar color parameters and promising results in terms of acceptability. The product represents a healthy and tasty alternative, suitable for vegan consumers or those with a specific egg-free diet.

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sciforum-103361: Managing Wastewater Contaminant Treatment via Food Byproduct-based Biochars

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Wastewater treatment is a significant part of food engineering and industry, during which a crucial step is to effectively absorb and remove contaminants from the water. To solve this issue, in this study, a series of biochar products were obtained from various food and agricultural byproducts and used as filtering materials for wastewater. Additionally, different approaches for producing large-scale biochar products were developed.

In the preliminary work, one type of biochar was harvested via the pyrolysis of corn cob stalks, and another type was obtained through the gasification of poultry litters. The effects of the experimental conditions on the yields, compositions, and physicochemical properties of the biochar products were investigated in order to optimize the processing products.

In the wastewater treatment application, the biochar products were ground into particles (with an average size of 213.09 μm) and used as filtering material against simulated flowing wastewater that contained ammonia or microplastics, which commonly exist in wastewater in the food processing industry. The preliminary tests demonstrated that the biochar-based filtration systems could effectively absorb the target contaminants and remove them from the water. The results showed that depending the amount of biochar usage and the level of wastewater loading, the removal rate of ammonia could reach up to 73.56%, while the removal rate of microplastics could reach up to 97.39%. Though more investigations are required, the results indicate the great potential capability of biochar as a filter and absorbent for treating wastewater contaminants.

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sciforum-099172: Mathematical Modeling of Thin-Layer Drying of Opuntia Ficus-Indica Peels

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Opuntia ficus indica is a popular summer fruit in Tunisia. It is primarily produced in arid and semi-arid regions and has significant economic implications for rural communities. It is typically sold in local markets as a whole fruit or after removing the peels from the edible pulp. Despite their rich composition in nutrients and bioactive compounds, their peels are undervalued. Within this context, the current study focuses on the potential for peel valorization through the dehydration process. This unit operation is required to reduce the initial high moisture content (about 80%) of fresh peels while preserving their bioactive compounds.

For the experiment, fresh *Opuntia ficus-indica* peels were collected and sliced into rectangular shapes (5 cm x 4.3 cm) before being placed in trays in a hot-air convective dryer. Three different temperatures (55, 65, and 75°C) were examined. Drying kinetics were determined by measuring the variation in wet mass peels at 20-minute intervals until a constant mass of dried peels was obtained.

The drying kinetics were investigated to determine the diffusion coefficient during the falling rate drying stage. The diffusion coefficient increased from $6.3*10^{-08} \pm 1.38*10^{-10}$ to $7.9*10^{-08} \pm 9.18*10^{-11}$ $m^2.s^{-1}$ with increasing temperature in the range of 45-75°C. An activation energy value of 24.69 $kJ.mol^{-1}$, for the *Opuntia ficus-indica* peel drying process, was deduced from the slope of the linear Arrhenius equation (R^2=0.97). Moreover, seven mathematical models were applied to the experimental data. The goodness of fit was assessed using R^2 and reduced chi-square (χ^2). The Page and diffusion models best described the convective drying behavior of *Opuntia ficus-indica* peels.

In conclusion, modeling the drying process of *Opuntia ficus-indica* peels contributes to reducing the requirement for the laboratory experiments necessary to design suitable equipment and to adjust process parameters according to specific needs, while maintaining regular dried product quality.

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sciforum-098949: Microwave Drying Versus Hot-Air Drying of Mixed Apple and Ginger Pomace

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Apple and ginger pomace is a by-product that can be valorised by drying and further grinding it into flour to be used in cakes, for example, adding fibre and phenols, with antioxidant and antimicrobial properties, to their composition. Drying is one of the most energy- and time-consuming processes and must be optimised to be more sustainable. The pomace was subjected to drying through two different methods: hot-air drying (HAD; Excalibur, model 4900, U.S.A.) and microwave drying (MWD; Samsung, MS23K3513AW, Ireland). HAD was performed at 45, 62, and 70 °C, whereas MWD was carried out at 100, 180, and 300 W. Mathematical models were tested to fit the kinetics of the moisture ratio (MR); the drying time was predicted through the models and the specific energy consumption was calculated for each experiment. Crank's model presented a good fit ($R^2 > 0.977$; χ^2 13.5E-03 RMSE 11.0E-02) of the HAD kinetics, with an apparent diffusivity coefficient between 2.28E-10 and 4.83E-10 m^2/s and an energy of activation of 23.9 kJ/mol; meanwhile, Midili's model presented a good fit (χ^2 9.5E-05; RMSE 9.1E-03) of the MWD kinetics. The drying time was calculated to achieve 12 % moisture content using these models with the parameters determined for each experiment. It resulted in being between 125 and 236 min for HAD and between 14 and 61 min for MWD, being 4 to 9 times lower in MWD. The specific energy required was 410.78–453.75 kWh/kg for HAD, whereas it was 1.32 – 2.26 kWh/kg for MWD. Due to its low energy consumption and short drying time, the MWD is more promising for drying apple and ginger pomace than HAD, reducing the environmental impact of the drying process.

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sciforum-099232: Mucoadhesion ability of protein and starch from lotus (*Nelumbo nucifera Gaertn.*) seeds, relative to milk casein, gelatine and gum arabic as well-recognized mucoadhesive biopolymers

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This study investigated the mucoadhesive properties of two polysaccharides [lotus seed starch (LS) and gum Arabic (GA)] and three proteins [lotus seed protein (LP), casein (CA), and gelatine (G)]. Different in vitro tests were carried-out to study the biopolymeric mucin interactions including mucin adsorption assay, turbidity development over 6 hours, and viscosity increase ("force of bioadhesion"). The free thiol content of proteins was also measured as one of the underlying mechanisms for adhesion. The biopolymers were studied at different concentrations (0.25-1% for polysaccharides and 2-10% for proteins, except G, which was studied at 1-5% due to its high gelling capacity). The effect of biopolymer modification on its ability as a mucoadhesive was also studied. Proteins underwent thermal treatment (H, 85 °C/30 min), ultrasounds (US, 50% amplitude at 40 °C/30 min), or heating followed by ultrasounds (H+US), while polysaccharides were treated with US only. The results showed a descending order of mucoadhesion: GA > LS > CA > G > LP. GA and CA had higher mucin adsorption than LP and LS. Increasing LP concentration decreased mucoadhesion, while CA increased adhesion, peaking at 10% protein content. However, gelatine showed maximum adhesion at 3%, which declined at higher concentrations; GA and LS had optimal mucin adsorption at 0.5%, with no improvement beyond this concentration. In addition, Casein's higher thiol content correlated with stronger mucoadhesion. Intact or heat-treated gelatine had high mucoadhesion, unlike US or H+US treatments, which reduced it. However, US treatment increased LS's ability to bind mucin, while LP showed no significant changes with any treatment. Therefore, these findings suggest the potential for using mucoadhesive biopolymers in food applications to prolong retention time on the mucosa, aiding in salt reduction without compromising taste.

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sciforum-102317: Mushrooms: a fortifying agent for wheat bread

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Bread is one of the most frequently consumed staple foods worldwide, and its production presents numerous challenges in terms of ensuring quality, shelf life, and nutritional content. In addition to these issues, providing sufficient food for the growing global population in the face of climate change is a major scientific concern. One potential solution to this problem is the exploration of new sources of nutritionally important compounds such as insects, algae, and mushrooms. Building on this, the current study examined the fortification of wheat bread with dry mushrooms. The following three different mushroom species were selected for this study: Agaricus bisporus (a commercially cultivated species), Suilis Luteus, and Boletus Edulis (common wild mushrooms). The mushrooms were dried and used to fortify wheat bread, a common bakery product in Europe. This study utilized two levels of mushroom fortification to prepare bread, which was compared to standard wheat bread. The resulting products were assessed using chemical composition analysis (protein content, fat, ash, and dietary fiber), organoleptic evaluation, and staling assessment (loss of water during storage). The findings indicate that the proposed fortification method has a significant impact on the nutritional value by means of higher dietary fiber content and to extend bread freshness due to bounding water in the loaf. On the other hand, overall baking characteristics, as well as consumer acceptance, remain high when compared to standard bread.

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sciforum-103324: Navigating the New Frontier of Agriculture with Agroecology, Transforming Sustainable Farming Through Nature-Based Solutions and Technological Integration

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The evolving landscape of agriculture is increasingly influenced by agroecology, which seeks to transform sustainable farming practices through a synergy of nature-based solutions and technological innovation. This article explores how agroecology, as a holistic approach to farming, integrates ecological principles with modern technology to enhance food production while maintaining environmental health. In recent years, advancements in technology have provided new tools to support agroecological practices. Precision agriculture, for instance, utilizes data-driven insights to manage resources more efficiently, thereby reducing waste and environmental impact. Additionally, the incorporation of biotechnology and digital platforms facilitates the better monitoring and management of crops and livestock, leading to improved food security and sustainability outcomes. This article highlights several case studies where agroecological practices have successfully been implemented, demonstrating their potential to address global food challenges. It examines how these practices contribute to reducing the carbon footprint of agriculture, enhancing soil fertility, and improving water management. The role of agroecology in supporting smallholder farmers, who are crucial to global food systems, is also discussed, emphasizing how these approaches can be tailored to local contexts to achieve optimal results. The future of agriculture lies in balancing ecological integrity with technological progress, ensuring that food production can meet the needs of a growing population while safeguarding natural resources. By adopting a framework that combines nature-based solutions with cutting-edge technology, agroecology offers a promising pathway toward a more sustainable and equitable food future.

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sciforum-099355: Obtaining carrot flour with functional properties

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Carrot (*Daucus carota*) is one of the most widely consumed vegetables in the world, providing important health benefits to consumers due to its high bioactive content. Wounding stress in carrots induces the accumulation of bioactive compounds, transforming this product into a functional ingredient that could be considered an excellent alternative to be processed as flour and used as a nutraceutical ingredient. The objective of this work was to optimize the process of obtaining carrot flour with high antioxidant content. Carrots of the Chantenay variety, obtained from Santiago del Estero-Argentina producers, were washed, disinfected, cut (grated) and stored at 15°C for 48h. The stressed tissue was dehydrated at different temperatures, 70°, 80° and 90°C, and the optimal temperature was selected based on the moisture content, water activity (aw) and visual sensory characteristics after drying. It was determined that after 4h at 80°C, a product with very good characteristics was obtained, with 7-8% of humidity and aw:0.4;,while at 70°C it took more than 5 h to reach that humidity level, and at 90°C the samples presented a darker and unacceptable appearance. The samples dehydrated at 80°C for 4h were ground in a knife mill and sieved to obtain the flour. The total phenolic content (TPC) and antioxidant compounds (ACs) of samples before dehydration and the flour were determined by the Folin–Cioucalteu (mg gallic acid/g) and DPPH (%inhibition) methods, respectively, and significant differences were observed between both. The carrot flour obtained had a content of approximately 90% more total phenols and 20% more antioxidant compounds than the carrot stressed before dehydration (13.88 mg gallic acid/g and 58%, respectively). These results indicate that the product obtained could be used as a food ingredient in the formulation of healthy innovative foods.

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sciforum-102822: Optimization of 3D Printing Conditions for Pectin-based Medium Chain Triglyceride (MCT) Oil Oleogels

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Introduction

Three-dimensional food printing can revolutionize food manufacturing by creating personalized products tailored to specific dietary needs. The challenge lies in the usage of unique ingredients, where understanding their rheological properties is crucial for improving the printability of complex and novel food matrices. This study investigates the formulation of 3D-printed MCT oil-based oleogels integrated with sugar and pectin, aiming to develop a printable matrix that can be used as a means of nutraceutical delivery. Oleogels, semi-solid systems formed by structuring liquid oils, offer a versatile platform for the development of customizable drug delivery systems.

Materials and Methods

A series of oleogel formulations were prepared by varying the ratios of MCT oil (2.5-40%), sugar (10-30%), and pectin (2-10%). The sugar syrup was prepared with 55° brix and then homogenized (Ultraturrax T18, IKA, Germany) at 15,000 rpm for 5 min with an MCT oil stabilizer and emulsifier. The developed oleogel was analysed for oil binding capacity, rheology, texture, and extrusion processing for 3D printability.

Results

The optimized oleogel formulation demonstrated an oil binding capacity of 80%, indicating its ability to retain a significant amount of oil. The texture analysis showed the highest firmness (1022.20 g) and consistency (663.42 g.sec), as compared to other formulated oleogels, while the cohesiveness and work of cohesion values suggest it has moderate internal bonding strength and requires less energy to deform. Rheological analysis confirmed the shear-thinning behaviour, which is crucial for extrusion-based 3D-printing processes. The structural integrity and printability of the oleogel were validated through 3D-printing trials using a 1.2 mm nozzle and a printing speed of 400 mm/min at constant pressure, showcasing the potential for creating intricate and stable structures.

Conclusion

The development of MCT oil-based oleogels with sugar and pectin integration presents a novel approach to nutraceutical delivery via 3D printing. This study highlights the potential of these oleogels for development in personalized medicine and nutraceuticals.

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sciforum-103371: Optimization of Extraction of Bioactive Compounds: Influence of Parameters on the Efficiency of the Microwave-Assisted Technique

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The use of bioactive compounds (BACs) in various industrial sectors has grown considerably due to their health-beneficial properties. BACs can be extracted from different plant matrices, such as plants, fruits and their by-products. Various extraction techniques have been developed to maximize efficiency and reduce costs. Microwave-assisted extraction (MAE) is presented as a more ecological and cost-effective alternative. MAE is based on solvent extraction and the heating capacity of microwaves, where electromagnetic energy penetrates the plant matrix and interacts with polar molecules, generating heat and pressure that accelerates the extraction and solubilization of the compounds. However, high temperatures, high extraction times and high pressures could lead to the degradation of specific BACs. For this reason, the optimization of MAE operational parameters such as pressure, temperature, microwave power, exposure time, as well as matrix and solvent characteristics is essential to obtain a maximized extraction yield. In this sense, the application of mathematical models such as the implementation of the response surface methodology (RSM) and the central circumscribed composite design (CCCD) is necessary to describe the combination of MAE operational parameters to maximize the obtaining of BACs, allowing to predict with greater accuracy the experimental results. This summary highlights the recent advances in the understanding of MAE for BACs extraction, providing a solid basis to optimize extraction methods and maximize the use of BACs in diverse applications. A comprehensive literature review was conducted, covering studies from last five years using electronic databases including PubMed, ScienceDirect, Web of Science, and Scopus searching for peer-reviewed articles using keywords such as "mirowave-assisted extraction", "bioactive compounds", and "extraction optimization".

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sciforum-102780: Optimization of Polymer Concentration and Electrospinning Parameters to Develop a Nanofibrous Membrane

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Introduction

Electrospinning is an electrohydrodynamic process that produces ultrathin fibers which get oriented randomly in a plate collector to form a nanofibrous membrane. The nanofibrous membrane has a wide range of applications, including the biomedical and food sectors.

Materials

The food-grade polymers such as polytetrafluoroethylene (PTFE), polysulfone (PS), polycaprolactone (PCL), and polyvinyl alcohol (PVOH) were selected and optimized the concentration with the respective dissolve solvents. The spinning parameters were optimized, including voltage, flow rate, distance between the collector and needle, speed of the plate, and spinneret.

Results and conclusion

The different ratios of PTFE and dissolvable agents do not exist with the characteristics required for electrospinning. Though it has good dissolvability, it does not form a membrane during electrospinning. Similarly, the PS was optimized to form an emulsion with a 50:50 (N, N' -dimethylformamide: acetone), and the polymer formed a cotton-like fibrous beaded membrane. The PCL formed a non-beaded nanofibrous membrane when optimized with a solvent ratio of 70:30 (chloroform: ethanol). The membrane was strengthened by spinning with 3 needles at the same time, with the optimized electrospinning parameters and the membrane had an average fiber diameter of 1.5 μm and an average pore diameter of 3 μm. The developed membrane is recommended to use in beverage applications, for instance, fruit juice filtration, concentration and clarification.

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sciforum-102840: Optimizing Conditions for The Development of 3D-Printed Chocolates

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Introduction

The 3D printing of food entails the layer-by-layer construction of food structures, with printability, post-processing, and applicability being the three main focuses. Although there are few studies on the printability of chocolates and their mixes, it is possible to speculate that 3D printing, by offering a fresh and innovative method of producing chocolate, could boost customer acceptance of goods containing chocolate.

Methods

This work outlines the process of building 3D-printed chocolate through the hot-melt extrusion 3D printer approach. The printability of the material supply was predicted to correlate with rheological behavior, thermal behavior, and a crystal-like nature. An investigation was conducted to assess the printability of extruded chocolate paste in terms of its ability to maintain its structural integrity over a long time. This was achieved by modifying several factors, including printing speeds, motor speed, nozzle diameter, and temperature ranges.

Results and conclusion

The rheological behavior, such as amplitude, temperature, and frequency, was measured through the amplitude sweep results, which ensure all the material supply remains within the linear–viscoelastic region (0.05%), and the frequency sweep ensures all the storage moduli are greater than the loss modulus. The results suggest that the high-precision constructs reached printing speeds ranging from 600 to 1000 mm/min, with a melt extrusion rate from 40 to 60℃. Additionally, we determined that the most efficient motor speed was 15–30% lower. The findings of this study can be utilized in the process of 3D printing intricate items employing chocolate and other analogous food materials.

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sciforum-100158: Optimizing Sourdough Production Using Fine-Ground Flours Including Key Parameters and Their Impact on Wheat Bread Quality

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This study aimed to identify optimal recipes and conditions for creating fine-ground wholegrain flour sourdoughs and to evaluate the quality of wheat bread made with 20% of these sourdoughs. Sourdoughs were prepared from wholegrain flours of wheat (WWF), rye (WRF), spelt (WSF), barley (WBF), buckwheat (WBWF), and sorghum (WSGF) using a Fermentor Diosna & IsernHäger AF Compact 100 HC with a wheat and rice starter culture. The sourdough fermentation was conducted over 20 hours at 30°C. Quality assessments of the sourdoughs included pH measurement, total titratable acidity (TTA), and volatile compound analysis via GC-MS. Bread was baked with these sourdoughs using a single-phase method in a Home Bakery ETA 2147 Duplica Vital, applying a 3-hour classic program in a controlled laboratory setting at the Department of Carbohydrates and Cereals, UCT, Prague. The control flour for baking was a special wheat flour type 530 (SWF). Post-baking, bread weight, volume (using the mustard seed displacement method), specific volume, and crumb hardness (measured by penetrometer) were recorded.

The selected sourdough yields were 250% for WWF, WSF, WBWF, and WSGF; 280% for WBF; and 300% for WRF. The dough yield for baking was standardized at 165%. GC-MS analysis identified 24 volatile compounds, predominantly alcohols and organic acids, with lesser amounts of esters, aldehydes, terpenes, furans, and ketones. Bread containing WWF sourdough exhibited the highest weight and the softest crumb, while control (SWF) bread had the lowest weight. Both WWF and SWF breads showed the highest volume. In contrast, bread with WSGF sourdough had the hardest crumb. These findings suggest that WWF sourdough yields the most favorable bread characteristics among the tested flours.

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sciforum-099301: Performance enhancement of an old Endless Chain Pressure (ECP) tea dryer for black tea manufacturing

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Ceylon tea, which is well known in the world market, is a major export commodity produced by Sri Lanka, placing the country among the most significant global tea producers. The drying process is a crucial and energy-intensive stage in black tea manufacturing which aims to decrease the moisture content of the tea leaves. As endless chain pressure (ECP) tea dryers age, their performance tends to decline. Especially, energy consumption increases and dried tea quality decreases with time. Therefore, optimizing their performance is critical to uphold the quality standards of tea. This study aimed to optimize the drying temperature of the ECP dryer at the Houpe tea factory in Ratnapura, Sri Lanka. Currently, the tea drying temperature at this factory is 250 °F. In this study, tea dhools were dried under five drying temperature levels: 240, 245, 250, 255, and 260 °F. The specific heat consumption (SEC), energy wastage, and organoleptic parameters were measured. The replicate data of each treatment were analyzed using one-way ANOVA. It was found that SEC and energy wastage were significantly (P0.05) lower for 240 and 245 °F compared to other temperatures. Tea dhool dried at 245 °F outperformed other samples in terms of liquor colour, aroma, infusion colour, leaf appearance, leaf colour, and overall acceptability. These results have led to the determination that the ideal drying temperature for this ECP dryer was 245°F, as it resulted in a superior quality tea and lower energy consumption. The adoption of this drying temperature will not only improve the quality of the tea but also reduce energy expenditure.

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sciforum-101637: Plant-Mediated Green Synthesis of Nanoparticles: Current Developments and Future Prospects

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Nanotechnology, by providing new techniques for creating nanoparticles (NPs) with sizes ranging from 1 to 100 nm, has transformed several scientific and technological domains. The use of hazardous chemicals in conventional noble metal processing has led to a move towards more ecologically friendly alternatives. Because green synthesis is safe, affordable, and scalable—especially when employing plant extracts—it has become a viable substitute. The current advancements in the plant-based green synthesis of nanoparticles (NPs) are examined in this review, with particular attention paid to production methodologies, characterisation methods employing spectroscopy and microscopy, and a range of applications including environmental remediation, food science, cosmetics, agriculture, and nanomedicine. Along with possible biological activities and toxicity considerations of plant-derived NPs, the synthesis mechanisms are examined, including the functions of phytochemicals as stabilising and reducing agents. Utilising plant extracts to synthesise NP offers numerous benefits; one of these is that simple, environmentally friendly methods can be used to customise NP characteristics including size, shape, and content. The size and structure of synthesised NPs must be confirmed using characterisation methods like UV–visible spectroscopy, TEM, and FTIR in order to guarantee reproducibility and their sector-wide application. Applications of plant-derived nanoparticles (NPs) in agriculture show their effectiveness in crop protection and nutrient delivery systems, while applications in nanomedicine emphasise their promise in targeted medication delivery, antioxidant characteristics, and antibacterial activity. The necessity for ethical and environmentally conscious breakthroughs in nanotechnology is further highlighted by the need for improved research into the environmental effects and biocompatibility of these nanoparticles.

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sciforum-089348: Preparation of a chayote flour cookie using Sechium edule (Jacq.) Sw. and the drying technique of a refractance window (VR), enriched with calcium and inulin, and flavored with passion fruit pulp

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Malnutrition is a global health issue, with children being the most affected. In Colombia, 24% of displaced children suffer from malnutrition, which is double the national average. Low levels of protein, minerals, and vitamins are present in the diet of the Colombian population. As a result, in this study, a cookie was developed from a vegetable matrix of easy access in Colombia (cidra Sechium edule (Jacq.) Sw. var. virens levis), whose fruit is rich in vitamins, minerals, and amino acids, using the drying technique of a refractance window (VR), which protects the functionality of the product. Four formulations were prepared: F1= C (E), F2= C, F3= 50C/50T (E), and F4= 50 C/50T. The (E) formulations were fortified with inulin and calcium fumarate. The cookies were dried using the VR technique, using a polystyrene sheet (Mylar type) at a temperature of 80 °C. The biscuits had a diameter of 36.5 mm and a thickness of 4 mm, with total drying times of 3.26 h for F1, 3.8 h for F2, 2.10 h for F3, and 3.13 h for F4. The chayote flour biscuits that were enriched with calcium and inulin (F1) were well accepted and were characterized as physicochemical and bromatological. The obtained results were as follows: 4.75% (%H); 0.531 (aw); 8.43 (°Brix); 0.427% (%AT); 5.6 (pH); 7.86% protein; 5.52% ash; and 14.71% fat. The chayote flour biscuit, enriched with calcium and inulin and dried using a refractance window, is a product with functional characteristics that comply with the physicochemical and microbiological parameters established in the Colombian Technical Standard NTC-241 and which has a high level of acceptance in terms aroma, color, and flavor intensity. Furthermore, no research has been found in which this technique is used for the preparation of bakery products.

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sciforum-103414: Refining Bromelain Extraction: Procedures and Precipitant Effects on Enzyme Activity Recovered from Pineapple Peel

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Introduction

Pineapple (*Ananas comosus* Merr.) is extensively used in various food products due to its widespread popularity. The residue from pineapple, which contains valuable bioactive compounds like bromelain, offers an eco-friendly approach to waste management. Bromelain, a protease prevalent in pineapples, can be extracted from waste parts, using methods such as solvent precipitation and ultrafiltration. An increasingly popular and environmentally friendly method for protein concentration and purification is polyelectrolyte precipitation, which preserves protein integrity while aiding separation.

This study utilized polyelectrolytic precipitation with carrageenan (Carr) to assess an efficient and sustainable method for extracting bromelain from pineapple stems.

Methods

An optimal purification methodology was assessed considering various steps, including centrifugation, pellet washing, and different Carr stock concentrations. The extracts were analysed for bromelain and proteolytic specific activities using LPNE and Azocasein substrates and the BCA assay.

Results

Bromelain-specific activity was shown in all samples, with no significant differences among peel extractions. The highest activity was observed in pellets from Process A and E, the lowest and highest Carr concentrations, respectively.

Specific proteolytic activity, assessed at pH 9, showed that all samples had this activity. Standard commercial bromelain served as a reference (≥3 U/mg protein). Peel extraction samples generally showed higher activity than the reference bromelain (≥4 U/mg protein), except Process C (~2 U/mg protein). Process A exhibited the highest specific activity among all processes.

Conclusion

In conclusion, changes to the extraction process did not significantly affect the bromelain-specific activity of peel samples. Specific proteolytic activity was higher for Process A, likely due to higher free total protein post-precipitation and other interacting components.

Extracting bromelain from pineapple waste offers a sustainable solution for waste reduction and supports health-focused products, promoting a zero-waste approach in pineapple production.

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sciforum-102408: Sensory Attributes and Preliminary Characterization of Milk Chocolate Bar Infused with Apricot Kernel Oil

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Chocolates are semi-solid suspensions containing fine solid particles dispersed in a continuous fat phase. Chocolates are categorized as milk, dark, and white depending upon the content of milk fat, cocoa solids, and cocoa butter. Among these, milk chocolate bars are one of the most popular processed cocoa products globally. The integration of apricot kernel oil into milk chocolate bars introduces a novel sensory experience and potential health benefits. In this study the physical, chemical, and sensory properties of milk chocolate enriched with apricot kernel oil (0.5%, 0.10%, and 0.15%) were investigated. The incorporation of apricot kernel oil into milk chocolate aimed to enhance its nutritional profile and introduce a unique flavor element. Sensory evaluation was conducted using a trained panel to assess attributes such as aroma, taste, texture, and overall acceptability. The results indicated that panelist acceptance levels varied with the concentration of apricot kernel oil added, with the highest acceptance in terms of aroma, taste, and overall preference observed at the 0.5% addition level. The addition of apricot kernel oil resulted in a significant reduction in hardness, and the color differences between milk chocolate with and without apricot kernel oil were minimal. Furthermore, the incorporation of 0.5% apricot kernel oil significantly increased the moisture content and antioxidant activity of the milk chocolate.

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sciforum-099257: Sensory evaluation and characterisation of roasted coffee hulls for beverage production using compostable capsules

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The consumption of easy-to-prepare products has increased in recent decades, such as beverages obtained from capsule extraction, which are typically produced with conventional materials, affecting their environmental sustainability. In addition, the generation of residual biomass in coffee processing, such as hulls, leads to under-utilisation of the crop. Therefore, the development of a new product using compostable capsules is a viable alternative to add value to the residual biomass. For this reason, this study aims to identify the roast curve and grind level that achieve the highest sensory acceptance and highlight positive attributes in the sensory profile. The raw material was subjected to density classification, Timsen disinfection, maturity classification, pulping and drying in forced convection ovens at 50°C. Four roasting curves and two grinding stages were designed using Keurig-type compostable capsules. In the physical characterisation of the roasted dehydrated husks, the values for °Brix (1.65+/-0.44), moisture content (6.62+/-0.28), tapped density (0.62+/-0.04) and colour in CIELAB were consistent (L*: 25.30+/-0.67 to 27.97+/-0.88; a*: 6.23 +/- 0.37 to 8.13+/- 0.26; b*: 7.17 +/- 0.46 to 9.77+/-0.25). Finally, the sensory profile and acceptance of the beverage parameters were determined with a trained panel, with curve 2 showing 100% acceptance for acidity, body and beverage, with sensory descriptors associated with honey, caramel, dried pineapple, mandarin, vanilla, tamarind and floral notes. It can be observed that the capsules are not only functional in terms of preparation, but also offer a pleasant and distinctive sensory profile. This makes them potentially attractive to consumers and a market niche who are interested in sustainability. However, areas for future research are highlighted, such as optimising the manufacturing process and assessing the environmental impact of this approach and consumer acceptance.

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sciforum-099888: Study on Value Addition of Co-Products in Algerian Fisheries

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SUMMARY

This study is a contribution to the search for added-value fishery products and co-products in the fishing sector. Two marine species were selected from a previous survey: in this case, *Trachurus* sp, which is highly present in sea cucumber landings and holothurians, far from being appreciated by the Algerian consumer, was selected. Two types of flour have been made from *Trachurus sp* (one meal based on whole individuals and the other without bones and bones), as well as a crude oil extracted from this fish, intended for various applications. Powdered gelatin was extracted from the sea cucumber *Holothuria sp.* The products obtained were subjected to biochemical and microbiological control in order to determine the quality and the fate of each. The results obtained revealed a high nutritional value (75 % proteins) with acceptable microbiological quality. The results reveal a significant yield and the high quality of the extracted oil. Likewise, the use of infrared spectroscopy on the gelatinous substance obtained from *Holothuria sp* presents a similar spectrum to that of commercial gelatin.

***Keywords**: investigation; co-product; *Trachurus sp;* flour; fish oil; *Holothuria sp;* gelatin; biochemical and microbiological quality

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sciforum-091105: Sweet and fortified wines produced from Aleatico grapes subjected to different dehydration process

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In a study examining the impact of dehydration processes on wine quality, Aleatico grapes were harvested and exposed to two distinct dehydration methods, both utilizing identical air speeds. One batch underwent postharvest dehydration in a cold room (Cell) at 10°C, 60% relative humidity (RH), while the other batch underwent dehydration at room temperature (RT), ranging between 20 and 22°C, with a 40% of RH. Both dehydration tunnels worked with exhaust fans. The time to reach 35% weight loss was 37 days in cold room (Cell) and 19 days at room temperature (RT). After reaching 35% weight loss, grapes were pressed and divided in two lots: one was fortified to reach 16% alcohol content; the other lot partially fermented, and the fermentation was stopped with sulfur dioxide. The four wines resulting from the test are two passito (Sweet RT, Sweet Cell) and two fortified wines (Fortified RT, Fortified Cell) which have different characteristics. Analyzes of the phenolic composition and of the main oenological substances were carried out showing significant differences. Sweet wines had a higher concentration of alcohols and esters than fortified wines, higher concentrations of terpenes and ketones but lower aldehyde content. Sweet wines also had a higher concentration of organic acids but greater susceptibility to oxidation. Beyond that they presented higher phenolic fraction resulting chemically more uniform. Fortified wines, with high residual sugars and higher alcohol content, had less aroma but more aging potential, even if they were more tannic and with less elegance.

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sciforum-099202: Technological Quality of Spent Hen *Pectoralis major* as Influenced by Ultrasonication

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The efficient utilization of meat from spent hens has been a major issue for the egg industry. The toughness of spent hen meat is undesirable for processors and consumers, making it a low-value and underutilized protein source. Ultrasound, with its mechanical waves at frequencies exceeding the threshold of human hearing, is a rapid, economical, and energy-efficient technology that has been used to tenderize beef, pork, and poultry meat. In this study, the effect of different combinations of ultrasonication temperature (5, 15, and 25°C) and duration (0, 10, 20, and 30 min) on the technological properties (CIE L*a*b*, pH, water holding capacity [WHC], Warner–Bratzler shear force [WBSF], and microstructure) of spent hen *Pectoralis major* was investigated. L* values and pH values were not significantly affected by sonication but remained within the 'normal' range for chicken meat lightness. On the other hand, a* and b* values and WHC significantly changed (p 0.05) due to ultrasound parameters. Additionally, a significant relationship between WHC and WBSF was detected (r = -0.443; p 0.01). WBSF values had no significant changes after sonication, but the overall mean values indicated a trend. The signal-to-noise ratios of WBSF mean values suggested 10 min and 5°C as the optimal levels for treatment duration and temperature, respectively. Using the optimal settings, the effect of ultrasound on the microstructure of spent hen meat was evaluated. Scanning electron microscopy (SEM) images revealed that sonication led to fragmented muscle fibers, deformed and separated fiber bundles, and disrupted connective tissues. While ultrasound seemed unable to significantly affect the toughness of spent hen meat based on WBSF, SEM images indicated evidence of its effects on muscle microstructure.

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sciforum-102958: Tequila 100% Agave Silver Class—Pink Hue: Innovative fusion of traditional and current techniques in the Tequila Industry

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The Tequila 100% Agave Silver Class—Pink Hue, commonly called *Tequila Rosado*, represents an innovative fusion of traditional and current techniques in the production of Tequila since color has been a characteristic aspect to attract a sector of consumers in recent years. Commercially, this beverage is the Tequila 100% Agave Silver Class (T100%-SC) infused with Hibiscus Flowers (T100%-SC-HF) or aged in Wine Barrels (T100%-SC-WB). Due to this, it is of special interest to study its physicochemical properties, demonstrating that these processes provide a distinct physicochemical profile that enriches the beverage with different types of organic compounds. In this study, the physicochemical characterization of T100%-SC, T100%-SC-HF, and T100%-SC-WB was evaluated using isotope ratio mass spectrometry, gas chromatography, liquid chromatography, UV–visible spectroscopy, and color study through digital image processing. The results show that *Tequila Rosado* corresponds to the Silver Class since it does not present statistically significant differences in methanol content (240.82 mg/100 mL A.A.; while the content is relatively high, it remains within the legally acceptable range, ensuring that the product is safe for consumption according to the current standards), while containing higher levels of alcohols (323.64 mg/100 mL A.A.), esters (24.36 mg/100 mL A.A.), aldehydes (3.64 mg/100 mL A.A.), furfural (0.68 mg/100 mL A.A.), $\delta^{13}C_{VPDB}$ (-12.62 ‰), and $\delta^{18}O_{VSMOW}$ (+21.88 ‰). However, due to its processes, there are obvious changes in its color. According to the image analysis carried out using the RGB model, the *Tequila Rosado* samples present more intense values in the red tone, resulting in rosé and beige colorations. This information is corroborated by UV-Vis spectroscopy studies, for which in T100%-SC-HF, a band at 530 nm is attributable to the extraction of the natural color of the flowers, while T100%-SC-HF presents a band at 365 nm characteristic of Tequila 100% Agave that has undergone a maturation process.

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sciforum-102146: The Bioactivity of byproducts from the blackberry juice industry

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Introduction

Blackberry (*Rubus sp.)* is a red fruit with great potential as a functional ingredient thanks to its composition rich in antioxidants. This work aimed to characterize and study the bioactivity of two byproducts (skins and seeds) from the blackberry juice industry.

Methods

To achieve this objective, “in vitro” gastrointestinal digestion and colonic fermentation were carried out on the byproducts [1]. The phenolic composition, antioxidant capacity (ABTS, DPPH and FRAP) and the genotoxicity of the products and their gastrointestinal digestion and colonic fermentation fractions were analyzed [2]. The effect of the colonic fermentation fraction on the composition of the intestinal microbiota was also analyzed by qPCR.

Results

Byproducts are rich in phenolic compounds that undergo transformations during digestion and fermentation. These changes modified the antioxidant profile, with skin samples exhibiting the highest bioactivity. The “in vitro” genoprotective effect of gastrointestinal digestion and colonic fermentation was concentration-dependent. The colonic fermentation of blackberry skin and seed samples modulated the gut microbiota, promoting the growth of bacterial *Bifidobacterium* and *Lactobacilli*, which are associated with a beneficial microbiota due to their known anti-inflammatory and immune-regulating effects on the intestinal barrier.

Conclusions

These results contribute to giving added value to these byproducts for their potential application as functional ingredients in foods.

References

1. Minekus, M., Alminger, M., Alvito, P., Ballance, S., Bohn, T., Bourlieu, C., ... Brodkorb, A. (2014). A standardised static in vitro digestion method suitable for food - an international consensus. *Food & Function, 5*(6), 1113–1124.
2. Rivero-Pérez, M. D., Muñiz, P., & González-Sanjosé, M. L. (2007). Antioxidant Profile of Red Wines Evaluated by Total Antioxidant Capacity, Scavenger Activity, and Biomarkers of Oxidative Stress Methodologies. Journal Of Agricultural And Food Chemistry, 55(14), 5476-5483.

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sciforum-102964: The Development of a Ready-to-Eat Product Using Innovative Sous-Vide Technology

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The 21st century has witnessed a notable shift in eating patterns, driven by changes in lifestyles and consumer demands for access to fresh foods with minimal additives and reduced thermal processing. In this context, ready-to-eat (RTE) products have gained global popularity, and within this category, sous-vide foods have emerged as an innovative option. Sous-vide technology, as an innovation in food technology, involves vacuum-sealed packaging (anaerobic conditions) and moderate heat treatment (maximum temperatures of 95°C), followed by cooling and storage (storage temperatures below 4°C). This technique has proven effective in preserving freshness and nutrients and extending the shelf life of products without the need for preservatives, resulting in safe foods with high sensory and nutritional quality.

A nine-step methodology was designed, focusing on creating ready-to-eat products specifically targeted at children, with high vegetable, cereal, and legume contents. These steps include the selection of ingredients based on studies of vegetable consumption in Uruguayan children, the design of specific thermal treatment processes for this product, and the microbiological and sensory evaluation of the final product with the target audience. Additionally, to ensure food safety, rigorous microbiological control has been carried out, including a microbiological challenge test with C. botulinum. Sensory optimization has been achieved through evaluation techniques with groups of children of different ages, identifying key attributes to improve the product's acceptability.

The result was an RTE product for children, developed using innovative sous-vide technology, notable for its high fiber and vitamin A content.

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sciforum-097184: The Impact of Lactic Acid Bacteria on Rheological Properties of Whey-Pectin-Based Edible Coatings

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Edible coatings made from dairy by-products have recently become a popular method for incorporating beneficial components, such as probiotics, into food products. However, there is a lack of understanding of how the incorporation of lactic acid bacteria (LAB) effects the rheological properties of whey-pectin-based edible coatings.

In this research, two edible coatings composed of either liquid acid whey protein concentrate (LAWPC) or liquid acid whey permeate (LAWP) were supplemented with *Lacticaseibacillus paracasei* and *Lactobacillus helveticus* (approximately 7 log CFU/g). The rheological behavior of these coatings was evaluated using a rheometer (300 s^{-1} of shear rate), tensiometer, and contact angle meter.

The results revealed that LAWP-based coatings showed the lowest viscosity (average of the samples—20.9 Pa), making them suitable for spraying on the food product' surface and covering it, while the most viscous sample was the LAWPC-based control (44.2 Pa) coating (p 0.05). This outcome was influenced by the higher solids content of the LAWPC-based coating, making it suitable for product immersion. Notably, the addition of LAB significantly decreased the viscosity of the LAWPC-based samples with encapsulated bacteria (with added *L. paracasei*—30.6 Pa; with added *L. helveticus*—27.3 Pa) (p 0.05). However, the results showed that there were no statistical differences ($p > 0.05$) between samples in the case of surface tension and contact angle measurement results.

Overall, the rheological properties of the coatings, particularly viscosity, varied among the samples and were influenced by the presence of LAB and the different solid content of LAWP and LAWPC. Despite these variations, the base and LAB did not affect the surface tension and contact angle results. These findings provide valuable information for determining the most suitable technique for applying the coating to product surfaces and highlight the potential of LAB-incorporated edible coatings for delivering probiotics.

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sciforum-099285: The Influence of the Application of Rosemary Essential Oil (*Salvia rosmarinus*) on the Sensory Characteristics and Microbiological Quality of Minimally Processed Pumpkin (*Cucurbita moschata*)

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Pumpkin (P) produced in Santiago del Estero, Argentina, is of high quality and semi-sweet. It is generally consumed cooked and can be used in its minimally processed (MP) form. Processing increases its susceptibility to microbial spoilage, making it necessary to use sanitizers. The effect of rosemary essential oil (REO)'s application on the sensory characteristics and microbiological quality of grated P was studied. The product was washed, sanitized, cut, peeled, grated and centrifuged, and then REO was superficially incorporated at two concentrations (4 and 8 μL/mL) and applied in three ways: spraying (TS), immersion (TI) and adhering strips embedded in REO to the storage container (TV). The samples were subsequently stored at 5 °C in sealed 35 mm polypropylene bags. In addition, an immersion treatment with NaClO at100 ppm for 3 min and a control without any additive were included. The samples were taken at 24 h and 8 days of storage, evaluating the mesophilic aerobic microorganism, psychrophilic, enterobacteria and mold and yeast (MY) counts. The sensory evaluation was carried out by trained judges, determining that aroma and flavor were the critical attributes for the acceptability of the product. At the end of storage, the microbiological analysis showed that the REO treatments presented levels of 10^7UCF/g, similar to those for the NaClO treatment, except TI at both concentrations, which was more effective in inhibiting the development of psychrophils and MY. Regarding the evaluation of the aroma, at 8 days, all of the treatments were acceptable, with the exception of TI and TV (8 μL/mL), while for flavor, all of the treatments were acceptable with the exception of TI at both concentrations. Therefore, the application of TA and TV treatments at the lowest concentrations could be considered in further studies for increasing the shelf life of MP P.

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sciforum-098482: The Potential for Using Nanoparticles to Prolong the Eating Quality of Oysters

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The object of the presented study is oysters (*Crassostrea gigas,* which is the main species of oyster consumed). The nutrition value of oysters is correlated to their longevity, which makes it interesting for both biology and food technology.

Oysters (Crassostrea gigas) were divided into two groups: a control group (normal conditions) and another in which the animals were additionally kept in a solution of hydrated fullerene C60 FWS for 24 hours (independent variables of the study). After incubation, animals from both groups were kept in hypothermic conditions at 5±1°C without water for 10 days.

Samples of gill and mantle tissues were homogenized and the concentration of proteins, lipid peroxidation products (LPOs), the concentration of reduced glutathione (GSH), and the activity of superoxide dismutase (SOD) and catalase were determined.

It has been shown that the use of fullerene C60 at the stage of preparation of oysters for hypothermic storage increased the protective activity of the antioxidant system of molluscs against oxidative stress and anoxia. Thus, the formation and accumulation of LPOs after preliminary exposure of molluscs in seawater with the addition of fullerene C60 were lower compared to the control group. This may indicate both the effect of the neutralisation of reactive oxygen species by fullerene C60 and the activation of adaptive mechanisms in the protective activity of animal antioxidants.

This study of the protective activity of antioxidants in the tissues of molluscs of the experimental group showed that on the 9th day of storage, catalase activity and the concentration of GSH were significantly higher than in the control group.

This study showed that the pretreatment of animals with fullerene C60 affects the protective activity of the oyster antioxidant system compared to the control group and allows us to extend of the shelf life of oysters while maintaining organoleptic properties and physicochemical parameters.

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sciforum-097266: Thermal stability of blending soybean oil with coconut oil during continuous deep-frying of banana chips

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Soybean oil is susceptible to thermal deterioration due to its high polyunsaturated fatty acid content. Blending oil is the simplest way to enhance the nutritional profile and stability of frying oil. In particular, coconut oil is resistant to oxidation; adding it to other vegetable oils that are prone to oxidation makes the mixes more stable. This study investigated the thermal stability of soybean oil by blending it with coconut oil and evaluating the blend's physicochemical changes during the continuous deep-frying of banana chips. Refined soybean oil was blended with refined coconut oil at different volume ratios (% v/v), including 100:00 (A), 80:20 (B), 70:30 (C), and 60:40 (D). All blended oils were operated under a deep-frying practice at a constant temperature of 180°C. Banana chips were fried for 1 min at 5 min intervals in nine batches. The results showed significant changes in the physicochemical properties of each frying oil with frying duration (p0.05). The alteration in free fatty acid and peroxide values was the lowest in treatment C, followed by D, B, and A. Conversely, the highest increment in TOTOX value was found in treatment A, followed by B, C, and D in the ninth batch of frying. The lightness of oil obtained the highest value in the last frying cycle in treatments B and C, followed by D and A, while the color of the fried banana chips achieved the maximum value in treatment D, followed by C. In addition, the lipid content in the fried banana chips was observed in the lowest amount in treatment D, followed by treatment C, in the first batch and in the ninth batch. Blending highly unsaturated soybean oil with coconut oil could enhance its thermal stability. Consequentially, a 70:30 (% v/v) ratio of soybean oil blended with coconut oil exhibited good thermal stability during deep-frying.

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sciforum-099296: Utilization of Ultrasonic-Assisted Extraction for Bioactive Compounds from floral sources

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This systematic review aims to evaluate the effectiveness of ultrasound-assisted extraction (UAE) for obtaining bioactive compounds from floral sources, emphasizing its potential application in the pharmaceutical and food industries. As a "green extraction" technique, UAE minimizes the use of organic solvents, energy consumption, and extraction time, making it a sustainable alternative to traditional extraction methods. On the other hand, flowers serve as a valuable reservoir of bioactive compounds. Appropriate experimental strategies are necessary to maximize the yield of bioactive compound recovery. The increasing use of floral sources in manufacturing dietary supplements and functional foods, coupled with rapid advancements in these sectors, indicates significant potential for the application of UAE. Its effectiveness is influenced by a multitude of factors, including operational variables and the matrix effect, both of which have the potential to impact the molecular structures of the specific compounds being targeted. In flowers, these compounds usually entail active secondary metabolites such as polyphenols. Hence, it is imperative to establish the optimal experimental parameters. A comprehensive literature review was conducted, covering studies from 2000 to 2024. Electronic databases including PubMed, ScienceDirect, Web of Science, and Scopus were searched for peer-reviewed articles using keywords such as "Ultrasound-assisted extraction", "bioactive compounds", "flowers", and "extraction optimization". The results indicate that UAE significantly enhances the yield of bioactive compounds, such as polyphenols, with extraction efficiencies reaching up to 95% under optimal conditions. The findings also highlight the importance of parameter optimization, as variations in solvent concentration and ultrasonic intensity can affect the structural integrity of the extracted compounds. In conclusion, this communication emphasized the significance of UAE technologies and presented recent research and updated data on their contribution to obtaining bioactive compounds from plant-based materials, particularly flowers.

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sciforum-103320: Virtual Flavour Prototyping: Harnessing Machine Learning to Revolutionize Flavour Development and Innovation in Food Science

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Predictive modeling, empowered by machine learning, represents a ground breaking methodology in the field of virtual flavor prototyping. This approach fundamentally transforms how flavors are developed by utilizing advanced computational models to predict the sensory profiles of novel flavor combinations. The process initiates with the compilation of extensive datasets that detail chemical compounds and their associated sensory characteristics. These datasets, drawn from scientific research and sensory evaluations, serve as the foundation for training machine learning algorithms. In the training phase, algorithms such as neural networks or support vector machines analyze the data to identify intricate patterns and relationships between chemical structures and flavor attributes. This trained model can then simulate the sensory outcomes of new ingredient blends with high precision. By inputting the chemical composition of a proposed flavor into the model, researchers can forecast how it will taste, allowing for virtual testing and refinement of flavor formulations before physical trials are conducted. To ensure the reliability of predictions, the model's outputs are compared with actual sensory data from experimental testing. Any discrepancies prompt further model refinement, with iterative adjustments enhancing the model's accuracy and predictive power. This iterative validation process ensures that the simulated flavors closely match real-world sensory experiences. This paper highlights the significant impact of predictive modeling on the future of flavor development, illustrating its role in advancing food science and offering a more efficient path to creating novel and appealing flavors.

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Session 2. Food Nutrition and Functional Foods

sciforum-098255: *L. rhamnosus* GG and *L. casei* Shirota growth on a medium enriched with rye protein and assessment of DPP-IV inhibitory activity

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Type 2 diabetes is considered a severe problem for the public sector around the world. DPP-IV inhibitors have shown a favorable therapeutic profile for glycemic control. This work aimed to evaluate the growth of two probiotics on a fermentation medium enriched with rye protein and determine the antidiabetic capacity from protein hydrolysis by these bacteria. Two strains were activated and adapted by cultivations in MRS broth and rye protein medium (7.5% rye isolate protein, 1% glucose, and solved in 0.1 M, pH=6.8 phosphate buffer). The last medium was used as a starter culture for fermentation systems, inoculating at 1% to the novel rye protein medium. Fermentation was performed at 37°C for 24 h, and the viable count was made afterward. Also, samples were centrifugated at 10,000 rpm at 4°C for 10 min to separate the supernatant, which was used to measure the hydrolysis degree and DPP-IV inhibition using spectrophotometric methods. The viable count in fermentation systems was 7.58±0.02 and 8.47±0.07 log CFU/mL for *L. rhamnosus* GG (LR) and *L. casei* Shirota (LCS) at 0 h. After 24 h fermentation, both strains exhibited a 2 logarithmic cycle growth, reaching 9.72±0.10 and 10.52±0.07 log CFU/mL. The LCS strain presented the highest nitrogen requirements because the free amino groups' concentration increased from 11.80±0.00 to 891.78±48.92 mg/L. At the same time, it was practically constant for LR, showing 163.33±6.97 and 167.50±1.54 mg/L at 0 and 24 h, respectively. In the case of DPP-IV inhibition, both strains displayed similar bioactivity, with LR increasing from 5.72±0.14 to 20.32±0.95%, and LCS from 10.37±1.04 to 27.04±1.57%. In conclusion, the rye medium allowed the growth of both strains to reach adequate levels for probiotics, and similar bioactivity was found in the fermentation systems tested, representing an excellent opportunity for developing fermented products from vegetable sources.

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sciforum-099340: Comprehensive Analysis of FODMAP Content in Portuguese Food Products with Preliminary Studies on Fruits and Vegetables

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Introduction

Fermentable Oligosaccharides, Disaccharides, Monosaccharides, and Polyols, commonly referred to as FODMAPs, can aggravate symptoms of various gastrointestinal conditions, such as irritable bowel syndrome. Patients with these conditions often need to follow a low-FODMAP diet, requiring knowledge of FODMAP composition. FODMAPs are found in both natural sources (fruits and vegetables) and industrial sources (ingredients and additives). This study aimed to analyze the FODMAP composition of various fruits and vegetables of Portuguese origin.

Methods

This experimental study was carried out between October 2022 and August 2023. To determine the FODMAP content, samples were collected and analyzed enzymatically, using the Megazyme Fructan HK Assay kit, and chromatographically by HPLC-RI in the laboratory.

Results

High fructan content was found in red onion (1.47±1.18 g/100g), white onion (0.52±0.00 g/100g), and Royal Gala apple (1.77±0.07 g/100g), all measured as fresh weight. Broccoli, red capsicum, zucchini, "Rocha" pear, and "Royal Gala" apple showed high fructose concentrations. Significant amounts of sorbitol were found in pear and apple (2.19±0.12 and 0.31±0.11 g/100g, respectively).

Conclusion

Our research also included a brief study on the impact of typical Mediterranean domestic cooking procedures on FODMAP content. Overall, the results were consistent with global data and provide a solid basis for developing a database on the FODMAP content of Portuguese foods and the best cooking techniques to minimize FODMAP content. However, they also highlight the significant variability in natural products, particularly due to differences in maturation, underscoring the need for a wider range of samples to obtain consistent results.

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sciforum-103425: Influence of Postharvest Red LED Light on Bioactive Compound Accumulation in Tomato Fruits

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Light-emitting diode (LED) systems have emerged as a promising and sustainable technology, with significant biotechnological applications in horticulture. Numerous studies have highlighted their use in greenhouse farming and food safety. This study aimed to investigate the influence of red LED lights on the postharvest accumulation of bioactive compounds in tomato (*Solanum lycopersicum*) fruits and the impact of maturity stage on this process. Tomato fruits harvested at the Breaker and Pink stages were exposed to daily cycles (12 hours) of red light for 14 days (20 °C), followed by 7 days of dark storage (20 °C). The results revealed changes in color parameters (a* and a*/b*) in Breaker fruits, with lycopene levels increasing by 52% and 53% in both Breaker and Pink stage fruits, respectively, by the end of the storage period. No significant differences were observed in firmness, soluble solids, and titratable acidity parameters. Additionally, the expression levels of genes involved in the biosynthetic pathways of lycopene, vitamins C and E, and folate were analyzed using qPCR assays. The SlGGP1 and SlHPPD1 genes, which regulate vitamin C and E biosynthesis, respectively, showed changes in relative expression in Breaker stage tomatoes stored in the dark. The SlPSY1 gene, involved in lycopene biosynthesis, exhibited altered expression only in Breaker stage tomatoes after 14 days of treatment. The SlGCHI gene, a regulator of folate biosynthesis, increased its relative expression in both Breaker and Pink stages during the treatment. These findings suggest that the Breaker stage is particularly suitable for red light treatments, as it results in significant increases in lycopene levels while maintaining the organoleptic quality traits of tomato fruits.

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sciforum-102952: Assessment of Bioactive Compound Changes and Antioxidant Activity in Processed Georgian Cherry Plum Products Using UPLC-PDA-MS

Aleko Givi Kalandia [1], Jeiran Putkaradze [1,2,*]

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Introduction

Endemic plum (Prunus cerasifera) is a key ingredient in Georgian cuisine, widely used in traditional products such as sauces, tklapi, korao, and, recently, in jams and preserves with added sugar. This study aimed to analyze the chemical composition of the fruit and assess the changes in its bioactive compounds during processing, employing advanced analytical techniques.

Methods

UPLC-PDA-MS analysis identified and quantified bioactive compounds in wild and cultivated cherry plum fruit, juice, and pulp. The effects of traditional high-heat processing (100°C) on the bioactive content in Tkvlapi and Korao were compared to those of innovative methods, including Ultra-Sonic Extraction and High-Pressure and -Temperature Water Extraction. Antioxidant activity was assessed using the DPPH radical scavenging assay.

Results

The analysis identified four carboxylic acids, three carbohydrates, five anthocyanin aglycones, seven anthocyanidins, fifteen flavonoids, fifteen phenolic carboxylic acids, one stilbene, and four cations in the fruits, juices, and pulps. Traditional high-temperature processing (100°C) significantly reduced the content of thermolabile phenolic carboxylic acids, anthocyanins (from 0.4 and 2.92 g/kg to 0.13 and 0.47 g/kg, respectively), and other compounds by 70-80%. Conversely, innovative extraction methods reduced this loss to 5-7%, preserving the high antioxidant activity of the original raw materials.

Conclusion

This study demonstrates the significant loss of bioactive compounds in traditional processing methods and the effectiveness of innovative techniques in preserving these compounds. The results suggest that optimizing traditional Georgian plum-based products using innovative methods can enhance their nutritional and health benefits.

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sciforum-102955: Assessment of Bioactive Compound Changes and Antioxidant Activity in Processed Georgian Cherry Plum Products Using UPLC-PDA-MS

Jeiran Putkaradze *, Aleko Givi Kalandia, Sofo Gogoberidze, Maia Rezo Vanidze and Ruslan Davitadze

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Introduction

Endemic plum (Prunus cerasifera) is a key ingredient in Georgian cuisine, and is widely used in traditional products such as sauces, tklapi, korao, and recently in jams and preserves with added sugar. This study aimed to analyze the chemical composition of the fruit and assess the changes in its bioactive compounds during processing, employing advanced analytical techniques.

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sciforum-099227: Bioactive protein hydrolysates derived from chayote (Sechium edule (Jacq.) Swartz) seeds using Subcritical Water Hydrolysis

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Chayote seeds possess high-quality protein and beneficial biological properties but remain underutilized as a protein source for producing protein hydrolysates [1]. Subcritical Water Hydrolysis (SWH) has emerged as an advantageous method for generating protein hydrolysates due to its affordability, safety, environmental friendliness, high yields, and low energy consumption [2].

This study investigates SWH to produce chayote seed protein hydrolysates with potential antioxidant and anti-diabetic properties. Experiments were conducted at different temperatures (160 °C, 190 °C) and with various gas atmospheres (N_2, CO_2, and 0.05 M HCl modifier), maintaining the same pressure (15 bar), frequency (3 Hz), solid-to-solvent ratio (1:30 g/mL), and reaction time (60 minutes). The resulting protein hydrolysates were analyzed for their chemical and nutritional properties, and detailed amino acid and phenolic profiles were obtained through chromatographic analysis. Additionally, the protein hydrolysates were assessed for their antioxidant potential and α-amylase inhibition activity.

The results indicated that the highest degree of hydrolysis was achieved at 190 °C in a CO_2 atmosphere, while the lowest value was found in a N2 atmosphere with pure water at 160 °C. Despite this, protein content was similar in both CO_2 and N_2 atmospheres when a HCl modifier was used. All extracts showed high levels of essential amino acids (334.13 mg/g of protein) and improved protein digestibility (83.1 ± 5.0%). Furthermore, the chayote protein hydrolysate produced in a CO_2 atmosphere exhibited the highest phenolic content (8.90 mg GAE/g dw), antioxidant capacity, and α-amylase inhibition (85% at 100 μg/mL concentration).

SWH significantly enhances the production of bioactive protein hydrolysates from chayote seeds. These protein hydrolysates hold promising potential for applications in food systems, enhancing both their nutritional and commercial value.

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sciforum-101388: Development of a Novel Functional Beverage using citrus peels

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Citrus fruits are an important fruit crop of global importance, both in terms of commercial value and nutritional importance. They are used by the juice industry in huge quantities. The juice industry processes millions of tons of citrus fruits per year, but only the pulp is used, while the peels, seeds, and membrane residues are most often discarded. The valorization of by-products from the citrus industry, particularly orange and lemon peels, is attracting growing interest in the agri-food sector. These peels, once considered waste, have been found to be a rich source of bioactive compounds with high potential for the development of functional beverages.

The objective of this study is to incorporate citrus peel powder at different concentrations as a natural colorant and an ingredient rich in bioactive compounds to formulate a functional beverage. The peels are well dried and ground; then, they are incorporated into the formulation as an important ingredient. In addition, a complete set of physicochemical (pH, Brix, moisture, and proteins) and phytochemical (polyphenols, tannins, carotenoids, DPPH, ABTS, etc.) analyses will be carried out.

For the beverage, the results were as follows: pH—5.635 ± 0.06; moisture content—85 ± 0.056%; DPPH antioxidant activity—92.59 ± 0.04%; ABTS—80.04 ± 0.19%; polyphenol content—150.28 ± 0.04 mg/100g; carotenoid content—13.76 ± 0.15 mg/100 ml; and tannin content—60.14 ± 0.06 mg/100 ml.

These results indicate the potential to incorporate citrus peels into food products, such as in the case of our functional beverage, to enrich food products with bioactive compounds and to valorize industrial by-products.

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sciforum-099449: Exploring the Functionality of Black Persimmon Jam: Nutritional Profile, Phytochemical Potential, and Consumer Preference

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Black persimmon, rich in antioxidants and dietary fiber, is gaining popularity due to its potential health benefits. This study investigated the development of black persimmon (*Diospyros lotus* L.) jam as a functional food, focusing on its nutritional value and potential health benefits. Jam was prepared using a boiling process and then comprehensively evaluated for its nutritional profile (proximate and mineral analyses), phytochemical content, and sensory characteristics (color, aroma, taste, texture, and overall acceptability). The proximate composition of the jam revealed carbohydrates as the most abundant component (73.33%), followed by fiber (11.08%), while the mineral analysis identified the significant presence of potassium (608.66 mg/100 g), alongside other essential minerals like calcium, magnesium, zinc, and iron. In-depth comprehensive in vitro analyses showed that our jam exhibited excellent physicochemical properties, including higher total soluble solids (70°brix), a good titratable acidity (1.09%), an optimal pH (3.33), and a rich phytochemical profile, containing significantly high levels of phenols (8.76 mg/g), flavonoids (1.91 mg/g), tannins (39.01%), TPC (3.72 g GAE/100 g), TFC (0.898 g CE/100 g), and ascorbic acid (112.39 mg/g). Furthermore, our jam also possessed good antioxidant potential, displaying DPPH radical scavenging activity (15.01%) and FRAP (552.04 μmol of Fe^{2+}/g). The sensory assessment revealed that the jam received very high acceptability scores from consumers, particularly for its taste and overall acceptability. In conclusion, this study successfully developed a black persimmon jam enriched with phenols and antioxidants, offering consumers a delicious and potentially functional food option and suggesting its good market potential.

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sciforum-098936: Incorporation of ash during traditional black olive processing: Effects on bioactive compounds and antioxidant activity

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Introduction

In addition to the conventional styles of table olive processing, there are some ancestral methods rarely used for which data are almost limited. Table olive composition is closely related to the applied technique, which is responsible for significant modifications. Consequently, the choice of a suitable method should take into consideration several parameters, in particular the use of natural ingredients that preserve their quality. Hence, the purpose of this study was to determine the effects of the incorporation of ash during olive processing on the bioactive compounds and the antioxidant activity of three Algerian olive cultivars.

Methods

Harvested olives were prepared with two methods using dry salt and ash as ingredients. Spectrophotometric methods were used for the analysis of fresh and treated olive extracts.

Results

The results indicate that processing has a significant effect on the contents of the bioactive substances as well as antioxidant activity. The method using ashes showed a better yield. Significant increases were recorded in phenolic contents, as well as antiradical activity, reaching an inhibition rate of 80% in Chemlal olives treated with ash, alongside a hydrogen peroxide inhibition activity rate of 75%.

Conclusion

This investigation confirms the quality of products prepared with natural and inexpensive ingredients which preserve their nutritional characteristics.

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sciforum-103357: Native carotenoid profile of banana inflorescence from Madeira Island

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Banana inflorescence, often discarded, is increasingly used in vegan cuisine, but its carotenoid composition, including provitamin A and lutein, and its bioavailability are still underexplored. In this study, the native carotenoid profile of banana inflorescence (Musa acuminata) from Madeira Island was assessed, with the plant material being lyophilized to obtain a homogeneous powdered sample. Carotenoids were exhaustively extracted with organic solvents and both the saponified and non-saponified extracts were analysed by HPLC-DAD. Co-chromatography with an oleoresin of marigold petals (*Tagetes* sp.), an established source of carotenoid esters already characterised by HPLC-DAD-(APCI+)MS/MS, was also performed for comparison purposes. Twenty-six carotenoids were separated in the non-saponified extract. The major carotenoids found were the provitamin A carotenes (all-*E*)-b-carotene (42%), (all-*E*)-a-carotene (17%), and (9*Z*)-b-carotene (6%) and the other free xanthophyll class (all-*E*)-lutein (14%). Eleven carotenoid esters were identified, including seven lutein diesters and three monoesters of the provitamin A (all-*E*)-b-cryptoxanthin. The diester (all-*E*)-lutein-3'-*O*-myristate-3-*O*-palmitate was the main xanthophyll ester found in the sample of banana inflorescence, presenting the same chromatographic and spectroscopic characteristics of the peak identified in marigold extract. The absence of these ester peaks accompanied by the increased proportion of both free lutein and b-cryptoxanthin in the saponified extract of carotenoids of this sample also confirmed the presence of acylated carotenoids. In summary, the inflorescence of banana plants from Madeira Island was shown to be a distinctive source of provitamin A carotenoids and lutein, free and esterified. For vegetarians and vegans who do not consume animal-derived foods with pre-formed vitamin A, provitamin A carotenoids are the main source of this essential nutrient. Therefore, banana inflorescence can be an effective nutritional strategy and a promising alternative for processed functional foods.

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sciforum-103033: Physicochemical, antioxidant, and in vitro cell viability properties of commonly consumed yams in Australia

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Yam (*Dioscorea spp.*), a high-calorie food, has long been a staple among Australian First Nation people; however, limited research exists on commercially available yams in Australia. This study investigated three genotypes (A, B, and C) of commercially grown yams in Australia for nutritional properties, such as total starch content and total dietary fibre, by using Megazyme kits, total phenolic content by the Folin–Ciocalteu method, antioxidant activity by FRAP (Ferric ion reducing antioxidant power) and ABTS (2,2'-Azinobis-3-Ethylbenzthiazolin-6-Sulfonic Acid), and in vitro cell viability properties using Caco2 and HT29 cell lines. The results showed that the flesh of genotype C had superior nutritional and antioxidant properties with higher total starch content (85.64%), dietary fibre content (10.34% (flesh), 50.15% (peel)), total phenolic content (15.17 (flesh) and 62.21 (peel) mg GAE/g), FRAP (23.10 (flesh) and 70.34 (peel) mmole Fe^{2+} eq/ g DW), and ABTS (607.08 (flesh) and 1099.8 (peel) µmole TE). The cell viability assay indicated that the peel had a stronger inhibitory effect on the growth of Caco2 and HT29 cell lines. Flesh extract concentrations of 678.2-8605 µg/mL and peel extract concentrations of 802.1-7657 µg/mL showed a 50% inhibition of growth in the HT29 cells. For Caco2 cells, flesh extract concentrations of 925.3-8245 µg/mL and peel extract concentrations of 1413-6943 µg/mL resulted in 50% inhibition. The results suggest that these yams may be considered nutritious, with potential health benefits, and useful as an ingredient in functional food products.

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sciforum-090247: The Importance of Medicinal Plants with Anti-Diabetic Potential in the Treatment of Diabetes Mellitus

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Diabetes mellitus (DM) is a metabolic disorder that may lead to chronic hyperglycemia; the most important type of DM is type 2 diabetes mellitus (T2DM). In recent years, the treatment strategies for DM have been progressed; however, anti-diabetic drugs have negative impacts such as kidney and liver disorders and hypoglycemic problems. The most important anti-diabetic activities of medicinal herbs and plant are hypoglycemic, anti-lipidemic, anti-hyperglycemic, and insulin mimicking. Some of the most important medicinal plants with anti-diabetic activities are garlic, bitter melon, ginger, and roselle plant. This literature review was conducted using different databases such as Google Scholar, MEDLINE, PubMed Central, and Science Direct. Many countries rely on plant-based medicine and medicinal plants because they are cost-effective and affordable. Medicinal plants can manage blood sugar levels and promote the immune system. Some chemical components such as fructans, kaempferol, quercetin, sulfur compounds, and allicin have shown anti-diabetic activities. The plants have no side effects, and most of them are effective in the treatment of DM. The goal of this manuscript is to highlight and study the biomedical significance and pharmaceutical benefits of some of the most important medicinal herbs and plants with anti-diabetic activities that have shown high potential to treat and prevent DM.

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sciforum-104889: The Role of Ghiza e Dawa (Food as medicine) and Dawa e Ghiza (Medicine as food) in Unani Medicine: A Sustainable Approach to Functional Food Development

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Unani medicine integrates nutrition and therapy through the principles of Ghiza e Dawa (food as medicine) and Dawa e Ghiza (medicine as food). These concepts are vital for promoting health and preventing disease. This review investigates how these traditional Unani principles can be applied to the development of functional foods, which offer both nutritional and medicinal benefits. A comprehensive literature review was performed, focusing on historical texts, contemporary research articles, and case studies documenting the use of Ghiza e Dawa and Dawa e Ghiza in Unani medicine. The review also analyzes specific Unani herbal formulations such as Sikanjabin (vinegar-honey syrup), Maul Jubn (whey), Maul Asal (honey-based preparation), Maus Shaheer (Barley water), and Zulal-e-Imly (tamarind-based beverage). The methods include their sourcing, processing, and application in modern functional food development. The findings indicate that Unani formulations like Sikanjabin, Maul Jubn, Maul Asal, Maus Shaheer, and Zulal-e-Imly hold significant potential in the development of functional foods. These preparations not only enhance nutritional profiles but also provide therapeutic benefits, such as improving metabolic health and overall well-being. The review highlights the importance of sustainable practices in sourcing and processing these ingredients to maintain their efficacy. Integrating Ghiza e Dawa and Dawa e Ghiza concepts into functional food development offers a promising strategy for addressing modern health issues. Bridging traditional Unani wisdom with contemporary food science can lead to the creation of effective and sustainable functional foods. Future research should focus on optimizing these formulations and evaluating their impact on public health.

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sciforum-095092: Valorization of Discarded Kiwiberries Through Ultrasound-Assisted Extraction of Phenolic Compounds

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Food waste is a global issue with significant implications for sustainability. A large portion of food waste results from the rejection of fruits and vegetables due to imperfections or suboptimal sizes, despite their being perfectly edible and nutritious. The fruit of *Actinidia arguta*, also known as kiwiberry, is rich in beneficial phytochemicals. This makes it an excellent candidate for preventing chronic illnesses and a valuable source of bioactive compounds utilized in health supplements, medical treatments, and beauty products. This study aims to repurpose discarded kiwiberries for the extraction of bioactive compounds, promoting sustainability and maximizing fruit utilization. It focuses on utilizing Response Surface Methodology (RSM) to optimize conditions for ultrasound-assisted extraction (UAE). Subsequently, the impact of three parameters (water-to-ethanol solvent ratio ranging from 0% to 100%; probe amplitude from 30% to 70%; and extraction time from 5 to 30 minutes) on the antioxidant and antiradical properties of the extract was evaluated through TPC, FRAP, ABTS, $O_2^{\cdot -}$, HOCl, and $ROO^{\cdot}$ assays. The most effective extraction conditions were achieved with 50% water content, a sonication time of 17.5 minutes, and a probe amplitude of 50%. A comprehensive HPLC-MS analysis of the optimal extract unveiled a total of 22 phenolic compounds, among which chlorogenic acid, neochlorogenic acid, catechin, and epicatechin were the most prominent. Further in vitro cytotoxicity assays demonstrated the extract exhibited no adverse effects on human buccal cell lines HSC-3 and TR146, suggesting its potential safety for oral applications. Overall, this study demonstrates the viability of repurposing kiwiberries to extract bioactive compounds, contributing to sustainability efforts and offering potential applications in functional foods or pharmaceuticals.

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sciforum-096958: Valorization of halophyte *Mesembryanthemum nodiflorum* for nutraceutical application: in vitro digestion and bioaccessibility of phenolic compounds

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Halophytic plants, such as *Mesembryanthemum nodiflorum*, have the capacity to survive in extreme conditions of water scarcity and soil salinity, producing protective secondary metabolites such as polyphenols, well known for their pro-healthy activities. The aim of this work was to valorize *Mesembryanthemum nodiflorum* for nutraceutical application by studying the effects of in vitro gastrointestinal digestion on the bioaccessibility and bioactivity of polyphenols present in the extract prepared by ultrasound-assisted extraction using GRAS solvents (water and ethanol).

The simulated in vitro digestion revealed an increase in the Total Phenolic Content (TPC) (21.2 mg of gallic acid equivalent (GAE)/g on dry weight (dw)), antioxidant (33.84 of ferrous sulphate equivalent (FSE)/g dw) and antiradical capacities (23.72 mg of ascorbic acid equivalent (AAE)/g dw) in the following order: oral gastric intestinal digestion. The phenolic and flavonoid compounds became more bioaccessible upon the in vitro digestion action of enzymes and pH changes, with recovery rates exceeding 150% and 50%, respectively, corroborating the TPC and TFC results. The extract also demonstrated neuroprotective properties (40%) after in vitro digestion, as well as upmodulating effects on antioxidant enzyme activities (catalase (130.46 nmol/min/g dw), glutathione peroxidase (178,46 µmol/min/g dw) and superoxide dismutase (65.8 µmol/min/g dw)). Moreover, the extract was safe on Caco-2 and HT29-MTX cells up to 500 µg/mL.

These findings suggest that *Mesembryanthemum nodiflorum* extracts could be explored as potential nutraceutical ingredient.

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sciforum-103120: A 4-week Mediterranean type diet intervention ameliorated the immunological profile of vulnerable individuals

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Introduction

Due to the increasing cost of nutrient-dense foods, food-insecure populations present a limited access to these products and a greater risk of obesity, which has been associated with alterations of microbiota composition and a pro-inflammatory status. **Objective**: Determine the impact of a food and nutrition education dietary intervention on the inflammatory profile of materially vulnerable individuals and elucidate the modulations of the gut microbiota.

Methods

Seventeen adults regularly receiving food assistance from Red Cross were recruited (Ethical committee: CEImPA2021.307). A one-month dietary intervention was conducted consisting of the provision to each volunteer of 1-hour educational training on MD recommendations based on the PREDIMED criteria along with educational materials (a monthly meal plan, a shopping list and recipes) and financial support for fresh foods purchasing. Nutritional assessment, blood and stool analysis were performed at baseline and after intervention. Dietary intake was recorded through 3 non-consecutive 24-hour food diaries and analysed using food composition tables (CESNID and USDA). Plasma cytokines were assessed with the Human Essential Immune Response Panel. Faecal microbiota and short chain fatty acids were determined by 16S rRNA gene sequencing and gas chromatography.

Results

After the intervention, a higher concentration of the interleukin (IL)-10 (by 12%) was detected, along with lower levels of IL-2 and IL-12 (by 34 and 35%). In addition, the intake of vitamin D was increased after the intervention and displayed direct associations with the relative abundance of *Roseburia* and *Ruminoccocus torques* group, which were also increased at the end of the study. Finally, the faecal levels of caproic acid were reduced (by 22%) at the end of this work and positive associations were found between its excretion levels and IL-2 and IL-12.

Conclusion

One-month intervention based on MD guidelines in vulnerable individuals ameliorated the pro-inflammatory status in parallel to modulations of the gut microbiota.

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sciforum-099758: A green snack for a greener planet: Bite-sized functional cookies supplemented with chestnut shell antioxidants

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Functional cookies are a popular snack owing to their affordability and convenience. Recently, the incorporation of fruits and by-products into functional cookies has gained attention due to its potential for boosting their health benefits, increasing their fiber and mineral contents, and enhancing their nutraceutical potential by incorporating phenolic compounds with effective antioxidant properties [1, 2]. In this study, an antioxidant-rich chestnut (*Castanea sativa*) shell (CS) extract prepared by Subcritical Water Extraction and previously validated by in vitro and in vivo studies was incorporated into fortified cookies (1.77%). The cookies were characterized regarding their nutritional composition, phenolic profile, biological effects, and sensory analysis performed by a trained panel (*n*=20) using a nine-point scale. The bioaccessibility of the cookies were assessed through in vitro gastrointestinal digestion.

The cookies' nutritional composition unveiled high contents of carbohydrates (54%) and fat (33%), followed by fiber (5%) and minerals (2%). The remarkable antioxidant/antiradical effects attested by ferric reduction (FRAP) and scavenging of synthetic ($ABTS^{\bullet+}$ and $DPPH^{\bullet}$) and biological radicals (reactive oxygen and nitrogen species) were positively correlated to the cookies' phenolic composition, represented by 60.8% hydroxybenzoic acids, 7.5% hydroxycinnamic acids, 26.4% hydrolyzable tannins, and 5.3% flavonoids. The total phenolic concentration was 152 mg/100 g cookies; caffeine was also detected (2.71 mg/100 g). In sensory analysis, the cookies achieved an overall acceptance of 84%, with all attributes scoring above 5 (appearance, color, texture, taste, flavor, sweetness, crunchiness, and hardness). Using an in vitro model, the phenolic concentrations and antioxidant properties of the cookies increased during digestion, reaching 153 mg/100 g after the intestinal phase (versus 164 mg/100 g for undigested cookies). Chromatographic analysis underlined the distinct phenolic profiling of undigested and digested cookies, with higher concentrations of phenolic acids upon digestion.

Overall, these findings sustain the efficacy of antioxidant-rich CS extract as a functional ingredient for cookies, offering a novel strategy to repurpose this agro-waste.

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sciforum-086486: A Review of the Importance and Nutritional Value of Caper (*Capparis spinosa* L.), and Its Health Benefits

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Introduction: Caper (Capparis spinosa L.) is one of the most important and dominant medicinal plants in the Greco-Arabic, Chinese, Iranian, and Ayurvedic medicinal systems. The chemical components found in this medicinal plant were flavonoids, lipids, tannins, alkaloids, lignins, (6S)-hydroxy-3-oxo-α-ionolglucosides, glucocapperin, and polyphenols. Capers are usually used in Mediterranean cuisine, especially in seafood dishes. Methods: The goal of this article is to survey the natural benefits and medicinal value of caper. A literature search was performed in Google Scholar, PubMed, Science Direct, Springer, Medline, and Wiley Online Library from 1990 to November 2023. The keywords used were the Latin and common names, as well as caper, natural products, traditional Chinese medicine, rutin, and kaempferol. Results: Caper has shown anti-microbial, cytotoxic, anti-arthritic, anthelminthic, anti-inflammatory, cardiovascular, antioxidant, chondroprotective, hypolipidemic, antidiabetic, anti-allergic, anti-carcinogenic, anti-histaminic, immunomodulatory, and anti-hepatotoxic activities. The main volatile ingredients discovered in caper bud oil were furfural, benzyl alcohol, 4-vinyl guaiacol, ethanol methyl pentyl acetal, octanioc acid, thymol, and methyl isothiocyanate. In addition to vitamin K and copper, capers also provide smaller amounts of vitamin E, magnesium, iron, and other different minerals and vitamins. In traditional medicinal science, caper has been used for the treatment of fever, headache, convulsions, diabetes, toothache, menstruation, kidney disease, skin disease, liver disease, rheumatism, ulcers, hemorrhoids, and sciatica. Conclusions: The leaves and fruits have anti-diabetic impacts, and fruits also exert cholesterol-lowering, anti-obesity, and anti-hypertensive impacts. Shoots, stem barks, fruits, and roots have shown antimicrobial effects, and roots, fruits, and leaves contain anti-inflammatory activity. In this article, we have introduced caper as a major medicinal plant by considering its natural products in both traditional and modern medicines.

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sciforum-090632: Advances in resources, biosynthesis pathway, bioavailability, bioactivity, and application of corylifolinin

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Corylifolinin, also known as isobavachalcone, is a flavonoid compound derived from the seeds of Psoralea corylifolia L. Its rich array of biological activities has positioned corylifolinin as a versatile therapeutic agent. This compound exhibits significant antioxidant, anti-inflammatory, anti-tumor, anti-bacterial, and anti-viral properties, making it a promising candidate for various medical applications.

Apart from its remarkable biological effects, corylifolinin also shows promise in improving liver function and cardiovascular health and providing neuroprotection. Its therapeutic uses are diverse, encompassing conditions such as hepatitis, cardiovascular disease, tumors, and inflammation. This review aims to provide a comprehensive exploration of corylifolinin, covering its sources, biosynthesis, biotransformation, physicochemical properties, absorption, assimilation, metabolism, and excretion.

Furthermore, the review delves into the molecular mechanisms underlying the diverse bioactivities of corylifolinin, as observed in both cellular and animal models. Insights from clinical trials and human studies are discussed, shedding light on the potential therapeutic applications of corylifolinin in human health.

In addition to its benefits, this review addresses toxicological profiles, safety considerations, and existing products and patents related to corylifolinin. This compilation serves as a valuable reference for the development and clinical use of therapies based on corylifolinin, aiming to enhance understanding and facilitate its application in the medical field.

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sciforum-103230: Amino acids profile and nutritional value of processed tomato by-products

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Tomato by-products, such as its fresh fruit, contain bioactive compounds with beneficial properties for human health. The analysis of these bioactive compounds provides relevant information that promotes the valorization of these by-products. Amino acids are considered to be compounds with a high nutritional value.

In this work, the amino acid (aa) profiles and nutritional values of processed tomato by-products, which were subjected to one of two dehydration methods—at 60 °C in a hot air circulation oven (OD) or freeze-drying (FD)—were analyzed using HPLC-DAD-FLD and AOAC, respectively. In total, 20 protein and 1 non-protein amino acids (γ-aminobutyric acid, GABA) were identified in the tomato by-products.

The co-elution of some compounds was observed, namely Asp+Glu, GABA+Pro, and Ile+Leu. Asp+Glu was the most abundant, followed by Gln, Arg, Tyr, and GABA+Pro. The OD treatment reduced the percentage of Gln (14.68%), Gly (10.88%), GABA+Pro (14.40%), Met (10.00%), Val (8.80%), Phe (13.07%), Trp (10.43%), Ile+Leu (11.05%), His (10.64%), and Lys (17.91%), while it increased that of Tyr (9.08%) compared to the FD method, in which no significant differences were observed in the other amino acids. Nevertheless, the OD treatment showed a higher percentage of essential amino acids (21.8%) compared to the FD treatment (20.5%). The decreased aa content in the OD treatment may be attributed to the temperature effect on the drying process. The fiber, carbohydrate, protein, and fat content, which were determined for the nutritional value, did not show significant differences between dehydration treatments.

The results contribute to knowledge about the composition of by-products from tomato processing industries. Although lower values were observed for some amino acids in the oven drying treatment, there were no differences in nutritional value, resulting in a more cost-effective option for the dehydration of tomato by-products as an economic source of phytochemical compounds, providing added value to biotechnology-based industries.

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sciforum-098687: Amino Acids, Phenolic, and Flavonoid Contents in Two Diverse Exracts of *Spinacia oleracea L.: Evaluation of In Vitro Antioxidant and Enzyme Inhibitory Activity*

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Spinach (*Spinacia oleracea L.*) is a green herbaceous annual leafy vegetable cultivated in many parts of the world; it is characterized by its low cost and is widely used in many traditional dishes. It is considered a functional food for its nutritional composition, phytochemicals, and bioactive compounds that contribute to reduce oxidative stress, inducing the secretion of satiety hormones helping to promote protection mechanisms against hypoglycaemia, cancer, and obesity.

Plant materials were collected for the protein extraction process. Two extraction processes were conducted, in which one involved the use of $CaCl_2$ (S2 sample), while the other one was extracted without the use of CaCl2 (S1 sample).

Then, the amino acid content was determined in both samples using the HPLC-DAD technique with the aim to investigate the phytochemical profile, together with the phenolic and flavonoid compounds. To allow the identification and quantification of amino acids using HPLC-DAD, derivatization with the fluorenylmethyloxycarbonyl (Fmoc) group was carried out following a previously described procedure.

Data reveal that sample S2 presents isoleucine (12.16 μg/mL), while sample S1 contains lysine (4412,6 μg/mL) and tyrosine (9,02 μg/mL). Both of them present a comparable total phenolic content ; however, as concerns the total flavonoid content, sample S1 shows a higher quantity (3.7 mg RE/g). Biological assays show a higher antioxidant activity in sample S1, according to ABTS (21,3 mg TE/g) and metal chelating (32,3 mg EDTAE/g) assays compared to sample S2 in antioxidant tests by CUPRAC (21,6 mg TE/g) and FRAP (13,6 mg TE/g). Finally, sample S2 exhibits a greater inhibition of tyrosinase than sample S1. In turn, sample S1 exhibits a greater inhibition of the glucosidase enzyme than sample S2. In conclusion, sample S1 presents a better amino acid content, antioxidant activity, and enzyme inhibitory activity. Further studies are required to improve the protein extraction method and to promote the development of enriched foods and beverages.

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sciforum-099092: An evaluation *of* the potential of *Inga paterno* sarcotesta and its seeds for the production of probiotic beverages: their effect on antioxidants and *Lactiplantibacillus plantarum* viability at refrigeration storage temperatures

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The sarcotesta and seeds of *Inga paterno* are good sources of nutrients but are rarely explored. Meanwhile, *Lactiplantibacillus plantarum* (*LP*) is widely used for probiotic beverage production. The aim of this work was to evaluate the flavonoid content, antioxidant stability, and *L. plantarum* viability in different formulations of the *I. paterno* beverage under refrigeration conditions.

The three beverages were prepared using *I. paterno* 5% w/v sarcotesta (Sa), 5% w/v seed (Se), or a 1:1 mixture of (Ae) and water. All were sterilized for *LP* inoculation (2.1×10^{6} CFU/ml), incubated (72h), and stored at 5°C. LP quantification was carried out in MRS agar (0, 4, 11, 18, and 25d). The total phenolic content (TPC) was determined by the Folin–Ciocalteu method, and antioxidant activity (TAC) was determined by DPPH•. Experiments were carried out in triplicate. Data were analyzed by one-way ANOVA and Tukey's test (p 0.05).

LP concentration increased in Se, Sa, and Ea (2.77×10^{7}, 8.67×10^{6}, and 3.97×10^{7} CFU/ml) compared to the initial amount. Microorganisms decreased in Ea every week until 8.67×10^{4} CFU/ml; however, microorganisms were stable in Se but decreased after 11d of storage (2.67×10^{4} CFU/ml). On the contrary, a slight increase was observed in Sa (2.10×10^{7} CFU/ml), which may be due to a greater presence of carbohydrates. Sa presented the highest TPC (69.54±9.13-376.42±7.07 ug gallic acid equivalents (GAE)/ml) and TAC (84.34±2.23-106.32±3.91 ug Trolox equivalents (TE)/ml). Se reaches the lowest TPC and TAC values (29.75±3.54-146.00±10.02 ug GAE/ml; 34.47±1.67-69.91±1.183 ug TE/ml, respectively). TPC and TAC presented the same tendency for Sa and Ea. The data showed that the sarcotesta of *I. paterno* was a better ingredient for the development of an antioxidant–probiotic beverage because it increases the antioxidant compounds and ensures the viability of LP. However, for the use of *I. paterno*, it is necessary to consider that it is a seasonal crop. Further investigations are needed to characterize the antioxidant compounds generated after fermentation.

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sciforum-097536: Anti-inflammatory activity of taro-derived resistant starch and its effect on the intestinal flora

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Taro (*Colocasia esculenta* (L.) Schott) is classified as an herbaceous root crop with a high starch content. No studies have been reported on the modulatory effects of taro-derived resistant starch (TRS) on intestinal inflammation and the gut microbiota. In this study, TRS with a concentration of 69.81% wt. was prepared from taro starch and its physicochemical and structural properties were evaluated by using SEM, FTIR, and XRD. The molecular degree of order (R1047/1022cm^{-1}) of the TRS was 0.915, while the degree of double-helix (R995/1022cm^{-1}) was 1.041. TRS exhibited the most prominent diffraction peak, observed at 17.0°, which is characteristic of type B crystallization. All animal studies were approved by the Experimental Animal Ethics Committee of Yangzhou University (license number SYXK2016-0019). The administration of 300 mg/kg TRS reduced colon shortening and alleviated colonic mucosal injury in colitis mice, thus reducing the infiltration of inflammatory cells. Compared to the DSS group, the levels of IL-6, TNF-α, and MDA were decreased in the DSS+TRS group, while the levels of IL-10, T-AOC, SOD, and CAT were increased, indicating that TRS enhanced the anti-inflammatory response. It is noteworthy that TRS restored the reduction in gut microbiota diversity and abundance caused by DSS-induced colitis in mice, while also reducing the abundance of potentially harmful bacteria, namely *Desulfovibrio*, *norank_f_Desulfovibrionaceae*, and *norank_f_norank_o_Clostridia_UCG-014*. Conversely, the prevalence of beneficial bacteria, such as *Lactobacillus* and *norank_f_Muribaculaceae,* was increased. Concomitantly, TRS treatment significantly increased the production of short-chain fatty acids, including acetate, propionate, and butyrate, in colitis mice. This was found to be positively correlated with the reinforcement of beneficial gut microbiota by TRS. These studies have demonstrated that TRS can attenuate the progression of colitis and is a promising candidate for the development of a new prebiotic treatment for ulcerative colitis.

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sciforum-097904: Antibacterial activity against gastrointestinal pathogens of novel powdered beetroot juices

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An innovative approach in the food industry is the use of lactic acid fermentation to preserve foods and modify their physico-chemical and microbiological properties, such as beetroot juice (BJ, with a high rate of bioactive compounds), fermented with selected probiotic bacteria. This process provides strong antioxidant properties, as well as many taste and health benefits. Our study focused on spray-dried (sd) or freeze-dried (fd) powders prepared from unfermented (NF-PBJ) and fermented beetroot juice (F-PBJ) using the probiotic *Lactobacillus plantarum* 299v, with the addition of 20% oligofructose. The aim was to evaluate the antimicrobial potential of PBJs, in the concentration range 7.81-32000 µg/mL, against a broad spectrum of reference bacterial strains (*Micrococcus luteus, Staphylococcus epidermidis, S. aureus, Bacillus subtilis, B. cereus, Escherichia coli, Pseudomonas aeruginosa, Klebsiella pneumonia, Proteus mirabilis, Acinetobacter baumannii,* and Salmonella typhimurium) using the broth microdilution method on Mueller–Hinton broth medium.

For all PBJs, the minimum inhibitory (MICs) and minimum bactericidal concentrations (MBCs) were in the range of 2-16 µg/mL and 4->32 µg/mL, respectively. Based on the MBC/MIC ratio, PBJ showed bacteriostatic (e.g. against *S. aureus, B. subtilis, B. cereus, M. luteus*) or bactericidal (e.g. against *E. coli, P. aeruginosa, K. pneumoniae, A. baumannii, Salmonella* spp.) activity, depending on the microbial strain, the contribution of the fermentation process, and the drying technique. These results highlight the antimicrobial potential of PBJs, including activity against the selected diarrhoeal pathogens tested (e.g. *E. coli*, *Salmonella* spp.). The resulting sd/fd-F/NF-PBJs offer desirable antimicrobial properties as well as an improved taste profile and a convenient food formulation with significant technological potential. This suggests a broad potential for the use of PBJs in the production of innovative functional foods, pharmaceuticals, cosmetics, or dietary supplements.

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sciforum-098327: Antimicrobial and antioxidant properties of an Australian bush food—*Syzygium smithii*

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Introduction

Many Australian native plants, including *Syzygium* spp., have been used as a traditional medicine by indigenous Australians; however, they have been underutilised in modern medicine due to the lack of scientific studies. The berries of *Syzygium smithii,* commonly known as lilly pilly, are considered to be a protective food and have not been investigated previously. This is a preliminary study of the antimicrobial and antioxidant properties of the berries and leaves of *Syzygium smithii*.

Method

Syzygium smithii berries and leaves were extracted using an in-house cold extraction method in ethanol and water. The antimicrobial properties were investigated using disc diffusion and minimum inhibitory concentration (MIC) assays against Gram-positive (*Bacillus cereus, Enterococcus faecalis, Listeria monocytogenes,* and *Staphylococcus aureus*) and Gram-negative bacteria (*Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa,* and *Salmonella enterica*). The antioxidant capacity was investigated using 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical inhibition, ferric reducing antioxidant power (FRAP), total phenolic content (TPC), and total flavonoid content (TFC) assays.

Results

During the disc diffusion assay, the berry and leaf ethanolic extracts showed inhibitory potential against all Gram-positive bacteria, except *S. aureus* for the berry extract. The MIC was found to be 25 mg/ml for the ethanolic leaf extract against all bacteria, excluding *S. enterica*, and between 12.5 and 25 mg/ml for the aqueous leaf extract against all bacteria, excluding *K. pneumoniae* and *S. enterica*. The TPC and TFC was found to be 663.44 µg gallic acid/mg and 489.80 µg quercetin/mg, respectively, with an antioxidant capacity with IC_{50} of 38.79 µg/ml against DPPH for the aqueous berry extract.

Conclusion

In conclusion, *Syzygium smithii* has the potential to be utilised by modern medicine as a potential antimicrobial and antioxidant agent. Further studies are needed to warrant these biological activities of *Syzygium smithii*.

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sciforum-103386: Antioxidant Activity of Various Bee Products

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Bee products such as honey, pollen, propolis, beeswax, and royal jelly are renowned for their biological properties, particularly their antioxidant activities. These products contain bioactive compounds like polyphenols and flavonoids, which play a crucial role in neutralizing free radicals, which are responsible for oxidative stress, a key factor in the development of various diseases. This study specifically focused on evaluating the antioxidant activity of five bee products : honey, pollen, propolis, beeswax, and royal jelly, collected from the region of Akbou.

This study assessed the antioxidant content and activities of these products by analyzing their levels of phenolic compounds, flavonoids, ascorbic acid, and carotenoids. Antioxidant activity was measured using two established methods: radical scavenging activity (DPPH) and reducing power. These analyses aimed to identify the strength and efficacy of each product in neutralizing oxidative stress.

The results indicated that all five bee products from Akbou contain significant amounts of antioxidant compounds. Among them, propolis and honey exhibited the highest concentrations of polyphenols and flavonoids. The DPPH analysis revealed that propolis had the highest radical scavenging activity, followed closely by honey and pollen. The reducing power analysis supported these findings, highlighting the effectiveness of propolis and honey as potent antioxidants. The presence of ascorbic acid and carotenoids in these products further contributed to their antioxidant capacity.

This study demonstrates that bee products from Akbou are rich sources of natural antioxidants, with propolis and honey standing out for their strong ability to neutralize free radicals. The findings underscore the importance of these products as functional foods or supplements to enhance antioxidant defense mechanisms in the body. Further investigation into their botanical origins may provide insights into their unique properties and enhance their characterization as high-value natural products.

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sciforum-099878: Antioxidant and Antihypertensive Activities of Giant Grouper (*Epinephelus lanceolatus*) Egg Protein Hydrolysates

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Fish eggs have been recognized as a potential source of bioactive peptides due to their high protein content. Accordingly, the utilization of roe by-products from the giant grouper as sources of biopeptides to increase their value appears to be feasible. This research aimed to identify the bioactivities of giant grouper roe, particularly on antioxidant and angiotensin-I-converting enzyme (ACE-I) inhibitory activities. Unutilized grouper roe was first defatted and subsequently hydrolyzed using pepsin (DFRpep), papain (DFRpap), and bromelain (DFRbro). The protein hydrolysates were then analyzed for their ACE-I inhibitory and antioxidantactivities. The results showed that the degree of hydrolysis after four hours was 26.25% for DFRpep, 12.66% for DFRpap, and 11.07% for DFRbro. Pepsin hydrolysates produced the highest yield at 59.99%, followed by papain (23.43%) and bromelain (17.09%), with protein contents of 91.46%, 73.03%, and 52.17%, respectively. At a concentration of 2 mg/ml, pepsin hydrolysates exhibited the strongest ACE-I inhibition, achieving 34.09 ± 1.83%, compared to bromelain and papain hydrolysates, which showed inhibitions of 31.15 ± 4.65% and 21.51 ± 1.41%, respectively. Additionally, grouper roe treated with papain and bromelain showed greater potential for DPPH scavenging activity at 21.36 ± 0.37% and a reducing power activity of 0.151 ± 0.040%, respectively, than pepsin hydrolysates. Based on these findings, giant grouper roe can be effectively utilized as a valuable raw material for producing specific bioactive peptides, such as ACE-I inhibitory and antioxidant peptides. These bioactive peptides can be formulated into pharmaceutical products to boost their market value and improve human health.

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sciforum-103075: Antioxidant and antihypertensive properties of biscuit melanoidins

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Melanoidins isolated from biscuits are good candidates for use as functional ingredients in the food industry because they can improve sensorial characteristics and possess biological properties with several potentially beneficial effects on human health. However, their bioactivity is closely related to their bioaccessibility and bioavailability. Therefore, this study focuses on the evaluation of the effect of the use of different proteolytic enzymes, pronase E and endoprotease papain enzyme (EP), for the isolation of biscuit melanoidins, as well as the effect of the gastrointestinal digestion process on antioxidant activity. The total antioxidant capacity was significantly increased after in vitro gastrointestinal digestion for both melanoidins, being significantly higher for melanoidins from pronase E. Additionally, the bioactivity of the bioavailable fractions of melanoidins against endothelial damage was tested for their ability to modulate the activity of angiotensin-converting enzyme (ACE) in phorbol 12-myristate-13-acetate (PMA)-induced endothelial cells (HUVECs). The results show the absence of the cytotoxicity of the bioavailable melanoidins and a decrease in ACE levels was observed as a biomarker of antihypertensive activity. These results suggest that bioavailable melanoidins may improve hypertension by inhibiting the activity of ACE. In conclusion, melanoidins may be promising candidates for blood pressure management and health promotion, highlighting their role as functional ingredients in food applications.

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sciforum-099083: Antioxidant and techno-functional properties of silverskin coproducts obtained from the *Coffea arabica* cultivated in Brazil and *Coffea canephora* cultivated in Vietnam

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The number of coffee consumers has increased, as has coffee's annual production and, consequently, the generation of coffee co-products. One of these co-products is a membrane that coats the coffee bean and is released during the roasting process of green coffee (silverskin). This study evaluated the physicochemical properties, antioxidant capacity, and techno-functional properties of silverskin obtained from roasted coffee varieties *Coffea arabica* from Brazil and *Coffea canephora* from Vietnam. The skins were obtained after roasting and ground in a coffee grinder for the analyses. Physicochemical properties were determined by measuring the samples' pH and water activity (Aw). Antioxidant capacity was determined by three different assays: ABTS, DPPH, and FRAP. The techno-functional properties measured were water-holding capacity (WRC), oil-holding capacity (ORC), and swelling capacity (SWC). For the pH of the samples, the results showed values (p0.05) of 4.78 and 4.86 for Vietnamese and Brazilian coffee, respectively, while Aw showed no significant differences ($p>0.05$) between the samples. For antioxidant capacity, the DPPH test showed no significant differences ($p>0.05$) between samples, while the ABTS test showed values ($p>0.05$) of 15.07µgTrolox/g flour and 15.10µgTrolox/g flour for silver skin from Vietnam and Brazil, respectively. In the FRAP test, the samples showed significant differences (p0.05) between them with values of 21.49µgTrolox/g flour and 16.76µg Trolox/g flour for silver skin from Vietnam and Brazil, respectively. As for the techno-functional properties, WRC and SWC showed significant differences between the samples (p0.05); however, ORC showed no significant differences ($p>0.05$) between the two flours. The results obtained show that the utilization of coffee silver skin can help to reduce food waste generated by coffee production. Different origins and species of coffee beans may cause differences in antioxidant activity. Further studies on coffee silver skin should be conducted to promote its use in different formulations of new food products.

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sciforum-099194: Antioxidant Properties and Mineral Composition of Saba Banana [*Musa acuminata x balbisiana* (ABB Group)] Peel Tea

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More than a million metric tons of waste, specifically banana peels, are generated annually from the production and consumption of bananas, a major crop and popular snack in the Philippines. Banana peels are often discarded, despite their significant potential for various applications, including food uses, as they contain higher amounts of nutrients and phytochemicals compared to the pulp. There is a notable gap in the literature regarding the utilization of banana peels, particularly those from unripe bananas, as a raw material for herbal tea production. This study addresses this gap by assessing the beneficial bioactive compounds of tea prepared from peels of unripe and ripe Saba bananas at different decocting periods (10, 20, 30 minutes) in terms of antioxidant properties and mineral composition. The peels were sourced mostly from small businesses that regularly utilize Saba bananas and do not have any more use for them, and were brewed into tea in a 1:8 ratio with water. Results from laboratory and statistical analyses show that the levels of antioxidant properties significantly increase (p 0.001) with ripeness, and the amount of minerals significantly increase (p 0.001) with both ripeness and decocting periods. Consequently, tea samples prepared from peels of ripe Saba bananas at a decocting period of 30 minutes had the highest values for antioxidant properties and mineral components. This study successfully utilized peels from both unripe and ripe Saba bananas, which would otherwise have been discarded. It demonstrated the presence of bioactive compounds in peels that can offer significant health benefits.

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sciforum-086578: Bioavailability enhancement of Secoisolariciresinol diglycoside (SDG) in flaxseed milk through seed treatment and probiotication

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Multiple studies have demonstrated the health benefits of flaxseed products containing bioactive compounds such as SDG. It was claimed that grinding, soaking, or roasting seeds might enhance the bioavailability of active compounds. On the other hand, cereal fermentation may increase this bioavailability. This study aims to enhance the bioavailability of SDG in flaxseed milk.

Flaxseeds were reconstituted in distilled water at 5% (W/V) for 15 minutes. The mixture was filtered to produce flaxseed milk (the control). The flaxseed milk was autoclaved before being cultured with *L. casei* or *B. bifidum*. The treatment of the flaxseeds before milk preparation was carried out as follows: soaking at room temperature or in boiled water for 4 hours and roasting at 120 or 150 ° C for 30 min. The changes in SDG in the control, treated and uncultured, and cultured flaxseed milk were monitored using HPLC. Furthermore, the cultured flaxseed milk was subjected to sensory evaluation.

The results showed that the flaxseed milk (5% w/v) contained 220 and 18.9 mg/ml of carbohydrates and protein, respectively. Probiotics were able to grow on the milk, with the best cell count being achieved after 25 h of incubation, reaching log 7 and log 7.23 for *B. bifidum* and *L. casei, respectively*. Several peaks in the chromatograph produced by *B. bifidum* were greater than those produced by *L. casei*. However, neither probiotics changed the percentage of SDG significantly. When *B. bifidum* was introduced to roasted whole flaxseeds, several HPLC peaks were generated, which may have been induced by the high temperature or bacterial activity. Additionally, SDG or its metabolites were slightly elevated. The best conditions that favored the production of SDG were soaking whole seeds for 4 h at room temperature and then culturing the milk with *L. casei*.

This study emphasised the significance of combining physical treatment and fermentation for flaxseeds to achieve higher levels of active compounds.

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sciforum-101635: Black Cumin (Nigella sativa L.): A Versatile Natural Remedy for Various Ailments

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Black cumin, or Nigella sativa (N. sativa), is a herb with potent therapeutic qualities that has been used for a very long time in traditional medicine. The therapeutic properties of the active ingredient, thymoquinone, against a wide range of illnesses have been thoroughly investigated. N. sativa has recently been shown to have potential beyond its conventional usage in controlling HIV/AIDS. This suggests that N. sativa could be a beneficial adjuvant therapy, although further validation is needed. Furthermore prized for their strong antioxidant qualities, N. sativa seeds are good choices for dietary supplements with little negative impact. When used with traditional chemotherapeutic medicines, N. sativa has demonstrated the capacity to improve treatment outcomes while possibly reducing the toxicity associated with concurrent drug administration. The bioactive substances present in N. sativa seeds and oil are thoroughly examined in this review, which also provides insights into their evolving functions as functional foods and nutraceuticals as well as their historical medical uses. Research demonstrates how well N. sativa works to heal long-term illnesses like inflammation, cancer, diabetes, heart disease, and neurological disorders. Its extensive therapeutic potential is further demonstrated by its efficiency against a variety of infectious disorders caused by bacteria, fungi, parasites, and viruses. Future research endeavors aim at delving deeper into the medicinal and biological mechanisms of N. sativa, paving the way for optimized therapeutic strategies and innovative treatment modalities. By elucidating its molecular pathways and pharmacological actions, researchers seek to harness the full therapeutic potential of N. sativa.

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sciforum-099446: Broccoli's sulforaphane, pathways and mechanisms against Lymphoma according to a Bioinformatic assay

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In total, 250,000 deaths around the world are because of Lymphoma (LP), the treatments for which include the following: chemotherapy, radiotherapy, monoclonal antibody therapy, and steroid medicine. However, those treatments can have side effects. Therefore, there is a need for low-cost treatments with fewer side effects. Broccoli's sulforaphane (SFP) is a glucosinolate derived from methionine that has gathered attention as a potential therapeutic agent against different types of cancer. Nevertheless, its relevance for it as a treatment against LP has not been tested. This study aims to identify SFP's targets, like anti-cancer treatments for LP, using different bioinformatic tools and databases. MalaCards and SwissTargetPrediction were applied for both SFP and LP. Later, Gene Ontology tests were conducted using ShinnyGo 0.8 from the genes gathered. Furthermore, StringDB was used to identify the protein–protein interactions and to discern HUB genes. Those hub genes were then subject to Gene Expression Profiling Interactive Analysis (GEPIA2) and a test of interactions between the tumor and the immune system (TISIDB). Finally, molecular docking studies were performed using the SwissDock database and visualized using Chimerax Software. The results suggest that SFP has a relationship with the metabolic pathways of cancer, like central carbon metabolism in cancer, adherent's junctions, EGFR tyrosine kinase inhibitor resistance, and miRNA in cancer. Particularly, most HUB genes seem highly related to the miRNA regulation pathways. Also, all the genes can have a direct effect on cancer–immune system infiltration. The effects of the HUB genes have shown, how cells like CD56dim could be diminished by the action of the HUB genes, changes in the production of such genes by action of SFP, or in their proteins, which could be triggered. Such findings are also supported by the docking analysis, at least in the sense that for all genes of interest, SFP seems to have a high affinity to attaching to them.

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sciforum-099429: Characteristics of Milk Thistle Seed Oil Extracted by Folch's Extraction Procedure

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Milk thistle (*Silybum marianum L. Gaertn*) is a medicinal plant from the family Asteraceae. Its seeds are renowned for their medicinal and industrial potential due to the presence of bioactive compounds, including silymarin and unsaturated fatty acids, vitamin E, flavonoids and phenolics, so it can be used in the prevention of cardiovascular disease.

In this study, Folch's method was employed to isolate lipids from other components. The composition of fatty acids in the extracted oil was determined by gas chromatography (GC), and the thermal properties of the oil were examined by Pressure Differential Scanning Calorimetry (PDSC). Furthermore, the quality of the extracted oil was assessed through acid value and peroxide value tests. Additionally, the potential health-promoting properties of the oil were determined by measuring the total polyphenol content and antioxidant activity.

The results showed that predominant unsaturated fatty acids were linoleic acid (C18:2) and oleic acid (C18:1). Saturated fatty acids, such as palmitic acid (C16:0) and stearic acid (C18:0), also had a significant contribution. The distribution of fatty acids in triacyglycerols revealed that unsaturated fatty acids are often in the internal position (sn-2), while saturated fatty acids are in the external position (sn-1,3). The oxidative stability demonstrated that the extracted oil possessed a long oxidation induction time (47.62 min), which is comparatively higher than the oil extracted by the Soxhlet method. This could be associated with the non-use of heat in the Folch method. Both acid value and peroxide value were in permissible levels, which indicates that fresh seeds were employed without heating treatments. The total phenolic content analysis showed a minor presence of phenolic compounds.

In conclusion, the use of non-thermal extraction methods like Folch's can effectively preserve the quality of the oil, making it a superior choice for health and nutrition applications.

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sciforum-103367: Characterization and Stability Evaluation of Whey-, Soy-, and Pea Protein-Based Emulsions Enriched with Mentha Essential Oil

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The increasing interest in developing emulsion-based foods employing various combinations of plant-dairy proteins necessitates a thorough understanding of how to integrate these protein mixes into both existing and novel formulations. This study aimed to evaluate the stability and physical properties of emulsions enriched with a functional ingredient, Mentha essential oil (MEO), at the oil–water interface within systems containing different mixtures of whey protein with plant proteins such as soy and pea protein isolates. Emulsions with three different protein compositions were prepared using ultrasonication by incorporating Mentha essential oil. The emulsions were characterized for their physical properties, including droplet size distribution, zeta potential, emulsifying stability against creaming and coalescence, viscosity, and antioxidant properties. The oxidative stability of these emulsions was assessed by analyzing volatile lipid oxidation compounds throughout the storage period (28 days at 45°C). Their physicochemical properties were assessed through measurements of droplet size, viscosity, and creaming index. The results indicated that the emulsion containing pure whey protein produced smaller droplets (124.2 nm), exhibited a higher zeta potential (−50.8 mV), and formed a more viscous emulsion (1.89 mPas) compared to the emulsion containing soy and pea proteins (181.4 nm; −36.8 mV; 1.62 mPas). The protein composition had no significant effect on creaming stability. Moreover, emulsions prepared with soy and whey showed a higher scavenging activity for ABTS+ and DPPH radicals as compared to those prepared solely with whey protein. This study suggests that emulsions produced with whey protein exhibit excellent physical stability against flocculation, coalescence, and creaming, as well as a high stability against lipid oxidation. Further studies should be focused on the pretreatments of plant proteins to improve their techno-functional properties, for their effective administration into food delivery systems.

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sciforum-100465: Chigee-derived *Lactobacillus acidophilus* NX2-6 Improved Lipid Metabolism and Enhanced Intestinal Barrier in High-fat-diet-fed Mice

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The high-fat-diet-induced metabolic disorders are often accompanied with oxidative stress and inflammatory responses, which eventually results in lipotoxicity and tissue impairment. It is reported that probiotics have abilities to improve lipid metabolism and attenuate hyperlipidemia. In this study, all ICR mice were randomly divided into three groups, including a normal control group, high-fat-diet (HFD) group, and HFD + *Lactobacillus acidophilus* NX2-6 (LHLA) group (n = 8). Our results showed that 8-week oral administration (10^9 cfu/mL) of *L. acidophilus* NX2-6 (NX2-6) improved the serum lipid profile in ICR mice using biochemical analysis. The Western blot method showed that NX2-6 treatment suppressed lipid accumulation in the adipose tissue by suppressing de novo lipogenesis and adipogenesis but promoting lipolysis and energy expenditure. However, supplementation with NX2-6 could not effectively ameliorate HFD-induced ER stress and inflammation in the adipose tissue. Meanwhile, NX2-6 also enhanced antioxidant capacity, improved the intestinal physical barrier and mitophagy, and suppressed inflammatory responses in the colon. High-throughput sequencing technology analysis showed that NX2-6 increased microbial species diversity and the relative abundance of beneficial bacteria, including *Bacteroidetes*, *Verrucomicrobia*, *S24-7*, *Lactobacillaceae*, *Lactobacillus,* and *Parabacteroides* but decreased the proportion of several harmful microorganisms, such as *Proteobacteria*, *Desulfovibrionaceae*, *Alistipes*, *Desulfovibrio*, *Helicobacter,* and *Mucispirillum*. Our data provide a new dietary insight into the prevention of diet-induced obesity. Specifically, this manuscript is presented on the anti-obesity effects of NX2-6 and underlying molecular mechanisms, which will provide a theoretical basis of anti-obesity probiotics for the development of functional foods.

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sciforum-098629: Chinese yam polysaccharides ameliorate high-fat-diet-induced atherosclerosis and modulate the gut microbiota in ApoE$^{-/-}$ mice

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Atherosclerosis, the leading cause of cardiovascular disease, poses a great threat to human health. Chinese yam polysaccharides (CYPs) possess various pharmacological effects and biological activities. However, the anti-atherosclerotic effects of CYPs and their underlying mechanisms remain unclear. Here, we explored whether CYPs could regulate the diversity and composition of the gut microbiome, as well as alleviate high-fat-diet (HFD)-induced atherosclerosis. In the present study, the atherosclerotic pathology, serum parameters, and gut microbiota analyses were used to determine how CYPs alleviate atherosclerosis in HFD-fed *ApoE$^{-/-}$* mice. The animal study protocol was approved by the Committee on the Ethics of Animal Experiments of China Agricultural University (Approval Code: AW92503202-5-1; Approval Date: 29 May 2023). Our results indicated that CYP treatment (400 mg/kg/day) for 6 weeks in ApoE-/- mice (n=12 mice in both control and CYP groups) reduced the plaque size to 50%, reduced the lipid and necrotic areas to 60%, and stabilized the atherosclerotic plaques. Concomitantly, CYPs slightly reduced the levels of TG and LDL-C in serum, while they elevated the HDL-C level. CYPs also decreased the serum MDA level (to 70%) while increasing the levels of GSH, SOD, and GSH-PX (to 120%). Further investigations demonstrated that CYPs reduced the expression of chemotactic factor *Mcp-1* (to 20%) and the expression of pro-inflammatory cytokines (*Tnf-α*, *Il-1β*, *Il-6*, and *Nos2, 20% to 75%*) in aortas. Remarkably, CYP supplementation produced structural changes in the gut microbiota, reducing the abundance of *Firmicutes* and *Actinobacteriota* and increasing the *Bacteroidota* and *Proteobacteria* at the phylum level. Collectively, CYPs can exert hypolipidemic, anti-oxidant, anti-inflammatory, and gut microbiota regulation effects, ultimately inhibiting atherosclerosis progression, and they could be further exploited as potential anti-atherosclerosis bioactive nutrients.

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sciforum-102304: Circular economy in the agri-food sector: valorization studies of vegetable by-products

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Interest in the sustainable use of agri-food by-products has grown over the years. The goal of this work was to determine the content in fibers and proteins, as well as the amino acids' profile of residues obtained from the extraction process of bioactive molecules, which is normally discarded and considered as waste. For this, it was obtained the residues from the maceration extraction of: 1) kale (*Brassica oleracea* var. *Acephala*); 2) zucchini (*Cucurbita pepo* L.); and 3) onion peel (*Allium cepa* L.) by-products. The residues were separated, freeze-dried, and characterized (in terms of the content of total, soluble, and insoluble dietary fibers, as well as crude and total proteins), following standardized methods of the AOAC. Additionally, the amino acids' profile was determined using chromatographic methods. The onion peel exhibited the highest content in fibers, i.e., 14.54 ± 0.37% of soluble dietary fibers and 54.61 ± 0.53% of insoluble dietary fibers. The crude protein and the total protein contents were significant in the kale (26.9 ± 0.2 and 23.34 ± 0.02 g/100g dw) and zucchini (30.67 ± 0.5 and 27.43 ± 0.03 g/100g dw) residues. These residues also showed the major total essential amino acids' content with 82.21 ± 3.90 mg/100 g dw for kale residue and 98.55 ± 4.70 mg/100 g dw for zucchini residue, with phenylalanine and leucine as predominant amino acids. In terms of non-essential amino acids' content, aspartic and glutamic acids were crucial in all the studied residues. The obtained results show the potential of the studied residues to be used as ingredients in the food industry, promoting the circular economy by transforming by-products into sources of fiber and amino acids.

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sciforum-103630: Coffee leaves: a natural source of compounds for reducing body fat accumulation

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Recently, coffee leaf infusion was authorized as a novel food by the European Commission. Little information is available on the bioactive profile and health-promoting benefits of this authorized novel food. Chlorogenic acid (CGA), a multifunctional health-promoting compound (antioxidant, hypolipemiant, antidiabetic) that is found in the different botanical parts of coffee, has been detected in its leaves and infusion. Body fat accumulation is linked to overweight and obesity, one of the major health problems associated with other pathologies, in which oxidative processes are involved. This research aimed to provide new information on the effect of CGA, coffee leaf infusions, and coffee leaf infusion waste on body fat accumulation, using a *C. elegans* animal model. Coffee leaf infusions were prepared according to the EFSA guidelines. After the infusion preparation, the soluble and insoluble fractions were separated. The insoluble fraction, i.e., the waste, was dried in an oven (40°C, 3 hours). The antioxidant capacities of the infusion (0.360) and waste (0.083) were determined using ABTS, expressed as mg CGA/ml. The effect of CGA, coffee leaf infusion, and waste on body fat accumulation with a standard diet was analyzed in *C. elegans* by means of Oil-Red-O staining. CGA (135, 5 and 2.5 μg/ml) and waste (20 μg/ml) significantly reduced (p0.05) body fat accumulation in nematodes with a standard diet, both qualitatively (images) and quantitatively (staining intensity/body nematode area). The infusion (100 and 50 μg/ml) did not show this effect despite exhibiting a higher antioxidant capacity. The infusion waste contains dietary fiber and phenolic compounds, which could synergistically contribute to the reduction in body fat accumulation. The use of waste could promote the control of body fat accumulation in the consumption of a standard diet and contribute to the Zero Waste goal. The waste containing nutrients could be used a as sustainable and health-promoting food ingredient. The infusion preparation can be improved to obtain an antioxidant beverage for reducing body fat accumulation.

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sciforum-101891: Coffee Pulp Valorization Strategy: Flavonoid- and lipid-enriched food-grade ingredients obtained from an advanced extraction technology

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The valorization of coffee pulp (CP) is gaining interest because of its content in high-value bioactive compounds. Flavonoids and lipids have been traditionally recovered from coffee by-products using organic solvents such as methanol, hexane, or acetone. However, the toxicity of these solvents limits their food applications. Accordingly, the development of food-grade extraction processes is promoted, supporting the idea of sustainability. This work investigated the feasibility of ethanol-modified supercritical carbon dioxide (EtOH-scCO_2) extraction as a safe and green technique for recovering flavonoids and lipids from CP. The extraction conditions, namely, temperature (45, 55, and 65 °C), pressure (20 and 30 MPa), and EtOH proportion (5 and 10%), were screened using response surface methodology for maximizing the selectivity and efficiency of lipid and flavonoid recovery. The results revealed that EtOH proportion significantly increased (p 0.05) the extraction efficiency but decreased (p 0.05) the extraction selectivity of flavonoids and lipids. Compared to conventional aqueous and ethanolic solid–liquid extractions, EtOH-scCO_2 yielded lower flavonoid recovery efficiency, while the opposite was observed for lipids compared to ethanol extractions. However, a superior extraction selectivity was achieved using such advanced technology compared to conventional extractions, namely, up to 33.7 mg CE/g extract for flavonoids at 45 °C, 30 MPa, and 5% ethanol; and 505 mg /g of extract for lipids at 55 °C, 30 MPa and 5% ethanol. Overall, these results revealed that the EtOH-modified sc-CO_2 extraction technology from CP could be a promising approach for obtaining flavonoid- and lipid-enriched food-grade ingredients. Hence, this research contributes to the circular bioeconomy paradigm framed on the valorization of agri-food by-products.

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sciforum-102945: Comparative Analysis of Functional Properties in Coriander Seed Extracts Using Various Extraction Methods

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Coriander is traditionally utilized for its therapeutic and functional properties, particularly in the treatment of various diseases. Coriander is consumed as a beverage in several ways, but no comparison or clear study regarding their functional properties has been carried out. This study evaluated the properties of coriander seed extracts using eight distinct methods: dried seed in cool water (A), roasted seed in cool water (B), dried seed powder in cool water (C), roasted seed powder in cool water (D), dried seed in boiled water (E), roasted seed in boiled water (F), dried seed powder in boiled water (G), and roasted seed powder in boiled water (H). The analysis focused on pH variation, total phenolic content, antioxidant activity (using the DPPH method), and antimicrobial properties (using the agar well diffusion method) to determine the optimal extraction method. The F extraction method exhibited the smallest pH variation (0.094) over a week, while the C method showed the highest variation (1.577). The F extraction method also had the highest total phenolic content (31.66 GAE mg/L), surpassing other methods, which ranged from 14.39 to 29.84 GAE mg/L. The antioxidant activity assessment revealed that the F method had a significantly lower IC_{50} value (241.42 ppm), indicating a higher inhibition capacity compared to other methods, with the standard ascorbic acid IC_{50} value being 83.62 ppm. Furthermore, the F method exhibited substantial antimicrobial potential against *Staphylococcus aureus* (15.33 mm) and an unknown fruit beverage sample (16.33 mm), although the H method showed the highest activity against *E. coli* (21.66 mm). In conclusion, the F extraction method emerged as the most effective, showcasing superior pH stability, the highest total phenolic content, potent antioxidant activity, and substantial antimicrobial properties, thereby offering the best functional properties among the methods studied.

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sciforum-101488: Comparative evaluation of hypoglycemic activity of *Cucumis sativus* and *Cucurbita pepo* whole plant in normal and streptozotocin-induced diabetic rats

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Background

Crude extracts are easily available and considered safe and cost-effective in comparison with synthetic extracts, or more accessible compared with purified compounds, making them suitable for initial screening and exploratory studies in drug discovery.

Introduction

Cucumis sativus and *Cucurbita pepo* are medicinal plants belong to the Cucurbitaceae family, commonly known as cucumber and pumpkin, comprising a series of phytochemicals such as chlorophylls, carotenoids, oleanolic acid, saponin, and triterpenoids.

Materials and Methods

In this study, ethanol extract of *Cucumis sativus* and *Cucurbita pepo* whole plants was used to assess their hypoglycemic effects in a fasted, fed, glucose- and streptozotocin-induced diabetes model of albino rats followed by Molecular Spectroscopic (FTIR and UV-Vis) analysis. Blood sugar levels were determined from samples collected at different intervals (0, 1, 2 and 4 hours).

Results and Conclusions

Significant blood glucose reduction was observed as a result of both plants, while the greatest reduction was shown by *Cucumis sativus*. The UV-Vis profile showed several absorption bands ranging from 200 to 800 nm, showing the presence of flavonoids, phenolic compounds, terpenoids, carotenoids, and chlorophyll. The FTIR spectra reveal the presence of carbohydrates, proteins, lipids, and phenolic compounds, which contribute to its nutritional and biological value. Further research is needed to determine the active agents and the likely mechanism of action of both the plants regarding their hypoglycemic effects.

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sciforum-099440: Comparative evaluation of the antihyperglycemic effects of Jatoba-do-cerrado (Hymenaea stigonocarpa Mart.) pulp: In vitro and in vivo studies

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Data from the International Diabetes Federation have shown an increased prevalence of diabetes in the coming years, reaching 12.2% of the world population in 2040. Since the majority of cases are type 2 diabetes mellitus (DM2), dietary intervention is one of the main approaches to controlling this condition. The role of plant sources of polyphenols, such as Jatobá-do-cerrado (Hymenaea stigonocarpa Mart.), is being investigated, because their intake could manage diabetes-related complications in several areas. Our previous studies concluded that the inclusion of Jatobá pulp (JP) (20%) in bread reduced its glycemic index (22%) because of its fiber and polyphenol content. However, the sensorial aspects of the bread were criticized, so we tested the mechanical and thermal processes involved in extrusion for the purposes of enhancing the texture, neutralizing the intense flavors, and maintaining the antihyperglycemic activity (AA) of JP. This study aimed to evaluate the antihyperglycemic mechanism of action of jatobá products in vitro and in vivo. Polyphenols were obtained by sequential extraction (ethanol and acetone). Then, the extract was digested by enzymes at physiological pH and the effects on sodium/glucose cotransporter 1 (SGLT1) and glucose transporter 2 (GLUT2) gene expression were evaluated in Caco-2 cell monolayers with different extract concentrations (0.05 mg/mL - 0.1mg/mL). Also, the glycemic response (GR) to 51.6 g extruded pulp (EJ) was evaluated in 10 healthy subjects. The results showed that the profile of polyphenols in the digested extract included compounds of biological relevance such as phenolic acids and flavonoids and that these compounds inhibited the gene expression of both glucose transporters (dependent on sodium or not) in a dose-dependent manner. Moreover, EJ has a moderate glycemic index (56-69) and a low glycemic load (≤10) per portion (30 g). Thus, it was demonstrated that JP as a source of polyphenols and fiber could be used in antidiabetic food products.

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sciforum-103088: Consumer attitudes and acceptability towards innovative functional foods: A retroprospective epidimiological study in Greece and Cyprus

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Introduction

The trend toward healthier food choices is driving the development of innovative functional foods. Understanding consumer perceptions is crucial for effective promotional strategies. In Greece, studies indicate that while there is awareness offunctional foods' health benefits, it remains limited. This study aims to evaluate the opinions and acceptance of Greek and Cypriot consumers regarding functional foods.

Methods

Participants were recruited through social invitations from May 2018 to January 2022. Adults who provided consent participated in personal interviews at the Human Nutrition Unit, completing a validated questionnaire on functional food opinions and acceptability, consisting of 38 questions. This study recorded sociodemographic characteristics and assessed participants' knowledge of functional foods and bioprocesses, as well as their feelings (e.g., confidence, fear) regarding novel functional foods. Factors influencing consumption decisions, along with expectations, motivations, and preferences, were evaluated. The data were analyzed using SPSS 17.0, employing descriptive statistics, chi-square, and Spearman correlation tests (significance level 0.05).

Results

In total, 1,933 volunteers (726 men and 1,207 women) participated from Greece and Cyprus. Of these, 53.3% were aware of functional foods, and 81.5% consumed them. A significant correlation ($p = 0.00$, $r_s = 0.05, 0.07$) demonstrated that lower educational levels corresponded to decreased confidence and daring in trying novel foods. Health was the primary motivation for purchasing (42.3%), while 76.8% of non-consumers cited a lack of organoleptic characteristics as a barrier. Knowledge positively influenced consumption decisions (14.9%), and 1,324 participants were willing to pay more for innovative functional foods. Only 42.6% had knowledge of food bioprocesses, and 36.9% expressed neutrality toward ethical interventions in food composition.

Conclusions

While many incorporate natural functional foods into their diets, hesitation exists regarding innovative functional foods made through bioprocesses. This reticence is linked to neophobia and insufficient awareness of health benefits. Enhancing consumer knowledge is vital for fostering confidence and acceptance of novel functional foods.

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sciforum-099385: Consumer perceptions of rabbit meat among the University of Fort Hare students

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Introduction

The Food and Agriculture Organization estimated that more than 820 million people suffer from nutrient deficiencies worldwide. This research aims to determine the potential of rabbit meat as a sustainable alternative of protein for the future, this is important in advancing the efforts of introducing sustainable food products to address this food security issue. Rabbits are sustainable as they grow fast and can produce 6 pounds of rabbit meat with the same amount of clean water and food needed to produce 1 pound of beef. However, the consumption of rabbit meat in South Africa is currently low and there are limited studies that indicate its potential in the market. Consumer perceptions serve as a trailblazer in marketing due to the market being able to identify tools that can be used to attract consumers and improve the product. This study aims to investigate perceptions as this may inform the industry of consumer expectations and stimulate interest of South African consumers in rabbit meat.

Methodology

The questionnaires were distributed to students at the University of Fort Hare, Alice Campus. A simple random sampling method was used to determine the sample size for the study using Yamane (1967) formula. Yamane's formular: (n= N/1+N (e)^2), where n= sample size, N= population size (15000) and e= margin error (5%). The respondents completed a guided questionnaire on the perceptions of rabbit meat as an alternate protein source. The collected data was evaluated using SPSS. Data on meat characteristics that affect purchasing decisions were subjected to Pearson correlation analysis to test the relationship ($P \leq 0.05$).

Results and Discussion

Only a quarter of respondents had at least once consumed rabbit meat. The majority (47%) of them accessed it through hunting instead of purchasing it (7%). Most respondents (75%) had never consumed rabbit meat, and the majority of them (46%) reported that the main reason for not consuming it was unfamiliarity with the meat. Additionally, 45% of the respondents were likely to try rabbit meat at restaurants, while 44% of respondents were likely to buy rabbit meat from grocery stores, and 62% were willing to consume it when offered by friends and relatives. The quality of meat was positively correlated with meat health, while quality also has a positive correlation with presentation .

Conclusion and recommendations

The majority of respondents have never consumed rabbit meat due to unfamiliarity with it. Fewer consumers were willing to buy rabbit meat if it was sold at grocery shops and supermarkets. Educating consumers about the benefits of rabbit meat is recommended before introducing it in this region to promote it as a sustainable meat source.

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sciforum-102654: Correlational study between fast food consumption and non-communicable diseases (NCDs) in adults of Pakistan

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The consumption of various categories of fast food is progressively expanding worldwide, including in both developed and emerging countries. Individuals belonging to various age groups, demographics, and socioeconomic backgrounds, and who are mostly adolescents and young adults, have a tendency to consume fast food due to changes in their lifestyle, dietary patterns, and food habits. The aim of this study was to examine the factors that contribute to the rise in fast food consumption and the connection between fast food and non-communicable diseases. We created a comprehensive and reliable questionnaire to gather dietary data from 200 healthy volunteers across various age groups through surveying. Then, the questionnaire was divided into four categories: personal information, socioeconomic considerations, nutritional assessment, and eating habits. Moreover, the acquired data were examined using statistical SPSS software, dividing each factor into different questions. This study revealed a higher prevalence of fast food consumption among individuals in the age bracket of 20–30 years old. We identified several factors that contribute to fast food consumption, such as a diverse menu, time constraints, easy accessibility, and the perception of fast food as a social status marker. We evaluated the health status of individuals by inquiring about their lifestyle and health-related habits. The results revealed that 16.1% of the respondents had fatty liver disease, while 14.6% were obese, 13.2% had diabetes, 2.9% had high cholesterol, and 14.6% experienced gastrointestinal problems. This study's findings indicate that there is a substantial correlation between the rising consumption of fast food, lifestyle changes, and the occurrence of non-communicable diseases.

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sciforum-104786: Cultivated Mushrooms: A Comparative Study of Antioxidant Activity and Phenolic Content

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Mushrooms are becoming increasingly popular, not only for their distinctive flavors and rich nutrient profiles, but also for their potent bioactive properties. These properties, which include antioxidant, anti-inflammatory, and anticancer effects, make edible mushrooms a valuable source of natural compounds. Although, the concentration and efficacy of these bioactive compounds can vary widely depending on factors such as the species of mushroom. This study aims to compare the total phenolic content (TPC) and antioxidant activity (AOx) of methanolic extracts from the following cultivated mushrooms: *Lentinula edodes* (LE), *Pleurotus ostreatus* (PO), *Agaricus bisporus*, white and brown varieties (AgW and AgB, respectively), and *Hericium erinaceus* (HE).

The TPC was evaluated by the Folin–Ciocalteu method [mg GAE/100 g fresh weight (fw)], and the AOx was assessed through the DPPH radical scavenging assay (μmol TE/100 g fw), ABTS radical scavenging activity (μmol TE/100 g fw), and FRAP assay (mmol FeSO4•7H2O/100 g fw). Each mushroom species was evaluated in triplicate. Analysis of variance (ANOVA) was performed using StatisticaTM v.8 software. The means were separated at the 5% significance level by Tukey's HSD test.

The AgW extract exhibited the highest antioxidant potential (3093.3 ± 138.2 mg GAE/100 g fw and 2.3 ± 0.3 mmol FeSO4•7H2O/100 g fw, assessed by DPPH and FRAP, respectively), along with the highest phenolic content (46.2 ± 6.4 mg GAE/100 g). The TPC of the methanolic extracts of the mushroom species was highly correlated with AOx_DPPH (r=0.85; p0.05). Moreover, the HE and PO extracts measured by ABTS also showed significant antioxidant properties. Chlorogenic acid and ascorbic acid, identified as the most abundant phenolics in TPC by HPLC, are likely the primary contributors to the observed AOx.

This study contributes to the growing knowledge of fresh cultivated mushroom species as sources of natural antioxidants, highlighting their potential as valuable functional foods with significant health-promoting benefits.

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sciforum-098486: Cytoprotective and anti-inflammatory properties of the bioaccessible fractions of encapsulated, HPP-treated mango peel extracts

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Introduction

Fruit by-products are a source of bioactive compounds (carotenoid and phenolic compounds) with antioxidant and anti-inflammatory properties, and ultrasound-assisted extraction, high-pressure processing, and encapsulation are sustainable technologies for their extraction and protection.

Methodology

Total carotenoid and phenolic compound (TCC and TPC)-mix extracts (EtOH/acetone, 54:36) of HPP-treated (200MPa/25°C/5 min) Keitt mango peel obtained by UAE (A36 μm/10 min) were encapsulated with gum arabic by spray-drying at 150°C (SF2) and by lyophilization (SF3). The two encapsulated extracts and the non-encapsulated extract (SF1) were submitted to in vitro gastrointestinal-digestion and TCC, TPC, and AA-FRAP were evaluated in bioaccessible fractions (BFs). Cytotoxicity in differentiated Caco-2 cells was checked with BFs at 24h. The cytoprotection viability, apoptosis, cell cycle and redox status (GSH), and anti-inflammatory activity (IL-6 and IL-8) of SFs pre-treated for 24h followed by 2h with 5 mM H_2O_2 to stimulate oxidative stress were obtained.

Results

The bioaccessible fractions of SF2 and SF3 presented higher TCC, TPC, and AA-FRAP than BF-SF1. The BFs recovered the viability levels of the control cells and increased cell viability versus digestion. The BFs increased viable cells and decreased early apoptosis. BF-SF2 and BF-SF3 showed greater cytoprotection by reducing late apoptosis. The BFs also decreased the sub-G1 cell cycle phase and allowed the recovery of disturbances in G0/G1 and G2/M evoked by H_2O_2. Oxidative stress decreased GSH, but it was recovered with BFs. The cytoprotective effect of BFs was confirmed, with it being statistically higher in BF-SF2 and BF-SF3 compared to BF-SF1. The BFs reduced the production of IL-8 and IL-6 versus H_2O_2, highlighting an anti-inflammatory effect of BF-SF2 and BF-SF3 compared to BF-SF1.

Conclusion

Greater TCC, TPC, AA, and cytoprotective and anti-inflammatory effects were observed in encapsulated (BF-SF2 and BF-SF3) compared to non-encapsulated (BF-SF1) extracts, although no differences were observed between spray-dryed BF-SF2 and lyophilized BF-SF3. Thus, both encapsulation techniques are effective to preserve the bioactivity of mango peel.

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sciforum-101244: Deciphering *Drynaria quercifolia* for the development and formulation of instant soup mix

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Introduction

The culinary preference for gourmet depends on the quality, economic value and sensory allure of the food product. This study was designed to formulate an instant soup mix using *Drynaria quercifolia* flour and supplementary ingredients which include pepper, cumin, turmeric, coriander, fennel, curry leaves, garlic and ginger, which will enhance the taste and nutritive value without altering the nutritive integrity. *Drynaria quercifolia,* a rhizome that is widely distributed around South East Asia and known as Oak leaf fern, is acclaimed for its innumerable therapeutic properties which include anti-inflammation, anti-rheumatoid, antipyretic and antioxidant.

Methods

Drynaria quercifolia was the major ingredient used in this formulation as it is a less exploited herb. In order to make 500g of soup mix, 100g of *Drynaria quercifolia* rhizome was grated and sun-dried, and about 100g of pepper, 25 g of cumin, 50 g of fennel, 25 g curry leaves, 50 g coriander, 150g garlic and 50 g ginger were added. All were roasted and powdered along with the sun-dried *Drynaria* to be formulated as a soup mix. Proximate composition and sensory analyses were performed.

Result

The proximate composition analysis of the soup formulation was found to have an energy content of 204 Kcal/100g, a carbohydrate content of 40.11g/100g, 11.4g/1000g protein, 7g/100g fat, 23.31g/100g fibre, 12.4 mg/100g iron and 598.2mg/100g calcium. The shelf life of the soup mix was found to be stable at room temperature for 6 months in plastic packaging.

Conclusion

Amidst the current focus on a health-conscious lifestyle, there is a pronounced demand for functional foods. The developed soup mix was found to be nutrient-dense, boasting good levels of energy, protein, carbohydrate, iron and calcium, and also devoid of additives and preservatives. The nutrient content of the developed soup mix is retained to its maximum and helps in enhancing the nutritional status of an individual.

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sciforum-103670: Determination of ideal sweetness level and nutritional and sensory properties of *Spondias mombin* juice

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Introduction: *Spondias mombin* L., also known as hog plum fruit, is native to the tropical areas of America and has been naturalized in Africa. Its juice is rarely consumed despite its nutritional benefits. This could be due to the sour taste of the fruit. Sweetening sour juices improves their acceptability; however, the level of sweetness required for this juice has not been previously reported. Thus, this study sought to determine the optimum sweetness level to encourage the juice's consumption and to assess its nutritional and sensory properties.

Method: The juice was sweetened with sucrose and artificial sweeteners: sucralose, aspartame, acesulfame K, saccharin, and stevia. The ideal sweetness of the sucrose-sweetened juice was determined by 60 assessors using the Just About Right scale. The equivalent sweetness levels of the sweeteners were assessed through the magnitude estimation method by 12 pre-selected tasters; this offers a measure of perceived sweetness intensity. The sweetened juices were then analyzed for their nutritional and sensory properties following standard procedures.

Results: The ideal sweetness level of sucrose was 9.95g/100ml, and the equivalent concentrations of sucralose, acesulfame K, stevia, saccharin, and aspartame were 0.0186, 0.0316, 0.1157, 0.0316, and 0.0580g/100ml, respectively. The proximate results showed that the fat and fiber contents did not vary significantly among the sweetened juices; the carbohydrate contents ranged from 4.45 to 13.60% and were highest in the sucrose-sweetened sample. Protein content was highest in the sucralose-sweetened juice, while ash content was highest in the stevia-sweetened juice. The concentrations of vitamin C and beta carotene ranged from 7.63 to 11.88 mg/10 g and from 0.70 to 1.06 mg/100 g, respectively. Juices sweetened with acesulfame k and aspartame exhibited acceptable sensory quality and overall acceptability, though lower than that of the sucrose-sweetened juice.

Conclusion: Sweetening *Spondias mombin* juice may contribute to its increased consumption. The sweetened juice is rich in many nutrients that are beneficial for health.

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sciforum-103422: Determination of Phenolic and Flavonoid Compound Content in Beverages Formulated for Elderly People

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Introduction: Bioactive compounds with antioxidant potential are excellent alternatives for dietary supplements for the elderly population, as they help to mitigate the chronic inflammatory state associated with advancing age, which is one of the main causes of metabolic changes that occur during aging. In this regard, ensuring adequate nutrition for the elderly is very important and functional drinks can be of great help. Objectives: Measure the content of phenolic compounds and flavonoids of two formulated functional beverages (F7 and F8), comparing these values with previous results found in the scientific literature for functional fruit beverages. Methodology: The formulations, F7 and F8, were prepared from concentrated oat extract, aqueous turmeric extract, whey protein powder and freeze-dried banana and strawberry, with the only difference between them being the content of concentrated oat extract (20% and 30% m/v, respectively) and were previously tested in preliminary sensory analysis from a total of 40 initial formulations. The total phenolic content was determined by the Folin-Ciocalteau method. The total flavonoid content was measured according to the method described by Taie et al. (2018) with modifications. The values obtained were statistically compared with each other. Results: The total phenolic compound content was 614.4 ± 36.1 and 689.4 ± 80.1 µg GAE/g in formulations F7 and F8, respectively. The total flavonoid content was 101.7 ± 1.4 and 52.9 ± 0.8 µg Quercetin/g in formulations F7 and F8, respectively. There were no statistically significant differences in the phenolic compound and total flavonoid content between the formulations analyzed. The composition is related to the presence of components with antioxidant potential such as turmeric extract (1184.8 ± 0.2 µg GAE/g and 7270.3 ± 590.0 µg Quercetin/g, respectively). Conclusion: The prepared formulations presented a high content of total phenolic compounds and flavonoids, proving to be a good source of these healthy compounds if applied as supplementation in the diet of elderly people.

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sciforum-103118: Developing a Functional Food from Beer Bagasse with Added Probiotics from Dehydrated Kefir Granules

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Brewer's spent grain (BSG) is an abundant by-product of the brewing industry, presenting both high value as a food raw material and an environmental challenge. Probiotics are widely recognized for their beneficial effects on human health and nutrition, particularly due to their role in the intestinal microbiota. Water kefir, a source of beneficial microorganisms, generates surplus granules that can be reused. This study aims to utilize these surpluses to produce a cereal bar based on BSG, cereals, and kefir granules (KGs), offering a high nutritional profile rich in proteins, fibers, and beneficial microorganisms while reducing costs within the framework of a circular economy. The BSG was dehydrated to less than 5% moisture, and three formulations were optimized with different percentages of BSG (20, 30 and 40%). BSG, whole grains, xanthan gum, kefir, sucralose and yogutrh thickener were the ingredients used. The content of the final product was evaluated for its nutritional profile. Proteins were determined by the official Kjeldahl AOAC 991.20 method (34.61 g per 100 g), fats by Soxhlet extraction (7.69 g per 100 g), ashes by calcination in a muffle furnace (2.3 g per 100 g), dietary fiber by gravimetric and enzymatic methods (20 g per 100 g), sodium by atomic absorption spectroscopy (40 mg) and carbohydrates by difference (31.15 g per 100 g). Total mesophiles, mycotoxins, fungi, and yeasts were analyzed in the industrially dehydrated BSG. KGs were dehydrated by low-temperature convection, and microbial viability was assessed by plate counts of lactic acid bacteria and yeasts. The cereal bar was formulated by combining BSG, KG, and cereals. The final product was evaluated for its nutritional content, shelf life, and sensory acceptability. The resulting product demonstrated high sensory acceptability, with significant fiber (30%), protein (40%), and probiotic microorganism content.

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sciforum-102816: Development and characterization of Mulberry-fleshed sweet potato--plum blended jam

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Fruit jam, made from whole fruits, offers various health benefits, including boosting antioxidant intake, supporting heart health, and providing essential vitamins, minerals, and dietary fibre, despite its high sugar contents. This study aimed to develop a functional jam by blending mulberry-fleshed sweet potato (MFSPP) and plum pulp (PP) in varying proportions, enhancing nutritional and sensory properties. Four jam formulations with MFSPP:PP ratios (100:0, 50:50, 30:70, 70:30) underwent comprehensive evaluation. Physicochemical analysis included pH, titratable acidity, total soluble solids, moisture content, ash content, crude fat, protein, and dietary fiber. The nutritional parameters assessed were beta-carotene, the total phenolic content, and FRAP assay. Microbial analysis encompassed total plate count, yeast, and mold growth. Sensory evaluation employed a nine-point hedonic scale, while statistical analysis utilized the ANOVA and Duncan's multiple range tests. The optimized 50:50 blend demonstrated significant enhancements. The moisture content decreased from 36.95% to 23.70%, while fat, protein, carbohydrate, and ash contents increased to 1.23%, 2.51%, 63.45%, and 1.21%, respectively. Beta-carotene concentration rose to 20.35 µg/100g, and total dietary fiber reached 4.21g/100g. Microbial stability improved, with a total plate count of 5.21 CFU/g after 10 weeks. Sensory evaluation revealed superior taste (7.8±1.2) and texture (8.1±1.1) for the 50:50 blend. The blended jam offers potential health benefits due to its antioxidant (FRAP: 245.6-321.1 µmol Fe^{2+}/100g) and dietary fiber content, making it a valuable addition to a balanced diet. These findings suggest the developed jam has enhanced nutritional and sensory properties.

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sciforum-099346: Development of a whey protein hydrogel as an alternative for the microencapsulation of calyx extracts from *Hibiscus sabdariffa*

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The aim of the present work was to develop a hydrogel based on whey protein as an alternative for stabilizing anthocyanins from roselle (Hibiscus sabdariffa L.) calyces, which have potentially beneficial effects on human health but are susceptible to degradation and oxidation reactions during processing and storage. Concentrated extracts were prepared and then microencapsulated using the emulsification technique in order to obtain hydrogels, which were then physiochemically characterized and stored for three weeks at 4°C where their color properties were monitored. The extracts exhibited a concentration of 81.37 ± 2.63 mg of cyanidin-3-glucoside per L, as well as a hue angle of 6.86 ± 0.52, both consistent with the literature for Jamaica-based products. The hydrogels obtained showed a high moisture content and water activity (82.22 ± 1.0% and 0. 93 ± 0.003, respectively) due to their tendency to store water up to 100 times their weight, while the particle size ranged from 8.75 ± 1.70 to 15.15 ± 2.19 μm; a decrease in color properties related to the incorporation of the pigment into the hydrogel was observed, as well as a decrease in bioactive compounds due to the effect of the processing steps. During storage, a 32.94 ± 3.72% decrease in red shades and a 27.10 ± 1.47% increase in yellow shades was observed, a change that was noticeable according to the total color difference scale, ΔE (ΔE=8.43 ± 1.69). The results of this study provide a novel alternative for the microencapsulation of bioactive compounds through the use of protein-based carrier systems, relevant for the development of innovative encapsulation systems.

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sciforum-101712: Development OF almond milk–fruit sorbet compositions with a record of their physico-chemical, biological, nutritional, and textural properties

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Constantly changing eating habits in favor of a healthier choice are an ongoing trending topic. The development of new products with enhanced properties is needed to meet the demands of the contemporary consumer. Sorbets (fruit ice creams) are typically preferred as a summer refreshment. This study focuses on the development of almond milk–fruit (apricots, plums, and their combination) sorbet compositions with reference to and a comparison of their physico-chemical properties (moisture and ash content, color spectra, titratable acidity, pH, total soluble solids, meting rate, and melting behavior), nutritional composition (by the calculation method), textural properties, antioxidant activity, and water activity. A control sample for each fruit was used, as well as two alterations of the initial recipe using bee honey and lucuma powder as refined sugar replacements. The soluble solids content varied from 12.80 to 28.03%, and the moisture content from 59 to 76%. The water activity was above 0.9 in all samples. The CIE-lab data showed significant differences between the three fruits used for the sorbet base. The apricot resulted in a yellowish product, the hybrid in a pink, and the plum in a red. The results show that similarity between samples exists but the choices of fruit and sweetener affect the product. Further research can provide even better reference for other frozen desserts.

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sciforum-102723: Development of muffins with Tannat grape pomace as potential functional foods

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An abundant byproduct of the Uruguayan winemaking industry, Tannat grape pomace (TGP) has a unique profile of phenolic compounds, making it a great candidate as an ingredient in the formulation of healthy and sustainable foods. The addition of TGP and sweetener to a muffin formulation may represent a challenge regarding technological properties. In this work, the objective was to develop potential functional muffins with the nutritional claims of "source of/high in fibre" and "no added sugars", by incorporating TGP as a source of fibre and bioactive compounds and stevia as a sweetener. For this purpose, a factorial experimental design with central points was assessed by varying TGP and sweetener contents. Colour was measured in the muffins by a CieLab system, and texture parameters (hardness, elasticity, cohesiveness, gumminess, and chewiness) were obtained by a texture analyser. The antioxidant capacity was also assessed by total phenol content (TPC by Folin reaction), ABTS, and ORAC-FL methods. Regarding colour parameters, the main results showed lower L values for the muffins with higher TGP content (34.4-35.9, p0.05). As for texture parameters, lower hardness values (3170-3655 N) were displayed by muffins with higher TGP content (p0.05). Elasticity showed no significant differences between the samples (0.773-0.873), with the exception of one of the formulations with higher TGP content. Cohesiveness values ranged between 0.210 and 0.374. Gumminess and chewiness values were lower for the muffin formulation with higher TGP and stevia contents (694±202 N and 538±182 N). Moreover, antioxidant capacity showed increased TPC values for muffins with higher TGP content when compared to the control muffin (without TGP). Similarly, ABTS and ORAC-FL values were higher for the muffins with higher TGP content (15.26-15.59 and 23.92-25.56 µmol Trolox equivalent (TE)/g samples, respectively). In conclusion, TGP muffins represent a sustainable food with adequate technological properties and enhanced nutritional properties, presenting potential to promote health.

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sciforum-099427: Digestibility, nutritional and sensory qualities of pearl millet-based extruded legumes containing balanced essential amino acids

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This global study aims to develop a plant-based protein source. However, legume protein is not recommended due to its low digestibility, antinutrient, and incomplete amino acid composition. Pearl millet, a drought-resistant superfood contains the crucial sulphur-containing amino acid. Thus, combining cereals with legumes could combat protein shortfalls.

A composite flour is prepared by mixing different legume flours, pearl millet flour, and pea protein isolate into three formulations. With the necessary amount of moisture supplied, the flour is extruded via a twin screw extruder's specially designed die. The die temperature (95-115 °C) and extruder screw speed (50-70 rpm) are varied, with a constant feeder speed at 40 rpm; the flour is then extruded and dried at 55 °C for 2 hours. This study investigated the percentage of protein, micronutrient and antinutrient factors viz. the trypsin, chymotrypsin, and tannin content of the extruded product. The in vitro protein digestibility, starch digestibility, and bile binding capability are studied. The sensory profiling of extruded lentils was explored using Quantitative Descriptive Analysis (QDA) and a consumer test for the overall acceptance using a 9-point hedonic scale.

The bile acid binding capacity, in vitro protein digestibility, and starch digestibility of the extruded lentil was found to be considerably increased from 0.43 to 0.67 μmol/100g DM, 81 to 89%, and 232 to 292 mg of maltose/g in comparison to its raw lentil, at 0.18 μmol/100g DM, 73.2%, and 181.8 mg of maltose/g, respectively. Trypsin (91.46%), chymotrypsin (94.73%), and tannin (96.12%) were significantly reduced in lentils due to extrusion without altering the protein content from 351 to 394 g/kg. The improvement of protein digestibility after extrusion processing could be attributable to the reduction in different antinutritional factors. QDA revealed that extruded lentils have descriptive features of sticky mouthfeel, beany aroma, beany taste, an aftertaste, and crunchy texture. The consumer test showed that the extrusion of lentil did not cause any difference in terms of overall acceptability.

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sciforum-104520: Effect of in vitro human colonic fermented coffee melanoidins on colon cancer cell proliferation

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Colorectal cancer, a chronic gut disease, is the second most deadly cancer worldwide, causing 1 million deaths/year. To the best of our knowledge, there are no data on coffee melanoidin's colonic metabolite effect on colon cancer cell events associated with the disease's pathophysiology, such as elevated Reactive Oxygen Species (ROS) levels and cell proliferation, linked with the former biological event. Short-chain fatty acids (SCFAs) and phenolic antioxidants are released during coffee melanoidin fermentation. Coffee melanoidins were isolated from Arabica Brazil roasted coffee beans and were fermented under simulated colonic human conditions for 48 hours employing Simgi® (Dynamic Gastrointestinal Simulator). The effect of coffee melanoidin fermentation metabolites on ROS production and cell proliferation was studied in Caco-2 human colon cancer cells. Intracellular ROS production was evaluated using an oxidant-sensing probe, 2´,7´-dichlorodihydrofluorescein diacetate (DCFH-DA). The colony formation assay was used to determine potential changes in cell proliferation. Colonic metabolites (100 µg/ml) caused a statistically significant (p0.05) decrease in intracellular basal ROS production and a suppression in colon cancer cells proliferation (83%, 48 hours), compared with the control (without treatment), in a time-dependent manner in cell proliferation. Therefore, these preliminary results suggested that coffee melanoidin colonic metabolites might limit colon cancer development. The metabolites produced, short-chain fatty acids and phenolic compounds, among others, may synergistically contribute to the observed effect.

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sciforum-103147: Effect of the addition of nori (Porphyra yezoensis) on the development and characterization of multi-millet idly batter

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Introduction: Taurine, the most abundant sulfur-containing amino acid in the body, is often deficient, particularly in individuals following vegetarian or vegan diets. This project aims to extract taurine from a vegan source and develop a taurine-fortified multi-millet batter to address taurine deficiency, especially among vegans, vegetarians, the elderly, and those recovering from COVID-19.

Methods: Taurine was extracted from seaweed laver (Nori) using an optimized ultrasound-assisted extraction method with 70% ethanol at a solvent ratio of 1:20 and 60°C for 40 minutes. The extract was purified via cation exchange chromatography with 225 Na resin, followed by crystallization and recrystallization with ethanol to isolate taurine. The purity of the taurine was confirmed using Thin-Layer Chromatography (TLC). The purified taurine was then microencapsulated with Arabic gum to enhance stability during cooking. Thermal stability was assessed using Differential Scanning Calorimetry (DSC). Taurine was incorporated into a multi-millet Idli batter, which included Proso, Little, and Barnyard millet, as well as fenugreek and black gram. The physicochemical and proximate characteristics of the fortified batter were analyzed.

Results: Quantitative analysis using High-Performance Liquid Chromatography (HPLC) confirmed 0.22% taurine content in the extract. The microencapsulated taurine exhibited thermal stability up to 319.8°C. The fortified Idli batter showed minimal changes in color, width, height, and cooking time, with increased hardness due to the thickening effect of Gum Arabic. Proximate analysis revealed a slight decrease in energy content in the fortified Idli (200.484 kcal) compared to the unfortified version (206.816 kcal). The taurine content in the cooked Idli matched the amount added, demonstrating stability through the cooking process.

Conclusion: The study successfully developed a taurine-fortified multi-millet Idli batter that maintains taurine stability during cooking. This approach offers a viable strategy for dietary supplementation with taurine, particularly for populations at risk of deficiency.

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sciforum-098692: Effect of treatment with natural phytoregulators on purple carrots (*Daucus carota* L.) during storage

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Introduction: Dark-colored carrots are known for their attractive color and high content in antioxidant pigments such as carotenoids and anthocyanins, which protect against pathologies. However, both organoleptic and health-promoting properties are altered during storage. In this respect, deterioration in sensorial quality, together with a decrease in antioxidant content, is usually observed after 5-7 days without refrigeration. The objective of this research was to propose an approach based on natural phytoregulators enabling purple carrot shelf-life to be extended with no need for artificial preservatives.

Methods: Visual appearance, juiciness, moisture content, total soluble solids, acidity and maturity index were measured as quality physicochemical parameters. Total and individual carotenoid contents were determined by absorbance at 485 nm and HPLC-DAD, respectively. Total anthocyanin content was measured by the pH differential method. Antioxidant activity was determined by DPPH and FRAP assays.

Results: Untreated purple carrots, used as a control, exhibited a natural increase in carotenoids over cold storage (three times higher) and an increase in the stability of anthocyanins, but a significant decrease (from 62% to 49%) in the maturity index. Treatment with natural phytoregulators (i.e., methyl jasmonate and abscisic acid) resulted in higher carotenoid content and a considerable improvement in quality parameters (maturity index of 75%). In contrast, anthocyanins and antioxidant activity mostly decreased with the treatments. In particular, a drop from 2.23 mg ECGg^{-1}DW in fresh untreated samples to 0.30 mg ECGg^{-1}DW in ABA-treated samples was measured.

Conclusions: Treatment with methyl jasmonate and abscisic acid enables purple carrot spoilage to be delayed over cold storage. This is reflected in the preservation of visual appearance and maturity index. Considering the commercial importance of these variables, these results are promising. The aim now is to optimize the procedure in such a way that the improvements in quality parameters and carotenoid content attained here are maintained while the partial loss of antioxidant properties is avoided.

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sciforum-099399: Effects of Instant Cascara Beverage and Purified Diets on Gastrointestinal Motility in Male and Female Rats

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Instant Cascara (IC) is a sustainable beverage made from dried coffee cherry pulp, and is a novel food recently authorized by the European Union. To investigate its effects on gastrointestinal health, we evaluated the impact of regular IC consumption on gastrointestinal transit in experimental animals (ethical approval: PROEX-059/2018) using male and female Wistar rats (n=7 per group) subjected to two purified diets (AIN93M or AIN93G) and beverages (water or IC, 10 mg/mL) over 3 weeks. Radiographic methods (barium contrast) assessed transit acutely (24 hours) and chronically (3 weeks). Acute studies revealed no significant transit differences across gastrointestinal regions. In the chronic study, males on the AIN93G diet exhibited delayed gastric and cecal transit, which IC effectively countered, while it slightly accelerated gastric emptying in females. Morphometric and densitometric analyses showed no differences due to diet or beverage in any region's size or density, although a reduction in stomach and cecum size was noted chronically, unaffected by IC. IC did not impact motility in AIN93M-fed animals, confirming it as a safe beverage, and improved transit in AIN93G-fed males, indicating its potential to prevent or alleviate conditions involving delayed intestinal transit. These findings underscore IC's potential as a functional beverage that contributes to both gastrointestinal health and sustainability by utilizing coffee by-products, addressing key challenges in food innovation. IC exemplifies how novel, nutrient-enriched beverages can support health and sustainability goals, responding to growing demands for safe, nutritious food solutions in a world facing ecological and economic challenges, ultimately offering a pathway to sustainable innovation in food science and technology.

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sciforum-093674: Enzymatic strategy to valorize two red macroalgae species for bioactive peptide production as promising nutraceuticals

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Currently, marine macroalgae represent a significant biological and economic resource. Natural molecules derived from this biomass contain numerous bioactive compounds with high nutritional and pharmaceutical potential. Initially, we focused on the development of an efficient method for algal cell wall destruction and the release of proteins from two species of red macroalgae (*Sphaerococcus coronopifolius* and *Gelidium spinosum*). Pretreatment of these biomasses by ultrasonication for 60 min proved to be the most suitable technique for protein extraction. These proteins were then digested with pepsin (pH 3.5 and 40 °C) for 24 h to produce several protein hydrolysates enriched with bioactive peptides from *S. coronopifolius* and *G. spinosum*, namely SCPH and GSPH, respectively. The peptide profiles of SCPH and GSPH were subsequently analyzed by reverse-phase high-performance liquid chromatography–quadrupole-time-of-flight mass spectrometry (RP-HPLC-QTOF/MS), with MS data bioinformatics management. In silico analysis of the hydrophobicity and toxicity of the identified peptides were also determined. Furthermore, angiotensin conversion enzyme (ACE)- and Dipeptidyl-peptidase-IV (DPP-IV)-inhibitory peptides were predicted using a quantitative structure–activity relationship (QSAR) method. Both protein hydrolysates exhibited large heterogeneity regarding peptide composition. Peptidomic analysis allowed the identification of 172 and 64 unique peptides from SCPH and GSPH, respectively. Thus, 26 common peptides for both species were found. Additionally, both hydrolysates contain a large percentage of highly hydrophobic peptides (62.63% and 53.48%, respectively) and have a low molecular weight with no toxic effects. Furthermore, the identified peptides showed a high proportion of potent predicted ACE-inhibitory peptides (IC_{50} 100 μM), in the range of 59.88% and 81.53% for SCPH and GSPH, respectively. Moreover, the potent predicted DPP-IV-inhibitory peptides were quantified as 92.98% and 91.30% for SCPH and GSPH, respectively. These findings indicated that protein hydrolysates from these two red macroalgae present an attractive source of food-derived bioactive peptides with promising nutraceutical properties, especially antihypertensive and antidiabetic activities.

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sciforum-102488: Evaluating the antidiabetic potential of Java seed-enriched bread in streptozotocin-induced diabetic rats

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Diabetes mellitus (DM), a metabolic disorder, is characterized by the body's reduced ability to respond to endocrine hormones to maintain blood glucose levels within normal limits. DM comprises three subtypes: Type 1 diabetes (T1DM), Type 2 diabetes (T2DM), and gestational diabetes. Type 2 diabetes, which accounts for 90% of diabetes cases, is predominantly associated with nutrition. In this study, wheat bread supplemented with Java seed (*Syzygium cumini*) powder was prepared by adding 15% Java seed powder to the standard bread recipe. This fortified bread was evaluated both qualitatively and quantitatively to assess its potential therapeutic impact on DM by regulating blood glucose levels in diabetic rats. A 35-day therapeutic trial was conducted on 20 male Wister rats, divided into five groups: G0 (non-diabetic: control diet), G1 (diabetic: control diet), G2 (diabetic: 25% replacement of normal diet with Java seed-supplemented bread), G3 (diabetic: 50% replacement of normal diet with Java seed-supplemented bread), and G4 (diabetic: 75% replacement of normal diet with Java seed-supplemented bread). The study results demonstrated that the inclusion of Java seed-supplemented bread in the diet of diabetic rats resulted in significantly faster and more promising health outcomes. The results for G4 and G3 were closely aligned with normal values for nearly all biomarkers, including body weight, diabetic biomarkers, lipid profile, and liver and renal function tests. These findings underscore the potential of Java seed in managing DM. Additionally, while the treatment of DM solely with medication may prolong the disease, incorporating Java seed bread alongside medication may expedite the recovery process. Consequently, Java seed can be effectively incorporated into various food products to help control diabetes and other related diseases.

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sciforum-103315: Evaluating the aroma compounds and structural properties of Plant-based seafood Analogues using Pea (*Pisum sativum* L.) and Faba bean (*Vicia faba*) Protein Isolates

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Plant-based seafood analogues have become imperative in today's world due to an increase in the awareness for environmental sustainability, overfishing and the conservation of the current global seafood stock. The use of plant-based ingredients blended in varying proportions to imitate the proximate composition and structural attributes of a seafood fillet proffers a sustainable solution to these environmental crises. This study addresses the challenges arising from the development of plant-based formulations when compared to the flavour attributes and textural properties of actual seafood. The combination of various plant-based ingredients, including plant protein isolates of Pea (*Pisum sativum* L.) and Faba bean (*Vicia faba*), a lipid source rich in polyunsaturated fatty acids, and a polysaccharide, was all subjected to enzymatic cross-linking by microbial transglutaminase, resulting in a seafood analogue. The addition of Dulse (Palmaria palmata) flakes and a commercial seafood flavour enhanced and promoted the development of seafood flavour compounds in the analogue. The headspace of the plant-based products was evaluated using a GC-O-MS approach to identify the aroma compounds present. The texture and structural attributes were evaluated and compared to a seafood fillet with the aid of a texture analyzer. The results indicate that the use of Pea and Faba protein isolates in the formulation of these products contained pulse-related aroma compounds, while the texture attributes were comparable to the data from seafood. The data from this study provide a formulation for the development and production of a potentially acceptable plant-based seafood product.

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sciforum-103430: Evaluation of bioactive amaranth compounds with hypoglycemic effect

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Type 2 diabetes is a disease characterised by high blood sugar levels. The World Health Organisation (WHO) estimates that by 2040, 642 million people worldwide will suffer from diabetes. Alternatives such as Amaranth (Amaranthus hypochondriacus), a plant endemic to Mexico, have been shown to have a hypoglycaemic effect in some preclinical studies based on protein fractions. However, in this study, the effect of amaranth total protein hydrolysates was evaluated in a preclinical animal model (Wistar rat) and in a clinical pilot phase in healthy people, under the prior approval of the Research Ethics Committee of Investigación Biomédica para el Desarrollo de Fármacos S. A. de C.V. Protein isolate was prepared from flour and hydrolysed at pH 7.3 at 55 °C for 3 and 6 h with alkalase (0.8 AU/ml), the degree of hydrolysis (GH) was determined and the molecular weight of the hydrolysates was resolved by mass exclusion chromatography. The isolate contained 80-87 % protein, the GH for the 6 and 3 h digests was 11-14 % GH, respectively. The administration of the hydrolysate for 6 h at 300 mg/kg body weight in the animal model (n=15) had an effect and significance of differences between treatments with Tukey tests at p0.05, while in the pilot test in humans (n=5) starting with 900 mg/kg hydrolysate for 3 h, an effect with a hypoglycaemic tendency was observed 30 min after ingestion with a p= 0. 188 according to the Wilconxon test; concentrations, GH, and time are still being analysed in order to maintain constant control of serum glucose, as was achieved in animals, and to obtain an amaranth-based product with hypoglycaemic bioactives.

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sciforum-097982: Evaluation of GABA and GA Content in Cereals (Wheat, Spelt, Barley, Millet) Undergoing Germination

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Introduction: Gamma-aminobutyric acid (GABA) serves as the primary inhibitory neurotransmitter in the mammalian central nervous system, regulating neuron excitability. GABA is synthesized from glutamic acid (GA) through decarboxylation, catalyzed by the enzyme glutamic acid decarboxylase. Consumption of GABA-enriched foods is related to numerous health benefits and augmenting GABA levels in foods and particularly in seeds is an interesting and challenging task. The aim of this study was to investigate GABA and GA content in cereals (wheat, spelt, barley, millet) during soaking and germination, both with and without the application of cold stress.

Methods: Cereals were purchased from a local market (Plovdiv, Bulgaria) and GABA and GA contents were determined by HPLC after derivatization with dansyl chloride. Germination was followed for 4 days without the application of cold stress or after stress at -18°C.

Results: Wheat accumulated the highest content of GABA on the third day of germination reaching 25.9mg/100g DW, compared to 8.6mg/100g DW in the non-germinated control. Germination increased GABA in all other cereals, reaching 13.9mg/100g DW in spelt, 8.8mg/100g DW in barley and 8.3mg/100g DW in millet. Severe cold stress at -18°C was less conducive to GABA formation and did not result in a further GABA increase. Interestingly, GA levels were notably higher than the GABA content, with wheat containing the highest amount: 130.3mg/100g DW of GA.

Conclusion: The investigated cereals are capable of producing sufficient amounts of GABA after soaking and germination. The data indicate an insignificant difference between the non-stressed and stressed groups, suggesting that the application of cold stress in these cultures may be redundant. These optimistic results inspire further research to enhance GABA yields from natural food sources for nutritional supplements and functional foods.

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sciforum-092243: Evaluation of the drying kinetics of a cidra snack impregnated with coffee leaf extract

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Fruit, vegetables and vegetable extracts have a very reduced lifespan under environmental conditions, because some compounds degrade easily and the amount of moisture present in them makes it difficult to retain some biochemical and sensory properties over time for consumption and storage; Therefore, more cost-effective alternatives such as vacuum impregnation and refractance window drying (VR) techniques are sought which favour the preservation of physico-chemical and nutritional characteristics of food. The aim of this research was to evaluate the refractance window drying kinetics of a cidra snack impregnated with vacuum coffee leaf extract. Vacuum (IV) impregnated 2 mm thick circular sheets of citron with a 1.5% solution of coffee leaf extract for 30 min, then the sheets dried by the refractance window (VR) technique at a temperature of 70°C in a Mylar membrane. Drying kinetics were performed up to constant weight by measuring the moisture ratio (MR) in kg $H2O$/kg ss every 10 min. The kinetics results showed that the equilibrium point was in a time of 1.8 hours (110 min) when reaching a mass of 0.0012 kg. At this point of equilibrium the snack presented a moisture percentage of 0%, allowing its preservation for a long time. To conclude, the combination of cidra and coffee leaf extract represents an alternative for the conservation of bioactive components, such as phenolic compounds, antioxidant activity, among others.

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sciforum-099620: Evaluation of the effect of plant sterol food supplement intake on eryptotic markers in statin-treated hypercholesterolemic patients

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Introduction: Eryptosis (the suicidal programmed death of erythrocytes) is associated with elevated adhesion to the vascular endothelium, and therefore, with a worsening of cardiovascular health. Statins, used for hypercholesterolemia treatment, can increase eryptosis, while plant sterols (PSs) have shown an anti-eryptotic effects ex vivo.

Methodology: A double-blind randomized controlled parallel trial involving statin-treated hypercholesterolemic patients was performed. Participants were randomized into treated (n=13) and placebo (n=13) groups, and they tooka food supplement enriched with PSs (2 g) daily or had a non-enriched daily diet, respectively. Blood samples were extracted before and after 6-week treatment, and erythrocytes were isolated. Flow cytometry analyses were performed for the evaluation of the externalization of phosphatidylserine and cell sizes (as markers of eryptosis), as well as for reduced glutathione (as a redox status marker).

Results: No statistically significant differences ($p>0.05$) were observed between treated and placebo patients in the % of cells with externalized phosphatidylserine (Δ final–initial measure) (-1.3±2.1 *vs.* -1.1±2.0 % of cells in the treated and placebo groups, respectively). Furthermore, no statistically significant ($p>0.05$) differences were found between the treated and placebo groups regarding cell size change (-1±7.9 *vs.* -8±10.3 arbitrary units), or glutathione levels (13±42.9 *vs.* 47±50.2 arbitrary units). Patients with lower adherence to treatment (> 4 days without supplement consumption) were excluded from the statistical analysis without creating any changes in the results. The data were also evaluated, stratifying patients according to sex, age and BMI, without observing any differences.

Conclusions: The results suggest that chronic PS food supplement consumption may not affect the eryptotic status in statin-treated hypercholesterolemic patients, although its effect on adhesion to the endothelium of eryptotic erythrocytes, as well as other markers of cardiovascular health (such as plasma cholesterol reduction), should be investigated for deeper knowledge. Furthermore, a higher *n* would be of great interest to be investigated in future trials to obtain conclusive results.

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sciforum-100962: Evaluation of the functional potential of beverages made from regional plant matrices

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The Argentine Patagonian region offers abundant plant-based raw materials for functional foods and features a culture of high value-added food production. Tisanes are beverages made from various plant parts by infusion in hot water, with compositions varying by region, culture, and consumer preferences. The functional potential of tisanes made with black tea (BT) or rooibos (R) and powdered Patagonian matrices (blueberry, rosehip, and yacon) was evaluated, as well as the impact of adding sucrose or a sweetener. The samples were analyzed in triplicate, evaluating total phenols (TPs) using Fast Blue BB, antioxidant activity index (AAI) with DPPH in methanol, flavonoids (Fvs) by $AlCl_3$, and sodium (Na) and potassium (K) by flame atomic absorption. Aqueous extracts were prepared with a proportion of 3 g/200 ml of water at 90°C. The main component of each tisane (BT or R) represented 40% of the total dry mass, while each of the other ingredients represented 20%. No significant differences were found in their TP concentration (67 mg GAE/100 ml), which could contribute to a diet rich in phenols (over 600 mg/day). The Fv concentration obtained (35 mg per cup with BT and 42 mg with R) could be a significant dietary contribution, considering a daily intake in the range of 50-800 mg. There were no significant differences in AAI, which was comparable to values of recognized antioxidant compounds. Compared to commercial beverages, the BT tisane had high potassium (159 ppm) and low sodium (4.42 ppm) levels, classifying it as being'low in sodium', while the R tisane had higher sodium (22.8 ppm) levels due to its base matrix. The addition of sugar reduced the content of bioactive compounds, whereas the sweetener showed no significant differences from the original product. When evaluating AA, it decreased in tisanes with sugar and increased in those with sweetener.

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sciforum-099398: Ex vivo and in vivo antioxidant activity of polyphenol-rich extracts derived from fermented jabuticaba (*Plinia* spp.) beverages

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Introduction: Jabuticaba is a fruit rich in polyphenols with antioxidant activity. Fermentation can enhance the bioavailability of phenolic compounds, thereby potentiating their biological effects. This study investigated the antioxidant activity of polyphenol-rich extracts from fermented beverages of two jabuticaba species, *Plinia peruviana* and *Plinia coronata*, against ex vivo- and in vivo-induced oxidative stress. **Methods:** The phenolics (total, O-diphenols, and flavonoids) and antioxidant capacity (FRAP and ABTS assays) of the extracts were assessed. Hemolytic potential and influence on erythrocyte osmotic fragility were evaluated by the spectrophotometric detection of hemoglobin in the supernatant. To evaluate oxidative stress, the erythrocytes were pretreated with different concentrations of extracts and challenged with 7 mM AAPH (up to 4 h). Hamsters were pretreated with extracts (150 mg/kg/10 days) and challenged with nicotine (1 mg/mL) (approval registration: CEUA-UFRJ 089/21). Plasma antioxidant capacity was determined by FRAP. Biochemical markers (creatinine, urea, and uric acid) were measured using commercial kits. Liver and cardiac tissue samples were collected and evaluated by light microscopy. **Results:** PPE (*P. peruviana* extract) showed the highest levels of phenolics (108 mg GAE/g), O-diphenols (58 mg CE/g), and flavonoids (43 mg QE/g) and exhibited the highest antioxidant capacity (FRAP = 720 μmol Fe^{+2}/g, ABTS = 3.05 mmol TE/g). Both extracts showed no hemolytic potential (HC50 > 500 μg/mL); instead, PPE showed a tendency to increase erythrocyte resistance to osmotic stress. Extracts provided maximum cellular protection against oxidative stress at the highest concentration (500 μg/mL). The in vivo assay demonstrated that the extracts protected animals against oxidative damage induced by nicotine similarly to the control (treated with silymarin, 150 mg/kg/10 days). A trend towards reduction in the serum levels of creatinine and uric acid was observed in animals pretreated and challenged with nicotine compared to the controls. **Conclusion:** The results suggest that fermented jabuticaba extracts are a rich source of antioxidants and could be potential candidates for nutraceutical formulations combating oxidative stress.

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sciforum-098406: Expanding sustainable iron sources: analysis of the minerals in Non-Conventional Food Plants

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Plant sources of iron are often restricted due to the limited variety of plants currently consumed. Knowledge of the iron content in non-conventional food plants can stimulate the consumption of these vegetables, increasing the repertoire of plant foods in the diet, contributing to more sustainable consumption. The aim, therefore, was to analyze the iron and phytate content of five NFCPs and to calculate the phytate–iron ratio to determine which ones might have the best iron bioavailability. The following NCFPs were studied: *Amaranthus viridis*, *Anredera cordifolia*, *Lactuca canadensis*, *Pereskia aculeata*, *Portulaca oleracea*, and *Stachys byzantine*. The leaves were dried in an oven at 70 °C for approximately 70 hours and homogenized in a blender to produce flour. The iron was determined using Flame Atomic Absorption Spectrometry. For phytate, absorbance was read at 517 nm on a spectrophotometer. The analyses were carried out in triplicate and the results are expressed on a wet basis. The plant flours with the highest iron content were *Stachys byzantine* (72.6 ± 2,3mg/100g) and *Anredera cordifolia* (20.7 ± 4,0mg/100g). The flours with the best possible bioavailability, assessed by the phytate/iron ratio, were *S. byzantine* (1.00 ± 0.03) *and A. cordifolia* (2.90 ± 0,03). The data presented indicate that these plants have a high iron content compared to traditionally consumed vegetable sources, such as kale (0.5mg/100g) and broccoli (0.6mg/100g). Also, these flours can be used in a variety of preparations, and for *S. byzantine*, even at low concentrations, such as in 10% of a simple cookie recipe, it can already provide in one serving size enough iron to be considered a source of the mineral (at least 1.8mg of iron per serving size). In conclusion, *S. byzantine* flour stood out in terms of a higher iron content and a higher iron/phytate ratio, being a potential iron source, providing an alternative to complement the nutritional needs of the population.

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sciforum-102057: Exploiting the potential of carob pods (*Ceratonia siliqua* L.) as a functional food ingredient: A review

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The carob tree (*Ceratonia siliqua* L.) is a Mediterranean plant whose fruits, known as carob pods, are rich in bioactive compounds. These compounds include dietary fibres, polyphenols, natural sugars, and essential minerals, which offer various health benefits. This study reviews the nutritional and bioactive properties of carob pods and their derivatives. A comprehensive literature review was conducted, focusing on studies that analyze the composition and health benefits of carob. Carob pods contain both soluble and insoluble dietary fibers, which aid in digestion, regulate bowel movements, control appetite, and reduce cholesterol levels. Polyphenols, such as flavonoids and tannins, provide antioxidant properties that neutralize free radicals and protect against oxidative stress, thereby reducing inflammation. The natural sugars in carob, including sucrose and fructose, serve as a natural energy source with a lower impact on blood sugar levels compared to refined sugars. Essential minerals like calcium, potassium, magnesium, and iron support various physiological functions, including bone and heart health. Carob's anti-hyperglycemic properties help regulate blood sugar levels, beneficial for diabetes management. Its antioxidant properties reduce the risk of chronic diseases such as cardiovascular diseases and certain cancers, while its anti-inflammatory properties can alleviate conditions like arthritis and inflammatory bowel disorders. Carob-based products, such as carob flour and carob syrup, hold significant potential as functional food ingredients due to their nutritional and bioactive properties. Applications include its use as a chocolate substitute, food additive, and dietary supplement aimed at improving digestive and metabolic health. Thus, carob and its derivatives represent a valuable resource for the food industry and health-conscious consumers seeking to enhance their health through nutrition.

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sciforum-101705: Exploring the Commercial Viability of Coffee Pulp Infusion as a Functional Beverage: A Physicochemical and Sensory Evaluation

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The food industry's interest in functional beverages is on the rise, driven by their potential health benefits. In this context, coffee pulp, the main by-product of coffee processing, has emerged as a sustainable source for functional infusions. This work aimed to evaluate the physicochemical and sensory properties of three antioxidant and anti-inflammatory coffee pulp infusions (CPI) to assess their potential commercialization. CPI (250 mL) was prepared with a solid–liquid ratio of 0.08 g/mL for 6 min (CPI-A) and 9 min (CPI-B) as the infusion times and with 0.05 g/mL at 9 min (CPI-C). Physicochemical parameters such as pH, titratable acidity, turbidity, density, refractive index, soluble solids, and color (CIELAB) were measured. Additionally, sensory analysis, including preference, satisfaction, and purchase intention tests were carried out. No significant differences were found among the pH (3.8), density (0.99 g/L), and refractive index (1.34) of the infusions. In contrast, differences were detected in titratable acidity (0.19–0.29 g citric acid/100 mL infusion), turbidity (0.64–1.07), and soluble solids (3.1–3.9 °Brix), distinguishing CPI-A, which had the lowest values, and CPI-B, which had the highest. The chromatic model exhibited that, in all the infusions, the *a**results moved toward red and *b**toward yellow, reflecting their brown coloration. Regarding the *L** and *C** parameters, CPI-A showed the highest values, followed by CPI-C. For the preference test, 40% of consumers chose CPI-A. However, on a satisfaction scale from 1 (strongly dislike) to 9 (strongly like), the rate for color, brightness, and aroma was 6 (like) for all the infusions, while the overall satisfaction and bitterness rate was 5 (neither like nor dislike). The purchase intention results showed that consumers probably would not buy any CPI. Therefore, improving its organoleptic properties by adding aromas and ingredients without modifying its functional properties would be necessary to commercialize it.

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sciforum-101642: Exploring the Therapeutic Potential of *Artemisia herba-alba* in Preventing Chronic Colitis

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Chronic colitis represents a significant health burden globally, characterized by persistent inflammation and functional impairment. The persistent nature of this disease can lead to severe complications, including an increased risk of colorectal cancer, which exacerbates the need for effective and long-lasting treatments. Current treatments often come with adverse effects and limited long-term efficacy, driving the need for alternative therapeutic approaches. Despite advances in medical research, many patients continue to suffer from the side effects of conventional medications, such as immunosuppressants and corticosteroids, which can lead to additional health issues over time. This study investigates the anti-inflammatory and protective properties of *Artemisia herba-alba*, a plant known for its medicinal potential, in an experimental model of chronic colitis. *Artemisia herba-alba* has been traditionally used in various cultures for its healing properties, and recent studies have suggested its potential in treating inflammatory diseases. Using murine models, we demonstrated that *A. herba-alba* extract significantly reduces symptoms of chronic colitis, such as neutrophil infiltration and colon damage. Our findings highlight the therapeutic potential of natural compounds in managing chronic inflammatory diseases, providing valuable insights into the development of safer and more effective treatments. The use of natural compounds offers a promising avenue for reducing the dependency on synthetic drugs and minimizing associated side effects. Further research is essential to fully understand the mechanisms of action and assess the clinical efficacy of *A. herba-alba*, paving the way for innovative therapeutic interventions targeting debilitating conditions like chronic colitis. The exploration of plant-based remedies not only opens new frontiers in medical treatment but also underscores the importance of integrating traditional knowledge with modern scientific research.

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sciforum-098008: Fatty acids and iron content in a puree made from *Sarda chiliensis chiliensis* (BONITO) AND *Ipomoea batatas* (Yellow sweet potato) for children aged 2 to 3 years in Lima, Peru

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Introduction: Anemia and childhood malnutrition remain major public health problems in Peru, affecting mainly the child population. The effectiveness of current interventions remains limited, despite the efforts being made. It is in this context that the potential of the bonito fish as a food resource to address these problems is being investigated. The objective was to determine the fatty acid profile and iron content of a puree made from *Sarda chiliensis chiliensis* (bonito) and *Ipomoea batatas* (yellow sweet potato) for children aged 2 to 3 years in Lima, Peru. **Methodology:** A qualitative laboratory study was carried out to develop two puree formulations. Fatty acid analysis, including that of Omega-3, was performed using gas chromatography based on ISO 12966-1:2014. The iron content was measured through atomic absorption spectrometry following the NOM 117-SSA1 (1994) standard. **Results:** No significant difference in iron levels was found between the formulations. Significant differences (p0.05) were observed in the levels of saturated and polyunsaturated fatty acids, but not in monounsaturated and unidentified fatty acids. Both formulations provided substantial amounts of Omega-3 fatty acids, including EPA and DHA. **Conclusions:** Both formulations prominently featured mono- and polyunsaturated fatty acids, successfully covering more than 10% of the daily requirements for Omega-3 fatty acids in children aged 2 to 3 years. Additionally, both formulations contained 5 mg/100 g, meeting over 10% of the daily iron requirements for this age group. Due to their Omega-3 and iron contents, these purees could be used in social programs aimed at addressing malnutrition and anemia in this age group.

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sciforum-100301: Fermenting a mixture of *Chenipodium quinoa* and *Annona cherimola* using water-kefir granules to optimize a functional beverage

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Functional beverages enhance the nutritional benefits of their ingredients by boosting their levels of vitamins, proteins, and other bioactive components like probiotics and prebiotics. For functional beverages to be popular, they must be both tasty and nutritious. This study analyses different mixtures of quinoa puree and cherimoya juice. Water-kefir grains were used to ferment these mixes at two specific temperatures, 25 and 32 °C. The measured quantities were the colony-forming units of lactic acid bacteria and yeasts in one millilitre (CFU/ml) and the overall likings (OL, -). The sensory attribute is a variable that includes the weights of four OL attributes: taste, smell, colour, and texture. Ten individuals, with partial training, assessed it on a 1–7-point hedonic scale. All three models exhibited R^2 values > 0.8, indicating their appropriateness. Optimising the collaboration of the three most crucial answers resulted in optimal conditions. At a temperature of 25 °C, the mass fractions of the mixes containing QP and CJ were 0.13 and 0.87, respectively. Under these optimal conditions, the levels of LAB and yeast increased by 4.2 and 4.4 log-bases, respectively, compared to the unfermented mixture of the raw materials from which they originated. In addition, we noted a 62 % rise in the total protein content. The kefir-granule consortium lowered the total sugar content by 52% and the levels of ascorbic acid by 82% for 48 hours of fermentation due to consumption by the kefir-grains consortium and Maillard's reaction between the reduced sugars and ascorbic acid.

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sciforum-103750: Formulation and Physicochemical Evaluation of Oleogels Based on Toasted Sesame Oil and Organic Candelilla Wax

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Introduction: The global health issues related to the high consumption of trans fats and saturated fatty acids have led to the establishment of legislative standards worldwide aimed at improving the nutritional properties of food. Oleogelation is a strategy to mitigate these effects, as it often exhibits similar behavior to commonly used fats. In this context, candelilla wax is a substance with potential for use in developing functional foods due to its gelling properties. The objective of this research was to formulate an oleogel based on toasted sesame oil and candelilla wax and compare its physicochemical properties with those of vegetable-based lard. **Methods:** An oleogel was formulated using toasted sesame oil and candelilla wax at concentrations of 3%, 6%, and 9%. The physicochemical properties evaluated included color, hardness (N), acid value (mg NaOH/g), peroxide value (meq O2/kg), and melting point (°C). **Results:** The results indicate that the oleogel exhibits a darker color and, in terms of hardness, presents a softer texture compared to vegetable lard, despite the increased concentration of candelilla wax. This could facilitate its integration into food formulations. Regarding acid and peroxide values, the oleogel showed higher values than animal lard; however, these values are within the limits specified by CODEX STAN 210-1999 and NMX-F-101-SCFI-2012 standards. Additionally, the oleogel allows for a higher intake of unsaturated fats compared to vegetable lard, potentially reducing negative health impacts. The melting point of the oleogel also increases with the concentration of wax. **Conclusion:** The oleogel formulated with 3% candelilla wax exhibited the best physicochemical properties and could potentially replace commonly used fats with high saturated and trans fat content in the formulation of traditional Mexican foods.

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sciforum-098966: Functional ingredients based on Jerusalem artichoke: technological properties, antioxidant activity, and prebiotic capacity

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This study aims to utilize whole tubers of Jerusalem artichoke (JA) for functional ingredient production as an alternative to extractive methods for inulin recovery, thereby maximizing its nutritional value. A 2^2 experimental design with “pretreatment” and “drying method” as factors was used. Levels for “pretreatment”: water immersion (W) and pressing (3 cycles of 5, 10, and 13 tn, 1 min) with citric acid dip pH=3.5 (P). Levels for “drying method”: air-drying at 60°C, 5% HR (A) and freeze-drying (0.22 mbars, T=-84°C, 48 h) (F). After milling, the JA powders (JAPWA, JAPPA, JAPWF, JAPPF) were analyzed for their technological properties, including the capacity of water holding (WHC), water binding (WBC), swelling (SC), and oil absorption (OAC). Their inulin, mineral, phenolic, and flavonoid content was also determined. Additionally, their in vitro prebiotic activity score (PAS) and antioxidant capacity were measured using the $ABTS^{+\cdot}$ and FRAP methods. The air-dried powders exhibited the highest WHC, WBC, and SC, whereas the freeze-dried ones presented the greatest OAC (p0.05). The “pretreatment” showed a significant effect on inulin content, and P favored retention (61±3 g/100 g ms). However, the “drying method” did not have a significant effect on inulin content. The highest PAS was observed in JAPPF (1.12±0.08), while the lowest was registered for JAPWA (0.58±0.04). These differences could be attributed to the influence of polyphenols, since freeze-dried powders presented more than twice the polyphenol content of air-dried powders (400±5 vs. 193±6 mg AGE/100g ms). JAPPA exhibited better technological properties, providing higher inulin content and prebiotic capacity than JAPWA, making it a cost-effective alternative for producing functional JAP with applicability in food matrices such as baked goods.

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sciforum-099294: Functional potential of different products based on maqui berries (Aristotelia chilensis)

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Maqui is a small, intensely purple wild berry obtained from a native plant in the Andean--Patagonian forests of Chile and Argentina, not marketed as fresh produce due to its astringency and high seed content. It has been shown to possess significant health benefits, although there is limited information on the preparation and use of functional ingredients based on maqui as a value-added strategy. The aim of this study was to analyze the functional potential of different products derived from maqui berries collected in natural populations of the Lanín and Nahuel Huapi National Parks, Argentina. The products evaluated were the following: fresh (F), blanched (E), and freeze-dried (FL) fruit; pasteurized juice (from unblanched fruit, JPSE, and blanched fruit, JPE); blanched freeze-dried fruit (FEL); and freeze-dried juice with maltodextrin (JMDEL). Extracts were prepared at 37°C using a 1% HCl aqueous solution in ethanol, and total phenols (TF), flavonoids (Fv), monomeric anthocyanins (ACY), percentages of polymeric color (% CP), anthocyanin degradation indexes (IDAs), and radical scavenging capacity (PAs) were determined. Pasteurization increased TF, Fv, and PA values (by more than 50%) due to enhanced extractability from temperature effects, inhibition of oxidative enzymes, and solute concentration in the absence of seeds. ACY content was affected by the combined effect of blanching and pasteurization, resulting in a 9% decrease. FL and FEL treatments tripled TF, Fv, and PA values compared to the fresh matrix, whereas JMDEL decreased those values by 50% (owing to the dilution from the addition of maltodextrin) but maintained a high ACY content and low % CP due to polysaccharide protection. The industrialization alternatives considered preserved or enhanced the functional potential of the fruits. Freeze-dried products demonstrated the best performance, albeit requiring an expensive process. JPE stands out due to its simple, cost-effective processes and high functional potential (TF 5403 ± 206 mg gallic acid equivalent/100g; Fv 507 ± 48 mg catequin/100g; ACY 728 ± 15 mg cyanidin-3-glucoside equivalent/100g; PA 0,45 ± 0,04 mg^{-1})

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sciforum-099282: Glass transition, isotherms and microstructure evaluation of thyme-enriched pumpkin snacks

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The enrichment of dehydrated vegetables with essential oils to obtain innovative snacks with health promoting properties may cause microstructural changes. In order to design new functional foods, developing water sorption properties and phase/state transitions, as well as microstructure assessments (by fractal analysis and confocal microscopy) are considered relevant tools. Pumpkin slabs were convectively dehydrated at 70°C and enriched with free and β-cyclodextrin encapsulated thyme oil. GAB and D'Arcy and Watt (DW) models were applied to simulate the sorption behavior of the samples. Glass transition temperatures (Tg) were achieved by DSC methodology. Microscopy image analysis (fractal and confocal) was performed at the center and contours of the samples by means of ImageJ software (FracLac plugin), using images obtained with a Scanning Electron Microscope (FE-SEM) SUPRA 40 (ZEISS) with a magnification range of 500 to 5000X. The GAB and DW models showed good fits to the experimental sorption data for all samples. Thermograms showed the water plasticization effects and that the Tg were in the range of -53.16 - 29.81°C. The SEM images showed the effects of the different enrichment techniques on the snacks' microstructure, evidenced by differences in the spatial arrangement of the cell and the intercellular space. Fractal dimensions (FDs) in the control and enriched samples showed lower values in the center compared to the contour of the snacks (shrinkage effect). Samples enriched with thyme oil microcapsules presented the highest FDs. The images obtained through confocal microscopy revealed the presence of lipids in the samples exposed to both free and microencapsulated oil. Lipid aggregates exhibited a distinctive angular morphology characteristic of beta-cyclodextrin microcapsules. The impact of enrichment techniques on the microstructural and thermodynamic properties of snacks highlighted their potential applications and emphasized the assessment of food microstructure as an optimization tool for the design of new functional foods based on bioactive compounds.

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sciforum-092822: Health-promoting Effects of Goji Berries (Lycium barbarum): a Literature Overview

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This literature overview examines the findings of meta-analyses investigating the health impacts of Goji berries and their derivatives. The aim was to provide a synthesis of available evidence regarding the potential benefits of Goji berries in various health parameters. Meta-analyses considered for inclusion were required to be published in peer-reviewed journals and to provide a pooled estimate of the impact of Goji berries and their derivatives on health-related outcomes. PubMed was screened up until April 2024, using the search terms "Goji Berry", "Goji Berries", "Lycium barbarum", and "Wolfberry". The search yielded 1288 research items, from which 5 meta-analyses met the inclusion criteria. The included studies varied in the number of clinical trials, ranging from 4 to 10, with participant numbers spanning from 161 to 548. Participants predominantly comprised healthy individuals or those with metabolic disorders. Goji berries were administered orally in forms such as fruit juice, dried products (up to 90 g/day), or polysaccharide extracts, with dosages ranging from 120 mL daily for juice to 150-300 mg daily for polysaccharide extracts. Intervention durations varied from 2 weeks to 3 months. The results indicated the favorable effects of Goji berries and their derivatives on lipid profile (elevation of HDL cholesterol levels by approximately 10-15 mg/dL), glucose metabolism (reduction in fasting glucose concentrations by around 7-6 mg/dL), oxidative stress, and quality of life, including an anti-fatigue effect. However, no significant effects were observed on body weight or blood pressure. In conclusion, this review suggests that Goji berries may offer potential health benefits, particularly in improving lipid and glucose metabolism, as well as reducing oxidative stress. However, further research is warranted to elucidate the full extent of their effects, ensuring evidence-based recommendations for clinical practice. The standardization of study methodologies and adherence to reporting guidelines are crucial for advancing knowledge in this field.

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sciforum-100987: Hydrolyzed legume flours: An alternative for improving protein and starch digestion in infant pureé

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Protein hydrolysates are essential in infant food formulations due to their high nutritional value and ease of digestion compared to native proteins. This study evaluates the impact of different enzymatic hydrolysis conditions on legume flours on in vitro protein and starch digestion to determine their suitability for infant foods. Chickpeas, lentils, and peas were ground and subjected to three hydrolysis methods: **A**) alcalase, **B**) heat treatment and mild acid before alcalase, and **C**) pepsin. Non-hydrolyzed flours served as controls. In vitro digestion simulated conditions for infants aged 6-12 months. Five grams of puree was tested with a 50:50 w/v food/fluid saliva ratio (oral phase,pH 7.0, 75 U/ml amylase); the ratio was 63:37 for the gastric phase (pH 5.3, 485 U/ml pepsin), and 62:38 for the intestinal phase (pH 6.6, 0.2 mg/ml pancreatin, 2.5 mg/ml bile salts). After digestion, the degree of protein hydrolysis (DH) was determined using the orthophthaldehyde method, and starch hydrolysis was measured using the dinitrosalicylic acid method. **A** samples showed the highest DH, at 35.1, 26.2, and 38.7 g/100g for chickpeas, lentils, and peas, respectively, which significantly higher values than were observed in the controls (22.0, 18.2, and 17.6 g/100g) p0.05. **B** samples showed increased DH for chickpeas (24.9 g/100g) and peas (31.9 g/100g), but decreased DH for lentils (3.4 g/100g), p0.05. **C** samples exhibited decreased DH in all samples. Starch hydrolysis increased under method **A** (63.1, 41.0, and 44.1 g/100g for chickpeas, lentils, and peas) compared to that in the controls (45.5, 31.6, 29.0 g/100g), p0.05. Method **B** also increased starch hydrolysis (65.0, 63.1, and 65.7 g/100g for chickpeas, lentils, and peas), with p0.05. Method **C** had varied effects: a decrease in chickpeas, an increase in lentils, and no difference in peas. Enzymatic hydrolysis with alcalase (method **A**) is the most effective method for enhancing legume protein and starch digestibility in infant food formulations. Hydrolyzed legume flours can be used to develop more nutritious, palatable infant foods and, and can be used to innovatively apply enzymatic hydrolysis to legumes.

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sciforum-099298: Impact of oat grain roasting on nutritional and physicochemical properties of two different oat varieties

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Oats have been a valuable and nutritious crop for centuries due to their unique flavour and high content of essential nutrients. The two oat varieties used in this research are Bingo and Gniady. These two varieties are considered important oat crop varieties in Poland. Bingo stands out with its high yield potential, 1000 kernel weight, and low husk percentage, resulting in a higher yield of husk-free grains.

The Gniady oat variety represents a significant advancement as the first variety with a brown husk listed in Poland. It demonstrates robust disease resistance, particularly against powdery mildew.

Roasting is a valuable food processing technique that uniformly heating a product to enhance its digestibility, flavour, and sensory attributes. A comprehensive study was conducted to assess the impact of roasting on the quality of oat oil. The research involved a controlled roasting process in a laboratory dryer at a temperature of 160°C for 20 minutes.

The calorific value was determined using the calorimetric method. Moreover, the Soxhlet method was used to determine the oil content and gas chromatography was used to determine the fatty acid composition in the extracted oils.

Additionally, the content of free fatty acids and primary oxidation products in the oil was determined by titration method, and the oxidative stability of the oil was determined by differential pressure scanning calorimetry (PDSC).

The research results have shown that Bingo and Gniady oats contain high-quality oil, and roasting the grains results in an improvement in the overall quality of oat oil, mainly the oil's hydrolytic and oxidative stability and increases its calorific value. Also, it is crucial to identify the difference occurring due to the roasting. In the future, it is necessary to conduct additional studies to identify the physiochemical changes that occur in the oat grain after roasting using FT-IR spectroscopy.

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sciforum-100331: In vitro gastrointestinal digestion and colonic fermentation evaluation of dialdehyde starch--epicatechin gallate conjugate

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Epicatechin gallate (ECG) has various bioactivities (e.g., antioxidant, antibacterial and anti-inflammatory activities). However, the poor structural stability of ECG makes it unable to stably pass through the human digestive system and reach the colon, which greatly limits its biological activity in vivo. In this study, ECG was conjugated onto dialdehyde starch by an acid-mediated coupling method to synthesize a dialdehyde starch--ECG conjugate (DAS-ECG) with improved digestion stability. Then, the digestive and fermentative properties of DAS-ECG were further elevated through simulated saliva-gastro-intestinal digestion and in vitro colonic fermentation systems. The results suggested that simulated saliva-gastro-intestinal digestion had little effect on the molecular weight distribution of DAS-ECG. The total phenol content of DAS-ECG was only decreased by 7.78%. In addition, the structure of DAS-ECG was not remarkably altered. Meanwhile, DAS-ECG maintained strong antioxidant activity during saliva-gastro-intestinal digestion. During in vitro colonic fermentation, DAS-ECG was gradually degraded and utilized by gut microbiota, showing a remarkably decreased molecular weight and changed structure. In addition, the total phenol content and antioxidant activity of DAS-ECG were obviously reduced. Meanwhile, DAS-ECG had a certain regulatory effect on gut microbiota, especially increasing the relative abundance of beneficial bacteria (e.g., *Bifidobacterium*, *Faecalibacterium, Prevotella, Blautia*, *Agaricus, Butyricimonas*, *Barnesiella* and *Enterococcus*) and decreasing the relative abundance of harmful bacteria (e.g., *Lachnoclostridium*, *Megamonas* and *Streptococcus*). Furthermore, DAS-ECG could significantly improve the levels of short-chain fatty acids. Our results were of great significance to reveal the in vivo digestion process of DAS-ECG and to broaden the applications of DAS-ECG in functional foods.

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sciforum-098874: Influence of A1 and A2 β-casein on early gut microbiota in a bovine animal model

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Introduction: Bovine β-casein has two main variants associated with an amino acid change at residue 67, i.e., variants A1 and A2. The first variant has been associated with gastrointestinal discomfort and allergic problems due to the release of β-casomorphin-7 during protein digestion. The A2 variant may facilitate digestion and help prevent the gastric discomfort that some people experience when consuming milk. This work aims to determine whether A2 milk consumption has a positive effect on the growth and intestinal microbiota of newborn Holstein calves, used as an animal model.

Methods: Pregnant cows from a dairy farm were genotyped for A1 and A2 β-casein variants. Three cows homozygous for each of the genotypes (A1 or A2) were selected. Newborn male calves (n=6) were fed exclusively with maternal milk from their own mother, containing exclusively A1 or A2 β-casein. Calves were weighed at birth and weekly for two months. Stool samples were collected for microbiota analysis. Microbial DNA was extracted using the MagMax Microbiome Ultra Nucleic Acid Isolation kit and the V3-V4 region of 16s rRNA was sequenced with an Illumina Novaseq SP (PE250) equipment.

Results: The percentage of body weight gain two months after birth was higher in A2-fed calves (52.2 ± 10.1 %) than in the A1 group (47.6 ± 6.0 %), although this difference was not statistically significant. The relative abundance of Enterobacteriaceae and Eggerthellaceae was significantly higher in calves fed A1 milk compared to those fed A2 milk. On the other hand, the relative abundance of Erysipelatoclostridiaceae and Clostridia UCG-014 was higher in calves fed with A2 milk.

Conclusion: The type of beta-casein ingested shows an influence on growth and induces significant changes in the intestinal microbiota of calves, which may result inchanges in their intestinal health. More studies are necessary to confirm these changes and translate their possible effects to human health.

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sciforum-098975: Influence of different extraction conditions on the bioactivity and polyphenol profile of propolis extracts

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The use of natural compounds in food development is gaining popularity in response to consumers' growing concerns about their diet. In this context, the application of extracts rich in functional compounds presents an attractive option for industries, with propolis standing out as an ingredient of great potential. The objective of this research was to determine the optimal extraction conditions and evaluate their influence on the polyphenol profile of propolis extracts rich in functional compounds. A Box–Behnken response surface design was employed, considering three factors, time (10-40 min), temperature (30-70°C), and ethanol concentration (40-90%), and two responses: antioxidant capacity (AC) and total polyphenolic compounds (TPCs). Design Expert 11 software was used to model the responses, and principal component analysis (PCA) was conducted to assess the impact on polyphenol profiles. The design generated 15 extraction conditions analyzed in duplicate, with AC results ranging from 5.25 to 0.48 mmol Trolox/100 ml and TPC results ranging from 560.6 to 33.9 mg Gallic acid/100 ml. The results fit quadratic models with R^2 values greater than 0.9621, showing that ethanol concentration and temperature significantly influenced the extraction process. The optimal conditions for maximizing a functional extract were found to be 31°C, 39 minutes, and 87% ethanol. The polyphenol profile was determined by HPLC, identifying eight compounds (Chrysin, Kaempferol, Quercetin, Sinapic, Ferulic, Caffeic, Cinnamic, and Gallic acids). PCA revealed that temperature negatively affects polyphenol concentration, possibly by facilitating their degradation. Gallic acid concentration increased with prolonged extraction times, while the others increased with higher ethanol percentages. In conclusion, the design allowed the identification of optimal conditions for obtaining a propolis extract rich in functional compounds. It was observed that the functional activity of the extracts is associated with higher amounts of Chrysin, Kaempferol, and Quercetin, which are mainly influenced by increased ethanol concentration and lower temperatures.

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sciforum-103052: Influence of fermentation pattern on aroma compounds in legume spreads

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While fermentation is recognized for its ability to enhance the functional, nutritional, and sensory aspects of legumes, the outcomes of various studies differ and lack consistency due to factors such as protein source, microorganisms, and applied fermentation methods. The aim of this study was to compare the profile of aroma compounds in spreads produced from different legume concentrates using different fermentation temperatures. The legume concentrates (LC) (local market, Latvia) of brown pea (AB), yellow pea (AY), and fava (AF) in 50:50 proportions with Alomix (legume concentrate mix), starter Danisco® VEGE 033 (Danisco, Denmark), were used in the research. PC was thermally treated (72±1°C, 30±5 min), cooled (37°C, 40°C, 43°C), inoculated, and fermented (until pH 4.9-4.6 was). Aroma compounds were detected in fermented spreads using Perkin Elmer Clarus 500 GC/MS and an Elite-Wax ETR column (60 m × 0.25 mm i.d.; DF – 0.25 μm). Aldehydes, alcohols, organic acids, and ketones haa the highest relative abundance in the analysed samples. A significantly lower (p0.05) hexanal concentration was detected in AF samples, regardless of the fermentation temperature, in AY samples at 37±1°C, and in AB samples at 43±1°C. Fermentation temperature has significant influence on aroma compounds in fermented legume spreads; however, the results are not consistent and depend on the LC. The choice of LC and an appropriate fermentation temperature can positively affect the aroma of the product.

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sciforum-095940: Influence of simulated in vitro gastrointestinal digestion on phytochemical contents and biological activities of date by-product extract (*Phoenix dactylifera* L.)

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The fruit of the date palm, *Phoenix dactylifera* L., is an essential raw material for a multitude of industries. The processing of date fruit results in the generation of a considerable quantity of seeds. Due to their abundance in high-added-value bioactive compounds, they have the potential to be exploited to make functional foods, food supplements, cosmetics, and pharmacology. The objective of this research was to assess the effect of in vitro digestion on the stability of the phytochemical composition and biological activities, as well as on the release of individual phenolics from date seed extracts of the Ourous cultivar. The total phenolic (TPC) and flavonoid (TFC) contents, the antioxidant capacity (ABTS, ORAC, FRAP, and DPPH), and the enzyme inhibitory potential against acetylcholinesterase, butyrylcholinesterase, tyrosinase (TYR), α-glucosidase (α-GLU), and α-amylase of extracts were evaluated before and after each digestion step (gastric and intestinal). Moreover, the release of individual phenolics, including phenolic acids and flavonoids, was quantified throughout the digestion process by UHPLC analysis. The results demonstrated a significant increase in both TPC (298 to 1042 mg GAE/g) and TFC (14 to 160 mg QE/g) after digestion. Furthermore, UHPLC analysis delineated an incremental release of individual phenolics, throughout the digestion process. In vitro digestion also enhanced the scavenging of ABTS (565 to 625 mg TE/g) and peroxyl (354 to 4580 mg TE/g in ORAC assay) radicals, as well as FRAP (978 to 1176 mg AAE/g), but resulted in a reduction in DPPH (578 to 249 mg TE/g) scavenging capacity. The enzyme inhibitory potential of the extracts decreased after digestion, although this was maintained or enhanced for α-GLU (87 to 86 %) and TYR (27 to 35 %), respectively. These findings indicate that the seed extract contains several bioaccessible components, which may enhance its functional attributes.

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sciforum-103176: Inhibition of migration of sw-480 cells induced by royal jelly due to reduction in β-catenin

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Royal jelly (RJ) is natural bee product highly appreciated in human nutrition because of its abundance in bioactive substance and is also named a super-food. It has been used in alternative medicine for centuries, and many studies have reported its therapeutic properties, including its anticancer activity. However, the greatest problem in standard cancer therapy is the migration of cancer cells, which leads to metastasis and the formation of secondary tumors, followed by lethal outcomes. Cancer cells acquire a migratory capacity through epithelial-to-mesenchymal transition (EMT), regulated partially by an aberrant activated Wnt/β-catenin signal pathway. The main component of this signaling, the transcription factor β-catenin, controls the expression of many other cellular components with a significant role in the motility of cells.

In this study, SW-480 cells, originating from stage II colorectal carcinoma (CRC), were purchased from American Type Culture Collection and cultured according to the standard culturing procedure, and when 90% confluence was reached, the cells were treated with RJ sampled from Serbia at two selected concentrations (10 and 100 μg/mL). After 24 h, the motility of the cells was examined by using a wound healing (scratch) assay, while the protein expression of β-catenin was measured with the use of the immunofluorescent method.

According to our results, RJ significantly suppressed the SW-480 cells' motility, where at the higher RJ concentration (100 μg/mL), this was more effective. Additionally, a prominent reduction in β-catenin protein expression was also observed in these cells after 24 h of treatment.

Our findings highlight the valuable effects of RJ in the regulation of CRC cells' motility via the modulation of β-catenin, a prominent CRC marker, thus reducing the aggressiveness of this disease. This study reveals, for the first time, the antimigratory potential of this widely used food supplement exerted on colorectal cancer, and its significant anticancer potential should not be neglected in further research.

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sciforum-099276: Innovative dehydrated snack using low-value horticultural products: Beetroot, apple and orange, a crispy combination

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In recent years, food waste has emerged as a critical problem worldwide, with 17% of food lost throughout the food chain, the majority of which occurs during harvesting, preservation, and processing stages. This study aims to address this problem by developing a new snack that uses fruits and vegetables with no commercial value due to low calibre, weight, and appearance.

For this purpose, a mixed puree consisting of steamed beetroot (52%), fresh apple (40%) and fresh orange (8%) without peel and albedo was dehydrated in thin, 5 mm thick layers by convection at 60 °C and an air velocity of 1.2 m s^{-1} for 24 hours until a final moisture stabilization at 4% was achieved. In this way, a snack with a crispy texture was produced, creating a chip-like snack using only fruit and vegetables as ingredients.

To understand the nutritional value potential, both pre-dehydrated and post-dehydrated products were physically and chemically evaluated, and in its final form, the product has 4.29 g/100 g protein, 0.23 g/100 g salt, 0.4 g/100 g fat, and 63.9 g/100 g sugar, of which 13.9 g/100 g fructose, 12.4 g/100 g glucose, and 37.6 g/100 g sucrose.

Sensory evaluation involving 46 untrained participants (age 28±11 years) resulted in an overall rating of 7.43 ±1.36 on a hedonic test scale of 1 to 9. Additionally, 87% of respondents indicated they would purchase the product if available in the market.

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sciforum-099180: Insight into the occurrence of betaines in plant foods for human nutrition.

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Betaines are naturally occurring quaternary ammonium compounds derived from amino (or imino) acids through specific biosynthetic pathways involving the exhaustive nitrogen methylation process. Betaines are ubiquitous plant constituents with species-specific distribution patterns in fruits and vegetables. Human dietary intake of exogenous betaines is mainly from plant foods. Scientific evidence has emerged that several betaines found in the human diet play a key role in maintaining health, acting as a defense mechanism against a range of aging-related diseases and disorders. However, the underlying mechanisms remain poorly understood.

In this study, we report LC-ESI-MS/MS quantification of betaines in a variety of fleshy fruits, including drupes (peaches, plums), pomes (apples, pears), and berries (bananas, grapes, strawberries, oranges, lemons, and mandarins), as well as cereals (rice, wheat, millet, and oats) and pseudocereals (quinoa) commonly consumed in human diets.

Betaines were extracted from the samples by homogenization with aqueous formic acid and purified by ion-exchange chromatography prior to LC analysis on a C8 column. Identification of the betaines was based on their retention times, MS^2 fragmentation patterns, and comparison with authentic standards.

The results of this study agreed with data reported in the previous literature. The analysis of cereal samples revealed a glycine betaine content range of 10 mg/kg in rice to 300 mg/kg in wheat. Notably, it was particularly abundant in quinoa, a pseudocereal belonging to the *Amarantaceae* family. Conversely, the concentration of this compound was found to be significantly lower in fleshy fruits.

A significantly higher concentration of proline- and 4-hydroxyproline-derived betaines was observed in fruit samples belonging to the *Citrus* genus when compared to other analyzed samples.

These results provide insight into the associations between dietary intake of plant-based foods and the use of specific betaines as dietary biomarkers.

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sciforum-098844: Investigation of the Chemical Composition and Biological Activities of Six Edible Macroalgae

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INTRODUCTION: Meeting the rising food demands of a growing global population is a critical challenge. This study proposes seaweeds as a nutrient-rich, low-fat solution. Although macroalgae are reported to be rich in nutrients and bioactive compounds, they still remain underutilized due to misunderstanding of their flavour and aroma.

METHODS: This work explores the chemical composition of six edible macroalgae, *Chondrus crispus*, *Gracilaria gracilis*, *Porphyra dioica*, *Palmaria palmata*, *Porphyra haitanensis*, and *Ulva rigida*, identifying unique compounds, many reported in this study for the first time. Additionally, screening was conducted to assess the bioactivity of the ethanolic algae extracts, including their ability to prevent lipid peroxidation, inhibit aldose reductase and tyrosinase enzyme activity, and inhibit 5-lypoxygenase, thus mediating inflammation processes.

RESULTS: *Porphyra* sp. showed higher TPC (10.8-14.8$mg_{GA\text{-}Eq}$/g) and proteins (1.0-2.4$mg_{BSA\text{-}Eq}$/g), while *P. palmata* had the maximum sugars (22$mg_{S\text{-}Eq}$/g). Forty-seven volatile compounds were identified in the six macroalgae, mainly acids (8), aldehydes (14), and alcohols (10). Pyrazines were only found in *P. dioica*, *P. haitanensis*, and *P. palmata*, terpenes in *P. haitanensis* and *U. rigida*, and lactones, specifically γ-butyrolactone, in *P. haitanensis* and *P. palmata*. *P. haitanensis* and *P. dioica* exhibited the highest inhibition rates for lipid peroxidation (IC_{50}=1.08 and 0.86mg/mL, respectively), with the former demonstrating the highest aldose reductase inhibition (IC_{50}=1.00 mg/mL). Although the ability of the examined algae to inhibit tyrosinase was limited (30% at the highest tested concentration), they showed superior anti-inflammatory potential, especially *P. haitanensis* (IC_{25}=0.26 mg/mL).

CONCLUSIONS: The evaluated algae resulted to be rich in proteins, sugars, and phenolic compounds. This study identified previously unreported compounds, filling gaps in the existing literature. These compounds influence algae's unique aroma, flavor, and bioactivity, suggesting their potential as novel ingredients in food processing and culinary applications. However, further research is needed to understand their bioavailability and interactions.

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sciforum-103092: Involvement of bread melanoidins in cellular pathways against ischemia

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Ischemic hypoxia, a common condition that can cause neuronal damage, triggers multiple cellular pathways, including hypoxia-inducible factors and anti-apoptotic mechanisms. Using food industry by-products with antioxidant and anti-inflammatory properties, such as melanoidins, as functional ingredients allows their revalorization and may enhance neuronal survival. The scientific impact of this study also considered the bioaccessibility of these compounds to exert a beneficial effect. Therefore, this study evaluates the potential effect of bioaccessible bread melanoidins on ischemic hypoxia. Bread melanoidins were obtained from bread crust through enzymatic extraction and dead-ultrafiltration, then subjected to in vitro gastrointestinal digestion to obtain bioaccessible melanoidins. Differentiated SH-SY5Y cells were incubated with these bioaccessible melanoidins and subsequently subjected to hypoxia induced by CoCl2. Cell viability was analyzed by flow cytometry, and the gene expressions (qPCR) of hypoxia-related proteins (HIF-1α and tp53), apoptosis regulation (Bax/Bcl2), oxidative stress response (p62/keap1), and antioxidant defense (SOD1, Catalase) were evaluated. The results showed a modulatory effect of bioaccessible melanoidins on pathways involved in the cellular adaptive response to ischemic hypoxia. Treatment with melanoidins decreased HIF-1α and tp53 gene expression compared to the ischemic control. Additionally, increased cell viability was observed in ischemic cells treated with melanoidins, accompanied by a decrease in pro-apoptotic Bax mRNA levels and an increase in anti-apoptotic Bcl2. Melanoidins also enhanced antioxidant protection against ischemia by upregulating the p62/Keap1 pathway and increasing levels of antioxidant enzymes SOD1 and catalase. In conclusion, melanoidins from food by-products could have beneficial effects against neuronal damage, contributing to their revalorization. Furthermore, using bioaccessible fractions ensures a comprehensive understanding of how bread melanoidins exert their biological effects. However, since the structure of melanoidins is unknown, attributing the effect to a specific bioactive compound is challenging, and in vivo studies are needed.

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sciforum-098999: L-theanine extends the lifespan of *C. elegans* by reducing the end products of advanced glycosylation

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L-Theanine, a non-protein amino acid naturally present in tea leaves, is renowned for its antioxidant, anti-inflammatory, and neuroprotective properties, positioning it as a potent functional food ingredient. This study explores the impact of L-Theanine on the lifespan of *Caenorhabditis elegans*, a model organism whose metabolic and genetic pathways closely mirror those of humans, making it a platform for evaluating the health benefits and potential risks associated with dietary components. This model is highly utilized in the development and testing of nutritional foods. Through advanced glycation end product (AGE) content analysis, we found that L-Theanine significantly reduced the accumulation of AGEs by 26.5%, which are key biomarkers linked to aging and various age-related diseases. When administered during early adulthood, L-Theanine extended the lifespan of *C. elegans* by 8.7% under normal conditions and by 7.3% under high-sugar-induced stress conditions. This suggests that L-Theanine not only promotes longevity under standard conditions but also offers protective effects against high-glucose-induced stress. Subsequent gene expression and mutant analyses revealed that the lifespan-extending effects of L-Theanine are mediated through the insulin-like signaling pathway, involving the critical regulators DAF-2 and DAF-16. DAF-2, an insulin-like receptor, and DAF-16, its downstream transcription factor, play an important role in controlling genes associated with aging. Our findings demonstrate that L-Theanine extends lifespan by modulating the DAF-2/DAF-16 signaling pathway and reducing AGE accumulation. Our results highlight tea leaves' and L-Theanine's potential as an anti-aging intervention in functional foods, demonstrating their capability to modulate significant aging-related pathways and offering a foundation for future research into their benefits in mammals, including humans.

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sciforum-103040: Lactic Acid Fermentation of Mango and Plum Smoothies: Physicochemical and Antioxidant Properties

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Functional beverages (such as fermented fruit juices and smoothies) have gained popularity among consumers due to their improved nutritional properties and health benefits. This study aimed to determine the metabolic activity of *Lactobacillus plantarum* and *Bifidobacterium bifidum* strains and the dynamics of changes in physical parameters (i.e., color, pH, titratable acidity (TA), and total soluble solids (TSS)), viable count, antioxidant activity, and total carotenoid content during the 48-hour fermentation of smoothies consisting of 100% mango and mango mixed with plum (10:1; w/w).

The results showed a significant decrease in the pH of mango and mango--plum smoothies and consequently a significant increase in TA during fermentation with *L. plantarum* and *B. bifidum*. However, no significant difference was observed in TSS values during 48-hour fermentation, with values in the range of 7.5-8 °Brix. Counts of both strains decreased after 24 h in mango smoothies, while it continued to increase up to 9.01 $\log_{10}$ (CFU/g) during 48 h of fermentation in mango--plum smoothies. Furthermore, a significant increase in the antioxidant properties (29%) of smoothies was observed after fermentation, which was shown to be higher in mango--plum smoothies than mango ones. Lactic acid fermentation had no significant impact on the total carotenoid content of smoothies. This study demonstrated the potential for lacto-fermented mango-based smoothies to improve functional properties.

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sciforum-103057: Lactic acid fermentation of papaya and mint: physicochemical parameters and bioactive compounds

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Papaya *(Carica papaya)* is a nutrient-rich fruit with significant bioactive compounds, presenting substantial potential for the development of functional beverages. This study explores the impact of lactic acid fermentation on the physicochemical parameters, bioactive compounds, and color stability of papaya and mint *(Mentha piperita)* smoothies. An optimal mixing ratio of 64:1 (w/w) for papaya to mint was established through preliminary experiments. Fermentation was conducted using *Lactiplantibacillus plantarum* and *Bifidobacterium bifidum* at 37°C, with a smoothie-to-water ratio of 2:1 (w/w).

The results showed that both strains proliferated rapidly in the smoothies, with colony counts increasing from approximately 6×10^4 CFU/g to 8×10^7CFU/g within 24 hours, followed by a stationary phase and slight decrease by 48 hours due to pH inhibition. Lactic acid fermentation significantly decreased the pH and titratable acidity (TA) of the smoothies, with the pH dropping to 3.51-3.56 and TA reaching 0.559%-0.553% after 24 h. After 48 h, TA increased further to 0.799%-0.743%. The otal soluble solids (TSS) also decreased significantly, falling to 5.58-5.53°Bx after 48 h of fermentation.

Furthermore, lactic acid fermentation preserved the total phenolic content (TPC) and ferric reducing antioxidant power (FRAP) in both papaya and papaya–mint smoothies, while enhancing the DPPH (2,2-Diphenyl-1-picrylhydrazyl) radical scavenging activity in the papaya–mint smoothie. Color analysis indicated that fermentation maintained or improved the color stability of the smoothies, with lightness (L*), chroma (C*), and hue (H*) parameters being preserved or slightly enhanced, contributing to the visual appeal of the final product. This study underscores the potential of lactic acid fermentation in creating functional beverages from papaya and mint, promoting health benefits, enhancing color stability, and extending shelf life. The findings suggest that fermenting papaya smoothies with *L. plantarum* for 48 h offers optimal results, providing a novel beverage option that preserves nutritional content, improves visual attributes, and reduces food waste.

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sciforum-102496: Lyophilized garambullo juice concentrate has endothelium-independent vasodilator effects on isolated thoracic aortic rings from rats with metabolic syndrome-associated hypertension

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Metabolic syndrome (MS), which increases cardiovascular risk, is constituted by abdominal obesity, dyslipidemia, insulin resistance, and hypertension (HTN). Garambullo, the fruit of *Myrtillocactus geometrizans*, contains cardioprotective betalains and flavonoids, but its effect on vascular function has not been elucidated. This study evaluated the vasodilator effect of a freeze-dried garambullo juice concentrate (CJG_L) on the thoracic aortic rings of Wistar rats with MS and high-fat-diet-induced HTN (HFD, 41%).

The total betalains, polyphenol content, and antioxidant capacity of CJG_L were analyzed in vitro by ORAC and FRAP assays performed in triplicate. Secondary metabolites were profiled by high-performance liquid chromatography coupled with mass spectrometry. Ex vivo, rat thoracic aortic rings precontracted with phenylephrine (10 μM) were used to evaluate the vasoactive effect of CJG_L (1-75 mg/mL) in isometric stress studies (n=5). Twenty-nine rats were divided into two groups: standard diet (CG; n=10) and HFD (MS; n=19). Over 27 weeks, we measured body weight, abdominal circumference, adipose mass, oral glucose tolerance, HDL cholesterol (c-HDL), and blood pressure, and isometric stress studies were performed to evaluate the vasoactive effect of CJG_L. The trial was registered under reference number BGFMUASLP-13-22.

CJG_L contains polyphenols (521.4 mgGAE/L), flavonoids (143.8 mg catechin equivalents/L), and betalains (75.8 mg/L), which exhibited ~18- and ~16-fold higher antioxidant capacities in FRAP and ORAC assays, respectively. The identified metabolites included betacyanins, betaxanthins, and flavonoids. CJG_L demonstrates dose-dependent vasodilation, with an EC_{50} of 10.68 mg/mL. Rats fed an HFD developed MS, with increased body metrics, glucose intolerance, and decreased c-HDL; 57% had HTN (MS+HTN). CJG_L at 10.5 mg/mL induced 62.6% endothelium-independent vasodilation in the aorta rings of MS+HTN rats, with no significant change compared to the control and MS groups without HTN ($p>0.05$; two-way ANOVA).

CJGL shows an endothelium-independent vasodilator effect related to its secondary metabolites, highlighting the ability of this functional food to alleviate vascular dysfunction in MS.

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sciforum-096400: Microencapsulation of young barley leaf extract with gum arabic, whey protein, and maltodextrin using freeze drying

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New consumer preferences are driving food brands and beverage manufacturers worldwide to create enriched products that support the immune system and boost energy levels. This study explores the microencapsulation of young barley leaf extract, selected for its rich content of bioactive compounds, such as chlorophyll, phenolic compounds, vitamins, and minerals, which are known to offer antioxidant properties and potential health benefits. Ethanol was used as a solvent in the extraction process due to its effectiveness in extracting these compounds, though alternatives like water or supercritical CO2 may be considered in future research to address potential concerns regarding residual solvents in food products.

The microencapsulation was performed using a spray drying method with a combination of maltodextrin (20 degrees of hydrolysis), gum arabic, and whey protein as wall materials. The combination was optimized using response surface methodology and a one-way grid design, resulting in 14 different wall formulations. The physicochemical properties of the resulting microcapsules—moisture content, microencapsulation efficiency, chlorophyll content, phenolic compounds, and antioxidant activity—were evaluated, with the results indicating that a mixture of maltodextrin, gum arabic, and whey protein significantly enhances these properties compared to single-wall coatings.

Numerical and graphical optimization identified the optimal wall composition as 63.45% maltodextrin, 19.25% gum arabic, and 17.30% whey protein. Stability tests of chlorophyll microcapsules conducted over 35 days at varying temperatures (4°C and 25°C) and humidity levels (52% and 75%) demonstrated a linear decrease in chlorophyll content, with better preservation observed at lower temperature and humidity levels. Microcapsules composed of 66.67% maltodextrin, 16.67% whey protein, and 16.67% gum arabic showed the lowest reaction rate constant and the longest chlorophyll storage half-life (216.56 days), indicating the highest stability. Under conditions of 4°C and 52% humidity, these microcapsules exhibited the smoothest surfaces, with minimal cracks and agglomeration.

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sciforum-099207: Milk and flaxseed-based fermented beverage for women's health

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Flaxseed is the richest known source of lignans (9–30 mg per g), which could alter the metabolism of estrogen and estrogen metabolites in postmenopausal women (Sturgeon et al., 2010). The biological activity of plant lignans results from their conversion to mammalian lignans by the intestinal microflora. A milk and flaxseed-based fermented beverage may be a great option for the health management of the female population, considering that milk is a source of calcium, flaxseed provides phytoestrogen, and that fermentation can be good for digestion, nutrient absorption, and overall health management for women. This research project was proposed for the development of a milk and flaxseed-based fermented beverage for female health and for the evaluation of its efficacy in the management of hormonal imbalances.

Lacticaseibacillus rhamnosus (NCDC 296) was used to ferment low-fat milk for 7 h. The milk and flaxseed-based fermented product was prepared by adding roasted flaxseed flour, stabilizer, and sugar to fermented curd. The efficacy of the product was estimated in 3-month-old ovariectomized female rats and blood estradiol levels were evaluated using ELISA. Ovariectomy, involving the surgical removal of the ovaries, and estradiol replacement facilitate the understanding of hormone-related diseases. Approved study protocols were practiced according to the rules and regulations of the animal ethics committee of the National Dairy Research Institute (Registration No: 1705/GO/Re/SL/13/CPCSEA).

The optimized product had an overall acceptability score of 8.21±0.5, a Lactobacilli count of 10^8 CFU/ml, and 32.14 mg per 100 ml of lignan. Estradiol levels may be considered a marker of female hormonal health; during the menopausal stage, estradiol levels decline. The optimized beverage showed the highest estradiol level (40.70 pg/ml) in ovariectomized animals, whereas the lowest estradiol level (19.80 pg/ml) was found in experimental animals fed a control diet. Regular intake of this beverage would help in the management of hormonal imbalances in women as established by the animal study, which could be further extended to humans.

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sciforum-093130: Millets: Types, Nutritional value, Processing methods and applications in processed food

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Millet grains are beneficial, because they are known as climate-resilient crops; their yield is exceptionally good in areas that are known for water scarcity. It is highly nutritious, and its uptake can fight diseases. The major problem of low nutrient value that is currently facing developing countries is that cereal-based foods have low bioavailability of minerals such as iron and zinc, which leads to serious problems in young infants. Food processing techniques are used to increase the nutritional quality and bioavailability of food nutrients. Millet is small and round and has a high nutritional content, consisting of carbohydrates (60 to 70%), proteins (7 to 11%), crude fiber (2 to 7%) and fats (1.5 to 5%). In hyperglycemia, millet can reduce glucose via the enzymatic hydrolysis of complex carbohydrates. Millets also reduced the chances of heart attack, as they are reliable sources of magnesium. Millets are a good source of phyto-chemicals that help control cholesterol and prevent cardiovascular diseases. Currently, there are distinct methods for processing food. The incorporation of millet in different processed foods is improving people's health. The methods used for the processing of millet are fermentation, malting, milling and soaking. It is true that considerable efforts have been invested in millet because of its high nutritional value, but its application is still challenging and limited due to its short shelf life. The present review illustrates the different types of millet, its nutritional advantages, and challenges surrounding millet-based food, highlighting key methods of processing that could by employed for millet food improvement.

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sciforum-098032: Modulation of coagulation and platelet function with red wine: insights from clinical evidence

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Background and Aims

Understanding the relationship between diet and cardiovascular health, particularly the effects of red wine (RW), on coagulation and platelet function, is critical in elucidating its role in preventing thrombosis and atherosclerosis.

Methods

A comprehensive review of 20 clinical studies was conducted, focusing on the effects of RW consumption on coagulation markers such as prothrombin fragments (n=7), activated factor VII (n=5), fibrinogen levels (n=8), and platelet aggregation (n=10). The review included studies with sample sizes ranging from 30 to 200 participants and RW intake varying from 1 to 3 glasses per day over periods of 2 weeks to 6 months.

Results

The findings indicate a trend towards decreased thrombotic and platelet activation and reduced plasma viscosity. Studies showed reduced thrombotic and platelet activation, decreases in PAI-1 and platelet aggregation, and increased FMD and nitric oxide levels. Some reported no change in carotid plaque volume, endothelial function, fibrinogen, or D-dimer levels. Others observed increased arterial stiffness, improved vasodilation post-smoking, and beneficial changes in atherosclerosis-related gene expression. However, there were mixed results on bleeding time and left ventricular function.

Conclusions

While research indicates that RW consumption can lead to reduced thrombotic and platelet activation, decreased plasma viscosity, improved endothelial function, and reduced arterial stiffness, these potential cardiovascular benefits are overshadowed by the broader health risks associated with alcohol consumption. The evidence is not uniform, with some studies reporting no impact on variables such as bleeding time, carotid plaque volume, or fibrinogen levels. These findings underscore the complexity of RW's effects on health. Due to the significant health risks linked to alcohol intake, including addiction, liver disease, and increased cancer risk, the use of RW as a strategy for increasing cardiovascular health cannot be recommended.

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sciforum-099272: Multidimensional approach to understanding the effect of physicochemical, technological and sensorial properties on the quality of gluten-free breads with *N. affinis* flours

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The design and formulation of gluten-free breads (GFBs) present challenges in improving nutritional and technological characteristics. The addition of unconventional gluten-free flours has been studied to improve the nutritional profile. The aim of this study was to evaluate the interrelationships of the physicochemical, technological and nutritional characteristics of GFB with the addition of *N. affinis* flours (NAFs), to comprehensively understand their effect on loaf quality. A traditional GFB recipe was used to replace rice flour and corn starch by fractions of flour obtained from *N. affinis* grinding (EM: exocarp-mesocarp; ES: endocarp-seed). A Box--Behnken design of three factors [EM, 0-20%; ES, 0-20%; dough water hydration (WH, 70-160%] with three levels (– 1; 0; + 1) was used to obtain the different formulations. Multiple Factor Analysis (MFA) was carried out to correlate instrumental and sensorial data with GFB formulations. The results showed that 72.32% of the data variation was explained by the first two dimensions (F1 and F2). The largest proportion of the variability was explained by F1, where optimal fermentation time, cell size, weight loss, and specific volume were related to WH, discriminating those formulations with higher WH. The latter were negatively correlated to firmness, cell density and uniformity parameters. In F2, EM fraction was correlated to titratable acidity, a*, Chroma and ΔE proteins and dietary fibre content, discriminating between the formulations with a higher proportion of NAF. These formulations were negatively related to carbohydrates, sensorial colour, L*, and pH. The ES fraction was correlated to air inclusion and was used to discriminate the central points of the design. The variables' firmness, cell density and uniformity discriminated the formulations with lower proportions of WH. Through the MFA, it was possible to gain a deeper understanding of the interactions between physicochemical, technological and nutritional properties, and to identify the relevant parameters that affect the quality of GFBs with *NAF*.

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sciforum-102174: Nano-Fortification of Flour for The Effective Management of Nutritional Deficiencies

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Introduction: Supplementation and use of fortified foods is considered as a treatment for osteoporosis and iron deficiency anaemia, but the bioavailability of calcium and iron when co-administered is an issue that needs to be resolved. Dietary intake is the best parameter to use for estimating the prevalence of nutritional deficiencies and nutrient intake through food as diet is the preferred route, rather than supplementation. Fortification of staple foods with essential vitamins and minerals is a proven, cost-effective and sustainable way of providing vital nutrients to a large population. The study aims to develop a simple method of fortifying edible flours with nano-sized calcium oxide, electrolytic iron and folic acid to achieve improved calcium and iron absorption in the body. Daily consumption of these food products will ensure a steady supply of calcium and iron, thus improving overall health.

Methods: The first step is designing a micronutrient premix that contains a uniform mixture of the desired nutrients in the required amounts. A premix is a powdered blend of vitamins and minerals that will ensure the uniform distribution of fortificants in the flour. Nano-sized micronutrients of calcium oxide, electrolytic iron and folic acid will be formulated and characterized. The intestinal bioavailability of micronutrients from commercially available fortified flour and fortified flour prepared in the laboratory is determined using in vitro cell lines. The micronutrient premix is then blended with flour and evaluated for its nutritional value, stability and organoleptic qualities

Conclusion: Edible flours blended with this nutrient premix can be used in the preparation of rotis or any other dishes as per the food habits of various consumers.

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sciforum-098702: Nutraceutical potential of *Tessaria absinthioides* combined with *Camellia sinensis* in controlling tumoral growth

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The development of plant-derived nutraceuticals is an increasingly popular research area, driving the exploration of well-known medicinal plants through bioprospection. *Tessaria absinthioides* (Ta) is a native plant from South America, which demonstrates anticancer activity. In vitro, Ta was cytotoxic against glioblastoma, adenocarcinoma, and colorectal cancer cell lines, while in vivo, its oral administration affects melanoma, colorectal, and breast cancer growth. Moreover, *Camellia sinensis* (Cs)—green tea—is known for its potent antioxidant and anticancer activity. This work evaluates the combination of Ta with Cs to obtain nutraceutical preparations with antitumoral properties. Ta and Cs aqueous decoctions were prepared at 5% w/v and were combined in different ratios. Cytotoxicity was determined using the MTT assay on the B16F0 cell line (non-metastatic murine melanoma; from ATCC, VA-USA) treated with Ta, Cs, and Ta+Cs (1:1, 2:1, 4:1) for 72h. The median effective dose and combination index were calculated using CompuSyn Software (values 1 indicate synergism). In vivo, C57BL/6 mice with subcutaneous B16F0-induced tumors were orally treated with Ta, Cs, or Ta+Cs (1:1), at doses of 150 mg/animal/day for 22 days; tap water was used as the control. Tumor growth was monitored daily, followed by necropsy and tumor weight measurement. Ta and Cs decoctions inhibited B16F0 cell proliferation dose-dependently, with median dose values of 1391.4 and 655.8 µg/mL, respectively. The Ta+Cs combination (1:1, 2:1 and 4:1) was synergistic, particularly at a 1:1 ratio (combination index = 0.43, 0.86, and 0.93, respectively). In vivo, Ta+Cs showed a significant decrease in tumor weight compared to the control (0.81g vs. 1.87g, respectively; ANOVA followed by Fisher's test, p0.0421), as well as a prolonged tumor detection time (21 vs. 14.5 days in control; Log Rank test, p=0.0088). These results demonstrate that the decoction of *T. absinthioides* combined with *C. sinensis* synergistically inhibits murine melanoma cell proliferation and exhibits a promising in vivo antitumoral activity, supporting nutraceutical preparation development as a complementary method of treatment for cancer.

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sciforum-101386: Nutritional and functional composition of microgreens: A comparison of various species

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In the last few decades, society has shown a growing interest in healthy eating and lifestyle, with increased demand for fresh, ready-to-eat foods with functional value. Referring to this trend, micro-scale vegetables, including microgreens, have gained special attention as an alternative for consumption, due to their potential to diversify and improve the human diet and address microelement and nutrient deficiencies, as well as providing a high content of phytochemicals with functional properties. Nowadays, there is an increasing demand for regular consumption of these products, and some of them are sold on the market. The objective of this work was to evaluate the nutritional and functional composition of microgreens of different species. The selected species were beet, pea, adzuki bean, popcorn, onion, and carrot. The nutritional composition was determined following the official analysis methods of the AOAC (Association of Analytical Communities) (i.e., water, crude fat, crude protein, ash, crude fiber and minerals). The content of total phenolic compounds, flavonoids, chlorophylls a and b, and total carotenoids and in vitro antioxidant activity were evaluated by spectrophotometry. Significant differences were found in the nutritional value and caloric intake between the species under study, with carrot and onion microvegetables standing out for their mineral, calcium, and potassium content and crude fiber. Regarding the pigment content, the adzuki bean microgreens showed the highest levels of chlorophylls and carotenoids (1295.4 µg%g fw, 295.49 µg%g, respectively). For total phenolic compounds and flavonoids, onion and carrot microvegetables had the highest content of these bioactive compounds; carrot had 891.34 mg%g fw of total phenols, and onion had 445.68 mg%g fw. These species also had the highest in vitro antioxidant capacity, with 85% and 95%, respectively. The results obtained show that microvegetables are an excellent alternative to fresh foods, with high nutritional and functional value.

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sciforum-098897: Nutritional characterization and caffeine content of a food bar made with Paullinia cupana (guarana) powder

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Introduction: The excessive consumption of energy drinks can cause many problems in the consumer's health due to the ingredients contained. A population that tends to consume this type of products more frequently are athletes and university students, that is why a product was developed with a similar function to an energy drink but with ingredients from natural sources. It should be noted that it is a food bar that presents simple carbohydrates and caffeine that provide immediate energy and a stimulating effect, respectively, not as a food rich in protein; which is why it is compared to energy drinks.

Methodology: Two different food bars (FB1 and FB2) were made with quinoa, honey, sunflower oil, peanut butter, cocoa powder, bitter chocolate and guarana powder. In which the guarana content varied from 28 and 21% per 70 g serving of each food bar, respectively. Proximal, microbiological and caffeine content per serving was determined in each sample.

Results: The proximate composition for a 70 g serving of FB1 was 329.8 kcal, 36.8% fat, 59.4% carbohydrate, 0.3% fiber, 3.8% protein, 5.2% moisture, 1.07% ash and 0.25% caffeine. For FB2 it was 336.4 kcal, 40.5% fat, 54.9% carbohydrate,0.4% fiber, 4.6% protein,5.45% moisture, 1.41% ash and 0.187% caffeine. Among these, there was only a significant difference in protein and ash content. The caffeine content in FB1 and FB2 was 175 mg and 131 mg/70 g, respectively. Microbiological analysis (molds) gave a result of 10 CFU/g for both samples, thus demonstrating their safety.

Conclusions: The food bars elaborated contain an adequate nutritional composition and an ideal amount of caffeine according to the nature of the product and complied with microbiological standards. These bars could provide the energy and stimulation in the form of a single food for training or day-to-day use

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sciforum-100284: Nutritional composition and fatty acids profile of Peruvian Ungurahui (*Oenocarpus bataura* Mart.) pulp

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Introduction: Ungurahui (*Oenocarpus bataua* Mart.) is the fruit of a palm belonging to the *Arecaceae* family and is widely consumed by the communities of the Amazonian region. The fruits of the genus *Oenocarpus* are rich in antioxidants, dietary fiber and healthy fatty acids, which give them the potential to prevent chronic diseases. The aim of this study is to describe the nutritional content and fatty acid profile of Ungurahui fruits obtained from the Peruvian Amazonia.

Methodology: Ungurahui samples were obtained from the Ucayali Region. The ripe fruits were properly selected and cleaned. The pulp was obtained manually. Fat, protein, carbohydrate, calories, moisture and ash contents have been calculated according to AOAC official methods (1). Gas chromatography with a capillary silica column and flame ionization detector was used to characterize the fatty acid profile (2). The results were expressed as a percentage of total fatty acids in the Ungurahui pulp.

Results: The proximate composition of the Ungurahui pulp showed a content of Fat 28.5%, protein 2.5%, total carbohydrate 23.5%, 44.6%, ash 0.8%. The total energy was 361 kcal/100g. In terms of fatty acid composition, MUFAs proportion was characterized by a higher content (23.53%), the concentration of PUFAs amounted to 1%, and the proportion of SFAs was 4%. The profile was mainly composed of oleic>palmitic>linoleic acid. The oleic acid concentration was approximately 23%. Finally, the calculated health-promoting index (HPI) was 7.2.

Conclusion: The Ungurahui pulp has a remarkable nutritional quality, with considerable amounts of healthy fats, mainly oleic acid. These results suggest its potential as a functional ingredient in disease prevention.

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sciforum-102912: Nutritional Intervention with Hematogen Shots to Combat Iron Deficiency Anemia in Pregnant Women: A Study in Faisalabad

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Iron deficiency anemia (IDA) is a prevailing nutritional inadequacy observed in pregnant women globally. Based on the 2018 national nutrition survey of Pakistan, 41.7% of women between the ages of 15 and 49 suffer from anemia. Anemia is regarded as a risk factor for maternal mortality and associated problems like an elevated likelihood of preterm birth, underweight newborns, and postpartum depression. The objective of this study was to assess the impact of hematogen shots on pregnant women with iron deficiency anemia in the Faisalabad district. Another objective of this study was to formulate iron-enriched shots with the aim of enhancing the iron levels in pregnant women suffering from iron deficiency anemia (IDA). Iron-enriched shots were prepared by combining soybean, chickpea, spinach, and red kidney beans in various combinations. This study involved 9 pregnant women who were diagnosed with iron deficiency anemia (IDA) and who were observed for a period of 30 days. Five treatments were chosen, namely T_o (control group), T_1 (red kidney beans + soybean), T_2 (red kidney beans + chickpea), and T_3 (spinach + soybean). Three groups of pregnant women, each consisting of three individuals, were assigned to receive T_4 treatment with a combination of spinach and chickpea. An efficacy trial was chosen as an experimental design in this study. Participants were administered hematogen shots twice daily. Hemoglobin levels were measured at the beginning of the intervention and again after 30 days. These shots underwent compositional analysis to determine their proximal, mineral qualities. The results were subjected to descriptive statistics and ANOVA for analysis to determine their level of significance, which was p 0.05. This study determined that T_4 is more efficacious than other treatments in increasing hemoglobin levels, making it a viable choice for meeting the daily needs of pregnant women with iron deficiency anemia (IDA).

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sciforum-098888: Nutritional quality, bioactive compounds, and antioxidant activity of nine clones of fresh garlic and its black garlic derivative: a comparative study

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Fresh garlic (*Allium sativum* L.) is one of the main bulbs cultivated and consumed worldwide as traditional medicinal plants or functional foods. Several biological functions of garlic have been reported and indicated owing to its organosulfur compounds and polyphenols. However, a critical drawback of fresh garlic is its strong odour and pungent taste. Thus, black garlic, an aged processed product, has gained importance as an alternative due to the fact that it possesses a sweet taste and less pungent odor compared with fresh garlic. Previous research has shown that pre-harvest factors like genotype and heat treatment conditions used to produce black garlic are important parameters that affect not only the contents of bioactive compounds but also their nutritional quality and biological properties. This work focused on the evaluation and comparison of the nutritional quality, bioactive compounds (total and individual phenolic compounds), antioxidant activity (by means of the DPPH method), and the correlation among these traits in nine clones of fresh garlic and its aged product, black garlic. For this purpose, nine clones, classified according to ecophysiological groups, were chosen from the germplasm collection of INTA La Consulta. Black garlic was produced in a ripening chamber for 7 days at 80 °C and 30 days at room temperature. The results denoted that the moisture content material of black garlic was reduced, while crude protein, crude fiber, crude ash, and carbohydrate contents were considerably improved. In addition, it was found that black garlic presented a higher total phenolic content (1028.84-1727.95 mg/100 g dw) than fresh garlic (228.49-403.65 mg/100 g dw) and four to nine times more antioxidant activity. Hydroxycinnamic acid derivates were found to be the main phenolic acids in both fresh and black garlic. The antioxidant activity was correlated with polyphenols content and pungency levels. These findings highlight a need for a careful consideration of garlic clones in both dietary and therapeutic contexts.

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sciforum-099403: Nutritional value and health-promoting properties of acerola (*Malpighia emarginata*): a tropical superfruit

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Introduction: Acerola (*Malpighia emarginata*) is a tropical red fruit native to Central and South America. Since the 1950s, acerola has been recognized worldwide as one of the main natural sources of ascorbic acid (vitamin C). It also contains other bioactive compounds such as phenolic compounds, flavonoids, and carotenoids, which are associated with several biological properties. **Methodology**: A literature review was conducted to examine the nutritional value and to investigate the health-promoting properties of acerola fruits. The search was performed using the PubMed, Scielo, MDPI, Science Direct, Springer Link, Wiley Online Library, and Google Scholar databases. The keywords included the scientific and common names, along with the terms *nutritional value*, *bioactive compounds*, *ascorbic acid*, *phenolic compounds*, *biological properties*, and *health benefits*. The search included peer-reviewed articles published in English, Portuguese, and Spanish that were published up until December 2023. **Results**: The nutritional composition of acerola includes ascorbic acid; vitamin A; and B-complex vitamins such as thiamine (B1), riboflavin (B2), and niacin (B3); as well as sugars (glucose, fructose, and sucrose), organic acids (malic, citric, tartaric, and succinic acids), and minerals (mainly calcium, iron, potassium, magnesium, and phosphorus). Furthermore, acerola contains provitamin A carotenoids, which contribute to the fruit's nutritional value. Like other berries, anthocyanins are the main phenolic compounds found in the fruits, in addition to other phenolic compounds such as catechin, quercetin, resveratrol, gallic acid, and caffeic acid. A range of biological properties have been demonstrated in acerola fruits, including antioxidant, anti-inflammatory, antimicrobial, antihyperglycemic, antihyperlipidemic, antigenotoxicity, antimutagenic, antitumor, and hepatoprotective properties. **Conclusion**: Acerola emerges as a tropical superfruit, with a compelling nutritional profile and a variety of bioactive compounds that contribute to a remarkable range of health-promoting and protective effects against diseases. Further research is warranted to fully elucidate the mechanisms underlying these benefits and to explore acerola's potential as a functional food ingredient.

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sciforum-099056: Nutritional, elemental and toxicity assessment of three tropical fruits pulps and seeds

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The tropical fruits velvet tamarind (*Dialium guineense* Willd), African locust beans (*Parkia biglobosa* Jacq.) and baobab (*Andansonia digitata* L.) are part of sub-Saharan Africa culture and are used as foods, usually as raw materials for beverage production, or even for medicinal purposes, being an important nutrient and bioactive compound source [1,2]. This research focused on nutritional composition and bioactive compounds in the fruit pulps and seeds of these Guinean-origin plant species.

Sugars were quantified using high-performance liquid chromatography with a refractive index detector (HPLC-RI) [3]. The profile determination and quantification of organic acids and phenolic compounds were performed using HPLC-PDA (photodiode array detector) [4]. Protein (Kjeldahl) and fat (Soxhlet) content [5,6] and antioxidant capacity (DPPH, FRAP) [4] were also determined. The fatty acids of the lipid phase were identified and quantified via gas chromatography with a flame ionisation detector (GC-FID) [6]. Elemental analysis was carried out using X-ray fluorescence [6]. Total, soluble and insoluble dietary fibre were determined enzymatically only in the fruit pulps [6]. Amygdalin [7,8], a toxic compound, was analysed via HPLC-PDA in the seeds and not detected.

The fatty acid profiles of the seeds are quite different, with African locust beans standing out for their high polyunsaturated content and baobab for its high monounsaturated content.

Several bioactive compounds were quantified, such as vitamin C, various hydroxycinnamic acids (caffeic, coumaric, chlorogenic, ferulic) hydroxybenzoic acids (gallic, vanillic, p-hydroxybenzoic), and polyphenols (quercetin, catechin, epicatechin, rutin, naringin, procyanidin, kaempferol), as well as fatty acids from the ω-3 and ω-6 series.

Velvet tamarind had the highest antioxidant capacity, African locust beans had the highest sugar, potassium, iron and copper content and baobab had the highest vitamin C, calcium and soluble and total dietary fiber content. Generally, fruit pulps are richer in sugars and organic acids and seeds in protein and fat.

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sciforum-095891: Optimization of the transformation process of *Agaricus bisporus* and *Pleurotus ostreatus* co-products into flours with potential food uses

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The mushroom industry generates large amounts of stem co-product. This is produced after mushroom harvests; stems are attached to the peat and growth substratum, and their only use has traditionally been as compost. In this study, we developed an alternative and profitable solution to *Agaricus bisporus* and *Pleurotus ostreatus* stems optimizing the obtention of intermediate food products by applying only physical processes, including cleaning and drying to retain food safety. The stems have a composition similar to that of the fruiting bodies, so the flour obtained could have several food applications, such as a fortifier in the development of functional foods due to its healthy nutritional composition and the amount of valuable compounds.

Four methods of cleaning the stem of *A. bisporus* (ABS) were developed (pre-drying, brushing, abrasive peeling, and immersion in chlorinated water). The results elucidated the use of abrasive peeling as the most suitable cleaning method with the highest colorimetry values in lightness (L*) (73.22) and the least protein content (0.26 g protein / 100 g fresh) that could be related to the peat lost. On another hand, ABS and *P. ostreatus* steams (POS) were dried in a freeze-dryer, a dehydrator, and an oven. Dehydration was the most economical and less invasive method, with L* of 68.19 in ABS and 81.62 in POS. In addition, three dehydration temperatures (40, 50, and 60°C) were compared. In the case of 50°C, the concentration of phenolic compounds (3.32 and 7.69 mg GAE / 100g fresh ABS and POS, respectively) was similar at 40°C and higher at 60°C. In conclusion, ABS should be cleaned by abrasive peeling to maintain food safety. On the other hand, drying ABS and POS in a dehydrator at 50°C could be a suitable process to obtain intermediate food products in the development of functional foods.

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sciforum-103248: Optimized Purification Processes for Isolation and Modification of Oligosaccharides from Rathi Cow's Milk

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Purification and characterization of milk oligosaccharides is a challenging process due to the complexity of the constituent oligosaccharides, which behave differently under various chemical treatment procedures, and often lose their structural properties in the process. Rathi cow's milk is widely used in the Rajasthan region of India for its nutritional and medicinal benefits. In our earlier work, we were able to show that the medicinal properties of Rathi cow's milk are attributed to its oligosaccharide content. Here, we aim to present an optimized method for the purification and analysis of oligosaccharides present in Rathi cow's milk. Contrary to the freeze transport methods used earlier, we treated the collected milk with ethanol for preservation, followed by microfiltration, lyophilization and fractionation on silica gel (60-120 mesh size) column chromatography coupled with chloroform/methanol-mediated gradient elution. Fractions were analyzed for sugar content via the phenol–sulfuric acid method. Fraction homogeneity was confirmed using high-performance liquid chromatography. Isolated analytes were treated with acetic anhydride/pyridine (1:1, v/v) to form less polar oligosaccharide derivatives, which could then be easily visualized and semi-quantitated using partition chromatography (thin later and paper) with chloroform/methanol. Structural identities of the purified oligosaccharides were determined using a combination of mass spectrometry and NMR (^{1}H, ^{13}C, HSQC, TOCSY, COSY, HMBC) techniques. Our results clearly demonstrate that the ethanol based-preservation, transport and purification of oligosaccharides is a simple and robust method for the analysis of Rathi cow's milk oligosaccharides. Furthermore, the acetylation of purified oligosaccharides allows for rapid analysis on thin chromatography, which is quite cost-effective compared to other analytical methods.

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sciforum-099491: Phase behavior and synergistic gelation of scallop (*Patinopecten yessoensis*) male gonad hydrolysates and gellan gum driven by pH

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BACKGROUND: Scallop P. yessoensis male gonads contain 81.7% protein. Scallop male gonad hydrolysates (SMGHs) are prepared by treating the male gonad of scallop with trypsin, which is a rich source of essential amino acids with the potential to be a protein supplement. Gellan gum (GG), as a typical anionic polysaccharide, can improve the textural properties of proteins. Complex polymerization can be considered the separation of two liquid phases driven by electrostatic interactions between oppositely charged biomacromolecules (proteins and polysaccharides) and is mainly affected by the pH of the solution. In detail, pH_c, $pH_{\varphi1}$, and pH_{max} are three critical pHs obtained during the complexation and coacervation processes, corresponding to the generation of the initial soluble complexes, aggregated coacervates, and the electrical equivalency with the maximum coacervates.

METHODS: The complexation and coacervation of SMGHs and GG were investigated via turbidimetric titration at different pHs (1-12) and biopolymer blending ratios (9.5:0.5-6:4).

RESULTS: Both pH_c and $pH_{\varphi1}$ exhibited ratio-independent behaviors with constant values at approximately pH 5.8 and pH 3.8, respectively. SMGHs/GG typically experienced three conditions, namely, mixed polymers, soluble complexes, and insoluble coacervates, with pHc and pHφ1 as boundaries. Overall, SMGHs and GG exhibited synergistic gelation under acidic conditions, with the storage modulus (*G'*) increasing by approximately 42-, 696-, and 3422-fold and 99-, 550-, and 1.5-folds, respectively, and at pH 7, 5, and 3, compared with SMGHs and GG. As pH decreased from 7 to 3, the G' of SMGHs/GG gels increased by 21-fold, with initial viscosity η values increasing by 3.3-fold.

CONCLUSION: Thus, the SMGHs/GG gels could be potentially utilized as food formulations, such as thickeners and fat replacers, carriers for nutraceuticals and flavor compound embedments, and in food-grade packaging, contributing to the current need in the field of foods that could solve or bring a substantial improvement.

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sciforum-096719: Physicochemical and functional value of lettuce: effect of mulching technique used during production on postharvest storage

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Lettuce (*Lactuca sativa* L.) is one of the most important vegetable crops cultivated and the most popular green vegetable worldwide. Lettuce quality can be affected by different factors, such as preharvest factors, postharvest processing, storage time, and environmental conditions. There are several techniques to increase yield and improve product quality, as well as reduce the environmental effects on cropping, that can be used. Mulch or mulching is an ancient horticultural technique, the objective of which is to protect the soil surface, create a physical barrier, and provide a more suitable environment for the crop. The objectives of our work were to evaluate the effect of different mulching techniques on the morphophysiological performance,and nutritive value of iceberg-type lettuce and study their changes during postharvest storage. Iceberg-type lettuce seeds were germinated on commercial substrate, and after three true leaves had grown, they were transplanted into the field using a complete randomized design. The mulching soil treatments consisted of two mulching films, dry alfalfa added on top of the grown bed and bare ground as a control. After harvest, the lettuce heads were stored under cold storage at 4 °C for 8 days. Mulching soil treatments had a significant impact on biometric measurements such as yield, physicochemical values, and functional value in lettuce heads. Mulch treatment x days after harvest interaction was significant (p 0.05) for chlorophyllous pigments and carotenoids, individual and total phenolic compounds, and vitamin C. The highest levels of pigments were registered at 4 days after harvest with black plastic foil. Meanwhile, the largest number of individuals, final amount of total phenolic compounds, and highest vitamin C levels were reached at 4 and 8 days after harvest with dry alfalfa added to the grown bed. Organic mulch had the best result, improving the bioactive compounds in lettuce.

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sciforum-099650: Physiological response and organic interactions of berrycactus in wistar rats with metabolic syndrome (MS)

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Background: Metabolic syndrome (MS) is a cluster of abnormalities affecting multiple systems in the human body, including the cardiovascular, endocrine, and metabolic systems; MS is present in ~24% of the general population. MS involves genetic and environmental factors, including abdominal obesity with visceral fat accumulation and an excess of free fatty acids. Treating MS requires a polypharmacy approach, with nutraceutical biocompounds being explored as potential adjuncts. Berrycactus juice concentrate (ByC; *Myrtillocactus geometrizans*) contains carbohydrates, proteins, fiber, vitamins, minerals, betalains (betanin and phyllocactin, among others), and phenolic compounds (caffeic acid, gallic acid, and peniocerol, among others); it is associated with hypolipidemic, anti-inflammatory, and antiproliferative properties. **Aim:** This study investigates the impact of ByC consumption on metabolism response and pathway interactions in a rat model of MS induced by a high-fat diet. **Methods:** Twenty Wistar rats were divided into the following four groups: control (water), ByC (200 mg/kg), high-fat diet 45% (HFD), and HFD plus ByC. This study was approved by the Animal Care Committee (BGFMUASLP-22-24), as per the NIH guidelines (Publication No. 80-23). After 140 days, metabolic markers were analyzed in plasma, including glucose, cholesterol, triglycerides, insulin, leptin, ALT, AST, creatinine, and BUN levels. The fat content in the liver and adipose tissue (FOLCH method), and the percentage of fat in the liver, were analyzed using morphometry. **Results:** HFD groups presented significant increases in body weight, glycemia, insulinemia, triglyceridemia, cholesterolemia, and leptinemia, as well as an increased fat content in hepatic and adipose tissues. ByC fed to HFD rats induced a decrease in triglycerides, cholesterol, insulin, and leptin levels without modifying glucose, liver enzymes, and renal function markers. **Conclusion:** ByC included within an obesogenic diet for 20 weeks showed an improvement by decreasing the metabolic markers of MS. These results suggest that ByC contains biomolecules that may be useful as adjunct treatments of metabolic diseases like obesity and MS. Further research is needed to understand the mechanisms and to identify the metabolite that is responsible for these effects.

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sciforum-100989: Potential valorization of apricot oil as a functional food: antioxidant properties and health benefits

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Apricot is a functional food that has many health benefits while being delicious and nutritious. In Morocco, apricot kernels are considered waste. Currently, the uses envisaged to valorize these almonds are rare even though almonds, although bitter, are rich in therapeutic compounds. Indeed, apricot kernels are a good source of oil, containing bioactive components such as fatty acids, tocopherols, terpenoid phenolic compounds with high antioxidant, anticancer, antimicrobial and anti-inflammatory activity. The objective of this study is to study the potential for the valorization of this co-product by analyzing the chemical composition of almond oils from different apricot genotypes from different geographical origins. Samples of by-products from apricots harvested for two years (2018-2091) were used in the study. We tested different methods of almond oil extraction, followed by conducting an analysis of the chemical composition of the oils.

The results revealed strong antioxidant activity, with anti-radical activity of up to 70%, a high content of unsaturated fatty acids including oleic acid (64% of omega-9) and linoleic acid (26% of omega-6), and a high content of vitamin E (4mg). This richness in photochemical compounds was discussed for possible work on the valorization of almond oil for use in cosmetics or food. Formulations of cosmetic products based on active extracts of these studied oils have been proposed and some are at the biological testing stage.

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sciforum-099009: Process optimization and characterization of plant-derived omega-3-enriched mozzarella cheese

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Omega-3 fatty acids are essential fatty acids and are crucial for the development of the infant brain, optimal cognitive functions and cardiovascular health in human beings. However, Indian and Western people are at the disadvantage of not receiving a sufficient amount of omega-3 fatty acids due to dietary intake of fish and fish oil, least of all, which is otherwise one of the richest sources of the same. Flaxseed oil is the richest plant source of omega-3 fatty acid (α-Linolenic acid: ALA), constituting approximately 45-56% ALA. Nevertheless, it cannot be used for cooking/frying purpose due to its highly polyunsaturated nature, which leads to the generation of rancid/off-flavor compounds during processing and storage. In the present study, oil-in-water (O/W) emulsions were prepared comprising 10, 15, and 20% flaxseed oil, 10% sodium caseinate, and 10% lactose. The results suggested that the only emulsion containing 10% flaxseed oil was physically stable. Therefore, it was further supplemented at the 3, 6, and 9% levels to prepare omega-3-enriched Mozzarella cheese. There was no significance difference ($P>0.05$) among the sensory scores of the 3% and 6% fortified cheese and control. However, 9% fortified cheese showed objectionable flavor and textural characteristics. Therefore, 3 and 6% fortified cheese samples were further evaluated for physicochemical characteristics during 28-day storage at low temperatures (4-7°C). Although peroxide value, Thio-barbituric acid value, and p-anisidine value increased gradually during the storage, they remained well below the maximum permissible limit recommended by CODEX (2013). Gas–liquid chromatography profiles suggested that 3% and 6% cheese samples retained ~1.0% and 1.65% ALA content, respectively, at the end of storage (on the 28th day), indicating that 100g of 3 and 6%-fortified Mozzarella cheese could meet ~62.5% and 100% RDA of ω-3 fatty acid, respectively.

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sciforum-101908: Profile of soy isoflavones in food supplements

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The food supplement industry's ability to bring high-quality soy isoflavone-containing products to the market is of particular importance for the well-being of postmenopausal women, who utilize these products the most. Although supplement labels commonly contain only the total amount of soy isoflavones, these products' actual isoflavone profiles could influence their biological effects, considering that the isoflavone aglycones glycitein, daidzein, and genistein do not have the same potency for binding to estrogen receptors, a step necessary for the manifestation of their activity.

Twenty-one commercial supplements with soy extract, intended mostly for relief of menopausal symptoms, were subjected to isoflavone profiling (daidzein, glycitein, and genistein, as well as their glucosyl, acetyl, and malonyl glycosides) by high-performance liquid chromatography with diode-array detection. For analytical purposes, a portion equivalent to an average mass of 10 tablets/capsules was measured from the pulverized material and extracted with 80% aq. methanol.

The supplements showed a broad range of total isoflavone content, 0.05-71.0 mg/dose unit expressed as total aglycone equivalents (mean value 20.4 mg/dose unit). The total isoflavone content deviated from the labeled value by less than ± 10 % in two supplements only, while the overall range of deviations was from -94.3 to +18.0%. Regarding isoflavone composition, genistein and daidzein, each with its glycosides, were on average equally abundant, participating with 43% of the total isoflavones, although the former showed greater variations in content (standard deviation 14 *vs.* 24%), while glycitein and its glycosides accounted for the remaining 14%.

This study showed that the quality of soy-based supplements varies greatly, in terms of both the amount of isoflavones and deviation from the labeled content, as well as in terms of isoflavone profiles. Such findings indicate a need for better control of the production process, including plant extract standardization, as well as of the final products. The increased public interest in health-promoting food supplements makes this issue even more relevant.

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sciforum-103231: Renoprotective and antioxidant effects of the ethanolic extract of *Diospyros lotus* in mitigating hypertension-induced acute kidney injury in Wistar rats

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Acute kidney injury (AKI) is closely associated with chronic diseases like cardiovascular disease, diabetes, and hypertension. Despite advancements in medical treatments, no established therapy effectively prevents AKI from progressing to chronic kidney disease (CKD), highlighting the need for alternative therapies. This study investigates the therapeutic potential of the ethanolic extract of black persimmon (*Diospyros lotus* L.) on hypertension-induced AKI in Wistar rats.

Rats were divided into five groups: control (G1), hypertensive-AKI (G2), hypertensive-AKI treated with standard drug (G3), and hypertensive-AKI treated with ethanolic extract of *D. lotus* L. @400 mg/kg/day (G4) and @600 mg/kg/day (G5). Hypertension and AKI were induced by exposing rats to cigarette smoke (two cigarettes/week) and 30% high-fat diet. The ethanolic extract was prepared via ultrasonic-assisted extraction, with subsequent proximate and phytochemical analyses. Treatments were administered for 30 days. Various assessments were conducted, including ECG readings, serum levels of creatinine, BUN, urea, and uric acid, oxidative stress markers (TAC, TOS, and MDA), antioxidant enzyme activities (catalase, SOD, GPx, and GST), and renal histopathology.

Treatment with the ethanolic extract of *D. lotus* L. significantly improved renal function and antioxidant status. Serum creatinine decreased from 0.94 to 0.73 mg/dL, BUN from 1.03 to 0.71 mg/dL, and urea from 51.27 to 42.34 mg/dL. TAC increased from 1.2 to 2.2 µmol/L, and antioxidant enzyme activities were enhanced (catalase from 0.93 to 1.19 U/mg protein, SOD from 151.32 to 247.22 U/mg protein, GPx from 27.32 to 41.1 U/mg protein, and GST from 42.36 to 64.76 U/mg protein). TOS and MDA levels were reduced from 2.54 to 1.87 µmol/L and 3.67 to 1.73 nmol/mg protein, respectively. The histopathological analysis revealed reduced renal inflammation, glomerulosclerosis, and tubular damage.

The ethanolic extract of *D. lotus* L. shows significant promise in mitigating hypertension-induced renal damage and oxidative stress, indicating its potential as a natural therapeutic option for managing AKI.

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sciforum-099185: Revalorising tomato by-products from *salmorejo* and *gazpacho* production for nutritional and functional food ingredients

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The food industry generates substantial amounts of by-products, which present both environmental challenges and opportunities for resource recovery. Tomato by-products, particularly from the production of the typical Mediterranean cold vegetable soups *salmorejo* and *gazpacho*, retain great amounts of tomato nutrients and are rich in bioactive compounds with potential functional benefits. The main aim of this study was to revalorise tomato by-products into powdered ingredients with a high content of bioactive compounds, protein, and/or fibre to formulate foods for human or animal consumption.

The complete by-product obtained after the industrial production of V-range *salmorejo* and *gazpacho*, in addition to the tomato peels and seeds separated from the *gazpacho* by-product, were dried in an infrared oven at 80 °C until the moisture content was below 10 %. Then, the dried tomato by-products were ground and sieved to 2 mm particle size, resulting in four potential ingredients. Total carotenoids, phenolic compounds, and antioxidant activity were evaluated spectrophotometrically, whereas individual carotenoids and vitamin C were determined by HPLC-DAD. Protein content was measured using the Dumas method, and fibre fraction contents were also assessed.

The highest carotenoid, phenolic content, and antioxidant capacity were found in *gazpacho* waste > *salmorejo* waste > tomato peel > tomato seeds, whereas vitamin C was not detected. However, the highest protein content was found in seeds (26%), while *gazpacho* and *salmorejo* wastes had among 18-21%, and peels had 8%. Regarding acid detergent fibre, related to fermentability in the rumen, the content was acceptable in all the by-products except for tomato peel, which had a high content that is difficult to digest.

Therefore, *gazpacho* waste exhibited the best combination of nutritional and functional properties, making it a promising ingredient for use in food or feed.

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sciforum-103300: Search for new functional foods in the Western Himalayan District of Jammu and Kashmir in India.

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Functional foods confer additional health benefits to humans apart from providing nutrients. Wild edible plants are often referred to as "new functional foods" due to the wide variety of benefits offered by them. This study was carried out in Doda District of the Union Territory of Jammu and Kashmir, India. The region is rich in plant diversity owing to its geographical attributes including high altitude and diverse climatic conditions. The district is inhabited by multiple ethnic groups and also a few tribes. The local populace being predominantly rural still utilizes wild edible plants which are collected by them from the large forest area of this region. This research was conducted in the study area to ascertain the botanical identification of the wild edible plants being consumed in the region and to identify potential functional foods.

This research was carried out by using standard ethnobotanical methodology. Field trips were conducted during which semi-structured questionnaires were used, and interviews of the local informants were carried out. The plants were collected, and later on their identification was performed. Herbarium sheets were prepared, which were submitted in the Herbarium of the University of Jammu, where each specimen was allotted a specific accession number.

This study revealed the use of 64 wild edible plants In the region for dietary as well as medicinal purposes. Nutritional evaluation of some plants was carried out and information about the nutrients and medicinal importance of these plants was also evaluated from the literature. This research indicated that most of these identified wild edible plants are potential functional foods and can be evaluated further.

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sciforum-099329: Seasonal and genotypic variation in fruit quality and antioxidant compounds of acerola (*Malpighia emarginata* DC.)

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Introduction: Acerola (*Malpighia emarginata*) fruit is known as one of the richest natural sources of ascorbic acid (vitamin C), containing up to 100 times the amount found in oranges and lemons. This study investigates the seasonal and genotypic effects on fruit quality traits, bioactive compounds, and antioxidant activity in acerola. **Methodology**: Three pre-selected acerola cultivars (BRS Rubra, Cabocla and Costa Rica) and one commercial cultivar (Junko) were produced under irrigation in semi-arid climate conditions. The fruits were harvested at the red, ripe maturity stage during the spring (October 2022) and summer (February 2023) growing seasons. The fruits were assessed for skin color, soluble solid content (SSC), titratable acidity (TA), SSC/TA ratio, ascorbic acid, phenolic compounds, and antioxidant activity using both 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) and 2,2-diphenyl-1-picrylhydrazyl (DPPH) assays. **Results**: Acerola quality traits were jointly regulated by the growing season and genotype. However, the genotypic effect was much greater than the seasonal effect for bioactive compounds and antioxidant activity. 'BRS Rubra' acerolas stood out in terms of SSC and the SSC/TA ratio, as well as in terms of having low TA, which is important for the perception of fruit sweetness. 'Junko' acerolas presented the highest content of bioactive compounds and antioxidant activity. **Conclusion**: In conclusion, this study provides valuable insights into the genotypic and seasonal variations in acerola fruit quality, emphasizing the importance of selecting appropriate cultivars and harvest season in maximizing desired quality traits. Breeding programs focused on developing advanced acerola cultivars rich in bioactive compounds should be used, considering the greater influence of genotype compared to seasonal conditions on these compounds.

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sciforum-099088: Sodium Content of Restaurant Foods: Publishing Trends

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Globally, the sodium content in diets often exceeds the recommended levels set by health organizations like the WHO. The restaurant industry substantially impacts sodium intake, as eating out frequently exposes consumers to meals with higher sodium content than home-cooked ones. A range of laws and regulations exist globally related to the sodium content of food sold by restaurants; most of these are labeling-oriented. Some restaurant operators have undertaken efforts to reduce the sodium levels in their offerings. Despite these efforts, achieving global sodium reduction targets remains a challenge. A bibliometric analysis of research articles published in the Scopus database between 1970 and 2023 that focused on the sodium content of restaurant foods was performed. A total of 119 scholarly articles were identified. The top five greatest number of articles were published by the United States, China, United Kingdom, Canada, and South Korea. The U.S. National Institutes of Health provided funding for the greatest number of these studies, followed by the U.S. Centers for Disease Control and Prevention, the Canadian Institutes of Health Research, the U.S. National Cancer Institute, and the Center for Clinical and Translational Science (University of Illinois at Chicago, U.S.). Journals with more than five of these articles published in them are focused on science and medicine topics, none were categorized as hospitality or restaurant industry journals. The data were also used to create a keywords co-occurrence network map of articles with restaurants and sodium in the title and keywords using the VOSviewer program. In summary, this study identifies research trends, influential publications, primary funding agencies, and gaps in the current knowledge needed to identify strategies to reduce the amount of sodium consumed by restaurant patrons.

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sciforum-099017: Soy isoflavones in soy food consumed in Republic of Serbia

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The global consumption of soy-based food has increased in recent decades due to its nutritional value and the link between the consumption and health benefits of soy isoflavones, such as their anticancer, hepatoprotective, cardioprotective, and beneficial effects on osteoporosis and menopausal symptoms.

The aim of the current study was to determine the profile and content of isoflavones in soy-based food available on the Serbian market, represented with 94 different products, divided into six groups: I—soy (soybeans, flakes, flour); II—meat substitutes; III—dairy substitutes; IV—tofu and related products; V—soy sauces; and VI—uncategorized products such as oil and sprouts. Sample preparation included homogenization, if needed, degreasing with hexane, and extraction with 80% methanol, while analytical determination was performed using high-performance liquid chromatography with diode array detection. Apart from the aglycones daidzein, glycitein, and genistein, which were used for the construction of calibration curves, their glucosyl, acetyl, and malonyl glycosides were quantified using calibration curves of the corresponding aglycone and taking into account correction for aglycone–glucoside difference in molecular weight.

Isoflavone content varied greatly across the soy food groups due to the differences in the raw materials and production techniques. The lowest values were recorded in soy sauces and the highest ones in the group of soybeans, flours, and flakes. The mean ± SD (range) isoflavone levels, expressed as total aglycone equivalents (mg/kg), were the following: group I: 1787.1 ± 113.3 (440.4-2546.9); II: 692.7 ± 175.0 (0-2344.8); III: 136.5 ± 22.9 (29.5-605.6); IV: 327.8± 36.2 (65.4-811.6); V: 14.6 ± 3.63 (0.38-40.0); VI: 45.5 ± 26.2 (0.08-141.2).

As differences in isoflavone profiles and content substantially influence their dietary intake and impact on consumer health, detailed and accurate compositional data regarding their most important nutritional source, soy-based food, is of the utmost importance.

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sciforum-101578: Soy Nuggets: A Plant-Based Sustainable Meat Substitute with the Potential to Alleviate Protein-Energy Malnutrition

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Background: The consumption of animal protein has historically been linked with various health hazards, such as cardiovascular illnesses, cancer, and environmental harm. In light of the increasing global demand for protein, researchers are exploring substitutes that can mitigate these issues while ensuring sufficient nutritional intake. An example of such an alternative is a plant-based meat substitute sourced from soybeans, a legume rich in protein, amino acids, and micronutrients. In contrast to animal protein, soy nuggets are cholesterol-free and have a reduced environmental impact, making them an appealing option for health-conscious individuals and those mindful of ecological sustainability.

Results: The findings showed that the inclusion of soy paste led to a reduction in moisture, fat content, hardness, and cohesiveness while increasing the levels of carbohydrate, ash, protein, and cooking yield in soy nuggets. Significantly differences (0.001) were observed in moisture, crude protein, fat, ash, carbohydrate, and cooking yield. The L* and b* values increased, while a* values decreased with a high concentration of incorporated soy paste. Non-significant differences were observed in the aroma aspect, while significant variations were evident in color, mouthfeel, and flavor. Adding soy meat decreased the overall acceptability and taste rating of soy nuggets, whereas appearance and texture received the highest scores.

Conclusion: Introducing soy meat into soy nuggets decreased production costs, making them an economically viable option. Soy nuggets treated with soy paste ranging from 25% to 50% exhibited higher levels of acceptability based on sensory assessment and economic viability, providing a secure and confident outlook on the product's sustainability.

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sciforum-103146: Structural Characterization and Quality Evaluation of Chapathi (Indian Flat Bread) with Encapsulated Folic Acid

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Introduction: This study aims to develop a micronutrient-fortified Indian flatbread using folic acid extracted from cauliflower leaves, targeting improved nutritional value. This research explores substituting water with orange peel powder and orange juice in the dough to enhance bioavailability, optimizing the preparation process, and assessing the fortified flatbread's physical and nutritional properties.

Methodology: Folic acid was extracted and purified via column chromatography, with qualitative analysis using FTIR and Thin Layer Chromatography (TLC) and quantitative analysis via High-Performance Liquid Chromatography (HPLC). The purified folic acid was encapsulated with maltodextrin and starch, and its thermal stability was assessed using Differential Scanning Calorimetry (DSC). The dough was prepared by substituting water with varying levels of orange peel powder and orange juice, with optimum levels determined by texture analysis. The fortified flatbread samples were then analyzed for physical properties, including color, water activity, and proximate composition.

Results: Qualitative analysis confirmed the presence of folic acid comparable to the standard, while HPLC revealed a folic acid concentration of 1.523 μg/100 mL with a retention time of 5.108 minutes. Encapsulation enhanced the thermal stability of folic acid by 45°C, as determined by DSC. Shelf life studies showed that the fortified flatbread maintained viability for 4 days at ambient conditions and 12 days under refrigeration, compared to 3 days and 10 days for the unfortified variant, respectively. The fortified flatbread achieved a folic acid content of 0.24 mg per 100 grams, confirmed by HPLC.

Conclusion: This study successfully developed a folic acid-fortified Indian flatbread with improved nutritional value, extended shelf life, and enhanced bioavailability. The increase in bioavailability is attributed to the synergistic effect of folic acid and vitamin C, contributed by the incorporation of orange peel powder and orange juice in the dough. This fortified food product holds promise for dietary interventions aimed at increasing folic acid intake.

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sciforum-095575: Sunflower (*Helianthus annuus* L.) bioresidues: a source of phenolic compounds and bioactive potential

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The sunflower (*Helianthus annuus* L.) is an extensively cultivated plant and, consequently, produces a significant amount of residues. However, these residues are discarded, although they are rich sources of high-value-added molecules that can be used in the food industry. In this sense, this work intended to valorize these residues through the study of different parts of the plant that are discarded after harvesting the seeds—FOG (leaves and stems) and FLG (flowers). The phenolic composition was determined by LC-DAD-ESI-MS^n, and the bioactive action was evaluated regarding its antioxidant (TBARS, RP, DPPH) and antimicrobial action. Twenty compounds were identified in the FOG sample, while fifteen compounds were identified in the FLG sample. The quantitative analyses revealed that 3-*O*-caffeoylquinic acid was found in higher amounts in FOG (0.191 ± 0.003 mg/g of extract), while the 5-*O*-feruloylquinic acid was more abundant in FLG (3.5 ± 0.1 mg/g of extract). Regarding the bioactive potential, FOG presents more promising antioxidant activity, reflected through a lower EC_{50} value, indicating greater efficacy in inhibiting lipid peroxidation. In terms of antimicrobial activity, tested on several strains of bacteria selected according to their relevance at the public-health level, it was visible that both extracts showed antibacterial action. The FOG extract showed a slightly better performance, particularly against *Enterobacter Cloacae* and *Escherichia coli*. Otherwise, the FOG extract showed better results against the strains *Morganella morganii*, *Listeria monocytogenes* and against MRSA.

Overall, these results are valid arguments to support the use of sunflower by-products as underexploited alternative sources of bioactive phenolic compounds with potential health benefits for consumers. This integral use is in line with the 2030 Sustainable Development Goals, promoting a healthy and circular economy.

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sciforum-098806: Supercritical fluid extraction of bioactive compounds from mango (*Mangifera indica* L.) by-products

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Introduction: Mango (*Mangifera indica* L.) is one of the most important tropical and subtropical fruit crops in the world. The main mango varieties grown in Spain are Osteen, Keitt and Kent. Supercritical fluid extraction (SFE) has evolved as a green alternative to conventional methods for the extraction of bioactive compounds. Some advantages of this technology are the possibility of controlling the selectivity, of improving mass, high diffusivities and variable solvent strength, very useful to achieve highly selective extractions.

Methods: Extractions were performed using an SFE module; an amount of dry mango peel was loaded into the extraction vessel while a CO_2 and ethanol as co-solvent were used. Stream flowed through the sample at different temperature, pressure and time were optimized. The conditions were selected based on the total phenolic content and mass yield. SFE final conditions were; 15g of lyophilized skin or pulp, CO_2 and 15%EtOH as cosolvent, extraction pressure of 30MPa, 50°C and 3h extraction time. Total phenolic compounds by Folin–Ciocalteu method, total carotenoid compounds and antioxidant capacity (DPPH and FRAP methods) were evaluated. Also, bioactive compounds were studied and identified by HPLC/MS.

Results obtained shown that yield extraction varied depending on fruit area, variety and ripeness degree. In the skin, Kent variety presented higher extraction yield than Keitt variety. Also, the higher ripening stage, the higher extraction yield was observed in Kent variety.

Regarding total phenol content, at low ripeness stage, was higher in the pulp than in the skin and when ripening stage increases, the skin becomes enriched in phenol and decreases in the pulp. Similar results were found in total carotenoid content.

Conclusion: The proposed SFE method allows to obtain solvent free extracts rich in polyphenols and carotenoids from mango by-products and also can be used to perform the fractionation into different groups of compounds.

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sciforum-096013: Sustainable use of apple pomace as a new functional ingredient due to its enhanced antioxidant and prebiotic properties

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The characteristics of apple pomace (AP) are being thoroughly studied to support the industries from the sector, implementing sustainable circular economy guidelines and, at the same time, providing consumers with health-promoting food products. Although plentiful, AP is still a largely untapped resource, rich in interesting bioactive compounds. In this work, the antioxidant capacity of AP was measured by two in vitro assays: the TBARS assay, which assesses the ability to inhibit the formation of thiobarbituric acid reactive substances in brain cell homogenates, and the ORAC assay, which measures the oxygen radical absorbance capacity. The prebiotic activity was compared with positive controls (glucose, inulin, and fructooligosaccharides (FOSs)). Three *Lactobacillus* and one *Bifidobacterium* were used, namely *Lactobacillus casei* (NCTC 6375), *Lactobacillus plantarum* (DSM 12028), *Lactobacillus acidophilus* LA-5 (Probio-Tec, Denmark) and *Bifidobacterium animalis spp*. lactis Bb12 (Probio-Tec, Denmark). Considering the different reaction mechanisms in the antioxidant activity assays, AP generally demonstrated good antioxidant activity, particularly in the ORAC test (161 μmol TE/g). In terms of the prebiotic activity, AP exhibited optical density values exceeding those of the positive controls for all the tested microorganisms, indicating that microorganisms accepted the sample as food. These results demonstrated that AP could be an effective carbon source for various prebiotic strains, fostering their growth more effectively than well-known prebiotics. This study highlights AP's potential as a functional ingredient in dietary supplements or nutraceuticals. Its antioxidant properties could be harnessed to develop natural food preservatives, providing a healthier alternative to traditional ones while supporting circular economy principles. AP could also be incorporated into formulations to boost gut health.

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sciforum-086484: The Biological Activities, Health Benefits and Medicinal Properties of of Asafoetida (*Ferula asafoetida* L.)

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Introduction: Asafoetida (*Ferula asafoetida* L.) is a monoecious, herbaceous, perennial plant of the Umbelliferae family, native to eastern Iran, central Asia, China. The roots of the asafoetida plant are used as a food source, and it has a prominent role in traditional medicine because of its anti-bacterial, anti-viral, carminative, sedative, anti-inflammatory and diuretic characteristics. **Methods:** The goal of this article is to survey the natural benefits and medicinal values of Asafoetida. A literature search was conducted using Google Scholar, PubMed, Science Direct, Springer, Medline, and Wiley Online Library from 1990 to October 2023. The keywords used were asafoetida, medicinal plants, anticancer, polysulfides, flavonol, natural products, and coumarins. **Results:** The study confirms asafoetida as an important source of components with remarkable bioactive and nutritional characteristics suitable for incorporation into functional foods. Asafoetida is an oleo gum resin obtaineded from the exudates of the plant roots. Its major and vital health advantages include decreased bloating and other stomach problems, and it aids in alleviating asthma, relieving menstrual pain, lowering blood pressure levels, reducing acne, reducing headaches. It has an anticancer impact, can act as an appropriate hair conditioner, improves brain health, and exerts antibacterial and antimicrobial activities. Analysis of asafoetida reveals its composition, including moisture, carbohydrates, minerals, protein and fiber. It contains different vitamins and mineral components including calcium as well as iron, carotene, and phosphorus. Asafoetida mainly contains resin, gum, and volatile oil. The odor of asafoetida is detected from the breath, flatus, gastric eructations, and secretions. It is difficult to eat it raw because of its bitter taste and strong smell. It occurs in three forms in commercial trade: paste, mass, and tears. **Conclusions:** Asafoetida has great medicinal importance, and more studies of asafoetida are needed. The active components of asafoetida can be used in combination as potent drugs, which may exert better impacts in comparison with other components.

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sciforum-093300: The Determination of calcium, magnesium and phosphorus intake in the Cuban population through the first Total Diet Study

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The Cuban population is currently facing an accelerated aging process, with a life expectancy of 77 years. This highlights the importance of maintaining a good diet in order to achieve a healthy old age. This research constitutes the first Total Diet Study conducted in Cuba. Food intake was determined through 24-hour memory surveys applied between October 2020 and March 2021 in the three geographic regions of Cuba (west, central and east) with a representative sample of the adult population (aged 18-91), and the sample size was calculated by statistical inference for 95% confidence (n = 450). A food frequency and amount questionnaire, along with reference photographs of different portions of food with their respective weight, was used to assess intake. The food was purchased at different points of sale throughout Cuba for three different samples. They were prepared using the most widely used cooking techniques in the country, which consisted of baking, steaming, grilling and boiling with deionized water. The groups were formed in correspondence with the percentage of each food obtained in the 24-hour recall survey. Each food group was made up in triplicate with different brands and places of origin, and their analysis was also carried out in triplicate. The determination of minerals was carried out by mineralizing the samples and using standard AOAC procedures through Flame Atomic Absorption Spectroscopy. The daily intake of Ca (687.38 mg/day), Mg (230.53 mg/day) and P (1220.25 mg/day) in the Cuban population was quantified. The prevalence rate of adequate Ca intake was 69%, which was lower than the results obtained in Cameroon (71.6%), Italy (76%) and Spain (80%). It was found that the highest Mg intake came from non-alcoholic beverages, meats, legumes, and dairy products. The Ca/P molar ratio was 0.44, levels that are below the optimal range and which confirm the global trend.

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sciforum-102572: The Development of Nutritious Gluten-Free Composite Flour Blends for Indian Flatbread to Meet the Needs of Autistic Children in Gwalior, Madhya Pradesh, India

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Introduction: The nutritional needs of autistic children in Gwalior necessitate the development of gluten-free complementary foods. This research focuses on formulating gluten-free composite flour blends for Indian flatbread (chapatti) and on evaluating their chemical, physical, textural, and sensory properties. The aim is to create a nutritious and acceptable alternative to traditional wheat-based chapatti.

Methods: Various trials were conducted using different gluten-free flours to achieve a product similar to wheat chapatti. The optimal blends comprised *Oryza sativa* (rice), *Sorghum bicolor* (sorghum), and *Glycine max* (soybean) flours. A constant 40% rice flour percentage was maintained due to its ability to impart a white color resembling that of wheat flour chapatti. Blends P1, P2, P3, P4, and P5 were formulated with varying percentages of sorghum and soybean flours. These blends were assessed for their chemical, physical, textural, and sensory properties by the standard methods.

Results: The standard wheat flour emerged as the most acceptable, with an overall acceptability score of 9.10. Chapatti containing the P4 composite flour blend were the second choice, with a score of 7.3, while chapatti containing the P1 composite flour blend was the least acceptable, with a score of 6.3 on sensory evaluation. A significant difference ($P > 0.05$) was found between the standard wheat flour chapatti and the product made with P4 composite flour blends. Besides the sensory results, a proximate analysis also reveals that the P4 composite flour blends have high protein and ash contents. The findings highlight the importance of the chosen ratios of rice, sorghum, and soybean flours in achieving the desired qualities with nutritional benefits.

Conclusions: The developed gluten-free composite flour blends, particularly given the composite flour blends, provide a promising alternative for gluten-free chapatti that meets the dietary requirements of autistic children. These blends ensure better acceptance and adherence, contributing to the improved nutritional intake and overall well-being of the target group.

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sciforum-098004: The Effect of Adding Degreased Flax Seeds on the Quality of Pork Sausages

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Degreased flax seeds (DFSs) are a source of many nutritionally valuable ingredients, such as protein, fiber, mucous substances and lignans, which makes them a potentially attractive raw material for use in the production of various types of functional food. The aim of this study was to assess the effect of adding DFSs on the quality of homogenized pork sausages. Five product variants were produced, with different amount of DFSs added, i.e., 0, 2%, 4%, 6% and 8%. The quality of the sausages was determined based on measurements of yield of processing, water activity, pH, colour and texture parameters and basic chemical composition, and a sensory evaluation of the product. It was found that the addition of DFS in the amount of 2% had no effect on most of the analyzed quality parameters of sausages. However, a greater addition of DFSs resulted in a significant deterioration in the product quality, especially its sensory quality. With the increased addition of DFSs to the batter of sausages, an increase in the intensity of the flax seed odour and taste was observed, while the perception of the meat odour and taste decreased. A decrease in the scores awarded for the colour desirability, elasticity and juiciness of the product, as well as its overall desirability, was also noted. A large addition of DFSs also caused a significant reduction in the shear force and cohesiveness of sausages, a reduction in the brightness of their colour, a reduction in the share of red colour, an increase in the share of yellow colour and an increase in the pH value. The obtained results therefore indicate that the production of good-quality homogenized pork sausage enriched with degreased flax seeds is possible, but the addition of this nutritionally valuable ingredient to the stuffing must be small and cannot exceed 2%.

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sciforum-099841: The Impact of Chia Flour Incorporation on Wheat Dough Properties and Bread Quality

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The aim of this study was to assess the effect of different shares (0/100, 5/95, 10/90, 15/85, 20/80 and 25/75 % w/w chia/flour) of ground chia seed and chia flour (CF), a source of protein, fiber and healthy fats, on the rheological and pasting properties (Mixolab, amylograph) of blends obtained from two types (650 and 750) of wheat flour (WF). Furthermore, this study focused on the evaluation of the quality (specific volume, crumb porosity, moisture, crumb and crust color, consumer acceptance) and nutritional attributes (total protein, TDF) of wheat breads (WBs), emphasizing the utilization of two distinct dough preparation methods: single-phase (1F) and two-phase (2F). The inclusion of CF in the flour blends resulted in an increase in both the total protein content and initial gelatinization temperature. The CF addition prolonged the time of dough development while concurrently diminishing the dough's stability and susceptibility towards retrogradation of blends. Remarkably, the addition of CF resulted in an increase in bread porosity and an enhanced level of consumer acceptance. Simultaneously, it induced an augmentation in overbake, total protein, and Total Dietary Fiber (TDF) content, along with an increase in crumb moisture and an elongation of bread freshness. However, this incorporation was not without consequences, as it led to a 7% reduction in the specific volume of a loaf with 25% CF compared with a 10% CF share and introduced a discernible darkening of both the crust and crumb. Notably, the results showed that the 10/90 CF share could be considered a potentially favourable functional ingredient, promoting health benefits and improving the physical and sensory properties of wheat bread. This suggests the potential use of CF to increase the nutritional value of WB and improve its overall quality.

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sciforum-098422: The Influence of Different Polyphenols on Wheat Starch Digestibility and the Estimated Glycaemic Index

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Noncommunicable diseases (NCDs) are the leading causes of death worldwide. Diabetes is one of the top four NCDs. More than 90% of cases are type 2 diabetes. Therefore, there has been a search for new methods to reduce the glycaemic index of commonly consumed foods without undesirable changes in organoleptic properties, such as the fortification of starchy foods with pure polyphenolic compounds. The aim of this study was to evaluate the effect of polyphenols, which are commonly present in food raw materials, on the digestibility of wheat starch and its glycaemic index value. The following polyphenols were added individually to the starch: *p*-coumaric acid, *trans*-ferulic acid (from phenolic acids), hesperidin, naringenin (from flavanones), (+)-catechin, epigallocatechin gallate (from flavanols), quercetin, and kaempferol (from flavonols), at 5, 10, and 20 mg. Then, 5% starch gels were prepared to be digested in the presence of amylolytic enzymes. The amount of glucose formed by hydrolysing starch was determined spectrophotometrically. These were used to determine the contents of RDS (rapidly digestible starch), SDS (slowly digestible starch), RS (resistant starch), TS (total starch), and SDI (starch digestion index), and to estimate glycaemic index (eGI) values. Concerning RDS, TS contents, and eGI, the lowest values were obtained with the addition of 20 mg of epigallocatechin gallate (p0.05). The addition of 10 mg of kaempferol resulted in the highest SDS and RS contents, and the lowest SDI value (p0.05). In general, the addition of epigallocatechin gallate at 20 mg and kaempferol at 10 mg had the greatest effect on the digestibility and estimated glycaemic index of wheat starch.

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sciforum-103544: The potential of *Lamiaceae* plants in developing functional foods: A patent analysis for preventing and treating cardiovascular diseases

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The *Lamiaceae* family of medicinal plants holds immense promise in the development of functional foods aimed at preventing and treating cardiovascular diseases (CVDs). These plants are rich in bioactive compounds, such as phenolics and flavonoids, which serve as potent enzyme inhibitors and exhibit strong antioxidant and anti-inflammatory properties. Species like *Salvia moorcroftiana* and *Ocimum sanctum* have been extensively studied for their beneficial phenolic profiles, contributing to their cardiovascular health benefits. Furthermore, essential oils derived from *Lamiaceae* herbs have shown significant biological activities, including antihyperlipidemic, vasorelaxant, thrombolytic, and cytotoxic effects, making them valuable components in nutraceutical formulations. In this study, our patent analysis reveals a significant uptick in filings related to *Lamiaceae* plants for CVD prevention and treatment since the late 1990s, with a peak around 2010. This trend highlights a growing global interest in utilizing these plants within the nutraceutical industry. Leading the patent filings is Tianjin Tasly Pharmaceuticals Co., Ltd., reflecting the active involvement of pharmaceutical companies alongside independent researchers and organizations. Geographically, China emerges as the dominant region for patent activity, followed by the United States and Europe, indicating both strong regional interest and potential market opportunities. These findings align with critical International Patent Classification (IPC) codes, such as A61K36/53 for *Lamiaceae*, A61P9/00 for cardiovascular drugs, and A61P9/10 for treatments of ischemic or atherosclerotic diseases. This study underscores the significant impact of *Lamiaceae* plants, not only in advancing cardiovascular health but also in shaping the future of functional foods and nutraceuticals, driven by their rich bioactive profiles and therapeutic potential.

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sciforum-098795: The Potential of Olive Leaf Extract as a Functional Ingredient in Yogurts: Physicochemical, Texture, and Antioxidant Effects

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Yogurt is widely appreciated for its high nutritional value and health benefits. The recent addition of plant extracts rich in phenolic compounds and bioflavonoids has attracted considerable interest, particularly as milk and dairy products contain a low amount of these beneficial elements. Olive leaf extract (OLE) has been studied as a potential source of bioactive compounds. This study assessed the impact of incorporating OLE on the physicochemical properties, total phenol content, antioxidant activity (assessed by DPPH and ABTS methods), rheological characteristics and color of yogurts made from cow's, sheep's, and goat's milk. The milk was enriched with OLE at concentrations of 0.5%, 1%, 1.5% and 2% (v/v) and analyzed after complete coagulation.

The results showed a decrease in pH and an increase in acidity during storage, with the buffering effect of OLE attenuating these variations. OLE-enriched yogurts had a higher total phenol content and increased antioxidant activity. In addition, the water holding capacity (WHC) of the yogurts increased with the addition of OLE, probably due to interactions between yogurt proteins and polyphenols, resulting in a reduction in syneresis. Color analysis revealed that OLE reduced brightness (L* values) and shifted in hue towards red (positive a* values) and yellow (positive b* values). The texture profile showed that higher levels of supplementation increased the firmness of cow's milk while reducing it for other types of milk. These results highlight the potential of OLE as a functional ingredient to improve the nutritional and health benefits of dairy products. Considering all the results and previous work, the addition of 1.5% OLE proved to be optimal. To confirm this conclusion, sensory analyses should be carried out.

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sciforum-103434: The propolis effects in depression and anxiety, from mechanisms to practical applications

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Introduction. Propolis is a resinous substance collected by bees from different plants and is widely used in health care and pharmaceutical products.

Method. The paper has the structure of a review and includes subchapters related to the propolis composition, and to the mechanisms of action on oxidative stress, psychological stress, depression and anxiety.

Results. Propolis contains more than 200 natural constituents including polyphenols, phenolic aldehydes, sequiterpene-quinones, coumarins, amino acids, fatty acids, steroids and inorganic compounds. Pharmacological effects of propolis have been attributed to the presence of flavonoids, phenolic acids, ester derivatives and terpenes. These constituents have a wide range of pharmacological properties and are important ingredients of traditional dietary supplements. This way, propolis has antimicrobial, antioxidant, anti-inflammatory and neuroprotective activities, improves cognitive decline, learning ability and memory. Propolis also has antistress, antidepressant and anxiolytic effects by antagonizing the hyperfunction of the hypothalamic-pituitary-adrenal axis and reducing glucocorticoid hormones and cortisol. Thus, propolis might be useful in behavioral disorders associated with anxiety and depression. For example, chrysin, a natural flavonoid found in propolis, can alleviate depressive behavior, being useful as an additional treatment of depression.

Conclusions. Propolis, through its constituents and under its various forms of use, has important neurological protection, antioxidant, antidepressant and anxiolytic effects.

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sciforum-091135: Therapies Using Herbal and Medicinal Plants as an Alternative Treatment for Cancer

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Cancer is considered as the second noticeable cause of death worldwide, and it is an important health problem. Traditional medicine, such as Iranian traditional medicinal science and traditional Chinese medicine, is considered a treasure trove in the quest for human well-being and has become increasingly popular in recent years for the treatment of patients with cancer in various parts of the world. Unlike chemical medicines, traditional medicinal plants and herbs have a slow impact, but they play a significant role for different targets, and have notable therapeutic effects from various links. This literature review was carried out in different databases such as Google Scholar, MEDLINE, PubMed Central, and Science Direct. The application of medicinal plants and herbs in different parts of Asia, especially China and Iran, has a long history. The most important medicinal plants for the prevention and treatment of cancers in traditional Persian medicinal science are *Curcuma longa*, *Autumn Crocus*, *Nigella sativa*, *Allium cepa*, *Ammi majus*, *Glycyrrhiza glabra*, *Avicennia marina*, *Astrodaucus orientalis*, *Myrtus communis*, and *Lepidium sativum*. Traditional Chinese herbs such as *Panax ginseng*, *Ganoderma lucidum*, *Coriolus versicolor*, *Astragalus membranaceus*, and *Grifola frondosa* contain glycoproteins and polysaccharides, and different mushrooms can regulate the metastatic potential and the innate immune system. Moreover, phytochemical components such as physcione, βsitosterol, bergapten, stigmasterol, 2-oxo-3-propyl-2H-chromene-7-carboxylic acid, 3-ethyl-7-hydroxy-2H-chromen-2-one, and graveolone from the roots of *Anethum sowa* L. have anti-cancer activities. Other secondary metabolites such as carotenoids, flavonoids, and alkaloids have anti-cancer characteristics.

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sciforum-104456: Ultrasound-Assisted Extraction and Alginate Encapsulation of Polyphenols from Hogplum Peels: Impact on Sensory Properties and Functional Groups of Maize Gruel (*Ogi*)

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Introduction:

Food waste, especially peels, presents environmental challenges, but its valorisation can mitigate its negative impacts. *Hogplum* (*Spondias mombin*) fruit peels, rich in phenolic compounds, may offer significant health benefits. This study aims to extract, encapsulate and characterise the phenolic compounds from *Hogplum* peels and evaluate their inclusion in a food matrix.

Methods:

Hogplum peels were dried (45℃, 4 h), milled into powder, and extracted with methanol in three batches: 1:10 w/v (Batch 1), 1:20 w/v (Batch 2), and ultrasound-assisted 1:20 w/v (Batch 3). Extracts were concentrated and encapsulated in 3% w/v alginate and extruded into 0.1 M $CaCl_2$ to form polyphenol microcapsules. The encapsulated and unencapsulated extracts were assessed for total phenolic content (TPC) and antioxidant activity [(DPPH radical scavenging and Ferric Reducing Antioxidant Power (FRAP)]. The microcapsules were evaluated for thermal stability by measuring TPC after heating in water (70℃, 3 h) and were then included in maize gruel (*Ogi,* a food matrix). The sensory attributes and functional groups (Fourier Transform Infrared Spectroscopy) of *Ogi* with and without the microcapsules were evaluated. Data were analysed using ANOVA (p0.05).

Results:

Unencapsulated extracts had significantly lower TPC (0.32–0.41 mg GAE/g), DPPH (18.75–20.06%), and FRAP (0.64–0.95%) compared to encapsulated ones (TPC: 0.98–1.89 mg GAE/g; DPPH: 52.44–92.05%; FRAP: 0.70–0.95%). Encapsulation enhanced TPC by 188-331%, though thermal stability decreased after 1 hour; ultrasound-assisted microcapsules showed superior stability over 2 hours. Ogi with microcapsules had higher sensory acceptability and improved functional groups compared to the control.

Conclusions:

Hogplum peels have high anthocyanin and phenolic content with significant antioxidant properties, and contain health-promoting compounds. Alginate encapsulation improved the thermal stability, functional groups, and sensory properties of *Ogi*. Incorporating these phenolic microcapsules into gruels such as *Ogi* suggests the potential for enhancing food matrices with health-promoting compounds.

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sciforum-100900: Valorization of apple bagasse using sustainable technologies and encapsulation

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Introduction: The apple juice industry worldwide generates millions of tons of bagasse as a by-product. The valorization of bagasse as a source of extract rich in phenolic compounds (TPCs) with antioxidant and anti-inflammatory properties has been studied using sustainable technologies such as ultrasound-assisted extraction (UAE), high-pressure processing (HPP), and encapsulation for their protection. TPC encapsulation could be used for food functionalization.

Methodology: HPP-treated (200-400 MPa/25°C/5 min) dried bagasse (6 g) of Granny Smith (BGS) (3.19 mg gallic acid equivalents (GAEs)) and Golden Delicious (BGD) apples (2.9 mg GAEs) were extracted using UAE (amplitude = 42μm/20min; EtOH/H_2O, 50:50) and the extracts were encapsulated by lyophilization with 200 ml of an 8% solution of maltodextrin (MD), gum Arabic (GA), or a mix of MD–GA (1:1.5). The yield (%), efficiency (% TPC inside compared to the total in the capsules), and efficacy (% TPC encapsulated compared to the total in the initial solution) of the encapsulation process were evaluated. In addition, the moisture content, hygroscopicity of the capsules, and the release of TPC during gastrointestinal digestion (GID) were determined.

Results: The yield of the encapsulation was a bit higher in BGD-encapsulated (99%) than in BGS-encapsulated (96%) samples. The humidity was similar in all the encapsulated samples (9-10%). GA-encapsulated samples (BGS = 34% and BGD = 39%) showed a higher hygroscopicity than MD- and MD–GA-encapsulated samples(~30%). The efficiency was higher in GA-encapsulated (~84%) than in MD–GA- (~70%) and MD-encapsulated samples (~23%). The maximum efficacy was found in GA-encapsulated samples (85% = BGS; 53% = BGD) compared to MD–GA-encapsulated (66%-BGS, 36%-BGD) and MD-encapsulated sampkes (127% = BGS; 6% = BGD). The highest TPC bioaccessibility was found in MD-encapsulated samples (BGS = 17% and BGD = 29%).

Conclusions: Very high lyophilization encapsulation yields were found with the three encapsulation materials (MD, GA, and MD–GA) and with the bagasse of two apples. The highest efficiency and effectiveness were achieved with Granny Smith bagasse and gum Arabic. The characteristics of the encapsulated bagasse phenolic extracts depended on the apple variety and the encapsulation material.

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sciforum-098885: Valorization of fennel leaves as a source of bioactive compounds: effects of dehydration on their nutritional and functional properties

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The fruit and vegetable food industries face a major problem: the generation of large amounts of waste, which can translate into a high amount of food by-products. Fennel is a very aromatic plant which has a characteristic anise flavor. Fennel leaves are rich in bioactive compounds such as phenolic acids, tocopherols, flavonoids and chlorophyll. The aims of this investigation were to study the effect of convective dehydration (50, 60 and 70°C) on total phenolic (Folin–Ciocalteu), flavonoid and chlorophyll contents (spectrophotometric methods). Further aims were to assess the drying kinetics of fennel leaves by mathematical modelling and to determine their functional properties (antioxidant and antidiabetic capacity) related to the aforementioned bioactive compounds in order to add value to and revalorize fennel leaves as natural sources of functional ingredients. As expected, the drying time required to reach a similar moisture content (15%) decreased as the drying temperature increased. In particular, the Midilli–Kucuk model provided an excellent fit to all the experimental drying curves. Drying temperature had a significant effect on phenol and flavonoid contents. The chlorophyll content in dried samples increased compared to the control, but as the drying temperature increased, the chlorophyll content decreased. Antioxidant capacity decreased with drying temperature, but at 70°C, it remained higher than at 50 and 60°C. The results of this investigation indicated that the extract with the highest antioxidant activity also showed the highest α-glucosidase inhibitory activity, meaning that antioxidant activity could influence the antidiabetic behavior of the extracts exerted by the bioactive compounds. In conclusion, the leaves of fennel, which are discarded nowadays, can be an excellent source of bioactive compounds that could be applied as ingredients in the design of new functional and healthy food products.

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sciforum-099870: Valuing endogenous and thermal resources in the production of healthy food: chestnut by-product flour with thermal water

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With the aim of enriching and innovating regional tourism and promoting new offerings based on two aspects that characterise the regions of Trás-os-Montes and Galicia, endogenous resources and thermal springs, this research has been launched, creating synergy between these two potentialities. Its main objective is to evaluate the contribution of incorporating thermal waters into the sustainable production of chestnut flour using chestnut by-products, shells and hedgehogs. This study involves obtaining more specific and concrete answers, such as demonstrating the viability of using chestnut by-products, shells and hedgehogs, in the production of chestnut flour. It is imperative to verify whether the introduction of chestnut by-products adds value to the nutritional characterisation of the product to be developed. The other variable under study is the introduction of thermal waters during the processing of the chestnut flour. These waters come from the thermal springs of Chaves, Portugal, and Ourense, Spain. Various chestnut formulations will be created with the different waters and by-products from the regions mentioned and then evaluated in terms of the chestnut flour's organoleptic, physical, chemical, and nutritional characteristics, as well as the effect of its consumption on human health. Once the most suitable formulation of sustainable chestnut flour with thermal water has been obtained, gastronomic experiments will be carried out with this new product to assess its degree of acceptance by consumers.

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sciforum-096384: Vitamin B contents of widely cultivating new improved rice (*Oryza sativa* L.) varieties of Sri Lanka

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Rice is a good source of vitamin B, which is important for human nutrition and health. In Sri Lanka, rice is the dietary staple and new improved rice varieties (NIRVs) account for more than 90% of rice cultivation in Sri Lanka. However, extremely limited studies are available on the vitamin B contents of NIRVs of Sri Lanka. This study evaluated the vitamin B contents of 16 widely cultivating NIRVs in Sri Lanka. The selected rice varieties (RVs) for the present study were Bg 300, Bg 352, Bg 358, Bg 360, Bg 366, Bg 379-2, Bg 403, Bg 450, Bg 94-1, Bw 272-6b, Bw 367, At 307, At 308, At 309, At 311 and At 362. Vitamin B was extracted from whole-grain rice flour in 0.1N HCL (n=3 each) and analyzed using High-Performance Liquid Chromatography coupled with a Diode-Array Detector (HPLC-DAD). The rResults clearly showed that vitamin B contents significantly (p0.05) varied among the studied RVs. The vitamin B_1, B_2, B_3, B_5, B_6, B_7 and B_9 contents of the tested RVs ranged from 4.3 to 31.9, 0.7 to 4.3, 15.1 to 82.9, 11.1 to 82.5, 5.7 to 13.8, 1.6 to 72.5 and 0.5 to 3.3 µg/g, respectively. The studied RVs contained more of vitamins B_1, B_3, B_5 and B_7 among the B-complex. Among the studied RVs, vitamin B_1 was significantly high in a red RV, At 311, while white RVs, namely Bg 300, Bg 352 and Bg 450, were significantly high in vitamin B_3. Interestingly, both highest vitamin B_2 and B_7 contents were also observed in Bg 300 RV while a red RV, Bw 272-6b, showed the highest vitamin B_5 content. Vitamin B_9 was only detected in the At 311, Bg 94-1, At 308, Bg 300, At 362, At 309, Bw 272-6b, Bg 450 and Bg 352 RVs and it was high in the Bg 300, Bg 352 and Bw 272-6b RVs. In conclusion, the studied NIRVs of Sri Lanka contained more of vitamin B_1, B_3, B_5 and B7 and the contents varied among the studied RVs.

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sciforum-103139: White wine pomace mitigates hypoxia in 3D SH-SY5Y model

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Hypoxia-induced reactive oxygen species (ROS) contribute to neuronal death and are a major factor in various neurodegenerative diseases. Currently, there is a need for the development of effective strategies for the control of these diseases. The application of food by-products with antioxidant properties, such as white pomace products (wWPPs), is valuable as it not only allows their revalorization but also shows potential for disease prevention.

The objective of this study was to evaluate the neuroprotective effect of bioaccessible wWPPs against hypoxia in SH-SY5Y human neuroblastoma cell line (ATCC-CRL2266™). Previous research demonstrated a positive effect in 2D in vitro models but did not explore 3D models. As a key innovation in this study, a 3D spheroid model was used, as it more closely mimics in vivo conditions. The cells were treated with 1.5 μg GAE/mL of bioaccessible wWPP and then subjected to hypoxia induced by $CoCl_2$. Cell viability, ROS levels, and gene expression were evaluated.

Hypoxia significantly increased hypoxia-inducible factor (HIF1) gene expression, cell death, and ROS levels, while the pretreatment with bioaccessible wWPP mitigated these effects. Hypoxia also altered the mRNA expression of nuclear factor-like 2 (Nrf2), nuclear factor κB (NF-kB), and Nrf2 inhibitor (Keap1), resulting in increased NF-kB and Keap1 expression and decreased Nrf2 levels. Bioaccessible wWPP fractions were able to reverse these changes, regulating the mRNA expression to control levels and upregulating antioxidant enzymes like superoxide dismutase 2.

In conclusion, bioaccessible wWPPs showed significant potential in mitigating hypoxia effects in a 3D SH-SY5Y model. These results suggest a potential neuroprotective effect of wine pomace and highlight the relevance of using natural products from the food industry in disease prevention. However, in vivo studies are necessary to better understand the potential use of these food by-products as functional foods.

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sciforum-098264: WPC-80 hydrolysates as a promising functional ingredient for diabetes control via DPP-IV inhibition

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Nowadays, type 2 diabetes has become a pathology with a high incidence worldwide, causing 4.2 million deaths, especially in middle-income countries. As the dairy industry grows yearly, an alternative way to mitigate whey contamination is to produce whey protein concentrates or whey hydrolysates, which are an adequate source of bioactive compounds and contain better-digestible proteins. Thus, this work tested the in vitro anti-diabetic capacity, achieved via DPP-IV enzyme inhibition, of WPC-80 hydrolysates obtained with alcalase and flavourzyme. WPC-80 powder was dispersed at 10% (w/v) in sterile phosphate buffer (0.01 M, pH=7.5). Then, the dispersion was heated at 90°C for 10 min. Enzymatic hydrolysis was performed by enzyme addition at a 100:2.5 mass ratio (soluble protein: enzyme), and the reaction proceeded for 6 h at 60°C and 130 rpm. Hydrolysis was stopped by boiling water treatment for 10 min, and samples were centrifugated at 10,000 rpm and 4°C for 10 min. Supernatants were used for hydrolysis degree determination and for the DPP-IV inhibition test using spectrophotometric methods. Free amino group concentration was slightly superior with alcalase, rising from 1198.04±24.21 to 2283.26±96.07 mg/L from 0 to 6 h, while in flavourzyme hydrolysis, it was 735.00±0.00 at 0 h and 1585.44±110.68 mg/L at 6 h. According to statistical analysis, both systems showed the same anti-diabetic capacity at the beginning of the hydrolysis, which was 22.03±1.92% for alcalase and 27.75±1.85% for flavourzyme. At the end of hydrolysis, alcalase exhibited slightly better DPP-IV inhibition, at 52.14±0.78%, compared to flavourzyme, at 43.26±1.42%. In conclusion, both WPC-80 hydrolysates showed a high potential to be incorporated into novel functional food formulations. However, sensory testing of those formulations must be performed to evaluate consumer acceptance.

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Session 3. Sustainable Food Security and Food System

sciforum-098816: Process of Obtaining an Antioxidant Ingredient from Red Grape Pomace var. Tempranillo and Its Application in Fresh and Dry-Cured Meat Products

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The wine industry is one of the agri-food sectors that generates the most by-products. Pomace, which consists of seeds, skins, stems, and pulp remaining after grape pressing operations, is the most abundant by-product of this industry. Red grape pomace var. Tempranillo was valorized by the application of high hydrostatic pressure, and the effect of the obtained ingredient was evaluated in meat products. A soft thermal treatment prior to high-hydrostatic-pressure treatment was applied to obtain an ingredient rich in phenolic compounds with antioxidant activity from red grape pomace. These processes resulted in a reduction in microbial loads and a decrease in the activity of the polyphenol oxidase enzyme in the pomace, thus yielding a safe product while preserving the phenolic compounds. The antioxidant activity was also well maintained in the valorized ingredient. This valorization process avoids the use of solvents to extract bioactive compounds and allows the entire by-product to be used in meat products, generating no waste. The application of this bioactive ingredient from red grape pomace was evaluated in fresh meat products (hamburgers) and dry-cured meat products (cured sausages) at levels of 0.5% and 1% (w/w). The effect was compared with a control batch (without the ingredient) and another batch manufactured with synthetic additives (metabisulfite for hamburgers and nitrites for sausages). An antioxidant effect was observed in both meat products, as the lowest levels of lipid oxidation were found in the batches containing the pomace ingredient. Therefore, incorporating the bioactive ingredient from red grape pomace into meat products could serve as a natural antioxidant and improve the shelf life of both fresh and dry-cured meat products.

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sciforum-*087120: Trichoderma* inoculum as growth and nutrition enhancer for neglected *Nigella sativa* L. crop

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Nigella sativa L. seeds play a pivotal role in both the spice industry, enhancing global flavors, and in traditional medicine. This study aims to enhance the quality and yield of *Nigella sativa* L. in Pakistan, aligning with SDG3 (good health and wellbeing) by exploring the use of chemical and biofertilizers. *Nigella sativa* L. (Ranunculaceae) is utilized as a therapeutic plant globally, but its production in Pakistan is unsatisfactory. The hypothesis tested the potential of *Trichoderma* strains (*Trichoderma harzianum, T. hamatum, T. viride*) to boost *Nigella sativa g*rowth and nutrition. The most promising results came from the combination of *T. viride* and *T. harzianum*, which improved plant growth, morphological traits, and yield in comparison to either strain alone or chemical fertilizers. The *Trichoderma* combination indicated the existence of more maximum phytochemicals like alkaloids, flavonoids, tannins, saponins, and steroids in qualitative assay than the control. In antioxidant assays, a higher concentration of phenolic compounds was found in petroleum ether extract. Higher levels of radical scavenging were noted in methanol extracts. Significant levels of moisture, ash, proteins, lipids, and carbohydrates were revealed by statistical nutrition analysis, confirming the use of *Trichoderma* in combination for evident plant growth and pathogen protection and nutrition.

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sciforum-106973: Case Studies of Small-Medium Enterprises Around the World: Major Constraints and Benefits from the Implementation of Food Safety Management Systems

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The study investigates the diverse specific challenges and advantages faced by small to medium food enterprises in various geographic regions in implementing Food Safety Management Systems (FSMS) like Hazard Analysis and Critical Control Points (HACCP). Global food safety and security are key principles to be followed in the context of the implementation of food safety management systems. The objective of this paper is to assess the contemporary developments of Food Safety Management System standards (FSMS) worldwide and to identify the primary constraints and advantages associated with their implementation by small and medium-sized enterprises across different regions. The effectiveness of these systems has also been evaluated. 116 case studies have been employed across developing and developed regions worldwide across 27 primary food sectors. After the implementation of FSMS, there was a significant increase in the percentage of companies that have implemented the international FSMS, both in developed (16.7% to 63.9%) and developing countries (26.6% to 48.1%). Certification has also increased from 34.2% to 59.6% in the total sample, namely from 33.3% to 61.1% in developed countries and from 34.6% to 59.0% in developing countries. There was a significant increase in medium vs. small company size (57.1% to 62.3%, $p = 0.046$), only in developing countries. Food safety culture and manager leadership implementation increased to over 80% after FSMS implementation in both developed and developing countries (p 0.001). Training, resources, and technology adequacy were also increased in all companies (p 0.001).

Keywords: food safety management system (FSMS); Good Manufacturing Best Practices; prerequisite programs (PRPs); HACCP; systems thinking; food safety culture; food security; developing countries; developed countries

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sciforum-093412: Enhancing Eco-Efficiency in Northern Spain's Fishing Sector: Integrating the water–energy–food nexus and DEA+LCA methodology

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The fishing sector constitutes an important source within the economy of northern Spain, primarily due to its extensive coastline and the multitude of fishing ports. However, fishing activities entail various direct environmental impacts, as well as indirect and off-site effects. In this context, various research studies have focused on the application of the five-step Life Cycle Assessment (LCA) and Data Envelopment Analysis (DEA) methodologies in fishing systems. However, all of them have used environmental indicators that focus on individual environmental issues, hindering the goal of achieving integrated resource management. Therefore, in this study, the water–energy–food (WEF) nexus is employed as an integrative perspective that considers the synergies and trade-offs between water demand, energy requirements, and carbon footprint.

The main objective of this study is to evaluate the operational efficiency and environmental impacts of Cantabrian fishing fleets. To this end, the combined use of LCA and DEA, along with the WEF nexus, was applied to the Cantabrian purse seine fleet to understand the eco-efficiency and potential environmental benefits of operating at higher levels of efficiency within this fleet.

The average efficiency of the fleet was above 60%; inefficient units demonstrated a greater potential to reduce their environmental impacts (up to 65%) by operating according to efficiency projections. Furthermore, the results revealed a strong dependence of environmental impacts on one of the operational inputs (i.e., fuel consumption). These findings highlight the significance of embracing holistic approaches that combine technical, economic, and social factors to achieve a sustainable balance in fisheries systems. In this regard, the five-step LCA+DEA method applied in conjunction with the WEF nexus emerges as a suitable tool for measuring operational and environmental objectives.

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sciforum-103050: Evaluating the potential of using plant-based milk alternatives in cake production: A review

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In recent years, the demand for alternatives to cow's milk has been increasing. There are several reasons behind this demand, mainly comprised of consumers' health problems, concerns related to hormone and antibiotic usage in cattle, different dietary preferences, awareness about animal welfare, and some potential environmental advantages. In this regard, the market size of plant-based milk alternatives (PBMAs), which are obtained from cereals, pseudocereals, legumes, nuts, and seeds, is increasing. However, there are very limited studies in the literature regarding the utilization of PBMAs in cake production. The most commonly used PBMAs in cakes are generally soy- and coconut-based, aiming for partial (typically 25, 50, and 75%) and/or total replacement of not only cow's milk but also, eggs, and fat.

From a nutritional point of view, the cakes made with soy milk had significantly higher protein content, but the fat content was significantly higher in cakes including coconut milk because of its higher saturated fat content, consisting of medium-chain triglycerides such as lauric acid. Regarding cake batter characteristics, while the viscosity values were higher when cows' milk was replaced with soy milk, the lower values were determined when using soy milk as an egg replacer. From the point of view of the technological features, there was an increase in hardness values as a textural parameter in the case of utilizing PBMAs for different purposes. Although there are some promising results regarding sensory properties, the overall quality generally decreased in cakes composed of PBMAs instead of eggs.

Although the potential of using lupin and oat milk was also evaluated by researchers in cake production, there is still either limited or no information about the influence of different PBMAs on the nutritional value and technological properties of cakes and gluten-free cakes.

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sciforum-091645: Fermentation-based extraction of polyphenolic bioactive compounds from *Larrea tridentata* using the fungal strain *Trichoderma asperellum*

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Introduction: Postharvest fruit losses are substantial due to phytopathogenic fungal infections, which can lead to fruit decay and a reduction in quality and commercial value. Common culprits include fungi such as *Alternaria*, *Aspergillus*, and *Botrytis*, which result in significant economic losses in the fruit industry. To mitigate these losses, it is imperative to study the molecular and metabolic processes involved in fungal infections and to develop effective disease control strategies. Plants produce bioactive metabolites that are considered safe, effective, and ecologically beneficial and serve as botanical fungicides against phytopathogenic fungi.

Methods: Pulverized air-dried leaves and stems of *Larrea tridentata* were subjected to fermentative extraction processes involving the use of the filamentous fungus *Trichoderma asperellum* for 120 h in both the solid and liquid states. The extracts (1 %) were then analyzed in terms of their polyphenolic constituents using Folin–Ciocalteu reagent and HCl butanol, and they were further assayed in vitro against *Fusarium oxysporum* and *Alternaria alternata* using plate-poisoning methods. Their phytoconstituents were quantitatively screened using RP-HPLC-ESI-MS. The antioxidant potential of the extracts was also tested using the FRAP, ABTS, and DPPH assays.

Results: The findings indicated that the solid-state fermentation of *L. tridentata* leaf extract meant that at 72 h, it contained hydrolyzable tannins (3.16 mg/g). Conversely, the liquid-state *L. tridentata* leaf extract exhibited the highest level of condensed tannins (3.29 mg/g) at 120 h. The liquid-state *L. tridentata* leaf extract at 120 h inhibited the growth of *A. alternata* by 62.6%, whereas the liquid-state *L. tridentata* stem extract inhibited the growth of *F. oxysporum* by 56.7%. All the extracts displayed significant antioxidant potential in the ABTS, DPPH, and FRAP assays. Eight major polyphenolic compounds were identified: quercetin, luteolin, 3,4-DHPEA, elenolic acid, NDGA, 5-Heptadecylresorcinol, 3,7-Dimethylquercetin, and kaempferide.

Conclusion: The *L. tridentata* leaf extracts exhibited strong fungistatic effects against phytopathogenic fungi, demonstrating their potential as bioactive ingredients in biopesticide formulations.

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sciforum-099050: Harnessing Food Waste Derived from Kitchen Households for Sustainable Agriculture: A Study on Soil and Plant Nutrient Enhancement

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Growing populations necessitate sustainable agricultural practices that increase crop yields, soil health, and food protection. This study examines how kitchen waste compost (KWC), vermicompost, and chemical fertilisers affect red radish growth and soil nitrogen and mineral content. It evaluates soil pH, electrical conductivity, and plant and soil micronutrients and minerals using inductively coupled plasma optical emission spectrometry (ICP-OES) in a systematic experimental approach. C, N, P, K, Al, As, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Na, Ni, Pb, S, Sr, V, and Zn are examined. These results show considerable nutritional and mineral variations between soil and plant samples. For instance, 10% vegetable waste had the highest soil mean carbon content, while 10% mixed meat waste had the highest root carbon percentage. Additionally, 10% mixed fruits and vegetables and vegetable waste increased shoot and shoot+root carbon. Soil with 50% mixed carbohydrate had the most nitrogen, while that with 10% yielded the most root nitrogen. Shoot nitrogen was highest at 10% of vegetable and fruit waste, and shoot+root nitrogen was highest in vegetable compost. Among the phosphorus sources, 25% meat compost had the highest soil content, 10% mixed carbohydrate was best for roots, and chemical fertilisers were best for shoots. Shoot+root phosphorus was highest in 50% meat compost. For potassium, 50% meat compost was greatest in soil, 10% fruit compost in roots, 10% in shoots, and 25% in shoot+root potassium. This study shows that kitchen waste compost improves plant and soil quality, making it a sustainable and eco-friendly alternative to chemical fertilisers. The findings suggest using food waste as a resource in agricultural systems and choosing optimal fertilisers and concentrations to boost productivity and sustainability.

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sciforum-102678: Plate Waste Study from “Daily Meal Plate” in Restaurants

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Food waste is a global issue, since one-third of food produced for human consumption is being wasted. The United Nations has established a goal to reduce food losses by 50% by 2030. The food service sector is the third largest contributor to food waste. Plate waste is significant for reduction efforts, as it is largely considered avoidable. Minimizing plate waste can decrease overall food waste, providing environmental and economic benefits.

This study was conducted in Northern Portugal over a period of 1 month and 2 weeks, with data collected over 2 weeks (10 days) in each of the three restaurants (n=3) during lunch periods. The focus was on "daily" meals, which are affordable weekday lunchtime meals varying daily, with both meat and fish options. In total, waste from 152 meals (76 meat, 76 fish) in restaurant 1, 175 meals (99 meat, 76 fish) in restaurant 2, and 244 meals (189 meat, 55 fish) in restaurant 3 was assessed. Portion servings and plate waste were measured using a Baxtran® scale with a 3 kg capacity. Each day began with noting the menu and preparing for waste evaluation. Plate waste was categorized into protein-based, carbohydrate-based, and vegetable-based waste, then weighed and recorded at the end of the day. Non-consumable leftovers such as bones and peels were excluded from the measurements.

This preliminary study revealed that, despite serving portions being 43% smaller than those in other studies, the plate waste remained similar. This indicates a higher relative plate waste in comparison to the initial portion size. Carbohydrate-based foods were the most wasted, with 19.1% of these foods left uneaten. Additionally, some meals were less favored by customers, leading to higher plate waste (e.g., 32% waste on Monday), highlighting the need to re-evaluate the menu. This study also identified challenges, notably the restaurant staff's reluctance to accommodate external researchers. This highlights the need for greater awareness of the economic benefits of reducing waste and improving customer satisfaction.

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sciforum-093410: SMART-FOODPRINT PROJECT: Advancing Traceability and Sustainability in Spanish Food Supply Chains

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In the contemporary food industry, the importance of traceability and food supply chain management are widely recognized for their critical roles in safeguarding food safety, ensuring quality standards, and enhancing transparency throughout the production and distribution processes. However, environmental problems have been tackled in isolation, considering the production on the one hand, and the consumption of products on the other. Therefore, most advanced management models are changing towards integrated approaches that allow for the establishment of relationships between production and consumption, as well as environmental and quality aspects. Furthermore, in response to the lack of transparency in the food supply chain, there is a need for the establishment of a science-based food traceability system, utilizing improved methods for authenticity testing.

In this context, the SMART-FOODPRINT project aims to develop a user-friendly and high-quality traceability system to enhance transparency within the food industry. SMART-FOODPRINT comprises seven work packages (WPs). The first two WPs are designed to ensure the feasibility and success of the project. Regarding the technical work, WP3 addresses the analytical techniques and procedures for evaluating food traceability. Subsequently, WP4 focuses on environmental assessment, WP5 is oriented towards the creation of the ECO- SMART-FOODPRINT application, and WP6 aims to integrate an ecological labeling certification system. Finally, WP7 represents the case studies in which the application will be tested.

The expected results for the first period of the project include the design of a reliable analytical infrastructure and the formulation of the corresponding life cycle model. Regarding the first objective, we will start with the compilation of a DNA barcode library for fish authentication and the development of an NIR Standard Operating Procedure to determine information about seafood products. Subsequently, to verify the environmental aspects, Life Cycle Assessment (LCA) methodology will be applied to calculate the impact of food fraud along this chain.

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sciforum-098075: Study on the effect of flavonoids on the formation of polycyclic aromatic hydrocarbons in barbecued food and its mechanism

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Polycyclic Aromatic Hydrocarbons (PAHs) are significant carcinogens in food processing, with long-term ingestion posing potential health risks. This study analyzed and quantified 16 PAHs prioritized for control in the European Union using gas chromatography–mass spectrometry (GC-MS/MS). The inhibitory effects of four flavonoids (chrysin, apigenin, luteolin, and baicalin) on PAH formation were investigated in a simulated glucose chemical model system and in a barbecue. The flavonoids differ in the number and position of their hydroxyl groups.

The results indicated varying inhibitory effects of flavonoids on PAH formation in both systems. In the glucose model system, the inhibitory effects were ranked as follows: baicalin (43%) > luteolin (36%) > apigenin (23%) > chrysin (17%). A positive correlation was observed between the inhibitory effects and the DPPH free radical scavenging activity of the flavonoids. In the barbecue, the order of inhibitory effects was different: apigenin (46%) > luteolin (40%) > baicalin (33%) > chrysin (30%). This discrepancy may be attributed to the complex matrix and steric hindrance in the barbecue.

In summary, the study demonstrates that while flavonoids can inhibit PAH formation, their effectiveness varies between chemical model systems and barbecues, likely due to differences in matrix complexity and molecular interactions. In addition, in the chemical models, we found that naphthalene, as a class 2 B carcinogen, was the most easily formed and its content was the highest, which needs to attract more attention.

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sciforum-099115: A Sustainable Approach to Food Waste Management: Optimizing Mycoprotein Production from Immature Rice Kernels Using *Neurospora crassa*

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The issue of food sustainability and waste management has become a pressing global concern (FAO, 2024). Agricultural by-products account for a sizable portion of this waste, highlighting the need to develop efficient methods to utilize these materials (FAO, 2013). Mycoprotein, a fungal biomass rich in protein and fibre that can be used for human and animal consumption, is a promising approach to convert agricultural waste into valuable food ingredients in a sustainable manner (Finnigan et al., 2019). In this study, the primary objective is to investigate the bioprocessing of mycoproteins using *Neurospora crassa*, with immature rice kernels serving as a carbohydrate source. By optimizing bioprocess conditions such as air flow, agitation, substrate pretreatment, and concentration, we aim to bridge the gap between food shortages and sustainability.

To achieve this, the immature rice kernels were milled to a fine consistency and subjected to specific enzymatic pretreatments while monitoring the release of fermentable sugars through liquefaction and saccharification (Gohel et al., 2021; Chu-ký et al., 2015). The pretreated rice substrate was evaluated for its suitability as a carbon source to support growth and mycoprotein production by *N. crassa* using agitated flask and stirred tank fermentation. The biomass production yield was monitored by gravimetry (Chrastina et al., 2015), and mycoprotein quality was monitored by electrophoresis (SDS-PAGE) (Montowska, 2007).

In conclusion, our research underscores the importance of integrating formulated enzymatic methods for the breakdown of agricultural by-products. Preliminary studies suggest that the mycoprotein biomass yield is expected to be 0.46 g/g of sugar substrate, with a protein content of 11.25 g/100 g of mycoprotein (Gombert, 2015; Khan et al., 2023). Future research will focus on developing complex structured food products while scaling up this process.

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sciforum-102011: A systematic review of the factors influencing the co-occurrence of wasting, stunting, and underweight in children under five who suffer from severe acute malnutrition in low- and middle-income countries

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Background: Concurrent wasting and stunting (WaSt) is a serious form of malnutrition among >5 children. Even though there is ample evidence that wasting and stunting have comparable causal pathways, there is still a dearth of information regarding WaSt correlates in middle-income countries. This rapid review aims to educate governments, policymakers, and service providers about the factors that concurrently affect stunting, wasting, and underweight in children under five suffering from severe acute malnutrition. The data sources served for this review were MEDLINE, including PubMed and Ovid, Embase, Central via Cochrane Library, Scopus, and Google Scholar.

Results: These results indicate that malnutrition is still a major public health problem among children under 5 years old. The factors that are commonly associated with stunting, wasting, and underweight are the child's age, anemia level, birth order or type, family structure, large family size, prematurity, being born to a malnourished mother, and being male boys. According to our review, boys are more likely than girls to suffer from undernutrition in children under the age of five, while the extent of these disparities varies and is more noticeable in certain situations than others. Cough was also linked to underweight, wasting, and WaSt. Moreover, wasting was substantially correlated with maternal age, occupation, and being a child from a poor family. In conclusion, malnutrition is still a major public health problem among children under 5 years old. Significantly, those children are suffering from severe, lifelong physical and mental impairment, which could lower their IQ scores and eventual earning potential.

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sciforum-099818: An Exploration of Nutrition Sustainability for Individual and Global Health

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The concept of nutrition sustainability emerges as a foundation for fostering both global and human balance at a time when the connection between one's health and the health of the globe is more interconnected than ever. This article highlights the substantial impact that the foods we consume have on the environment, while delving into the intricate relationship between our dietary habits and our physical wellness. At its core, nutrition sustainability advocates for a purposeful eating pattern that transcends personal health constraints. It encourages people to consider the potential wider environmental effects of their dietary choices. The article deals with the concern of the global waste of food, and demonstrates the process of composting, the cautious scheduling of meals, and supporting initiatives that minimize food waste to minimize the release of methane from landfills. It also stresses the value of using natural sources and renewable methods for farming. As our dietary habits have an important effect on environmental impacts, the article advocates a shift to diets composed of plants, stressing the sustainable cultivation of several kinds of cultivars that promote biological diversity and lessen the strain on the Earth's resources. The current study uses a technique that consists of an extensive review of the literature and an unbiased assessment of the studies carried out in the field of sustainable growth. It further seeks to pinpoint patterns, difficulties, and possible avenues for further investigation. In summary, the objective is to elucidate the mutually advantageous correlation between personal and worldwide health. Through promoting attentiveness in eating choices, supporting sustainable diet practices, and fostering knowledge, this article hopes to inspire a communal dedication to sustaining not just ourselves, but also our planet. We are building the groundwork for a healthier, more robust future for both the Earth and ourselves as we set out on this path toward sustainable eating.

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sciforum-093409: Applying negative emissions technologies in the superfoods sector: How far are we from achieving a carbon neutral spirulina production?

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Environmental degradation is one of the biggest challenges of our time, with a negative influence on society by stressing food and forestry systems. However, these negative effects are reciprocal, as around 50% of food is produced under conditions transgressing some planetary boundaries. As a consequence, new opportunities for food supply chain stakeholders are occurring around the world; among them, the development of alternative nutrient sources and the implementation of carbon removal technologies are highlighted as mitigation pathways compliant with carbon neutrality targets.

This study seeks to prove the effectiveness, through carbon accounting and carbon footprint (CF), of two carbon capture and utilization techniques in the production of spirulina, an increasingly known and consumed ‘superfood’. Spirulina is considered an important CO_2 consumer and in its industrial production this supply is made by means of synthetic CO_2. Two scenarios that aim to reduce the associated burdens are compared: (i) use of CO_2 recovered from the fermentation of beer (SP_BRW), and (ii) use of CO_2 from a direct air carbon capture unit (SP_DACC).

The results show that both scenarios present better environmental performance than current production methods. The CFs are estimated at 1.03 tons and 1.37 tons CO_2 eq./year for the SP_BRW and SP_DACC scenarios, respectively. In accordance, carbon accounting confirms that only CO_2 emissions can be reduced, compared with the business-as-usual scenario, by up to 51.1% by using residual emissions from breweries and 47% by capturing CO_2 from air. These findings provide a starting point in developing robust and transparent carbon accounting that verifies the efficiency of carbon removal in food systems, particularly in the superfoods sector. Future challenges focus on technical feasibility, in terms of the technology readiness level and implementation, as well as economic feasibility, since their actual application, especially of the DACC, would require a significant investment.

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sciforum-099241: Chayote (*Sechium edule* (Jacq.) Swartz) peel extracts: exploring their bioactive potential and cosmeceutical uses

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Innovative technologies for investigating chayote (*Sechium edule* (Jacq.) Swartz) peel's nutritional and economical valorization are required. This study aimed to extract bioactive compounds from chayote peels, comparing four sustainable extraction techniques: subcritical water extraction (SWE), microwave-assisted extraction (MAE), ultrasound-assisted extraction (UAE), and maceration (ME).

The obtained extracts were analyzed for their phenolic and carotenoid contents using High-Performance Liquid Chromatography (HPLC) and screened for their potential anti-inflammatory activity via the protein denaturation assay, and antioxidant activity through DPPH, ABTS, and FRAP in vitro assays. Based on these bioactivities, and after assessing cytotoxicity on Caco-2 cells, the most promising extract was used to formulate an ethosomal gel. Ethosomes were prepared by a solvent dispersion technique comprising 2% phospholipids, 20% ethanol, 2% lyophilized chayote peel extract, and an aqueous phase of 100% (w/w). Carbopol 934 was used to prepare the ethosomal gel. Test and control formulations were evaluated for pH, conductivity, rheology, and physical stability over one month at 4 °C and 25 °C.

The results showed that the UAE approach was more effective inextracting phenolics and carotenoids from chayote peels. AnHPLC analysis of the UAE extract identified tocopherol esters as the main class of carotenoids, and phenolics such as 4-hydroxyphenylacetic acid, gallic acid, protocatechuic acid, ferulic acid, p-coumaric acid, myricetin, and quercetin. At a concentration of 1000 µg/mL, the UAE extract showed a slight but significant decrease in cell metabolic activity, reducing MTT to 91.6% and 91.5%. A stable ethosomal gel containing the UAE chayote peel extract was successfully developed and characterized for its cosmeceutical potential. The gel demonstrated good physical stability after one month of storage at both 4 °C and 25 °C.

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sciforum-102266: Circular gastronomy applied to green asparagus by-products: Development, characterization and evaluation by consumers of derived pasta formulations.

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The environmental impact of food production represents a relevant challenge today. Many by-products generated by the agrifood sector, under a circular economy approach, represent an opportunity for sustainability with sensory and nutritional benefits. Green asparagus (*Asparagus officinalis*), a significant crop in the Community of Madrid, releases large amounts, with few food applications described. The aim of this work is the effective incorporation of green asparagus by-products in pasta products.

Asparagus by-products were collected from Fuenlabrada Agrarian Park and processed via different culinary techniques such as cutting, blending, enzymatic hydrolysis and dehydration. Proximal composition and total polyphenols were determined (via the Folin–Ciocalteu method). Preliminary pasta formulations underwent sensory evaluation under the supervision of 43 gastronomy students. After the optimization of pasta proposals, hardness and color were evaluated with a Kramer probe using a TA.XTPlus texturometer and a CR-400 Konica colorimeter, respectively. The acceptance of four final developments and a spinach commercial reference was evaluated by 107 consumers in a tasting room.

The proportion of green asparagus by-products was about 42% at the source. Lyophilization and dehydration at 40°C were the most appropriate techniques. The composition showed remarkable contents of fiber (31.7±1.13/100 g of dry by-product) and protein (15.95±0.07), with a polyphenol content of 3.55±0.30 mgGAE/g. Sensory results of preliminary pasta urged us to prioritize moderate flavors (30g/100g semolina) and improve color and texture. For optimized developments, a global acceptance of 5.75-6.15 (hedonic scale 1-9 points) was observed, two of them being without statistically significant differences compared to the commercial reference. After reports of the characteristics, 85% of consumers re-evaluated samples positively, with 53.3% of the total prioritizing nutritional advantages. Most of the consumers associated developments with pleasant feelings, while only 5.6% would pay less.

The viability of using green asparagus by-products in pasta was demonstrated; it showed acceptable mechanical properties, good acceptance and nutritional benefits. It contributes to sustainability, also presenting an important gastronomic opportunity.

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sciforum-102390: Effect of a nutritional intervention using a combination of perspective theories and expected utility on the use of orange-fleshed sweet potato among women of childbearing age of the commune of Zè in Benin

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Vitamin A deficiency is a major cause of morbidity among women of childbearing age and children. This study aims to evaluate the effect of a nutritional intervention using the combination of perspective theories and considering the expected utility in the adoption of orange-fleshed sweet potato (OFSP) among women of childbearing age in the commune of Zè. A total of 103 women randomly selected from four villages participated in the intervention. The implementation of this intervention firstly consisted o presenting the benefits of OFSP through a sketch and providing a culinary demonstration of the Afokaki recipe improved with OFSP. The sensory analysis of Afokaki reveals that the taste, color, texture and smell were very liked by 74.76%, 56.07%, 62.61% and 55.14% of women, respectively. Then, the intervention group received messages oriented towards gain and satisfaction, as did the control one; messages oriented towards loss and risk were developed in order to assess knowledge, attitudes and practices regarding food rich in vitamin A and perceptions on the use of OFSP before and after nutritional education. After the intervention, the knowledge score of the regarding foods rich in vitamin A increased from 49% to 98.75% in the control group and from 49% to 99.58% in the intervention group. Regarding the perception of the use of OFSP, the score increased from 89% to 100% in the intervention group and from 89% to 92.59% in the control group. These results prove that regardless of the orientation of the message, knowledge and perception of the use of OFSP were improved. Future interventions should assess the impact of OFSP on women's vitamin A status.

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sciforum-103134: Effect of storage on oxidative stability, polyphenol content and antioxidant activity of fat fraction extracted from chokeberry and blackcurrant seeds by ultrasound-assisted process

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Pomace—a by-product of the fruit industry—is a potential source of bioactive compounds, such as oils. It is important to conduct research on their effective extraction from this material. The aim of this study was to investigate the effect of storage on the oxidative stability, polyphenol content and antioxidant activity of chokeberry and blackcurrant seed oils extracted by an ultrasound-assisted process. The analyses included determination of the total polyphenols, antioxidant activity, oxidative stability and fatty acid profile. The results showed that the use of ultrasonic extraction made it possible to shorten the extraction time and had a positive effect on the oxidative stability of the oils during storage. The highest efficiency was achieved when oil was extracted from blackcurrant seeds according to a process of 12-minute sonication with an amplitude of 60%. The extraction method used had a positive effect on the polyphenol content in the blackcurrant seed oil and the antioxidant activity against ABTS radicals of both oils. The lowest reduction in the polyphenol content after storage was recorded in the case of the blackcurrant seed oil extracted using the sonication process with an amplitude of 60% for 12 minutes. The lowest reduction in antioxidant activity against ABTS radicals after storage was found for the samples obtained by ultrasonic-assisted extraction (amplitude: 60%; time: 12 minutes), and in terms of their activity against DPPH radicals, the lowest reduction was found for the samples obtained by classical extraction. To maintain a higher oxidative stability of the oils during storage, a higher amplitude (90%) and a shorter extraction time (6 min) were preferred. There was no effect of the ultrasound-assisted extraction process on the fatty acid profile. The use of sonication with appropriately selected amplitude and time parameters in the extraction process was beneficial, as it shortened the extraction time and improved the oxidative stability of the chokeberry and blackcurrant seed oils.

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sciforum-098266: Enhancing Soybean Drought Resilience with Natural Compounds: How Curcumin and Lupenone Influence Heme Oxygenase-1

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Climate change exacerbates drought, impacting crop yields and food security. This study investigates how the bioactive compounds Curcumin and Lupenone can enhance drought resilience in soybean (*Glycine max*) by modulating the enzyme heme oxygenase-1 (HO-1), which is crucial for stress responses. We used molecular docking and molecular dynamics (MD) simulations to explore the interactions between these compounds and HO-1. Our molecular docking analysis revealed that Curcumin and Lupenone exhibit strong binding affinities to HO-1, with Curcumin displaying a binding free energy (ΔG) of -7.81 kcal/mol, and the Curcumin+Lupenone complex showing a significantly enhanced binding energy of -12.57 kcal/mol. This complex demonstrated high stability, indicated by a total internal energy of 0.67 kJ/mol and low torsion energy of 0.03 kJ/mol, suggesting a synergistic effect that could potentiate HO-1's role in drought stress adaptation. MD simulations over 100 ns further confirmed the stability of the Curcumin+Lupenone-HO-1 complex, with minimal root mean square deviation (RMSD) fluctuations and consistent root mean square fluctuation (RMSF) values. The simulations indicated robust hydrogen bonding interactions, contributing to the complex's stability and potential effectiveness in vivo. The radius of gyration (Rg) values oscillated between 14.7 to 15.0 Å, indicating the significant compactness and stability of the protein–ligand complex. These findings lay the groundwork for future experimental validation in live plants and examining their impact on phytohormone signaling pathways through comprehensive laboratory and field studies. Understanding the downstream signaling networks and specific targets influenced by these compounds could deepen insights into the molecular mechanisms underlying drought resistance in soybeans and potentially other crops. This research offers promising strategies for sustainable agricultural practices, enhancing crop resilience to drought and supporting global food security. By integrating natural bioactive compounds into crop management, we can develop innovative solutions to mitigate the adverse effects of climate change on agriculture.

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sciforum-098947: Evaluation of the effect of grinding type and enzyme-assisted extraction on okara protein concentrate properties.

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Okara is a protein-rich byproduct from soymilk production. It has little market value, so it is usually used as animal feed or discarded. The growing consumption of soy-based products has lead to the search for more sustainable soy processing with greater profits. Soymilk obtention includes a step of grinding in cold or hot water in which the cell walls are broken. However, some cells are not damaged. Enzymatic-assisted pretreatment (EAP) could improve protein extraction by breaking these cells. The aim of this work was to evaluate the effect of the grinding type and the EAP on the extraction yield, thermal behavior and protein solubility of concentrates obtained from okara.

The okara used was from hammer (water at 90°C) (HO) and disc milling (water at 20°C) (DO). PCD-T and PCH-T protein concentrates were obtained by extracting proteins from DO and HO by solubilization at pH 8.0 and subsequent precipitation at pH 4.5 (traditional method). Also, an EAP with Viscozyme was made prior to extraction at pH 8.0, obtaining PCD-E and PCH-E. Protein content was determined by the Kjeldahl method (Nx6.25) and thermal behavior was determined by DSC for HO and DO and their protein concentrates. The protein solubility of the concentrates was quantified by the BCA method (pH range: 2.5-11.5).

The heat-treated samples (hammer mill) showed lower extractability. There was a significant increase in extraction yield in the EAP samples (17 times for HO and 3 times for DO). The thermal profiles of HO, PCH-E and PCH-T did not present the characteristic endothermic peaks of soy proteins, which indicates that the thermal treatment probably denatured them. The protein solubility presented the typical U-shape with a minimum at pH 4.5.

Disc milling leads to better protein yields and less protein denaturation. The EAP increased the yield. These results encourage the use of this byproduct to obtain protein concentrates that could be utilized in nutrition and as functional ingredients.

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sciforum-105537: Examining Consumer Perceptions of Tomato Scarcity in Southwestern Nigeria: Evaluating Awareness, Adaptation, and Sustainable Measures for Improved Food Security

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This study investigated consumer perceptions of tomato scarcity in Southwest Nigeria, between January and July 2024, with a particular focus on awareness, adaptive strategies, and sustainable practices for improved food security. This research adopted a quantitative approach using a structured questionnaire administered via Google Forms. Participants were recruited by means of convenience sampling with informed consent. The questionnaire consisted of multiple-choice and Likert-scale questions focused on perceived causes of tomato scarcity, consumer reactions and coping mechanisms, and expectations on future scarcity scenarios. Of 150 individuals, 71 responded. Upon screening, 60 valid responses were from Southwest Nigeria. Using both descriptive and inferential statistics, this study found that while 100% of respondents recognised the existence of tomato scarcity during the period, only 40% were aware that *Tuta-absoluta* is the leading cause. Two recognised major root causes of scarcity are poor transportation infrastructure (70%) and inadequate storage facilities (61.6%). Other key causes are seen to be climate change (65%) and the recent fuel subsidy removal (73.4%). Consumers have responded to scarcity by cutting tomato consumption (66.7%), switching to concentrated tomato products (66.7%), and changing their cooking habits (56.7%). Two most often used substitutes are tomato paste (66.7%) and onions (63.4%). Investing in disease-resistant cultivars (73.4%), building new storage facilities (90%), and improving transportation infrastructure (91.8%) were perceived as suitable ways to avoid future tomato scarcity. These results indicate that consumers recognize that tomato scarcity in Nigeria results from numerous interconnected factors and believe that comprehensive solutions like adopting sustainable agricultural techniques, infrastructure development, and farmer education can combat it.

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sciforum-098359: Exploring the neuroprotective properties of agri-food waste-derived phenolic extracts against Alzheimer's Disease

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Agri-food waste management is a pressing global concern, exacerbated by population growth and increased production. Moreover, consumers have been demanding clean-label and health-enhancing products. Along these lines, the circular economy and valorisation of agri-food waste offer solutions, yielding high-value products like phenolic compounds. These plant metabolites are known for their antioxidant, anti-inflammatory, and neuroprotective properties [1,2]. Recent decades have shown the interesting neuroprotective potential of various polyphenols against Alzheimer's Disease (AD), which accounts for nearly 80% of all dementia cases worldwide, affecting over 40 million people. Beta-amyloid protein ($A\beta_{42}$) is the primary culprit in AD development, with its progression accelerated by oxidative stress in neurons [3]. This study delves into the neuroprotective potential of different food waste residues, such as grape seeds, sloe seeds and peels, and avocado peels, by applying several bioanalytical strategies. Antioxidant potential was estimated by different in vitro assays based on spectrophotometric techniques, including lipid peroxidation inhibition and the viability of a human neuroblastoma cell line (SH-SY5Y). Inhibition of $A\beta_{42}$ aggregation and a fibril morphological study after the co-incubation of phenolic extracts and neurotoxic metal ions were evaluated by obtaining micrographs via Transmission Electron Microscopy. Finally, HPLC-DAD-ESI-MS and HPLC-ESI-QTOF-MS/MS were employed to obtain the phenolic profile of extracts (highlighting catechin, gallic acid, dihydroxybenzoic acid, and ferulic acid), and chemometric tools were applied to correlate the neuroprotection effects with the chemical composition of the phenolic extracts. Overall, the outcomes indicate potential for agri-food by-products as sources of polyphenol-rich functional ingredients with applicability in the nutraceutical industry.

references

[1] Vicente-Zurdo et al., IJMS 25(11) (2024): 5906.
[2] Gómez-Mejía et al., LWT 169 (2022): 113988.
[3] Vicente-Zurdo et al., Talanta 269 (2023): 125519.

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sciforum-101547: Exploring the use of intestinal organoid models for advancing the application of New Approach Methodologies in food safety assessment

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Regulatory toxicology and risk assessment are experiencing substantial changes. At a global level, institutions, regulatory agencies and the scientific community have embraced the objective of revolutionizing the paradigm of the evaluation of regulated products, contaminants and pollutants, with marked consequences for food safety standards. For these reasons, the conventional strategies that made massive use of animals have been gradually replaced by New Approach Methodologies (NAMs). These models, based on stand-alone or integrated in vitro, in chemico, in silico and ex vivo methods, guide the transition towards Next-Generation Risk Assessment. The implementation and usage of NAMs in the regulatory context have been becoming main objectives of worldwide governmental bodies and agencies, including the European Food Safety Authority and United States Food and Drug Administration. Among NAMs, organoids are promising self-organized 3D in vitro models, able to mimic the key structural, functional and biological complexity of an organ and recapitulate physiology and molecular profiles closer to native tissue.

Looking at this context, this study aimed to set up and optimize an efficient methodology for the establishment of human intestinal derived organoids (HIOs) and verify that they faithfully express the molecular markers characteristic of intestinal cytotypes. The local effects of selected stressors on the intestinal epithelium were assessed in terms of cytotoxicity, inflammation and intestinal barrier integrity.

The obtained results show that HIOs replicate native tissue and accurately reflect human response to toxicant exposure. Thus, HIOs have potential to be utilized for regulatory needs. Precise quality control definition and a full in-house validation study are key priorities to increase the strength of these tools. Overall, the goal of the project, filling the gap of there being a very limited number of studies conducted in this field, is to pave the way for a more focused and standardized use of HIOs in regulatory assessments.

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sciforum-096221: Green approach to phenolic compound extraction from date fruit (*Phoenix dactylifera* L.)

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In recent times, green and efficient natural deep eutectic solvents (NADESs) that can replace harmful traditional ones have attracted considerable attention. The objective of the present study was to investigate a sustainable method for enhancing the extraction of phytochemicals from date palm fruit (Tazizaout cultivar), a valuable source of bioactive compounds. In this study, lactic acid/sucrose-based NADESs were employed as an alternative to conventional chemical solvents, in conjunction with the ultrasound-assisted extraction (UAE) method. Subsequently, the extracts were subjected to analysis in order to determine their bioactive compound contents, phenolic composition, antioxidant activity, and enzyme inhibitory potential. The results demonstrated that the Tazizaout extract contained considerable contents of total phenolics (570.8 mg GAE/100 g), total flavonoids (40.3 mg QE/100 g), proanthocyanidins (38.8 mg CE/100 g), and total triterpenoids (9.72 mg OAE/100 g). The cultivar displayed high antioxidant capacity against the $ABTS^{•+}$ cation radical (214 mg TE/100 g) and ferric-reducing antioxidant potential (136 mg AAE/100 g). The extract exhibited moderate antioxidant activity when tested using the $DPPH^{•}$, phosphomolybdenum, $NO^{•}$, and linoleic acid lipid peroxidation assays. Furthermore, the extract exhibited notable inhibitory effects on α-amylase and acetylcholinesterase enzymes in vitro, with inhibition rates of 33% and 34%, respectively. High-performance liquid chromatography with diode array detection and mass spectrometry (HPLC-DAD-MS) identified a total of five compounds (three phenolic acids and two flavonoids) as the main phenolics present in the extract, with the predominant compound being gallic acid. The results indicated that the combination of UAE and NADESs represents a novel and useful alternative to chemical solvents for sustainable and green extraction. This approach could have implications for industries seeking eco-friendly alternatives for the extraction of phytochemicals, with potential applications in foods, pharmaceuticals, and other related sectors.

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sciforum-092264: Impact of COVID-19 Pandemic on Food Security in Selected Households of Mataasnakahoy, Batangas, Philippines

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Food is regarded as a basic human requirement. However, the COVID-19 pandemic disrupted global healthcare and other aspects of human life, hence affecting food security. There has been progress in reducing global food insecurity, but significant challenges remain. The standard approach of defining food security as "access to food" ignores two essential dimensions: availability and usage. Since global food availability has risen in recent years, it is no longer a significant concern. Due to home quarantine orders and unemployment, the COVID-19 pandemic can drastically disrupt household food security. This study examines how the COVID-19 pandemic affected food access and availability in Mataasnakahoy, Batangas. The demographics and food security before and during the COVID-19 pandemic were also investigated in this study. The study's research approach was cross-sectional with 385 randomly selected households from Mataasnakahoy, Batangas. A modified questionnaire was statistically treated using frequency, percentage, mean, standard deviation, and the paired t-test. The study revealed a neutral level of food security before and during the COVID-19 pandemic. Furthermore, the selected households of Mataasnakahoy, Batangas had significant differences in food security before and during the COVID-19 pandemic. The average availability of food was lower before the pandemic than during the pandemic. The pre-pandemic value is higher when comparing the average food supply before and after the pandemic.

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sciforum-102938: Importance of food waste reporting for collaboration between Australian retail, farming, and food rescue organizations

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Introduction:

Australian retail and farming organizations play a crucial role in collaborating with food rescue organizations by donating surplus edible food waste. Existing research highlights the importance of food waste reporting by donors for the effective operation of food rescue initiatives. However, there is a significant gap in the literature examining the role of food waste reporting within the retail and farming sectors in the context of Australian food rescue efforts. This study investigates the importance of food waste reporting in enhancing collaboration between these sectors and food rescue organizations.

Methods:

This study employed a qualitative approach, conducting a content analysis of annual reports from Australian retail, farming, and food rescue organizations to assess their food waste reporting practices. Additionally, semi-structured interviews were conducted with representatives from these organizations to explore collaboration challenges and the role of food waste reporting in addressing these issues.

Results:

The findings reveal that enhancing key metrics for capturing food waste data—such as quality, quantity, and consistency—is crucial for supporting food rescue efforts. However, food waste reporting by Australian retail and farming organizations is often limited to data on food waste by weight. Timely sharing of detailed food waste data with food rescue organizations can significantly improve collaboration between these sectors.

Conclusions:

This study recommends government tax incentives and mandatory food waste reporting guidelines for retail and farming food donors to encourage greater participation in food waste reporting. While internal food waste data improve the efficiency of food rescue operations, publicly available data can increase public awareness and support for food rescue organizations. Further research is needed to investigate food waste data recording practices and develop comprehensive food waste reporting guidelines.

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sciforum-090789: Inventory of neglected traditional recipes with high nutritional potential for improving vitamin A status in Benin

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The general objective of this study was to identify endangered or neglected traditional recipes with high nutritional potential (NTRs) in Benin. The lack of documentation of the nutritional composition of these recipes represents a major limitation for the implementation of effective interventions against nutritional deficiencies in Benin.

The study was carried out in nine cultural areas (CAs) of Benin with 120 women aged ≥ 50 years, with experience cooking these dishes for sale and/or for consumption at home. Food ethnography methods were used to collect information on the foods consumed 60 years ago, their composition, their preparation process, and the reasons for abandoning their consumption. The West African food composition table (FAO 2019) was used for the calculation of the theoretical nutritional value of the NTRs.

A total of 181 endangered traditional recipes have been identified: CA Ifè/Yoruba/Nago/Idatcha (49) and Bariba (31) have the highest number of NTRs followed by AC Adja (26), Goun/Tori (25), Fon/Mahi, Aïzo (19), Cotafon/Sahouè /Mina (17), Ditamari/Warma (17), and Dendi/Germa (14). The main ingredients of these recipes are cowpea, voandzou, and maize. A total of 55 NTRs were identified for use in an orange-fleshed sweet potato (OFSP) scale-up intervention to improve vitamin A status. Based on their nutritional composition, five NTRs (tipinpinti, yoê-yoê, kia bangu, afokaki, and stew) were theoretically improved by partial or total substitution of OFSP flour. Future research consists of sensory and socio-cultural acceptability tests; analysis of the nutritional value of NTRs; and improving their scalability in households in Benin.

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sciforum-098579: Metagenomic Insights into the Antibiotic Resistome of an Organized Dairy Production System

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Metagenomics is a powerful approach for detecting antibiotic resistance in microbial communities, allowing for comprehensive analysis of genetic material from all organisms in a sample without the need for culturing. In this study, a metagenomics approach was used to understand the prevalence of antibiotic-resistant genes in various ecosystems within an organized dairy production system. A total of 36 samples of milk, faeces, soil, and wastewater were collected from three different dairy farms. Metagenomic sequencing yielded 275, 281, 348, and 281 million raw reads with data sizes of 200, 206, 243, and 207 GB from milk, faeces, soil, and wastewater, respectively. The majority of reads were mapped against bacterial genomes, revealing a total of 37 bacterial phyla, with the highest diversity in wastewater, followed by faeces, soil, and milk. A higher abundance of the phyla Pseudomonadota, Bacillota, Actinomycetota, and Bacteroidota was observed across the dairy production system. The most abundant genera found in milk, faeces, soil, and wastewater were *Clostridium*, *Bifidobacterium*, *Janthinobacterium*, and *Corynebacterium*, respectively. Furthermore, the antibiotic resistome analysis using the CARD database revealed a total of 455 distinct antibiotic-resistant genes in the organized dairy production system. These genes belonged to 36 diverse drug classes and were characterized by 12 distinct resistance mechanisms. The antibiotic-resistant genes were highly diverse in wastewater (354), followed by milk (229), faeces (156), and soil (109). Interestingly, the actual abundance of antibiotic-resistant genes was high in wastewater, followed by faeces, soil, and milk. The predominant resistance mechanisms identified included target modification and efflux pumps, with a high occurrence of genes conferring resistance to aminoglycosides and macrolides. This comprehensive metagenomic analysis provides critical insights into the antibiotic resistance landscape, underscoring the importance of ongoing surveillance and intervention strategies. The findings emphasize the urgent need for measures to control antimicrobial resistance and prevent its spread in dairy production systems.

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sciforum-099341: Natural deep eutectic solvents as a green approach to extracting bioactive compounds from Moringa leaves

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Efforts are being made to valorize agroindustrial waste by recovering compounds of technological or functional interest using green extraction methods. Natural deep eutectic solvents (NADESs) emerge as a versatile and sustainable alternative to traditional organic solvents. The objective was to design food-safe NADESs and use them as solvents to extract polyphenolic compounds from plant sources. NADESs were prepared as mixtures of citric acid and glucose (1:1) (CIT:GLU) and with glycerol and glucose (4:1) (GLI:GLU), with a final aqueous content of 30%w/v. The mixtures were heated and stirred (60 °C, 90 min) until homogeneous systems were obtained and were characterized by determining their density, refractive index, pH, water activity (a_w), electrical conductivity, and polarity. The NADES extraction yields were determined based on the total polyphenolic content (TPC) extracted per gram of dry *Moringa oleifera* leaf. The prepared NADESs had a density between 1,238 and 1,382 g/mL, with systems CIT:GLU presenting a higher density than GLI:GLU. The refractive indices ranged from 1,420 to 1,456 without significant differences (p0.05) between the systems. The a_w of the CIT:GLU NADES was close to 0.75 and 0.66 for the GLI:GLU mixture, suggesting a greater water--water interaction in this last system. The pH of NADESs with citric acid was less than 1.00 due to the high concentration of acid, while the pH in the GLI:GLU system was 3.13. Conductivity was 0.31 mS/cm in CIT:GLU due to the presence of citrate and null in the GLI:GLU, since its components do not form ions. The TPC of the extracts was between 40 and 50 mg EAG/g b.s. The extraction yields were compared with ethanol, and better yields were obtained for the NADESs. In addition, NADESs have the advantage of being natural, non-toxic, and can be designed with particular characteristics to favor the extraction of specific compounds, and also to stabilize them during extraction and storage.

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sciforum-098115: Nutritional properties of selected edible insects as food for future

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Edible insects have been identified as a sustainable source of alternative proteins for achieving food security and the nutritional needs of increasing populations. However, their nutritional profile depends on the species and can be highly variable due to the biodiversity of insects in the ecosystem. This study aimed to determine the nutritional properties of targeted edible insects as future food. A total of eight edible insects of different species and developmental stages were studied, including dubia roach (*Blaptica dubia*) adult, superworm (*Zophobas morio*) larvae, locust (*Locusta migratoria)* adult, silkworm (*Bombyx mori)* pupae, house cricket (*Acheta domesticus*) adult, sago palm weevil (*Rhynchophorus ferrugineus*) larvae, black soldier fly (*Hermetia illucens*) larvae, and grasshopper (*Oxya Yezoensis*) adult. The samples were analysed for proximate composition, fatty acid profiles and amino acids. Results showed that silkworm (175.45 mg/g) had significantly higher (p0.05) protein than grasshopper (119.16 mg/g), with the levels of glycine amino acid being the most abundant, comparable to those in conventional meat. The amino acid composition highlights that edible insects are one of the valuable sources of protein with all essential amino acids. The targeted insects are confirmed to provide healthy fat, with more than half of the total fatty acid content being unsaturated fatty acids, except for black soldier fly, which contained high lauric acid. This is further proven by the outstanding nutritional indexes with generally high PUFA/MUFA ratios, but lower omega-6 to omega-3 ratios, atherogenicity and thrombogenicity indexes. The findings reveal that some edible insects could serve as a sustainable source of nutrients for daily requirements to mitigate food insecurity in the future.

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sciforum-103395: Optimization of alkaline extraction for increased protein recovery from brewer’s spent grain

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Brewer's Spent Grain (BSG) is a byproduct of brewing in the food industry. However, few studies have addressed the functional features of protein from BSG and how it can be enhanced through optimization studies. The present study is centered on extracting protein using an alkaline treatment to improve recovery. This extraction process was systematically carried out under different alkaline concentrations (0.1, 0.5, 2, 4, and 8 M KOH), with 5 mM sodium metabisulfite added to each of the concentrations. The samples were incubated at room temperature (30 °C; 30 rpm) for 24 h. Precipitation with saturated citric acid to a pH of 3 and freeze-drying for 24 hr were performed. This then represented a fixed process variable. Bradford assay was utilized for the quantification of the protein extract. The result of the quantification showed a protein content of 614.6 mg/100 g of BSG at a concentration of 0.5 M KOH, which was significantly different (p0.05) from other concentrations. While 4 M KOH was also significantly different, it recorded the lowest protein content of 33.36 mg/100 g. Variation in the alkaline concentration impacts the protein yield. This highlights the potential for optimized protein recovery using the alkaline method for upscaling and sustainable biomass conversion. It is pertinent to explore innovative methods for protein extraction from agro-industry byproducts like BSG, as this will assist in addressing the demand for suitable protein sources.

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sciforum-099373: Optimization of the conditioning and drying stages of table olive by-products to obtain new powdered ingredients

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During table olive production, around 90-150 tons of fruit waste is generated as a consequence of the mechanical action of the different processing stages or due to defects in the external fruit quality, mainly consisting of olives that do not meet the required quality standards due to their size, the presence of visual defects or mechanical damage. These by-products contain interesting components such as polyphenols and monounsaturated fatty acids (MUFAs), so they may constitute an excellent raw material for obtaining new ingredients or bioactive compounds. However, table olive by-products also present a high salt content, which could hinder their subsequent incorporation into food products. So, this work aims to optimize the conditioning stage before the drying process to obtain new powdered ingredients from by-products of the table olive industry. The table olive by-products were conditioned by combining the washing and pressing stages to reduce their acidity and salt content and minimize the samples' moisture. The obtained olive paste was spread out on food-grade trays and dried in a convective drying chamber at 70 °C up to a constant weight. Thin-layer modelling was assessed to explain the drying kinetics. The results showed that the conditioning methods that included a washing stage reduced the olives' salt content by up to 75 %. The application of a pressing stage before or after washing did not affect the final salt content of the samples. Table olive powder with a reduced salt content was obtained after 5 h of drying. A combination of conditioning stages, washing and pressing before the drying process reduced the salt content in the table olive by-products, leading to new powdered ingredients that could be used by the food industry for new product development.

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sciforum-096964: Optimizing carotenoid and amino acid extraction from tomato waste for biostimulant production

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The food industry generates 2-5% of its annual production as vegetable waste, causing significant environmental and economic issues. Revalorizing this waste into bioproducts like biostimulants is a potential solution. Tomato waste, which is rich in bioactive compounds, amino acids, and other micronutrients, can improve crop yield, stress response, and fruit quality when applied to fields. This study aimed to evaluate different strategies to improve the extraction of carotenoids and/or amino acids from tomato wastes for biostimulant formulation.

Tomato spoils were homogenized and submitted to different treatments, including sequential enzymatic hydrolysis at 50°C for 4h with different concentrations of commercial cellulases and proteases. Enzymes were inactivated by means of heating (80°C for 5 min). A surfactant (Tween20, 2% w/w) was added before centrifugation to improve solubilization, and supernatants were collected. Controls were established for each treatment step to ensure reliability. Total carotenoids and amino acid release were evaluated spectrophotometrically using standard curves of β-carotene and L-Arginine, respectively.

Enzymatic hydrolysis with the highest protease concentration favored the release of carotenoids and amino acids from the tomato matrix. Moreover, the presence of a surfactant was critical for enhancing solubilisation into the aqueous media. The highest carotenoid (132 mg β-c/L) and amino acid (160 mg L-Arg/L) contents were obtained when the surfactant was added. The combination of cellulases and proteases, along with thermal treatment, likely depolymerized the cell wall and broke the protein–carotenoid complexes in chromoplasts, releasing soluble peptides and carotenoids, which were then more readily entrapped by the surfactant. L-Asp, L-Glu, and L-Ala are the main amino acids found in tomato, which have proven effects on nutrient absorption and chlorophyll production.

Applying enzymatic hydrolysis with a combination of cellulases and proteases, together with heat treatment and surfactant addition, effectively enhanced the extraction of carotenoids and amino acids from tomato waste, facilitating their use in the formulation of biostimulants.

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sciforum-099155: Phenolic compounds of olive mill wastewater (OMW) samples from Spain and evaluation of their antioxidant potential

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Aim: Industrial processes for olive production generate a considerable amount of oil wastewater, also known as "olive mill wastewater" (OMW), or *alpechin*, which is a great source of phenolic compounds. The aims of this study are to optimise the conventional extraction of the phenolic fractions present in the *alpechín*, to characterise the total phenolic content, and to determinate their antioxidant potential using the TEAC assay.

Method: To carry out the study, eight samples of olive mill wastewater (OMW) and five samples of *alpechín* sludge from abandoned ponds in the Mediterranean area and southern Spain were analysed. After sample defatting using hexane and subsequent drying in an oven, the total phenolic content and antioxidant properties of the extracts were analysed using spectrophotometric techniques.

Results: The samples of alpechín from Cordoba, Tarragona, Alicante, and Toledo, corresponding to codes TED-4, TED-15, TED-14, and TED-16, respectively, showed high TPC contents ranging from 7.2 g GAE/kg to 18.9 g GAE/kg. They also exhibited an antioxidant capacity equivalent to 10-60 micromoles of Trolox/g, significantly exceeding samples from other geographical locations. The polyphenol content of the *alpechín* samples was influenced by factors such as the matrix condition, seasonality, location, degree of abandonment of the ponds, and vegetation water. In addition, the pH, temperature, extraction technique, and solvent type also affected the recovery of phenolic compounds.

Conclusion: This study provides a solid basis for the implementation of innovative strategies for the valorization of this residual material as potential bioactive compounds for the food and agricultural industries.

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sciforum-103492: Preserving Heritage through Flavor: Traditional Cheese Marinated in Herb- and Spice-Infused Cold-Pressed Oil

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Romanian cheese production is long-standing, with different traditional regional varieties being available on the market. This study explored the development of a hard cheese marinated in cold-pressed oil flavored with herbs and spices to provide a unique and savory flavor as a new addition to the Romanian cheese landscape. Two batches of traditional Romanian cow milk-based hard cheese were made with commercial rennet (Biocult, Denmark). The heese was tested for fat, protein, moisture, ash, salt, calcium, pH, and instrumental textural qualities. Routine microbiological analysis was carried out to assess the potential presence of pathogens (yeast, molds, *Salmonella sp., S. aureus, Listeria sp.,* and *E. coli*). Sunflower cold-pressed oil, chosen for its flavor and health benefits, was mixed with complementing dill and chili pepper to form a flavorful marinade. The sensory profile of the cheese was assessed before and following maturation in the infused oil, which allowed the flavor to develop and penetrate the cheese's body. Five trained evaluators used descriptor questionnaires, taste datasheets, and tasting samples to evaluate the cheese's sensory features. The shelf life of the newly manufactured product was also determined by the number of days during which the cheese product maintained its quality. The aromatic effect of the infused cold-pressed oil improved the customer acceptance and flavor profile of the cheese. In addition to their fragrant properties, dill and chili pepper had an antibacterial effect, as shown by a decrease in aw. This initiative has the potential to increase the assortment of cheese products in Romania while also showcasing the use of local resources and conventional techniques to create one-of-a-kind food items, with implications for food security and sustainability.

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sciforum-098367: Prevalence of Antimicrobial Resistance in Organized Dairy Production Systems

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The dairy production system is a cornerstone of the agri-food chain, delivering vital nutrition and simultaneously serving as a major reservoir for antibiotic-resistant bacteria. Given the mounting global concern over antibiotic resistance, it is crucial to gain knowledge on the prevalence of antibiotic-resistant bacteria within the organized dairy production system. In this study, 48 samples of milk, faeces, soil, and wastewater were collected from four distinct dairy farms. An antibiotic-guided approach was used for the isolation of putative antibiotic-resistant bacteria, utilizing three different growth media and eight antibiotics, categorized as critical and high priority by the World Health Organization. A total of 615 putative antibiotic-resistant bacteria were successfully isolated, and 393 of these isolates were identified using 16S rRNA gene sequencing and MALDI-TOF techniques. The majority of the bacterial isolates belonged to the phylum Pseudomonadota (59%), followed by Bacillota (12%), Bacteroidota (8%), and Actinomycetota (3%). A total of 51 different genera, encompassing 125 distinct species, were identified. Among them, the most predominant genera was *Escherichia* (22%, 85), followed by *Pseudomonas* (11%, 42) and *Acinetobacter* (9%, 34). Among the identified putative antibiotic resistant bacteria, 274 were closely related to critical-, high-, medium- and healthcare-associated pathogens. A total of 153 falling into these different categories were successfully analyzed for their antibiotic resistance potential. It was found that beta lactam resistance was prevalent in dairy production systems, with extended spectrum cephalosporin-resistant *Escherichia coli* being predominant. Furthermore, this study found more than 20 multi-drug-resistant bacteria (13%) belonging to critical-, high-, medium- and healthcare-associated pathogens in the dairy production system. In conclusion, this study emphasizes the necessity for effective management strategies to combat the challenge of antibiotic-resistant bacteria in the dairy production system.

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sciforum-099361: Proximate, functional, and structural properties of protein isolate from undehulled, dehulled and defatted broad bean (*Vicia faba*).

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Dehulling and defatting are conventional practices in the production of high-protein ingredients from oil seeds and pulses. However, it is unclear how crucial these steps are during pulse protein isolation. This study aimed to elucidate the role of dehulling and defatting in extracting protein from broad beans using alkali/isoelectric precipitation. It investigates their impact on the yield, protein purity, and functional and structural properties of the resulting isolates. Flour samples that were undehulled and those that were dehulled and defatted exhibited a similar protein content of approximately 28%, whereas the dehulled but undefatted flour had a higher protein content of approximately 31% (dry weight basis). Isolated protein showed significant (p 0.05) variation, notably increased protein purity. Functional properties, such as water absorption capacity, oil absorption capacity, foaming, and emulsion capacity and stability, showed no significant differences (p 0.05) among the isolates. This suggests that the flours are likely to behave similarly when used in food systems. Proximate composition data were similar across the samples. In terms of structure, Sodium Dodecyl Sulfate-Polyacrylamide Gel Electrophoresis analysis showed similar molecular weight distribution (22-75KDa) in the protein under both reducing and non-reducing conditions. The results of this study suggest that dehulling and defatting steps in protein isolation from broad beans and perhaps other pulses with low-fat content (10%) may not be necessary, depending on the intended end use of the protein isolate. Additionally, omitting these solvent-intensive processes could reduce the time, cost, health, and environmental risks associated with protein isolation. Studies are ongoing to determine the nutritional composition, including amino acid profiles and digestibility, as well as the thermal properties of the isolates.

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sciforum-100671: Recent advancements in the commercial production of synthetic food for global food security: Future prospectives and challenges

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Background: Currently, we are facing huge pressures to fulfil the demands for nutritious, safe and cheaper food due to the tremendous increase in the total world population, limited agricultural land and food resources, the unavailability of high-yielding crop plant varieties, and anthropogenic activities. Climatic changes in the environment have affected livestock, crops, forestry, aquaculture, and fisheries, and affects food security in complex ways which can cause economic consequences, eroded livelihoods, trade disruption, and adverse health impacts.

Objectives: The aim of this review is to address the need to develop some alternative food production system which can fulfill our current qualitative and quantitative food requirements. To resolve this unavoidable problem, researchers are trying to create synthetic food in such a way that they can minimize the environmental impact on food production.

Outcomes: Synthetic foods are created artificially in a controlled laboratory setting and under industrial conditions instead of through natural methods. The development of the synthetic biology field revolutionized the food industry for sustainable food manufacturing in the future. The major technologies used for the production of synthetic foods are cell culture, tissue culture, stem cell technology, fermentation, and genetically modified organisms (GMOs). The synthetic food available includes lab-grown meat, plant-based meat alternatives, veggie meat burgers, vegan cheese, shrimp made of algae, and lab-grown ricotta and mozzarella. Despite these advancements, there are many challenges in the production of synthetic foods, such as standardized lab protocol, cell sourcing, the availability of synthetic materials, side effects, ethical challenges, and the safe use of synthetic foods.

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sciforum-099239: Stabilized White Grape Pomace as a Natural Preservative in Frankfurt-Type Sausages: The Effects on Microbial Growth, Oxidation, and Color Stability

Maria Jesus Martin Mateos *, Jonathan Delgado-Adámez, María Díaz-Ponce, Miriam Sánchez-Ordóñez, Beatriz Toro-Hernández and M.Rosario Ramírez-Bernabé

CICYTEX

The main byproduct of winemaking is grape pomace, which comprises seeds, skins, stems, and remains of grape pulp. Its main use is for distillation to obtain ethanol. However, grape pomace contains interesting compounds (fiber, proteins, fat, phenolic compounds) with health benefits. For this reason, white grape pomace (*Cayetana* cv) was stabilized by means of thermal blanching (to inactivate the polyphenoloxidase enzyme) and high hydrostatic pressure (with the aim of reducing the initial microbial loads while preserving the phenolic compound content) to obtain an ingredient for food product preservation. The valorized ingredient (WGP) was added to the formulation of Frankfurt-type sausages. Four formulations were evaluated: Negative Control (NC: without white grape pomace and without sodium ascorbate and nitrites), Positive Control (PC: with sodium ascorbate and nitrites), Low Level (LL: with 0.5% WGP and without sodium ascorbate and nitrites) and High Level (HL: with 3% WGP and without sodium ascorbate and nitrites). Immediately, the frankfurters were refrigerated, vacuum-packaged, and stored at +5°C in darkness. Microbiological, color, and oxidation parameters were analyzed. Neither nitrites nor WPG were able to prevent microbial growth in the sausages throughout the storage period. Additionally, the highest counts were observed when the pomace was added at high levels (3%). The use of nitrites provided and initial pink colour and prevented the discoloration of the sausages during storage, while WGP only showed an effect when added at higher levels. Both nitrites and WGP were effective in reducing lipid oxidation of the sausages during the manufacturing process and the refrigerated storage. However, only WGP limited protein oxidation development during storage, while nitrites showed the opposite effect. Therefore, the incorporation of WGP in the frankfurter formulation was effective in reducing lipid and protein oxidation during processing and storage, and an addition of 3% WGP also maintained stable color parameters, but WGP showed no antimicrobial effect.

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sciforum-093441: Steeped processed products of bird's eye chilli: A geographical indication-tagged chilli of Mizoram

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Bird's eye chilli (Capsicum annum) is a geographical indication-tagged crop of Mizoram. It is unique due to the small-size, tapering fruits, mainly two or three at a node, and high pungency (50,000 to 1,00,000 Scoville heat unit) associated with anti-inflammatory properties which help to relieve headaches, flu and high fever; it also regulates blood pressure and has anti-cancer properties. The cost of this high-value chilli is low during the December-to-February season when the production is high, but it has a short shelf life. Specific storage conditions are not available to common farmers for their abundant production during the harvest season, resulting in less profit for the growers. No processed bird's eye chilli products are made in the state except dried chilli. This chilli can be converted into various processed products, namely, chilli in brine, chilli garlic sauce, chilli pickle, frozen chilli, etc. The main focus is on the standardisation of chilli steeped in brine (5%, 8% and 10%) to help maintain saline conditions for its preservation with 5% vinegar which aids in inhibiting bacterial growth development. A storage study for a duration of 6 months based on sensory analysis (colour, texture and smell), using the hedonic scale and capsaicin content, may be carried out to find out the most stable treatment at the end of the storage period. This will help enhance the shelf life of these products in a sustainable way using only salt and vinegar, ensure their availability out of season, prevent post harvest loss and double the income of the local farmers in Mizoram. The preservation of bird's eye chilli by steeping it in brine and vinegar will prove to be a sustainable method for preservation. The development of such a product will help local farmers and entrepreneurs and promote the economic development Mizoram.

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sciforum-094341: Strategic approaches for reducing toxic components in plum kernels (*Prunus domestica L.*): A sustainable valorization approach

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In the current scenario, transforming agricultural by-products into high-value commodities is essential for preserving the environment. Plums are globally renowned for their flavor, juiciness, and nutritional value. Despite being widely popular, substantial quantities of plum kernels, rich in oils (45.95–50%) and proteins (35.9–40.0%), are underutilized due to the presence of toxic compounds like amygdalin (range 0.1–17.5 mg/g). Therefore, detoxification becomes a crucial step to mitigate the risks associated with cyanide toxicity. This study employed a response surface methodology to optimize hydrothermal treatment conditions to reduce amygdalin levels. Despite the significant reduction of 68.72 %, none of the treatment conditions reduced amygdalin to below the allowed limits. On the contrary, microwave heating at 540 W for 6 min also showed a considerable reduction of 67.90% in amygdalin but not within the permissible limits, and the prolonged heating caused burning spots on the samples. However, a combined approach involving microwave heating at 450 W for 6 minutes and hydrothermal treatment at 45 °C for 10 hours reduced the amygdalin levels to undetectable levels. These detoxified samples exhibited significant quantities of high-quality dietary proteins (32.09 %), crude fat (45.14%), crude fibre (4.16%), total ash (2.16%), carbohydrates (7.19%), and bioactive compounds, representing valuable resources for human nutrition and food industry applications. Isolated proteins from detoxified plum kernel meal displayed notable antioxidative properties alongside their nutritional and functional attributes, making them attractive ingredients for various product formulations. The purity, yield, and solubility of protein isolate from detoxified plum kernel meal at a pH of 10.5 were 90.49 %, 26.45 %, and 66.36 %, respectively. The protein isolate was rich in essential amino acids. This study underscores the potential of detoxified plum kernels as a sustainable source of essential nutrients and functional additives, contributing to advancing Sustainable Development Goals through innovative agricultural revalorization practices.

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sciforum-096399: Sustainable Food Security in Romania and Neighboring Countries: Trends, Challenges, and Solutions

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Introduction

Food security is a critical issue for Romania and its neighboring countries, as it directly impacts regional stability and public health. This study analyzes the current state of food security in Romania, Bulgaria, Hungary, Serbia, Ukraine, and Moldova, focusing on four key pillars: food availability, accessibility, quality and safety, and stability. By identifying the specific challenges each country faces, this study proposes sustainable, regionally-coordinated solutions to enhance food security and resilience in the face of climate change, economic disparities, and political instability.

Methods

Utilizing data from external sources, government reports, and international organizations, this study assesses food security pillars: availability, accessibility, quality and safety, and stability. Comparative analysis identifies regional disparities and explores the impacts of climate change, economic inequalities, and agricultural practices.

Results

Availability: Diverse agricultural outputs face challenges like climate change, infrastructure, and import dependency. Romania's growth is offset by crop diversity and import reliance issues. Moldova and Ukraine suffer from political instability and poor infrastructure.

Accessibility: Economic disparities affect food access, with rural poverty prominent in Romania and Bulgaria. Moldova and Ukraine's economic instability hinders food affordability. Hungary and Serbia have regional inequalities.

Quality and Safety: Food safety regulations vary; Hungary is strong, while Moldova and Ukraine need improvement. Ensuring food safety and nutrition is crucial to prevent diet-related health issues.

Stability: Climate change threatens agricultural stability. Romania has initiated adaptation strategies; Moldova and Bulgaria are developing theirs, while Serbia and Hungary are in early implementation stages. Ukraine's conflict complicates stability efforts.

Conclusions

Collaborative regional efforts are essential for food security. Recommendations include diversifying agriculture, improving infrastructure, strengthening food safety regulations, and developing climate adaptation strategies. Coordinated approaches can enhance sustainable food security, benefiting regional stability and populations. This model offers a framework for other regions to build resilient, sustainable food systems.

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sciforum-098586: Sweet potato industry waste is an interesting by-product from which to obtain polyphenols with antioxidant properties

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Sweet potato (*Ipomoea batatas* (L.) Lam.) is one of the most important crops in the world, characterized for being a relevant source of antioxidant polyphenols with health-promoting biological activities. Its industrialization generates waste considered an alternative and inexpensive source for obtaining phenolic compounds, with potential applications in the food industry for the development of functional foods with antioxidant properties. In this work, we investigated the in vitro antioxidant characteristics of two sweet potato wastes (1—the peel from a peeler and 2—the pulp from a sieve) to identify which one is the better source of antioxidant properties. Both wastes were lyophilized and grounded using liquid nitrogen. The phenolic extracts were obtained with a 50% v/v ethanol solution (7 g of dry weight, DW, with 100 mL of solvent; extraction repeated three times). The content of total polyphenols (by Folin–Ciocalteu) and total anthocyanins (by a pH differential method) was studied. The antioxidant capacity was investigated by FRAP (reducing power), ABTS, and DPPH (both methods of radical-scavenging capacity). The peel waste presented 8 mg/g (DW) of polyphenols and 0.8 mg/ g (DW) of anthocyanins. Instead, the pulp waste presented 50 % fewer polyphenols without evidence for the content of anthocyanins. The higher content of antioxidant compounds in the peel waste impacted its higher reducing power and radical-scavenging capacity. The results showed that the peel waste coming out of the sweet potato industry is a promising source of natural antioxidants to our health, while its recovery helps to reduce pollution and adds value to the residue.

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sciforum-098452: The Development of a sustainable analytical methodology for obtaining sloe seed oils rich in tocopherols and unsaturated fatty acids

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Introduction

The food processing of fruit and vegetables, and especially of the *Prunus* genus, generates millions of tons of waste each year. Thus, the valorization of these fruit stones has become an emerging trend for obtaining bioactive compounds. Particularly, fatty acids and tocopherols, which exhibit antioxidant properties and can prevent and mitigate certain diseases, can be extracted from *Prunus* seeds and be used for potential applications in the food and cosmetics industries.

Methods

A novel method based on ultrasound-assisted extraction (UAE) using the green solvents tert-butanol and ethanol has been designed and optimized to obtain oil from *Prunus spinosa* L. seed residues generated before maceration and after maceration in alcohol for 6 months to produce liquor. The obtained oils were characterized by both fatty acid and tocopherol profiles using GC-MS and HPLC-DAD, respectively. Their bioactive potential was evaluated in terms of oxidative stability and antimicrobial activity against several bacteria.

Results

The obtained oils were rich in unsaturated fatty acids, mainly oleic (61-73%), linoleic (18-30%) and palmitic acid (5-7%), together with $\beta+\gamma$-tocopherols (84-100 mg/kg). The processing to which sloe stones are subjected has a significant impact on the oil chemical composition. Overall, the oils obtained after maceration had the highest variety and content of unsaturated fatty acids, the highest total tocopherol content and the best oxidative stability. In addition, these oils showed the most varied antimicrobial capacity against Gram-positive (*S. aureus*) and Gram-negative (*E. coli* and *P. aeruginosa*) ubiquitous bacteria.

Conclusions

A simple, fast, economical and environmentally friendly extraction method has been developed as an efficient alternative methodology to the traditional Soxhlet method with *n*-hexane for the extraction of oil from sloe seed residues.

Specifically, the sloe seed oil obtained after maceration showed the greatest potential for its feasible use in the cosmetics and food industries.

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sciforum-099206: The Effect of a natural ingredient from plum by-products for the preservation of pork burgers

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Introduction

Plum by-products (var. *Cimson Glo*) contain healthy bioactive compounds, such as fibre and phenolic compounds with antioxidant and antimicrobial activity. Consumer concern about chemical additives in meat foods has been increasing. Natural ingredients are a good alternative to replace chemical additives and to preserve meat products. The valorisation process using high hydrostatic pressure (HHP) preserves food products by reducing microbiological counts while maintaining levels of bioactive compounds. The main objective of this study was to evaluate the effect of an ingredient from plum by-products for the preservation of pork burgers.

Methods

In order to obtain a bioactive ingredient from plum by-products (*var. Crimson Globe*), fruits were ground to a fine puree. It was blanched at 80°C for 1 min and treated with HHP (600 MPa 5 min at 10°C). HHP technology does not inactivate the polyphenol oxidase enzyme (PPO), so a previous heat treatment (blanching) was necessary to inactivate the PPO.

Three lots of pork burgers were elaborated: control (traditional recipe without additives or ingredients), sulphite (with methabisulfie), plum 1% (with the ingredient). Instrumental colour, lipid oxidation (TBA-RS), and protein oxidation (carbonyls) were measured in the burgers. In addition, sensory analysis was performed by a panel of 8 expert tasters. The burgers were stored in refrigeration for 8 days.

Results

After 8 days of refrigerated storage, the burgers with the natural plum ingredient presented a higher red colour (CIE a*) and reduced protein oxidation compared to the control burgers. Lipid oxidation development was also lower in burgers with plum than the burgers with sulphites. In the sensory evaluation, the tasters evaluated the burgers with natural ingredients, and no differences were noticed with respect to other formulations.

Conclusion

The natural ingredient from plum by-product is a good alternative for preserving pork burgers. Healthier burgers could be obtained by replacing sulphites with the developed ingredient.

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sciforum-099277: The valorization of orange by-products in food systems as additives and functional ingredients: A review

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CRTAA

Fruit by-products contain several industrially important components, such as polyphenols, dietary fiber, pigments, and nutraceuticals, which are valuable for various industrial applications, particularly in additive production (Wani et al., 2021).

Oranges are among the fruits that generate large quantities of waste. These by-products are applied as additives in the food industry, serving as antioxidants, emulsifiers, flavoring agents, and thickeners (Wadhwa et al., 2016; Khan et al., 2021; and Varmie and Thakur, 2021). Orange pomace, due to its high fiber content, is successfully used in the development of innovative "whole food" products (Oduntan and Arueya, 2019) and also serves as a valuable source for producing fiber-rich yogurt with enhanced functional and nutritional benefits. In addition, the high water content of orange pomace gives it the ability to reduce syneresis and improve the viscosity of yogurt, while also maintaining or enhancing sensory properties (Acharjee et al., 2021). Like pomace, orange peels offer significant benefits and have diverse applications in the food industry. They are used in the preparation of sweets (Mohanta et al., 2021) and incorporated into a range of products, such as healthy biscuits (Teke et al., 2023), functional cupcakes and crackers (Zoair et al., 2019), brewed beers (Pereira et al., 2020), marmalades (Sicari et al., 2018), and orange jam (Teixeira et al., 2020). Orange peels enhance the color, taste, and flavor of these products (Verma et al., 2020). Additionally, they improve the quality of cakes (El-Beltagi et al., 2022) and help preserve products such as corn against *Sitophilus zeamais* (Yves et al., 2021) and ice cream by enriching it with antioxidants (Ademosun et al., 2021).

Fruit waste represents not only a loss of food commodities but also an indirect waste of vital resources. Transforming these wastes into useful products is essential for achieving a sustainable food supply and preserving natural resources.

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sciforum-093158: Time to Recovery from Severe Acute Malnutrition and Predictor among 6-59 months Children in Oromia Regional State, Ethiopia, 2023

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Background: Over ten million children worldwide pass away from severe acute malnutrition without receiving hospital care. The death rate is still very high, even in settings where hospital care is provided in Ethiopia. The study aimed to estimate the median time to recovery and its predictors among 5-59-month-old children hospitalized at the stabilization center at the Boset District Public Health Facility in Oromia, Ethiopia, in 2023.

Methods: Prospective cohort research involving 357 kids was carried out. The study included all 6-59 months Children from local health institutions who met the inclusion criteria for severe acute malnutrition. Face-to-face interviews with structured questionnaires were used to gather data. For analysis, the collected data were imported into Epideta version 3.1 and exported to SPSS version 24.Using a survival curve graph, the Kaplan-Meier method was utilized to compare the children's survival status among various predictor variables. Using Cox proportional hazard regression, time-to-recovery predictors were found. Variables nominated for multivariable analysis during bivariate analysis have p-values less than 0.25The adjusted hazard ratio with a 95% confidence interval was used to interpret the final model.

Results: The overall median recovery time from severe acute was 18.4 days (95% confidence interval: 16.6, 19.4).Adherence of healthcare providers to the national treatment protocol (AHR = 1.68; 95%, CI (1.03, 2.73) and beginning phase 2 by feeding on ready-to-use therapeutic feeding (AHR = 1.47; 95%, CI (1.04, 2.08)) were the variables that were significantly linked with the time to recovery. Vitamin A (AHR = 1.82; 95% CI = 1.07–3.29), shock upon admission (AHR = 0.66; 95% CI = 0.31–0.86), and those treated with oral (PO) antibiotics (AHR = 1.32; 95% CI = 1.04–1.67).

Conclusion: Pumping down at phase 2, following the national protocol, taking vitamin A supplements, and receiving oral (PO) antibiotic treatment aid in the rapid recovery of admitted children suffering from severe acute malnutrition and the slower recovery of those in shock.

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sciforum-093411: Towards sustainable ‘superfoods’: development of regionalized nutritional index for comprehensive life cycle assessment

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The motivation to integrate nutritional and environmental sustainability is increasingly understandable and crucial for ensuring a better future for food systems, especially for emerging market segments such as that of so-called ‘superfoods’. However, it is not an easy task to bring these aspects together, which is why the concept of nutritional Life Cycle Assessment (n-LCA) has emerged. Addressing this tool, special attention should be paid to the purpose of the system, as well as to the strong influences to localized nutritional needs and climate interactions, which may affect the design of the methodological framework. Therefore, the objective of this contribution is the development of a comprehensive regionalized nutritional index to be introduced as functional units (FUs) in the LCA of ‘superfoods’.

The index consists of a nutrient profile model. It was designed to accomplish specific requirements and took Spain as reference for regionalization. The selection of nutrients for encouragement was guided by the nutritional shortfalls of the Spanish population, while negative nutrients were selected for their dietetic importance. The introduction of weighting factors was motivated by the ability of these products to be consumed as food supplements and to cover nutritional deficiencies with a relatively low intake. The integration of all the characteristics gave rise to the Spanish Nutrient Rich (super) Food 9.2 (sNRF9.2) index.

The sNRF9.2 model's validation and testing across various foods successfully fulfils its purpose by aligning with the Spanish Public Health Strategy and providing an adequate prioritization of products. The application of the index identified chia seeds, turmeric, kale, and moringa as the most beneficial. Although the application of FUs in the n-LCA of ‘superfoods’ is ongoing, the preliminary results show its usefulness in conveying integrated information efficiently. Therefore, the model represents an initial step toward advancing research, developing a methodology for future objective environmental measurements of ‘superfoods’.

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sciforum-098741: Trends in Oil Palm Research

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Palm oil, derived from the oil palm tree, has become the leading plant-based oil globally, constituting about 35% of plant oil production due to its high yield and versatile applications in food, personal care products, and biofuels. This paper explores the historical factors contributing to palm oil's dominance, its production's environmental and social challenges, and the trends in global research on palm oil. Using bibliometric analysis of the Scopus Data Base from 1992 to 2022, 12,710 peer-reviewed articles were identified with the terms palm and oil in the titles. Of those, 4,787 of the articles were published in open-access journals and 471 were review articles. The top countries that sponsored oil palm research during these 10 years were Malaysia, Indonesia, Thailand, the United Kingdom, and the United States. The first three in this list are also the top three producers of palm oil. Biology-, engineering-, and chemistry-related journals published approximately 55 % of the articles focused on oil palm research. In addition, the bibliometric data were used to create a keyword co-occurrence network map of articles with palm and oil in the title using the VOSviewer program. Clusters identified research areas including plant genetics, human health, sustainability, palm oil mill effluent management, and oil palm biomass and its applications. This paper highlights the need for future research to address palm oil cultivation's environmental and social impacts.

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sciforum-106142: Upcycling Brewers' Spent Grain into Muesli Bars

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Brewers' spent grain (BSG) composes the largest portion of waste produced during beer brewing. At current, it is usually discarded to landfill or used as livestock feed. However, emerging research suggests it may be a viable functional food ingredient to be used in human foodstuff due to its nutritional properties. Diminishing resources and climate change are putting pressure on agriculture to ensure food security; thus, the food industry has an increasing interest in novel low-cost sources of functional food ingredients. This is further driven by consumers demanding healthy food products and the growing "healthy snack" food category. Muesli bar samples were produced with four different percentages of BSG to oats: 0% (control), 15%, 25%, and 50%. Colour and texture measurements were taken to assess the end-product quality. Total starch, dietary fibre, ash, and protein were measured to determine the nutritional content of the muesli bars. The addition of BSG in muesli bars had a significant effect on colour. BSG caused the muesli bars to increase in darkness and redness, but there was also a decrease in yellowness. No clear trend or significant difference was determined when comparing the hardness of the muesli bars. The addition of BSG in muesli bars had no significant effect (p 0.05) on the level of starch, protein, and ash contents. However, dietary fibre significantly increased in the muesli bars with the addition of BSG (p 0.05). These results show that BSG does have a significant positive effect on muesli bar nutrition by providing higher levels of protein and a significantly greater amount of dietary fibre. This is of great interest to the food industry due to their interest in upcycled foods as a novel low-cost source of food ingredients.

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sciforum-099278: Use of agro-industrial waste for the development of a snack with an improved nutritional profile

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Agri-food industries generate waste that constitutes an environmental problem. These wastes have strong potential to be used in different processes, such as the production of new products, adding value to products, and the recovery of altered environmental conditions, promoting sustainable development. The objective of this work was to develop a snack with an improved nutritional profile, using agro-industrial waste. The following ingredients were used: yatay residue powder, barley bagasse powder, toasted and crushed pumpkin seeds, oil, egg, corn starch, salt, dehydrated onion, and dehydrated garlic. The dough obtained was stretched to an approximate thickness of 2 mm and individual small pieces were cut. Baking was then carried out (200°C for 10 min). The content of proteins, fats, carbohydrates, and fiber was determined for the developed snack. In addition, the textural properties of the product were analyzed using a texturometer, and the sensory properties were investigated using tests with consumers. Regarding nutritional properties, the snack presented the following contribution of macronutrients: proteins (21.8%), fats (22.3%), carbohydrates (47.7%), and fiber (13.7%). According to what is established by the Argentine Food Code, this snack could be called a food with high protein content (>12%) and high fiber content (>6%). On the other hand, the product had a low hardness (6.25 N). With respect to sensory properties, the developed product was well accepted by consumers, who to a greater extent selected the "I like" category (45%), while only a minority chose the "I dislike" category (3%). This is a very positive aspect if one considers that it is a product developed from three agro-industrial wastes. This product could be an interesting alternative as a replacement for typical snacks due to its nutritional contribution and low impact on the environment, thanks to the fact that its main raw materials are agro-industrial waste with potential qualities for human health.

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sciforum-099188: Valorisation of plant beverage by-products with fungi to obtain mycoprotein

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The global food industry is facing significant challenges due to population growth, climate change and shifting consumer preferences. These factors contribute to the increasing demand for sustainable food production and food waste management. The valorisation of food by-products through microbial conversion represents a viable solution to these issues. This study explores the use of filamentous fungi, specifically *Aspergillus oryzae* and *Fusarium venenatum*, to convert food waste into valuable products such as mycoprotein. These fungi present a Generally Recognized as Safe (GRAS) status with diverse enzymatic capabilities to grow on diverse substrates. This research focuses on evaluating their potential to produce protein-rich biomass from different local by-products such as carob, rice, and tiger nut, obtained from the production of vegetable beverages, under different preparation methods, including sterilization, crushing or not, hydration with sterile water, and supplementation with 4% glucose and 2% yeast extract. The results show that in carob and tiger nut by-products, the fungi were able to grow on the uncrushed substrates; however, in the rice by-products, the fungi needed the crushing and supplementation of the substrates to grow efficiently. The protein content of the fungal biomass was analyzed using the Kjeldahl method. The results indicate significant differences in protein content based on the substrate and preparation method. Specifically, the supplementation of crushed substrates led to the highest protein yields in both fungi when cultured on rice. These results highlight the efficacy of using food waste substrates for fungal protein production, which aligns with Sustainable Development Goals and the circular economy. Furthermore, this obtained fungal biomass could be used as a basis for the development of meat analogues. The findings have implications for reducing environmental impact, enhancing food security, and promoting innovative solutions for waste management in the food industry.

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sciforum-099343: Valorisation of sea bream by-products through its inclusion in fish and shrimp burgers

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It is estimated that a large amount of by-products are generated in the fishing industry. Some of these have shown to be of excellent nutritional quality. This work aimed to introduce the by-products generated by the sea bream processing industry as a new ingredient in the production of healthy and sustainable fish and seafood burgers. To this end, the bones, attached muscle and fins from sea bream filleting were treated to obtain flour from these by-products, which was used in the formulation of sea bream and shrimp burgers. Initially, a total of four burger formulations were tested: control samples (C), samples with sea bream and shrimp muscle + 10% by-product flour (BP10), samples with sea bream and shrimp muscle + 7% by-product flour + seaweed mix (sea spaghetti, kombu, nori and wakame) (BP7Sw) and samples with sea bream and shrimp muscle + 7% by-product flour + spirulina (BP7S). After a sensory evaluation with semi-trained panellists, the BP7Sw and BP7S formulations were discarded, especially because of their intense taste and colour. A sensory evaluation with the selected burgers (formulations C and BP10) was carried out with consumers using hedonic scales. The control burgers were highly acceptable, with values above 7 out of 10 for all attributes. The presence of the by-products caused a decrease in sensory acceptability. The odour and flavour attributes were evaluated with values of 7.4 and 7, respectively, but the overall acceptance was slightly below 7, mainly due to the colour attribute. It would be necessary to reduce the percentage of flour or to use some natural ingredient that could improve the burger colour. On the other hand, the use of this by-product flour could be interesting in battered fish products, where the dark colour of the by-products could be masked by the batter.

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Session 4. Food Microbiology

sciforum-098851: A logistic model describing lactic bacteria's ability to modify the organic acid concentration during white wine's malolactic fermentation in new and used French oak barrels

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Introduction: Variation in wine's organic acids during malolactic fermentation (MLF) affects the wine's quality. Manipulation of these parameters during MLF represents a challenge for the wine industry. Evaluation of the fermentation kinetics given the abovementioned parameters is important in order to obtain insights into the MLF process, which can help toward optimisation. Thus, MLF kinetics is utilised to evaluate the MLF ability of two bacteria strains in new and used oak barrels.

Methods: In the present study, the variation in different wine parameters such as pH, total and volatile acidity, and organic acid levels (tartaric, malic, lactic and citric acid) was evaluated during MLF in the same initial wine, utilising two commercial lactic bacteria strains. The fermentation was performed in new and used French oak barrels for each strain: citrate-negative *Oenococcus oeni* (CINEnew, CINEold) and *Oenococcus oeni* (CH35new, CH35old). The obtained experimental data were fitted to the logistic model for each parameter monitored.

Results: The degree of fitting R^2 was greater than 0.9891, revealing that the models are very good predictors of the experimental results for substrate consumption (tartaric acid, malic acid, citric acid), as well as product formation (lactic acid). Using the CINE strains in the used barrel produced significantly higher amounts lactic acid and caused the consumption of the highest amount of tartaric and citric acid compared to the rest of the strains. On the other hand, the combination CH35new resulted in the wine with the lowest amount of malic acid.

Conclusions: The logistic model reflected the change in the pH and content of acids during MLF fermentation very well. The results could adequately describe the changes in the levels of organic acids during MLF fermentation in the barrels. This modelling may be particularly useful for forecasting in industrial-scale production.

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sciforum-103426: Antimicrobial Resistance Genes in Vegetables Fertilized with Pig Manure: A Bibliographic Review on Food Safety

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Intensive pig farming involves raising a large number of animals in enclosed and controlled facilities to maximize efficiency and reduce costs. However, this method has raised concerns regarding animal welfare, environmental sustainability, and the excessive use of antibiotics. This study involved a bibliographic review to gather evidence on the presence of antimicrobial resistance genes (ARGs) in vegetables intended for human consumption that were fertilized with organic amendments derived from pig manure, with a focus on food safety.

We analyzed various scientific articles to assess the prevalence of ARGs in fifteen types of vegetables. These genes were categorized by the antibiotic families that they resist and the mechanisms involved. The analysis revealed that Brassica rapa subsp. chinensis and Allium tuberosum had a higher abundance of resistance genes related to various antibiotic families, identifying a total of seven. Specifically, the genes were primarily associated with tetracyclines, sulfonamides, chloramphenicols, aminoglycosides, and beta-lactams. The predominant resistance mechanism was efflux pumps.

These findings suggest that consuming vegetables fertilized with pig manure could potentially spread antimicrobial resistance genes, posing a risk to consumer health. Therefore, it is essential to implement proper management and treatment practices for organic amendments used in agriculture and regulate the overuse of antibiotics in the animal industry. Such measures will help prevent the transmission of antimicrobial resistance genes and improve food safety.

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sciforum-101907: Biofilm Formation and Immunomodulatory Response of Probiotic Blend

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Background: Gut dysbiosis and an inflamed bowel are growing concerns within mammals, including dogs. Probiotic supplements are safe and effective for restoring the natural microbial community and improving gastrointestinal health. The biofilm formation, antimicrobial activities, and immunological responses of probiotics are crucial to improving gut health and thus were analyzed in this study.

Method: We tested a commercial probiotic blend (LabMax-3), a canine kibble additive, comprising *Lactobacillus acidophilus*, *Lacticasibacillus casei,* and *Enterococcus faecium*, for itsability to inactivate common enteric pathogens on agar plates, itsability to form biofilms on plastics, and its epithelial cell adhesion and immunomodulatory response on the Madin--Darby Canine Kidney (MDCK) cell line.

Results: The probiotic LabMax-3 blend or individual isolates showed a strong inhibitory effect against *Salmonella enterica* serovar Typhimurium, *Listeria monocytogenes*, enterotoxigenic *Escherichia coli*, and *Campylobacter jejuni*. In contrast, heat-killed and probiotic cell-free supernatants did not show any inhibition. LabMax-3 formed a moderate biofilm compared to *Staphylococcus aureus* cultured for 72 h, further confirmed by microscopic imaging. LabMax-3 adhesion to the MDCK cell line (with or without lipopolysaccharide (LPS) pretreatment showed comparable adhesion (*P*0.05) to *Lacticasibacillus casei* ATCC 334, used as a control, which was further verified by Giemsa staining. LabMax-3 also did not show any cytotoxic effects on the MDCK cell line, as measured by lactate dehydrogenase assay. The IL-10 and TNFα ratio of LabMax-3, compared to the *L. casei* control, showed a significant increase (*P*0.05), indicating a more pronounced immunomodulatory effect. TGFβ showed no significant differences between LabMax-3 and *L. casei* treatment.

Conclusions: LabMax-3, a canine kibble additive, can potentially improve canine gastrointestinal health.

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sciforum-103348: Adaptive Mechanisms of Wine Yeast Strains Under Ethanol-Induced Stress

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Yeasts are essential in biotechnological processes like alcoholic beverage production, where they face various stresses, including ethanol-induced stress. Ethanol's solubility in water and lipids allows it to penetrate cell membranes, increasing fluidity, compromising integrity, and enhancing permeability. This can disrupt mitochondrial function, reduce ATP levels, and promote oxidative stress, decreasing cellular vitality.

This study aimed to investigate the effects of ethanol stress on the growth, membrane fluidity, and cell surface morphology of yeast strains from *Saccharomyces cerevisiae* and non-*Saccharomyces* species, specifically *Torulaspora delbrueckii* and *Metschnikowia pulcherrima*. These strains, commercialized as wine starters by AEB SpA, are preserved at the Unimore Microbial Culture Collection (UMCC).

The strains' fermentative fitness was assessed in grape must, and their growth under ethanol stress was evaluated using selective media with varying ethanol concentrations. Membrane fluidity was measured using a Laurdan generalized polarization, and cell surface morphology was observed through Atomic Force Microscopy (AFM).

The results showed that all *S. cerevisiae* strains exhibited high ethanol tolerance, sustaining growth up to 14% (v/v) ethanol, with the most tolerant strains growing even at 16% (v/v). Non-*Saccharomyces* strains showed compromised growth above 10% (v/v) ethanol, though *T. delbrueckii* was less inhibited at 10% ethanol than *M. pulcherrima*. Strains with higher ethanol tolerance and better fermentative aptitude demonstrated increased membrane fluidity at 10% (v/v) ethanol, while less tolerant strains showed lower fluidity. Additionally, non-*Saccharomyces* strains had higher Root Mean Square (RMS) values at 18% (v/v) ethanol, indicating greater instability under high ethanol stress, whereas more tolerant strains had the lowest RMS values, reflecting superior adaptability.

This study provides valuable insights into yeast strains' distinct responses to ethanol stress, highlighting the importance of membrane fluidity and cell surface alterations in developing more resilient strains for enhanced fermentation processes. This research was supported by AEB SpA.

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sciforum-098521: Agro-industrial by-products for potential development of gluten-free Type 1 sourdoughs

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Sourdough (SD) is a fermented dough used traditionally as a natural leavening agent in baked goods. The aim of this work was to microbiologically and biochemically characterize Type 1-SD prepared with agro-industrial by-products such as soybean extruded--expelled meal (SD-SEE) and rice bran (SD-RB). SD-SEE and SD-RB were prepared by mixing tap water and flour in ratios of 2.5:1 and 1.5:1, with dough yields of 350 and 250, respectively. Fermentations were carried out daily at 25°C for 8 h, after a 24 h initial fermentation, with refrigeration at 4°C for 16 h between each fermentation. The backslopping procedure used 25% (w/w) of the previous day's SD as inoculum for the new flour mixture. *Enterobacteriaceae*, lactic acid bacteria (LAB), and yeasts were enumerated on specific agar media under controlled temperature conditions; pH and total titratable acidity were determined; and carbohydrates, lactic, and acetic acid concentrations were quantified using HPLC. After 10 days of fermentation, a significant decrease in pH was observed, from initial values of 6.7 (SD-SEE) and 6.31 (SD-RB) to 4.5 and 4.2, respectively. Furthermore, a notable increase in lactic and acetic acid concentrations (mM) was recorded in both SDs, underlining the significant microbial activity during the fermentation process. Cell densities of presumptive LAB (log CFU g^{-1}) and yeasts (log CFU g^{-1}) increased significantly, while a decrease in carbohydrate content (mM) was observed, indicating their utilization by the fermenting microorganisms. On the other hand, the culture-dependent method did not detect *Enterobacteriaceae* counts (log CFU g^{-1}) due to the acidic environment of SD. Selected LAB and yeast isolates from the final SD samples, identified by the culture-dependent method, revealed *Pediococcus pentosaceus*, *Levilactobacillus brevis*, and *Saccharomyces cerevisiae* as the dominant species. These findings highlight the promising use of industrial by-products in GF-SD, underscoring the importance of continuing to explore and optimize these processes to enhance the nutritional and sensory quality of the final bakery products.

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sciforum-087447: Antagonistic Activity of Probiotic Lactic Acid Bacteria Against Isolates of *Escherichia coli* Isolated from Diarrhoeic Stool Samples

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Probiotics are generally known as live, non-pathogenic bacteria that provide health benefits when consumed. Milk and other fermented dairy products serve as the most common sources of probiotics. This study was carried out to assess the antagonistic activity of probiotic *Lactobacillus* species isolated from a locally fermented milk sample (*Nono*) against clinical isolates of *Escherichia coli* from diarrhoeic stools of children. The milk sample was purchased from a local vendor within Samaru, Zaria. A portion of the milk was immediately taken to the Laboratory of the National Animal Production Research Institute (NAPRI), Ahmadu Bello University (ABU), Zaria, for proximate analysis. Another portion was also taken to the Laboratory of the Department of Microbiology, ABU, Zaria, where it was serially diluted, inoculated onto De Man Rogosa and Sharpe (MRS) Agar using the spread plate method and incubated anaerobically at 37°C for 48 hrs. Isolates with characteristic colonial morphology of *Lactobacillus* species were further identified using Gram staining and biochemical tests, followed by screening for probiotic properties. These were then tested against the clinical isolates of *Escherichia coli* using the agar well diffusion technique. Results for the proximate composition of the milk revealed that it contains moisture (84.57%), crude protein (4.85 %), crude fibre (0.00%), fat (2.25%), ash (1.15%) and carbohydrates (7.18%). Biochemical tests also confirmed the isolates to be *Lactobacillus acidophilus* and *Lactobacillus fermentum*. Out of 18 clinical isolates of *Escherichia coli* tested with the probiotic bacteria, 7 (38.8%) were susceptible, producing a zone of inhibition ranging between 09 and 21mm. From this study, it was concluded that *Lactobacillus* species (which are probiotic bacteria) have antagonistic activity against pathogens such as *E. coli*. It can therefore be recommended that children with diarrhoea be treated with foods such as fermented dairy products containing these lactic acid bacteria.

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sciforum-103161: Antimicrobial Action of Organic Acids Vs. Bacteria of Food Origin

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Organic acids are antimicrobial products that act against food-contaminating bacteria, representing potential alternatives to the antimicrobials used in animal production. The growing resistance to therapeutic antimicrobials highlights the importance of evaluating new antimicrobial alternatives. This study aimed to evaluate the antimicrobial effect of Lactic Acid P.A.—PROC9 Industry and of a mixture of organic acids, composed of lactic acid, formic acid, acetic acid, propionic acid, and copper sulphate pentahydrate against strains of *E. coli*, *Salmonella* sp., and *Staphylococcus aureus*. For this purpose, the disk-diffusion methodology (Kirby and Bauer method) was used. The isolated strains were diluted in saline solution and sown on plates with Müeller–Hinton agar culture medium. Disks impregnated with 10 µL of the lactic acid P.A. and the mixture of organic acids were applied to the plates. The results obtained were as follows: the inhibition halos on the plates treated with lactic acid P.A. were 1.89 cm for *Salmonella* sp., 2.4 cm for *E. coli,* and 2.8 cm for *Staphylococcus aureus*. With the mixture of organic acids, the halos observed were 2.2 cm for *Salmonella* sp., 2.7 cm for *E. coli,* and 4.9 cm for *Staphylococcus aureus.* The results indicate that lactic acid has an excellent antimicrobial effect against these strains and that its antimicrobial action is related to the antimicrobial response of the organic acid mixture, since lactic acid is a component of this product. The greater efficacy of the organic acid mixture observed against *Staphylococcus aureus* suggests a possible synergy between the different organic acids present in the mixture.

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sciforum-103218: Antimicrobial activity of medicinal mushroom *G. lucidum* produced by submerged liquid fermentation

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For centuries, people have produced mushrooms by solid-state fermentation, which results in the accumulation of a large amount of waste. As an alternative, the production of mushrooms by submerged liquid fermentation is used today because it is more environmentally friendly. The purpose of this study was to investigate the antimicrobial activity of medicinal mushrooms produced by submerged liquid fermentation towards selected pathogenic microorganisms. Two medicinal mushroom samples were used—*Ganoderma lucidum* from Asia, Malaysia (Kuala Lumpur) and *Ganoderma lucidum* from Europe, Serbia (Belgrade). The mycelium of both samples was dried to a constant mass and powdered. An initial concentration of the water solution of 80 mg/mL was prepared from the powder. Using the microdilution method and determining the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC), antimicrobial activity was tested on Gram-positive bacteria (*Enterococcus faecalis*) and Gram-negative bacteria (*Salmonella enterica*) at sample concentrations of 40, 20, 10, 5, 2.5, and 1.25 mg/mL. The antibiotic gentamicin was used as a control. An inhibitory effect against *E. faecalis* was determined in both tested samples (MIC - 20 mg/mL). Despite the different conditions under which they were grown, the mycelia of both tested mushrooms show a similar antimicrobial potential, which could be due to the presence of ganoderic acid, a compound known for its bioactivity. *S. enterica* was more resistant to the extracts of the mycelia examined (MIC - 80 mg/mL). The difference in the structure of the cell wall of Gram-positive and Gram-negative bacteria directly affects their resistance to bioactive substances such as antibiotics or mushroom extracts.

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sciforum-099428: Antimicrobial susceptibility of *Staphylococcus aureus* strains against *Melipona bicolor* honey

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Strains of *Staphylococcus aureus* have shown a high rate of resistance to conventional antimicrobials; on the other hand, stingless bee honey has shown antimicrobial capacity and may be an alternative product to fight against these infections. There are no reports about the antimicrobial activity of honey from the *Melipona bicolor* species. In this context, the aim of this study was to test *Melipona bicolor* honey against strains of *Staphylococcus aureus*, a strain that is multi-resistant to antimicrobials (Clindamycin, Erythromycin, Streptomycin, Oxacillin, Penicillin, and Vancomycin) and to determine the minimum inhibitory concentration. The strain of *Staphylococcus aureus* used was isolated from raw milk, collected directly from a dairy farm and stored in a solid nutrient medium at room temperature. The antibacterial potential of *M. bicolor* honey (pH 3,07) against multidrug-resistant and sensitive *S. aureus* strains was assessed using the minimum inhibitory concentration (MIC) method in 96-well microdilution plates. From the isolated colonies, the inoculum was prepared with a standard concentration of colony forming units (CFUs) at a concentration of 0.5 McFarland (1.5 X 10^8 CFU/mL). The dilutions of honey tested were made at concentrations of between 5 and 1000 µl by sterilization through filtration with a 0.22µm 30mm PES membrane syringe filter and the dilution of the filtered aliquot in Muller–Hinton broth (MHB). Then, 50 µl of each dilution tested was added to the wells of 96-well plates, followed by 50 µl of the suspensions of the bacteria tested in isolation. The microplate was then incubated at 35°C for 24 hours. The MIC value was then investigated by applying 30 µl of the viability and aerobic cell metabolism detector dyes Resazurin and 2,3,5-triphenyltetrazolium chloride (TTC). The growth of the strains was observed at all the concentrations tested, so the antimicrobial effect of *M. bicolor* honey against the *S. aureus* strains studied was not confirmed.

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sciforum-099420: Antimicrobial susceptibility of *Staphylococcus aureus* strains against organic acids

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Staphylococcus aureus is a pathogen that produces toxins associated with clinical and food-borne diseases. For that reason, it is crucial to monitor and control this microorganism during food production and industrialization to ensure food safety and protect consumers' health. In light of increasing concerns about bacterial resistance and its impact on public health, organic acids are being considered as potential alternatives to antimicrobials in livestock production. This study aimed to investigate the susceptibility of *S. aureus* to a blend of organic acids (Acidal ML ® - Impextraco NV) in vitro and in a controlled environment by assessing the Minimal Inhibitory Concentration and Minimum Bactericidal Concentration of the product. The recommended prescription of Acidal ® ML is 0.1% in vivo, but we tested amounts of 0.0125%, 0.025%, 0.05%, 0.10%, 0.20%, 0.25%, and 0.30% in 96-wells microplates using Muller Hinton Broth and 18-hours strains in Brain Heart Infusion (36°C) and thinned until 0.5 on the MacFarland scale. In this way, the results appointed a Minimal Inhibitory Concentration and Minimum Bactericidal Concentration of Acidal ® ML against the tested *Staphylococcus aureus* strain of 0.1% and 0.25%, respectively. In conclusion, the concentration recommended by the product's label proved effective in inhibiting bacterial growth, although a higher amount was necessary for a bactericidal effect. The dosage must be tested in vivo for better comprehension.

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sciforum-098384: Assessment of safety and probiotic properties of soil *Bacillus* spp. isolated from Mount Karadzica

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Currently, while specific *Bacillus* species are utilized as probiotics, the exploration and integration of new, highly effective and safe probiotic strains remain a crucial concern within the fields of microbiology and the food industry. The focus on biodiversity within soil ecosystems has markedly intensified over the past two decades. Numerous studies have been conducted to isolate probiotic bacteria from various sources. This study aimed to isolate and evaluate the probiotic and safety potential of *Bacillus* spp. isolated from undisturbed soil. Forty-six spore-forming, Gram-positive *Bacillus* strains were isolated from four soil samples and assessed for in vitro probiotic potential. The tolerance to acidic pH, 0.3% bile salts, antimicrobial activity against foodborne pathogens, and antibiotic susceptibility was investigated, using physiological and biochemical tests. The preliminary antimicrobial screening showed that seven *Bacillus* spp. isolates inhibited the growth of *Salmonella enterica* ATCC 10708, with the highest activity exhibited by strain B30 (19.84 mm). The results revealed that the selected seven isolates were tolerant to 0.3% bile salts and survived incubation for 24 and 48 hours in nutrient broth at pH 3.00. An antibiotic susceptibility test of the isolates showed that the isolates are sensitive to the twenty-four tested antibiotics. Overall, this study has indicated the possibility of isolating potential probiotic bacteria from undisturbed soil and their application as candidates for enhancing the nutritional quality of diets and as safe additives in functional foods.

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sciforum-103116: Bioactive influence of Cell-Free Supernatant from *Lactobacillus plantarum* strains towards probiotic Bifidobacteria: a preliminary study on growth and survival kinetic parameters

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The positive influence of probiotic strains on human health has become increasingly evident and there are numerous scientific studies that highlight how the interaction between different probiotic strains provides even more beneficial action.

Lactobacilli and *Bifidobacterium* spp. are among the most studied probiotic and/or functional genera and are prominent members of the normal flora of the gastrointestinal tract throughout the host's life.

Today's scientific research in the field of probiotics, prebiotics, and parapostbiotics focuses its attention on the study of the mechanisms that underlie the interaction between these two genera of microorganisms and between the multiple strains belonging to the different species.

This paper shows the first results of a preliminary study on the bioactive action of cell-free supernatants obtained by potential probiotic *Lactobacillus plantarum* strains towards probiotic strains of Bifidobacteria. In particular, the experimental data obtained were modelled using the Gompertz equation in order to monitor the effectiveness of the bioactive effect of the supernatant on the kinetic parameters of the microbial growth curve. Specifically, the bioactive action was evaluated both in the growth and death phases to also evaluate how the bioactive action acted on the survival of the target strains.

A stimulation/inhibition effect during the bifidobacteria growth and death phases, respectively, were recorded.

In our experimental conditions, a potential “prebiotic” activity and/or an inhibition exerted by the cellular extracts of *L. plantarum* strains on the growth and death of bifidobacteria was observed; furthermore, a strain dependence on the stimulating strains and a species dependence on the stimulated bacteria was recorded.

This paper could be considered as the first report about the study of the bioactivity of cell-free supernatants from probiotic *L. plantarum* strains on Bifidobacteria.

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sciforum-089986: Biofilm development and removal on/from HDPE coupons of various colors using selected sanitizing treatments

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Packing facilities for fresh blueberries have developed various protocols to clean/sanitize harvest containers to prevent cross-contamination between berries and their surfaces. However, it is unknown whether these cleaning/sanitizing practices could effectively remove biofilms formed by microorganisms from blueberry production/packing environments.

This study investigated the effectiveness of some cleaning and sanitization practices in removing biofilms formed on coupons of high-density polyethylene (HDPE), a material of blueberry harvest containers. It also assessed whether the color of HDPE affected the formation and removal of biofilms.

Three inoculums of fecal coliforms isolated from fresh market blueberry harvest/packing environments were used to develop biofilms on HDPE coupons with various colors (n=7). Coupons of selected colors (yellow and orange) with developed biofilms were treated with sterile water, 100 ppm sodium hypochlorite, and 2% liquid dish soap, respectively with or without a 5-min soaking, manually or using a benchtop wash machine for 1 min. The experiment was replicated twice, and each treatment was duplicated. Biofilms or their residues were quantified using the crystal violet binding assay. Data collected were analyzed using the Analysis of Variant of the SAS.

Treatments with soaking and using the bench top wash machine removed significantly ($P \leq 0.05$) more biofilms from coupons than those without soaking and manual washing. Sodium hypochlorite-treated coupons had significantly more biofilm residues than dish soap-treated coupons, while no differences ($P > 0.05$) in biofilm residues were observed between these two types of coupons and water-treated coupons. Biofilm residues on the orange coupons were significantly higher than on the yellow coupons, although coupon color did not have a significant impact on biofilm formation.

The concentration of sanitizer and detergent used by some packing facilities may not be adequate to eradicate biofilms from berry-contact surfaces. The study reveals the challenges of maintaining the hygiene of blueberry harvest containers.

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sciforum-103401: Biomass and Pigment Production of *Monascus purpuresus* in *Chenopodium quinoa*-Based Culture Media

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The fungal biomass of *Monascus purpureus* is studied for its relationship to productivity and can be measured directly or indirectly. In addition, the pigments produced by the fungus have a high economic value in different parts of the world. In this research, the biomass and pigments of *M. purpureus* colonies growing on *C. quinoa*-based culture media that demonstrated the greatest significant difference in radial growth were analysed. Fungal biomass was measured by dry weight (g) and N-acetylglucosamine (mg) by UV-Vis spectrophotometry at λ=537 nm, and conversion was performed with the calibration curve. Pigment measurement was calculated by UV-Vis spectrophotometry as (AU/ml) at λ=400, 470 and 500 nm for yellow, orange and red pigments, respectively. The analysis time of the samples was 288 hours, where the treatments that presented the greatest significant difference were the quinoa media supplemented with sodium chloride and monosodium glutamate. The results of N-acetylglucosamine and biomass per dry weight were 1.41 and 2.26 times greater in the presence of sodium chloride than monosodium glutamate. In addition, yellow, orange and red pigments were found with factors of 1.99, 0.84 and 1.23 in the presence of sodium chloride when compared to monosodium glutamate. The use of *C. quinoa*-based culture media supplemented with carbon, nitrogen and salt has an effect on the production of fungal biomass and natural pigments.

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sciforum-103291: Characterization of *Diaporthe toxica* associated with lupin beans: growth, spore production, phomopsin-A and alkaloid biosynthesis

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Introduction

Increasing interest in lupin as a plant-based protein source for human consumption has raised concerns regarding its safety. Actually, lupin could be affected by a phytopathogenic fungus named *Diaporthe toxica*, which can produce phomopsin-A (PHO-A). This mycotoxin causes hepatic damage in animals and has been recently recognised as potentially harmful for humans. Given the limited literature available on this species, an investigation into its metabolism and PHO-A biosynthesis pathway is necessary.

Methods

Oat Flake Medium (OFM), Potato Dextrose Agar (PDA), yeast extract, peptone, Dextrose Agar (YPD), Malt Extract Agar (MEA) and Water Agar (WA) were inoculated by using a mycelial plug and incubated at 25.0 °C for 21 days to evaluate the growth of *Diaporthe toxica* on different substrates using mycelium diameter measurements. The same agar media, together with WA with lupin beans, were used to evaluate the spore production. Furthermore, WA with lupin beans inoculated following three different protocols was used to investigate the production of PHO-A and alkaloids.

Results

The results revealed a high adaptability of the *Diaporthe toxica* that grew on all the media, even if the spore production was only achieved on WA with lupin beans. PHO-A production evidenced a diverse fungal adaptation in the three different scenarios. In ideal conditions, PHO-A reached 1082.17 ppm concentration after 21 days, while in the conditions encountered in commercial lupins it reached values of 75.09 and 155.83 ppm depending on the inoculation technique. The quantification of alkaloids revealed that their concentration increased over time in inoculated lupin beans.

Conclusions

The results highlighted an adaptability of *Diaporthe toxica* to different media, and differences in PHO-A production. Conversely, spore production was only evident in one case. Alkaloid production poses new challenges, but further research is necessary. In conclusion, a significant update was provided on *Diaporthe toxica* that might help to contain the related risks.

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sciforum-101417: Characterization of Shiga toxin-producing Escherichia coli in strains isolated from raw and cooked hamburgers in Argentina

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In Argentina, Shiga toxin-producing Escherichia coli (STEC) is the primary aetiological agent of haemolytic uremic syndrome (HUS), and E. coli O157:H7 is the predominant serotype. The consumption of undercooked ground meat or cross-contamination during food preparation are also common routes of STEC infection.

In Buenos Aires, as a part of monitoring, samples of raw and cooked hamburgers were obtained from a fast food restaurant and were studied at the local bromatology laboratory. The isolated STEC strains were pheno-genotypically characterized using traditional methods and sent to the National Reference Laboratory for massive whole-genome sequencing. The strains were sequenced with the Illumina platform and were analyzed based on a command line scheme: FastQC, Kraken, MLST, ARIBA (Virulencefinder/Plasmidfinder/Resfinder), srst2, Unicycler, ipcress, Prokka, and Snippy. In all samples of raw and cooked hamburgers, E.coli O157:H7 stx1a/stx2c/eae/ehxA (ST7816) was isolated, and the following virulence genes were detected: astA, iha, traT, espA, espB, espJ, gad, chuA, eae, iss, nleA, nleB, nleC, ompT, terC, tir, stx1, and stx2. These virulence genes are mainly related to adherence, secretion system, and toxins. The strains are not part of a hypervirulent clade. In the sequences, no genes associated with resistance were detected and showed only seven SNPs of difference, indicating high genetic similarity between the isolates. In our country, the prevalence of HUS in the pediatric population has reached worrying numbers and the consumption of hamburgers in fast food chains is a common practice. We consider it essential that random samples continue to be studied in this type of establishments, since we were able to demonstrate that the cooking process affects the presence of the pathogen in food. The application of good hygiene practices in the handling of said foods is important to reduce the risk of transmission of STEC infection.

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sciforum-102369: Coating of Chitosan and Oregano Essential Oil (*Origanum vulgaris*) as a Biocontrol Agent of the Phytopathogenic Fungus *Penicillium brevicompactum* in Cassava (Mandioca spp.) and Yam (Dioscorea spp.)

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Tubers such as cassava (Mandioca spp.) and yam (Dioscorea spp.) are sensitive to fungal deterioration, affecting their production and marketing. This has generated the need to develop treatments that minimize damage in the post-harvest stage. This research evaluated the in vitro inhibitory capacity of chitosan- and oregano essential oil (OEO) (Origanum vulgaris)-based coatings against the fungus *P. brevicompactum* due to their antifungal, antimicrobial, and anti-inflammatory properties. For this purpose, tests were performed to find the minimum inhibitory concentration (MIC) corresponding to 0.1562 μL/mL, which decreased the growth rate of the microorganism dependent on the OEO concentration. When using sublethal concentrations of OEO, an inhibition percentage of 82.5% ± 1% was obtained at a concentration of 0.0781 μL/mL. The kinetic analysis parameters for the fungal growth were estimated from the modified Gompertz model A (maximum diameter reached by the colony during stationary phase), ?m (maximum growth rate), and λ (lag phase duration) for both the control and the treatments. In addition, a hypothesis test for media comparison of growth intervals was performed, resulting in A: 2.5768, ?m:0.325762, and λ:0.20962 for controls, and A: 1.033289, ?m:0.49902, and λ:5.73742 for treatments, giving a significant difference within a 95% confidence interval. Morphological changes in the cellular structure of the fungus could be observed by optical microscopy, noting a considerable increase in the permeability of the plasma membrane. Likewise, morphological changes in the structure of the mycelium were noted. The results of this research allow for the visualization ofchitosan- and OEO-based coatings as a sustainable alternative for the post-harvest preservation of tubers such as cassava and yam.

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sciforum-103400: Determination of the Fungal Biomass via N-Acetyl Glucosamine Analysis in the Production of an Inoculum of *Monascus purpureus* Using Quinoa Flour

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Solid substrate fermentation is a technique widely used in mushroom production, where it is common to use 'Mushroom spawn' from cereals as a substrate for the first stage of edible mushroom production; this technique may take up to a few weeks, while submerged fermentation, which is a technique used to produce mycelium (inoculum), can be completed in a shorter time. Mycelium is the biomass of the mushroom, and it can be measured indirectly via N-acetylglucosamine analysis. In this research, *Monascus purpureus* was used because its most important characteristic is to produce secondary metabolites with bioactive properties, which have been used in different processes in Chinese culture. In addition, *Chenopodium quinoa* (quinoa), a grain with a high protein value, was used as a source of substrate. For this research, a culture medium was employed with a volume of 100 mL, a 4% substrate, and 0.01% sodium chloride, adjusted to pH 6, incubated at 30 °C with 120 rpm agitation. Every 24 hours, one group was removed in order to analyse the concentration of N-acetyl glucosamine and the yellow, orange, and red pigments during a period of 168 hours. It was observed that the fermentation can be stopped at 120 hours (p0.05), obtaining a production at 32.847 ± 0.977 mg/gDM of N-acetyl glucosamine and absorbances of 0.746 ± 0.012, 0.448 ± 0.015, and 0.411 ± 0.015 for the yellow, orange, and red pigments, respectively. The biomass obtained was tested as an inoculum in solid fermentation with quinoa grains, where the fungus showed an adequate development. In this research, an inoculum was obtained with good results in a short period of time, which can be used in solid fermentations at a larger scale.

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sciforum-102485: Development of probiotic containing soy-based functional foods with novel *Weissella* spp.

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Fermented soy foods are excellent sources of probiotics and can significantly enhance the nutritional profile of a diet. Our study aims to compare the physicochemical properties of soymilk fermented with five probiotic-type strains of *Lactobacillus (Lb)* and five newly isolated strains of *Weissella (Ws)*. Soymilk fermented with novel *Ws*- and *Lb*-type strains at 12, 24, 36, and 48 hours of fermentation was used to study which strain is more effective in boosting the nutraceutical potential of fermented soymilk. Fermentation studies showed that soymilk fermented with novel strains of *Ws*- and *Lb*-type strains revealed an increased total antioxidant activity (2.21 times in *Ws*- and 2.14 times in *Lb*-fermented soymilk), decreased phytic acid (6.23 times in *Lb;* 4.12 times in *Ws*-fermented soymilk), and increased free mineral content for iron (5.38 in *Lb*; 3.16 times in *Ws*-fermented soymilk) and zinc (2.38 times in *Lb*; 3.96 times in *Ws*-fermented soymilk) compared to the unfermented soymilk. We also detected the hydrolysis of isoflavone glucoside into aglycones, i.e., an increase in daidzein, genistein, and glycitein (3.86/1.51-fold, 3.20/1.58-fold, and 3.31/1.55-fold for *Lb* and *Ws*, respectively), along with a decrease in hexanal (40.441-fold), and a rise in the viable count of bacteria. The novel strains of *Weissella* behaved similarly to the well-known *Lactobacillus*-type strains. A mixed fermentation method and further development of synbiotics in the future could use the two strains found in each group, *Lactobacillus rhamnosus* JCM1136 and *Weissella confusa* 30082b.

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sciforum-101275: Effect of environmental factors on biofilm formation by *Pseudononas aeruginosa* isolated from dairy processing lines

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Biofilms are structured communities of bacterial cells enclosed in a self-produced polymeric matrix and attached to biotic or abiotic surfaces. Production of biofilms is a universal strategy adopted by bacteria to increase their survival chances against harsh environment including physical and chemical antimicrobial treatments.

In dairy industries, *P. aeruginosa*, classified as spoilage bacteria, can colonize different materials and equipment such as tanks, pipes, pumps and contact surfaces. This can pose challenges in terms of controlling microbiological contamination. Indeed, this bacterium can form resistant biofilms, which makes their elimination difficult and promotes their persistence in the industrial environment.

This study focuses on the influence of carbon source, surface type, temperature and contact time on biofilm formation. The objective was to evaluate the ability of three strains of *P. aeruginosa* to form biofilms in the presence of different sugars (lactose, glucose and galactose), on different types of surface (PVC and Teflon) at different temperatures (25, 30 and 40°C). The methodology involved incubating strains with various concentrations of sugars (0.5, 1, 1.5, 2, and 2.5%) and assessing biofilm formation at specific time intervals (24, 48 and 72).

The results show that sugars have variable effects on biofilm formation, depending on the strain and incubation time. Glucose promoted high initial biofilm formation (OD=1.64). After 72 h, glucose became the most significant inducer of biofilms for all strains. Additionally, our research demonstrated the ability of the strains studied to form biofilms on Teflon surfaces.

In conclusion, the values obtained indicate that certain combinations of sugars, temperatures and incubation times particularly favour the formation of biofilms by the *P. aeruginosa* strains studied, highlighting the need for rigorous control of these parameters in dairy industries. Understanding these interactions will help to develop control strategies to maintain food quality and safety in such industry.

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sciforum-102486: Essential Oil of Clavo (*Syzygium aromaticum*) as a Biocontrol Agent for the Phytopathogenic Fough Fungi *Penicillium brevicompactum* and *Penicillium expansum*

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Fruits and vegetables are highly consumed because they are rich sources of essential vitamins, minerals, fiber, and antioxidants, which are vital for our health. However, they are often vulnerable to attacks by fungi, particularly of the Penicillium genus, leading to significant economic losses. In response, this study examines the antifungal properties of clove essential oil (*Syzygium aromaticum*) on two types of phytopathogenic fungi, namely *Penicillium brevicompactum* and *Penicillium expansum*, through both lab experiments and computer simulations (in vitro and in silico). The findings indicate that the essential oil inhibited the growth of the fungi, with minimum inhibitory concentrations of 0.312 µL/mL for *P. brevicompactum* and 0.156 µL/mL for *P. expansum*. Moreover, sublethal concentrations of the oil resulted in inhibition rates of 58.3% ± 2.8% for *P. brevicompactum* and 51.7% ± 3.2% for *P. expansum*. Additionally, the essential oil-induced changes in the fungi's structure increase the permeability of their cell membranes and reduce spore germination, particularly in *P. brevicompactum*. Lastly, the study employed computer simulations to explore the potential morphological targets affected by the essential oil's components. The results suggest that clove essential oil could be a promising alternative for controlling phytopathogenic fungi and mitigating post-harvest losses, such as using it in edible coatings, which is important in the food industry.

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sciforum-099094: Evaluating the Efficacy of Four Preservatives Against Pathogenic Bacteria in Meat Analogues

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Meat products represent a large proportion of the human diet and can be included into the diet in a variety of ways. Recently, with changing consumer perceptions of sustainability, some food intolerances, and even animal welfare concerns, trends have emerged to reduce meat consumption. To achieve this, the industry has had to come up with vegan or vegetarian alternatives—meat analogues—"products that mimic meat in their functionality, bearing similar appearance, texture, and sensory attributes to meat".

Meat analogues typically include synthetic chemical preservatives in their formulation, namely, ascorbic acid, nitrite and nitrate, or phosphates. This study aimed to evaluate the effectiveness of four clean label alternatives as replacements for conventional chemical preservatives. These preservatives include cultured dextrose, phenolic compounds obtained from *Olea europaea* by-products, grape extracts, and vinagre derivatives. Each preservative has different properties, and the focus of this research was to determine which one(s) has a greater activity against pathogenic bacteria such as *Clostridium sporogenes* (DSM 767, NCA 3679). and a cocktail of *Listeria* monocytogenes (2542, FSL J1-177, FSL J1-031, FSL N3-013, FSL R2-499, FSL N1-227 and MF4077), while also preserving the product during its shelf life. This study involves the production of laboratory-scale meat analogues using the original industry formulation and formulations with each clean label preservative, followed by inoculation with pathogenic bacteria. The evolution of the pathogens was monitored, and the shelf life of the products was evaluated according to ISO standards. The results show positive prospects for clean label alternatives to replace current preservatives with healthier alternatives, in particular grape extracts and cultured dextrose, which have shown the best antimicrobial properties when added to meat analogues. However, further studies need to be conducted to assess the safety of these preservatives and their impact on the technological properties of meat analogues.

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sciforum-099651: Evaluation of Bacteriostatic Effect of Rosemary and Oregano Essential Oil Against a Non-Pathogenic Surrogate of Salmonella spp. (E. coli ATCC 9637)

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Food preservation and safety is paramount to our continued survival an good health. Bacterial growth in food products is a significant obstacle to achieving food safety. Such growth can lead to spoilage and food-borne illnesses, which becomes a safety risk to consumers. As such, managing bacterial growth in food is essential to maintaining food quality and safety. The use of food additives is one answer raised to address this problem. However, some synthetic antimicrobial additives pose minor to serious health risks to consumers. Natural antimicrobial additives are potential alternatives to synthetic additives that are able to control microbial growth without significant health risks. This study evaluated the bacteriostatic effect of rosemary (REO) and oregano essential oil (OEO) against E. coli ATCC 9637, a non-pathogenic surrogate of Salmonella spp. in culture and in raw chicken breast. Final concentrations of 1.5% REO and 0.15% OEO were added to cultures of E. coli ATCC 9637 and the growth rate was evaluated. Raw chicken breast pieces were dipped in E. coli ATCC 9637 culture prior to being dipped in 1.5% REO and 0.15% OEO. The chicken samples were then taken at two-day intervals and the growth of E. coli ATCC 9637 was analysed. No growth was observed in culture after a 24 hr incubation period. The chicken samples treated with 1.5% REO resulted in a 0.69 log reduction compared to the positive control, while those treated with 0.15% OEO resulted in a 0.31 log reduction (p 0.05). This shows that REO and OEO are effective against E. coli ATCC 9637 and have promise as natural antimicrobial agents.

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sciforum-098487: Evaluation of different virulence factors across *Acinetobacter* species

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Several *Acinetobacter* species are prevalent in various food-related environments, including fresh produce, dairy products, and meat. These species have been identified as potential causative agents of a wide range of foodborne diseases, with an impact for both consumer health and food safety. While they have traditionally been considered low-grade pathogens, recent studies suggest that *Acinetobacter* infections are complex and multifactorial. This complexity involves numerous virulence determinants that interact to facilitate contamination and infection. Understanding these factors is crucial, though much remains to be explored. The current research aims to assess the presence of virulence factors common to foodborne pathogens in *Acinetobacter* species. Different virulence factors (haemolysis, protease, lipase, phospholipase, and motility) were tested in 21 *Acinetobacter* spp. isolated from meat. All the experiments were performed in triplicate, with positive and negative controls used. Isolates of *Acinetobacter johnsonii* have been shown to possess virulence determinants such as lipase and phospholipase, which play a critical role in bacterial pathogenicity and survival in the food environment. Additionally, emerging species such as *Acinetobacter portensis* and *Acinetobacter guerrae* have shown similar virulence factors, although these species are still being investigated. Understanding the virulence factors of *Acinetobacter* species is crucial for developing strategies to mitigate their risks in the food supply chain. Despite being classified as low-grade pathogens, their potential to cause foodborne illness is significant.

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sciforum-098725: Evaluation of molds and yeasts in *Melipona bicolor* honey

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The honey of stingless bees creates an unfavorable environment for pathogenic microorganisms due to its low pH and high acidity, making it safe for human consumption. However, it is prone to the development of molds, yeasts, and lactic acid bacteria at a pH below 4.5. Therefore, in this study, the objective was to quantify molds and yeasts in stingless bee honey and identify the detected microorganisms. For this purpose, the mold and yeast load in *Melipona bicolor* honey was quantified using acidified potato agar, and the present yeasts were identified molecularly through genomic DNA extraction and amplification of the ITS region by PCR using the primers V9G and ITS4. Initial denaturation was at 94°C for 5 minutes, followed by 35 cycles of denaturation at 94°C for 30 seconds, annealing at 48°C for 30 seconds, extension at 72°C for 1 minute, and a final extension step at 72°C for 10 minutes. DNA sequencing was performed with the BigDye kit on the ABI3500 sequencer, again using the V9G and ITS4 primers. Preliminary yeast identification at the genus level was conducted using the NCBI online BLAST tool. No molds were observed in the samples, with the exclusive growth of yeasts with similar macroscopic characteristics observed in all samples, with counts ranging from 3.28 to 7.30 log CFU.mL^{-1} in raw honey. The yeast was identified as belonging to the genus *Starmerella*. Although a high quantity of yeasts was observed in the analyzed honey, molecular analysis indicated that they were non-pathogenic microorganisms for humans and associated with stingless bees, highlighting a relevant symbiotic relationship between these insects and the microorganisms present in the honey.

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sciforum-099013: Evaluation of probiotic fermentative capability of Sri Lankan traditional rice variety "*Sudu Heenati*": compositional and physico-chemical characterization

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Rice is an Asian crop and a staple food in Sri Lanka. Rice varieties passed from generation to generation are known as "traditional" rice varieties that offer health benefits such as relief from diabetes, heart diseases and cancers. Past research has proven that "*Sudu Heenati*" contains high amounts of resistant starch and protein and antioxidants and has other nutritional properties. Resistant starch is a prebiotic ingredient that promotes the growth of probiotics and allows fermentation. According to the International Scientific Association for Probiotics and Prebiotics (ISSAP), probiotics are "live microorganisms that, when administered in adequate amounts, confer a health benefit on the host". Probiotics play a significant role in diarrhea, lactose intolerance and irritable bowel syndrome. The probiotic fermentative capability of "*Sudu Heenati*" was evaluated through the viable probiotic cell count and selected physico-chemical and compositional parameters of fermented and unfermented slurries. Rice flour slurry was prepared at 121°C for 15 minutes, inoculated with 2% (w/w) *Lactobacillus acidophilus* (LA 5) freeze-dried culture and incubated at 44°C. The viable cell count of the fermented slurry was 9.26±0.43 colony forming units per gram in $\log_{10}$ ($\log_{10}$cfu/g), which exceeded the required limit (8.0$\log_{10}$cfu/g) to label it a probiotic food. During the fermentation, the titrable acidity, pH and viscosity of the unfermented slurry, 0.09±0.00 (% by weight), 6.62±0.00 and 818.26±6.01 cP, significantly varied (p0.05) to 0.14±0.01 (% by weight), 4.71±0.00 and 1701.70±3.12 cP in the fermented slurry, respectively. Probiotic fermentation enhances the production of organic acids, which reduces the medium pH. Viscosity was increased due to the exopolysaccharide (EPS) production by LA 5. Compositionally, only the ash content (% weight on a dry basis) was significantly increased (p0.05) from 1.89±0.04 to 2.45±0.17 in the fermented slurry. Significant changes in carbohydrate, protein or fat were not observed in the fermented slurry. However, the "*Sudu Heenati*" variety is a suitable substrate for LA 5-incorporated probiotic functional foods with favorable technological properties.

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sciforum-099093: Evaluation of the use of propolis and sodium hypochlorite as methods to control contamination of free-range eggs

Giovana Scuissiatto de Souza [1,2], Julia Unicki Philipp [2], Elisana Julek [2,3,*], Gabriela Campi Voltolin [2], Guilherme Souza Cavalcanti de Albuquerque [4] and Julia Arantes Galvão [1,2]

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In recent years, the production of free-range eggs has increased due to growing consumer interest in animal welfare. However, this production method introduces new sanitary challenges due to free-range housing, which can increase the microbiological risk. It is therefore essential to implement proper egg sanitization practices to avoid contamination by harmful microorganisms. The use of propolis and sodium hypochlorite can be effective in improving the bacteriological quality of eggs, due to their antimicrobial properties. The aim of this study was to evaluate the effectiveness of 1% sodium hypochlorite and 30% propolis extract as methods of controlling egg contamination on a free-range farm located in southern Brazil. Eighteen eggs were collected and divided into three groups: six eggs were sprayed with 30% propolis, six were sprayed with 1% sodium hypochlorite and six eggs were used as controls, without spraying. For shell analysis, 6 eggs from each group were rinsed in 0.1% buffered peptone water. For the contents, two yolks from each group were used, adding peptone water in a ratio of 1:9. Mesophilic aerobes were counted using the plate count agar (PCA) method and colonies were counted after 48 hours of incubation (36°C). On eggshells, the results were as follows: propolis: 0.6 log UFC/mL, sodium hypochlorite: 1.3 log UFC/mL, control: 3.26 log UFC/mL. In the egg contents, the propolis and sodium hypochlorite treatments had 0 log CFU/g, while the control group had 4.78 log CFU/g. It can be concluded that both methods were able to reduce the microbiological load of the eggshell and egg contents, with propolis being the most effective in this process.

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sciforum-102934: Evolution of bacterial growth in *Melipona bicolor* honeys after one year of storage

Lorena Lima Ludovico [1], Milena Gabrielle de Jesus [1], Kauã Colaço Schier [1], Elisana Julek [1,2,*], Luana Siqueira de Souza [1,3], Juliana Chiesse Da Silva Zatta [1] and Julia Arantes Galvão [1,3]

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Guaraipo (*Melipona bicolor*) is a sting-less bee distributed throughout south and southeast Brazil, which is known for its honey production; however, it is not currently the target of much research. There are not many citations in the literature about the microbial activity of honey after storage, so the aim of this study is to elucidate this point by comparing the microbial condition of the product produced by sting-less bees after both 8 and 17 months of storage under refrigeration (4°C). With that in mind, the total and thermotolerant coliforms, mesophilic aerobic microorganisms, as well as yeasts and molds, were quantified in three honey samples collected in forest areas in the metropolitan region of Curitiba. No growth of total or thermotolerant coliforms was noted; however, it was possible to observe a decrease in mesophilic aerobes in the sample over the course of their storage. In the sample stored for 8 months, the counts were between 2.46 and 4.08 log CFU/mL; in the sample stored for ayear, these values were between 1 and 1.30 log CFU/mL or even no growth of mesophiles was observed. In addition, no growth of yeasts and molds was observed in the samples from 17 months of storage, with ≤ 1 log CFU/mL, unlike the samples stored for 8 months, which previously had both yeasts and molds, with counts ranging from 1.78 to 2.43 log CFU/mL. Although mesophilic, yeast, and mold growth were observed in the first instnace, we can conclude that after storage for a year in refrigerated conditions, there was a decrease in the bacterial growth found in sting-less bee's honey.

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sciforum-098925: Genomic Surveillance of *Listeria monocyotgenes* from Human sources and Food Products in Argentina

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Listeria monocytogenes is an opportunistic pathogen that causes the infection listeriosis, primarily affecting immunocompromised patients and pregnant women. The invasive form of the disease is characterized by severe symptoms, with an estimated mortality rate of 20–30%. The transmission of the bacteria typically occurs through contaminated ready-to-eat foods, including unpasteurized dairy products and raw vegetables. Understanding the molecular epidemiology and genetic diversity of isolates collected from clinical and food sources is crucial for identifying clusters and common sites of infection. This study aimed to determine the population structure and genomic epidemiology of *L. monocytogenes* strains in Argentina. Between 2018 and 2023, we analyzed 71 isolates in total: 41 from human sources and 30 from food products. These isolates were submitted to the National Reference Laboratory at the INEI-ANLIS "Dr. Carlos G. Malbrán". Whole-genome sequencing analysis categorized the strains into two lineages, four serogroups, seventeen sequence types, and fifteen clonal complexes (CCs). Clinical isolates were mainly associated with lineage I (65.1%, 28/43), while food isolates were mainly linked to lineage II (53.6%, 15/28). The hypervirulent clone CC1, belonging to lineage I and serogroup IVb, was predominant in both clinical (36.6%, 15/41) and food samples (23.3%, 7/30). Single-nucleotide polymorphism, or SNP, analysis showed high (0-10 SNPs) and possible (11-30 SNPs) epidemiological relationships between isolates from humans and/or food samples. These findings suggest the presence of transmission chains and common sites of infection, underscoring the need to strengthen the genomic surveillance of *L. monocytogenes* in Argentina. Integrating genomic data with metadata from food and environmental isolates, along with information from patient questionnaires—including medical details, travel history, and food consumption patterns—could help formulate more targeted public health intervention strategies for the control and prevention of listeriosis.

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sciforum-098835: Gram-positive and Gram-negative Bacteria Inhibition Potential of Ethanol Extract Ethiopian ginger (*Zingiber officinale*) Genotypes

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The bioactive components in ginger (Zingiber officinale) have antibacterial activity against pathogens that cause foodborne illnesses. Microorganisms that cause food to spoil contribute significantly to food losses and issues in public health. The use of Ethiopian ginger against antibiotics is less common in the region where it is grown. In this study, 384 samples from four genotypes of ginger, four drying techniques, three microorganisms, and four concentration levels determined via duplications were analyzed. Antimicrobial inhibitory potentials utilizing ethanol were used to extract the dried Ethiopian ginger genotypes (boziab, volvo, local, and candidate-19) from the fluid bed, oven, solar, and open-air sun energy sources. Using the disc diffusion method, the extracts' zones of inhibition (ZOIs) against Staphylococcus aurous, Escherichia coli, and Salmonella thephi were found at concentrations of 10, 7.5, 5.0, and 2.5 mg/mL. Ginger genotypes, drying techniques, concentrations, and the kinds of bacteria that are resistant to ginger extracts were the main factors influencing the considerable variations in the detected ZOIs against the microorganisms, with varying values. The ZOIs values obtained from this investigation ranged from 3.07±0.01 to 8.43±0.12 mm, in contrast to those from microorganisms at varying concentrations of the extract. The results of the investigation demonstrated the possible level of genotype inhibition that Ethiopian ginger (Zingiber officinale) has against Gram-positive (Staphylococcus aurous) and Gram-negative (Escherichia coli and Salmonella thephi) bacteria, together with the advantages of food preservation. Future research should be conducted on antimicrobials in vivo and in vitro using various solvent extracts and concentrations while incorporating more bacteria.

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sciforum-102466: Green Synthesis of Silver Nanoparticles by Using Phyllanthus emblica and Adhatoda vasica Leaf Extract and their comparative study on microbes

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Introduction

In ancient times, silver played an important role as a novel metal ion in curing many diseases and fighting against many infections. Currently, silver is used in the form of AgNPs for targeting many biomedical and physio-chemical reactions to fulfill research goals .But many drawbacks are also reported in AgNP reactions, such as allergy and environmental risks. Therefore, to avoid all these side-effects, plant-based AgNPs are synthesized. In our research, we have used silver nano-particles of *Phyllanthus emblica and Adhatoda vasica* leaf extract and carried out a comparative study on microbes.

Methods

Leaves were first collected and then crushed into a powder. Next, we made a water-based extract solution by heating the mixture to 80 degrees Celsius for three to four hours using a magnetic stirrer. Finally, the leaf extract was combined with 1M silver nitrate solution, which was made by dissolving 1.7 grams of silver nitrate in 100 milliliters of water. Finally, the mixture of amla and adusa silver nitrate was centrifuged at 12000 rpm for 30 minutes, discarding the supernatant and collecting the dark pellet to form AgNPs of leaf extract. Finally, the leaf extract was collected in the form of a powder and dried for two to three days in a dark place. Using the disc diffusion and well diffusion methods, we investigated the effects of these AgNP powders at varying concentrations against bacteria that cause disease, such as E. Coli, S. Aureus, Mucor, and Aspergillus strains. Additionally, we utilized the commercial antibiotic streptomycin to complete a comparative study.

Conclusions

Secondary metabolites in plant leaves make plant-based drug systems and AgNP molecules more effective and eco-friendly compared to chemical-based AgNPs. In our research, a comparative study of the effects of amla and adusa leaf extract AgNPs on microbes produced positive results compared to the commercial antibiotic streptomycin, with their ability to kill microbes clearly shown by the formation of a zone of inhibition on the Petri dishes.

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sciforum-102907: Hepatitis E Virus in Wild Ungulates Intended for Human Consumption: A Survey in the Region of Liguria (NW Italy)

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Hepatitis E virus (HEV) is an enteric virus belonging to the *Hepeviridae* family. It is responsible for acute hepatitis in humans, through the consumption of contaminated water, and undercooked meat or through being in contact with infected animals. HEV has eight genotypes; of these, HEV-3 and HEV-4 are zoonotic and are responsible for sporadic cases of food-borne diseases in developed countries. Swine and wild boars are the principal sources of infection for humans. Among the wild species that act as reservoirs of the virus, wild boar is the most investigated in Italy, while limited data on HEV prevalence are present in other ungulates. In this study, we investigated the circulation of HEV in the three most hunted ungulates species in the Region of Liguria (northwestern Italy) (*Sus scrofa*, *Dama* dama, and *Capreolus capreolus*) to assess the potential risk of HEV transmission through the consumption of game meat. During the 2023-2024 hunting seasons, 303 liver samples from 66 wild boars, 155 roe deer, and 82 European fallow deer were collected and tested for HEV RNA using real-time RT-PCR. The HEV genome was found in the livers of 8/66 (12.1%) wild boars analyzed; however, it was not found in the roe deer and European fallow deer samples. The results obtained in this study showed that in the Liguria Region, HEV is present only in wild boars. Therefore, the consumption of uncooked meat, liver products, or direct contact with these species represent a potential risk for consumers and hunters.

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sciforum-097847: Human-related microsporidian spores in farm chickens from Makeni, Sierra Leone

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Sierra Leonean Ebola survivors can have compromised health, with an increased mortality risk, so preventive health to minimize exposure to opportunistic and emerging pathogens is important for their clinical care and follow-up. The aim was to study the presence and temporal variation/distribution of opportunistic microsporidian species [*Enterocytozoon bieneusi* and *Encephalitozoon* spp. (*E. intestinalis*, *E. hellem* and *E. cuniculi*)] in chickens from different farms in Makeni city and its surroundings (Bombali District). Fresh faecal samples were collected from twenty chickens from Lion Poultry in April 2019, meanwhile twelve were collected in summer 2022 from this chicken farm and other private family farms across this district. Moreover, twenty-five water, twenty food, and three leaf samples that the chickens were using for eating/drinking were also collected in 2022. Faecal samples collected in 2019 were processed molecularly after extracting DNA using a Fast-Prep for Soil® kit, using a SYBR Green real-time PCR, meanwhile the most recent samples collected were tested only for *Encephalitozoon* species using a specific monoclonal antibody (Mab) of murine-origin IgG2a, patented as a diagnostic tool. Six faecal samples gave positive results microscopically (spores of *Encephalitozoon* spp. were observed in five samples and *E. bieneusi* in one). Five 2019 samples resulted positive by molecular methods: two *E. intestinalis* and *E. hellem* and one *E. bieneusi;* meanwhile, ten 2022 samples were positive for spores of the genus *Encephalitozoon*, specifically eight chickens and two water samples. None of the food samples were positive. To our knowledge, this is the first study reporting the presence of human-related microsporidia in chickens in Makeni city and its surroundings and is further confirmation of their presence in the water. The results also suggest a moderate circulation of *Encephalitozoon* spp. in chickens and farms, which could represent a risk for Sierra Leonean individuals living near these farms or a food risk.

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sciforum-099868: Impact of polyphenol profile of selected traditional apple varieties on infection by *P. expansum* CBS 325.48 and patulin biosynthesis

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Penicillium expansum causes the accumulation of patulin in apples, which has a negative impact on food safety and human health. Higher levels of polyphenols such as flavan-3-ols, flavonols, procyanidins, dihydrochalcones and phenolic acids in traditional apple varieties showed a high potential for resistance to infection by *P. expansum*. On this basis, the resistance of selected traditional apple varieties, ´Ilzer Rosenapfel´, ´Bobovec´, ´Mašanka´ and ´Zelenika´, to infection by *P. expansum* was analysed after harvesting in 2022, and after a six-month storage period. The samples of each examined traditional apple variety were analysed using the HPLC-PDA method to determine the polyphenol profile. To investigate the resistance of the traditional apple cultivars to *P. expansum* infection, 1 cm thick apple slices were first sterilised in Petri dishes, then inoculated with 14 days-old *P. expansum* CBS 325.48 slices and incubated in at 29°C until the *P. expansum* colony on the apple disc reached a diameter of 9 cm. The patulin content was determined using the LC-MS/MS method of Sulyok et al. (2020). The results showed that ´Ilzer Rosenapfel´ had the highest content of procyanidin B2 and phloridzin after six months of storage, ´Mašanka´ had the highest content of chlorogenic acid, procyanidin A2, catechin, and rutin, ´Bobovec´ had the highest content of procyanidin B1 and epicatechin and ´Zelenika´ had the highest content of p-coumaric acid. The average growth period of the *P. expansum* colony to reach a diameter of 9 cm was from 5 to 8 days. Furthermore, the results showed that patulin was only detected in ´Ilzer Rosenapfel´. Also, ´Ilzer Rosenapfel´ showed the highest content of epicatechin, gallic acid and catechin, which contributed to the increase inpatulin concentration in the tested variety. This only adds to the confirmation of the fungal sensitivity to cellular oxidative status perturbations, as well as to confirmation of the polyphenolic compounds' prooxidative activity in the examined ´Ilzer Rosenapfel´ traditional apple variety.

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sciforum-096114: Investigation of ESBL-Producing *Escherichia coli* Presence, Antibiotic Resistance and Biofilm Production Ability in Chicken Meat in Istanbul

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Multiple-drug resistance (MDR) complicates the treatment of *E. coli* infections. Food is an important carrier for the spread and infection of MDR *E. coli*. Extended-spectrum ß-lactamase-producing *E. coli* is included in the list of priority pathogens to be considered in 2024 published by WHO. In this study, the presence of ESBL-producing *E. coli*, antibiotic resistance patterns and biofilm production capacity were measured in raw chicken meat obtained from Istanbul (n=208). 48.5% (101/208) *E. coli* isolates were detected via PCR and multiple antibiotic resistance was detected in 79.2% of *E. coli* isolates. The highest resistance was observed against amoxicillin clavulanic acid, ampicillin and tetracycline. In addition, all isolates were susceptible to piperacillin-tazobactam. In total, 17.8% of *E. coli* isolates were found to produce phenotypically ESBL. ESBL genes were investigated via the mPCR method; bla_{TEM} (97.02%), $bla_{CTX\text{-}M}$ (45.5%), bla_{SHV} (9.9%) and $bla_{OXA\text{-}2}$ (0.9%) were observed. In the study, 34% of *E. coli* isolates were resistant to carbapenem, as observed via disc diffusion. Carbapenem resistance genes (bla_{VIM}, $bla_{OXA\text{-}48}$, bla_{NDM} and bla_{KPC}) were analyzed via mPCR, and no related genes were found. The PCR method was used to investigate colistin resistance, and the *mcr*-1, *mcr*-2, *mcr*-3, *mcr*-4, *mcr*-4, *mcr*-5, *mcr*-6, *mcr*-7, and *mcr*-8 genes were not observed. The biofilm production capacity of the isolates was measured using the microplate method on Tryptone Soya broth (TSB) containing 1% sucrose, TSB containing 0.6% yeast extract, brain heart infusion broth, nutrient broth and LB broth. The highest biofilm production was detected in TSB with 1% sucrose at a rate of 43.5%. *E. coli* isolates producing multiple-antibiotic resistance and biofilms through foods threaten public health, and this study highlights the significance of food safety.

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sciforum-098923: Isolation and antimicrobial potential of fermented dairy products' exopolysaccharide-producing lactic acid bacteria

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Lactic acid bacteria possess significant industrial relevance due to their capacity to withstand harsh environmental conditions and metabolic capabilities. These microorganisms synthesize diverse metabolites that contribute to desirable technological and organoleptic properties to food products, particularly fermented dairy commodities. One specific metabolite of interest is exopolysaccharides (EPSs), which have gained attention due to their bioactive properties and various applications. EPSs are particularly important in the production of fermented products and ensuring the safety and quality of food due to their food preservation, product stability, and potential health-promoting properties

This study aimed to isolate and identify the lactic acid bacteria that produce EPSs from traditional Moroccan fermented dairy products, specifically *Lben, Raib, Jben, and Klila*. Subsequently, the lactic acid bacteria that produced EPSs were tested for their antimicrobial activity using the spot method against the following pathogenic bacteria: *Listeria monocytogenes* CECT 4032, *Staphylococcus aureus* CECT 976, *Pseudomonas aeruginosa* ATCC 27853, and *Escherichia coli* ATCC 25922.

Seven samples of different fermented dairy products were analyzed for EPS-producing strains. Forty-eight strains were considered to produce EPSs and twenty-seven strains among them were identified as lactic acid bacteria and exhibited inhibitory activity against different pathogenic bacteria. Their antimicrobial properties suggest their potential use as natural food preservatives.

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sciforum-096632: Isolation of lactic acid bacteria and yeasts from fermented corn gruels with angiotensin-converting enzyme (ACE) and hydroxymethylglutaryl-coenzyme A (HMG-CoA) reductase-inhibitory activities

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Introduction

This study was designed to investigate the HMG-CoA reductase and ACE-inhibitory activities of lactic acid bacteria (LAB) and yeasts isolated from fermented corn gruels for the production of functional foods/nutraceuticals. The use of “statins” and “prils” as inhibitors of HMG-CoA reductase and ACE for the treatments of hyperlipidemia and hypertension are usually accompanied by adverse side effects. Hence, the need for alternative sources of HMG-CoA reductase and ACE inhibitors from food-grade micro-organisms arises.

Methods

LAB and yeasts were isolated and characterized from fermented maize gruels using standard methods. The HMG-CoA reductase and ACE inhibitory activities of the LAB and yeast cultures were also carried out using established protocols.

Results

The screening of LAB with HMG-CoA reductase and ACE-inhibitory activities revealed that at concentrations (mg/ml) of 3,6, 12 and 24, *Lactobacillus helveticus* MZL12 showed the highest HMG-CoA reductase-inhibitory activities of 5.96, 9.63, 12.84 and 15.14, with corresponding ACE-inhibitory activities of 8.41, 16.60, 19.47 and 25.00, respectively, when compared with other isolates. In addition, at concentrations (mg/ml) of 6, 12, 24 and 48, the yeast isolate *Cryptococcus* sp. MZY13 showed the highest HMG-CoA reductase-inhibitory activities of 8.72, 11.92, 19.72 and 22.48, with corresponding ACE-inhibitory activities of 13.93, 35.11, 41.41 and 57.63, respectively. *L. helveticus* MZL12 also showed the lowest HMG-CoA reductase half maximal concentration inhibitory (IC_{50}) value of 84.84 μg/mL, with an ACE IC_{50} value of 46.09 μg/mL, while *Cryptococcus* sp. MZY13 had the lowest IC_{50} values of 108.38 μg/mL and 49.93 μg/mL for HMG-CoA reductase and ACE inhibition, respectively.

Conclusions

Used together, *L. helveticus* MZL12 and *Cryptococcus* sp. MZY13 can be employed as potential starter cultures with HMG-CoA reductase and ACE-inhibitory activities that can be used for the fermentation of functional foods targeted against hyperlipidemia and hypertension.

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sciforum-103186: Microbial And Antioxidant Analysis of Mint Chewable Gummies Incorporated with *Moringa oleifera*, *Syzygium aromaticum* and *Plectranthus amboinicus*

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Chewable gummies have attracted particular interested fortheir sweet taste and chewy nature due to the presence of additives, the excessive consumption of which may result in health issues. In the present work, three treatments consisting of 10% selected herbs (*Moringa oleifera*), cloves (*Syzygium aromaticum*) and Cuban oregano (*Plectranthus amboinicus*) were incorporated into chewable gummies to formulate the ingredients and were assessed for their antimicrobial activity, antioxidant activity and phenolic content. Chewable gummies incorporated with Moringa yield the highest zone of inhibition against *Bacillus subtilis* at 21.3 ± 1.5 mm, compared to when tested against *Staphylococcus aureus, Escherichia coli* and *Salmonella Typhi* using the Kirby-Bauer method. The incorporation of chewable gummies with cloves yielded 3.37 ± 1.32 log CFU/ml of microbial count while the other treatments were describedas "too many to count" (TNTC) when tested on MRS agar for *Lactobacillus* spp. growth. The highest level of radical scavenging action is found in Moringa at 82.66% for DPPH assay and possesses a mean of (1.1688 ± 0.0535) nm that is significantly lower (p 0.05) than the control (3.2686 ± 0.0863) nm. Meanwhile, the highest total phenolic content when tested using the Folin–Ciocalteu method is recorded at 59.64 ± 0.0060 mg GAE/g for Moringa, which is significantly lower (p 0.05) than cloves at 45.38 ± 0.0400 mg GAE/g. The findings suggest that chewable gummies incorporated with *Moringa oleifera* are the most accepted as a possible food for product development, followed by *Plectranthus amboinicus* and *Syzygium aromaticum.* Future research is required to improve the formulation of chewable gummies, as well as analyzing the sensory acceptability of newly formulated chewable gummies.

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sciforum-102026: Monitoring the Fermentation of cv. Kalamata Natural Black Olives Using Raman Spectroscopy

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Kalamata table olives are of great significance for the economy of the table olive industry in Greece. Consequently, it is crucial to monitor the fermentation process of cv. Kalamata table olives to ensure product quality and safety. This study aims to evaluate the efficiency of Raman spectroscopy, as a rapid and non-destructive analytical technique, in monitoring the table olive fermentation process. For this purpose, natural cv. Kalamata black olives were fermented according to industrial practice in 7% (w/v) NaCl salt for 145 days. Four substitution levels of NaCl by KCl were performed: namely 0, 25, 50, and 75% (w/v). Raman spectra were acquired from the surface of olives from four spots of three different olive fruits sampled from each fermentation vessel. The spectra were analyzed using Partial Least Squares Regression (PLS-R) in order to correlate spectral information with the population of lactic acid bacteria (LAB) and yeasts, pH changes, and lactic acid concentration in terms of titratable acidity measurements. Orthogonal Partial Least Squares Discriminant Analysis (Ortho PLS-DA) was also employed to discriminate among the olive fruits fermented exclusively in NaCl against those fermented in different NaCl substitution levels. The most efficient PLS-R models provided R^2 and RMSE scores for Cross Validation of 0.65 and 0.81, 0.44 and 0.58, 0.63 and 0.39,and 0.56 and 0.11 for LAB, yeasts, pH, and % lactic acid, respectively. Ortho PLS-DA successfully discriminated olive samples fermented in NaCl from olive samples fermented in various levels of NaCl substitution by KCl. Overall, the results obtained in this work provided promising perspectives for the use of Raman spectroscopy as a rapid and non-invasive technique to monitor table olive fermentation.

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sciforum-102065: Monitoring the Inoculated Fermentation of cv. Kalamata Natural Black Olives with Lactic Acid Bacteria Starter Cultures Using Raman Spectroscopy

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Greece has a long tradition of table olive processing. In recent decades, the table olive industry has evolved into a dynamic sector of the Greek economy. Raman is an emerging spectroscopic technique that has found application in agri-food analysis due to rapid spectrum acquisition, noninvasiveness, and simple sample preparation. The effective control of fermentation requires on-line monitoring of process parameters to ensure the quality and safety of the final product. In this study, the efficiency of Raman spectroscopy as a rapid and non-destructive technique to monitor table olive fermentation was evaluated. Kalamata black olives were fermented in 7% (w/v) brine comprised of NaCl and KCl at a 1:1 ratio for 145 days. Three fermentations were performed, namely, (a) spontaneous fermentation with the indigenous microbiota and inoculated fermentations with (b) *Lactiplantibacillus pentosus* B281 and (c) a commercial starter culture (VegeStart-60) containing *Lactiplantibacillus plantarum*. Raman spectra were acquired during processing from the surface of olives from four spots of three different olive fruits. The spectra were analyzed using Partial Least Squares Regression (PLS-R) to estimate the counts of lactic acid bacteria (LAB), pH, and titratable acidity values directly from spectral data. In addition, Orthogonal Partial Least Squares Discriminant Analysis (Ortho PLS-DA) was employed to discriminate olive fruits between the beginning and the end of fermentation. The results showed that the most efficient PLS-R models provided R^2 and RMSE scores for cross-validation of 0.60 and 0.61, 0.81 and 0.61, and 0.74 and 0.72 for LAB, pH, and titratable acidity, respectively. Moreover, Ortho PLS-DA successfully discriminated olive samples at the beginning and the end of the fermentation, providing promising perspectives for the use of Raman spectroscopy in on-line monitoring of table olive fermentation.

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sciforum-099055: Prebiotic evaluation of acacia gum for *Lactobacillus casei* strain Shirota

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Probiotics have gained significant attention recently due to their extensive use in the food and health sectors. The *Lactobacillus casei* strain Shirota is a well-known probiotic with various health advantages. Different gums can aid probiotics in colonizing the human colon, transferring their beneficial health properties. Partially hydrolyzed arabic gum (PHAG) has been investigated for its potential in probiotic encapsulation and as a prebiotic material. Glucose-enriched MRS liquid media showed superior cell growth at 6.0x10^9 CFU/ml, while PHAG-enriched MRS media also supported growth at 8.0x10^8 CFU/ml. The decrease in the total sugar content in the culture media after bacterial growth in the PHAG-supplemented MRS media confirms that probiotics utilize PHAG as a carbon source, indicating its promise as a prebiotic. The enzyme activities of β-glucosidase and phosphoglucosidase in the PHAG-inoculated media were 14.5 mU/mg/min and 21.76 mU/mg/min, respectively. The analysis of the total reducing sugars using the BCA method showed that they were consumed post-inoculation, highlighting them as preferred substrates for the bacteria. An in silico comparison of the *L. casei* strain Shirota with other *Lactobacillus* strains showed a higher relative abundance of genes for mannose and galactose metabolism. Notably, mannose and galactose are major components of natural gums like arabic gum, indicating its potential as a prebiotic for this strain.

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sciforum-101767: Prevalance and Antibiotic Resistance Profile of *Vibrio vulnificus* in Whiteleg Shrimp (*Litopenaeus vannamei*)

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Shrimp aquaculture in Malaysia has expanded to meet the increasing demand for food commodities, mainly focusing on whiteleg shrimp (*Litopenaeus vannamei*). The shift towards intensive farming systems has been adopted to enhance productivity. However, these high-density farming practices elevate the risk of disease outbreaks, notably from pathogenic bacteria such as *Vibrio vulnificus*. This Gram-negative bacterium is associated with serious health issues, including gastroenteritis, which can lead to severe wound infections or fatality. It also poses a substantial public health risk due to the emergence of multidrug resistance. Therefore, this study aimed to determine the prevalence rate and quantify the presence of *V. vulnificus* in 67 samples of whiteleg shrimps sold at wet markets and hypermarkets in Sri Kembangan, Malaysia. Several methods have been used, including isolation and detection on CHROM agar and MPN-PCR. Furthermore, antibiotic susceptibility tests were performed using ten types of clinical antibiotics by applying the standard disk diffusion method. The overall prevalence rate of *V. vulnificus* in whiteleg shrimp was 40.30% (28/67), consisting of 48.15% (13/27) from the hypermarket and 51.85% (14/27) from the wet market. The total coliform count in the samples reached 4.6 MPN/g, which exceeded the acceptable limit of 3 MPN/g set by the Malaysian Food Act 1983 and its associated regulations. Moreover, the t-test analysis indicated no significant difference in total coliform count between wet market and hypermarket samples. Antibiotic susceptibility tests revealed that 60% of V*. vulnificus* strains were susceptible to doxycycline, while 100% were resistant to amoxicillin. In conclusion, the results highlight significant concerns regarding the high bacterial contamination levels in the shrimp samples and the presence of antibiotic-resistant microorganisms. Hence, this study could increase awareness about the correct handling and storing of raw shrimp to minimize bacterial contamination and to be aware of the usage of antibiotics in farms to prevent further resistance development.

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sciforum-091872: Prevalence and Antimicrobial Resistance of *Staphylococcus aureus* in Rabbits for Consumption: Implications for Food Safety

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Staphylococcus aureus is a bacterium that is commonly found in humans and animals and can cause a wide variety of infections in both. The development of resistance to multiple antibiotics in this bacterium in animals for consumption, particularly rabbits, represents a major concern in terms of food safety and, consequently, public health.

The aim of this study was to investigate the presence of methicillin-sensitive *S. aureus* (MSSA) and methicillin-resistant S. *aureus* (MRSA) in rabbits for consumption and to determine their antimicrobial resistance.

A total of 65 rabbit samples were collected from different farms in northern Portugal and eight MRSA strains were randomly selected and subsequently tested against 14 antimicrobial agents including penicillin, cephalosporins, fluoroquinolones, aminoglycosides, macrolides, tetracyclines, oxazolidinones and other miscellaneous agents. Susceptibility testing was carried out using the agar disc diffusion method, as recommended by the EUCAST and CLSI guidelines.

Of the 65 samples collected from healthy rabbits, 16.92% corresponded to MRSA and 9.23% to MSSA. All the strains selected showed resistance to penicillin and ciprofloxacin. None of the strains showed resistance to linezolid or chloramphenicol; however, 37.5% showed resistance to gentamicin, 25% to cefoxitin, tobramycin, kanamycin, clindamycin, fusidic acid and mupirocin and 12.5% to erythromycin, tetracycline, and trimethoprim-sulfamethoxazole. Of the strains selected, 25% were multidrug-resistant.

Our results highlight the prevalence and antimicrobial resistance of *S. aureus* in rabbits for consumption, emphasizing the potential risks to food safety and public health. Thus, understanding the form of *S. aureus* contamination in rabbit meat is crucial for implementing effective control measures to mitigate the spread of antimicrobial resistance and ensure the safety of the food chain.

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sciforum-099157: Proteomic and transcriptomic analyses revealed cell changes and physiological adaptations in ethanol-stressed *Oenococcus oeni* strain

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Introduction

Oenococcus oeni is involved in the malolactic fermentation and its metabolic activities can modify the taste, aromatic properties, and microbial stability of wine. For this reason, there is growing interest in formulate starter cultures from it, as the resistance to the harsh environment of wine is strictly strain-dependent.

Methods

To investigate the effect of ethanol stress on cell physiology, we characterized the proteome and phosphoproteome of *O. oeni* DSPZS12 from Aglianico wine produced in the Vulture zone (Basilicata region, Southern Italy). Total proteins were separated by two-dimensional gel electrophoresis and identified by MALDI-TOF mass spectrometry and ElectroSpray Ionization-Fourier Transform Ion Cyclotron Resonance Mass Spectrometry (ESI-ICR/FT-MS). Proteins exhibiting Post-Translation Modification (PTM), especially phosphorilation on Ser, Thr, or Tyr, were also investigated. For protein identification, we chose a bottom-up approach and we performed Peptide Mass Fingerprinting (PMF) and tandem MS analyses. A total of 133 peptide and 99 proteins were identified; in addition, MS/MS data processing leads to the identification of 78 phosphorylated peptides from 50 spots and 39 proteins.

Results

The presence of ethanol promoted a shutdown of several proteins involved in energy/carbohydrate metabolism, protein synthesis and stress response. Moreover, changes in cell physiology are often accompanied by the modulation of gene expression profiles to ensure cell vitality and proliferation. So, we also investigated the transcriptome expression profile of *O. oeni* DSPZS12 strain by quantitative Real Time PCR (qPCR) that allowed us to identify and characterize the differentially expressed genes and the pathways most influenced by stress conditions tested, such as the regeneration of NADPH and maintenance of redox balance and the cell morphology, involving peptidoglycan biosynthesis and cell wall components.

Conclusions

O. oeni is able to respond to environmental changes by varying its gene expression and implementing a series of mechanisms that ensure its survival and the performance of its vital functions.

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sciforum-098647: Quality assurance in food microbiology laboratories from a laboratory accreditation perspective

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Food testing laboratories are required to conduct independent third-party testing, mainly to provide all parts with accurate and trustworthy information on the quality and safety of the food product in question. Laboratory accreditation is the most valid way to ensure the competence and reliability of third-party testing services. The reliability of laboratory testing is determined by a number of factors. Human factors, ambient circumstances, selected test procedures and their validation, equipment, chemicals, measurement traceability, sampling and sample flow, and test item processing are some of these elements. To keep the analytical process stable and guarantee reliability, these variables must be continually monitored.

Internal quality control refers to all of the procedures that a laboratory uses to assess its work on a regular basis and to keep an eye on the accuracy of its findings. Ensuring that results are consistent every day and meet predetermined criteria is the main purpose. In the context of all this information, internal controls should also be applied in food microbiology laboratories. These controls comprise procedures for controlling the air and surface environments, the medium and water, the equipment (autoclave, pipette, safety cabinet, etc.), the UV efficiency, the reference strain, the cleaning procedures, and the follow-up for food microbiology laboratories. The effective implementation of quality assurance procedures requires the establishment of an internal quality control program in the laboratory and the operation of procedures in accordance with test frequency. Quality control cards are helpful in identifying any trends in the quality of the laboratory's generated experimental results by evaluating if they have changed over time. It is important to evaluate and interpret controls using statistical methods.

This review discusses the implementation methods of internal and external quality assurance processes for laboratories operating in the field of food microbiology and describes the authors' practical experience in this field.

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sciforum-101870: Receptor-Targeted Next-Generation Probiotics Ameliorate Mammalian Colitis

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Introduction

A loss of intestinal barrier function, inflammation, and an elevated expression of epithelial heat shock protein 60 (Hsp60) are features of an inflamed bowel. Probiotics have been used to alleviate colitis-induced pathologies, but offer poor adhesion and adaptation to the diseased gut. We hypothesize that enhancing probiotic adhesion in the inflamed bowel may ameliorate such pathologies. *Listeria* adhesion protein (LAP; 94-kDa acetaldehyde alcohol dehydrogenase) aids *Listeria* attachment to the epithelial cells by interacting with the mammalian receptor Hsp60. Bioengineered *Lactobacillus casei* probiotics (BLPs) expressing LAP showed strong interaction with epithelial Hsp60, a high immunomodulatory response, and sustained epithelial barrier integrity.

Method

Dextran sodium sulfate (DSS)-treated mice were fed with BLP ($1x10^{10}$ CFU/mL) for 10 days.

Results

DSS (2%, 7days)-fed mice treated with BLP showed a > 50% reduction in FITC-labeled 4 kDa dextran (FD4; epithelial permeability marker) translocation compared to the control groups. BLP-fed DSS-treated mice gained 3% body weight and conferred a 40% reduction in disease activity index (DAI) and inflammatory response compared to the control. BLP treatment restored fecal consistency to Type 3, 4 (Bristol scoring) within 9 days of feeding, while the controls failed. The colon showed visible damage (shortening), wall thickening, fragile tissue, and mucus accumulation in control mice, while the cecum and colon of BLP-fed mice appeared healthy. The microbiome data show a partial restoration of diversity and richness, primarily a distinct subpopulation fed with the BLPs. Myosin light chain kinase (MLCK, tight junction modulator) knock-out (KO) mice have increased resistance to DSS-induced colitis. Post-DSS treatment, BLP-fed MLCK mice improved weight gain, restored fecal consistency, and recuperated colonic health compared to the control groups, despite enhanced colitis symptoms.

Conclusions

Our BLPs offer promising results in alleviating mammalian gut inflammation and can be implemented as a food additive to improve gut health.

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sciforum-102312: Risk Assessment of xenobiotic--gut microbiota exposure: an in vitro approach to study food-derived microplastics.

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Xenobiotics are a range of chemicals and compounds that are not present in biological systems, i.e., antibiotics and drugs, aflatoxins, heavy metals, pesticides, microplastics (MPs), and others. MPs are widespread contaminants that are highly persistent in the environment and present in matrices to which humans are extensively exposed, including food and beverages. MP ingestion occurs in adults and children and is becoming an emerging public health issue. The gastrointestinal system is the most exposed to MP contamination, which can alter its physiology starting from changes in the microbiota. The toxicity of these compounds is mediated by the gut microbiota, which have a variable response depending on differences in microbiota population and activity. In these terms, there is an impellent need to elaborate and standardize reliable risk assessment procedures to test xenobiotics directly on human gut microbiota. This study investigates, by an omics approach, the impact of a single intake of a mixture of polyethylene (PE) and polystyrene (PS) MPs on the ecology and metabolic activity of the colon microbiota of healthy volunteers in an in vitro intestinal model. PE and PS microplastics were pooled together in a homogeneous mix, digested with the INFOGEST system, and fermented with MICODE (multi-unit in vitro colon model) at a maximum load of 0.166 g, that by the literature corresponds to the intake of food-derived microplastics of a single meal. The results demonstrate that the MP mix induced opportunistic bacteria overgrowth (*Enterobacteriaceae*, *Desulfovibrio* spp., *Clostridium* group I, and *Atopobium --Collinsella* group) and a contextual reduction in the abundances of all the beneficial taxa analysed, with the sole exception of *Lactobacillales.* This microbiota shift was consistent with recorded changes in bacterial metabolic activity, expressed as the higher production of indoles and phenols and lower production of short chain fatty acids.

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sciforum-099348: Screening of lactic acid bacteria isolated from foods for interference with bacterial quorum sensing systems

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Quorum sensing (QS) is a cell-to-cell communication mechanism through which microorganisms can sense their own population density and adjust their physiology by producing and detecting small signalling molecules called autoinducers (AIs). QS influences various aspects of microbial physiology including virulence and pathogenesis by bacterial pathogens, biofilm formation, sporulation, antimicrobial resistance, etc. Lactic acid bacteria (LAB) have been used for centuries in food fermentation to improve sensory and nutritional profiles and preserve against spoilage and pathogenic microflora. This study investigated the potential of foodborne LAB of various genera, including *Lactococcus*, *Lactobacillus*, *Leuconostoc*, *Streptococcus*, and *Enterococcus*, to interfere with the QS system of bacterial pathogens. For this, cell-free supernatants (CFSs) of ninety LAB isolates from foods were collected by centrifugation following 20-hour culture (at 30 °C) in quarter-strength Brain Heart Infusion (BHI) broth. The pH of all CFSs was adjusted to 6.5 and sterilized by filtration. The anti-QS activity of the sterilized CFSs was initially screened, using the biosensor strains *Chromobacterium violaceum* 026 and *Agrobacterium tumefaciens* NTL4 (pZLR4), through an agar well diffusion assay that is able to detect the inhibition of the QS system that is based on acylated homoserine lactones (AHLs), which are used as AIs by Gram-negative bacteria. Additionally, all the CFSs were also screened for interference with the autoinducer 2 (AI-2) QS system that is mostly used for interspecies communication by both Gram-positive and Gram-negative bacteria. This was assessed using a luminescence bioassay with the *Vibrio harveyi* BAA-1117 biosensor strain. The results indicate that several LAB isolates were able to inhibit either AHL-based or AI-2 based QS. In addition, there were some LAB that were able to produce their own AI-2 molecules. In the next steps, these selected LAB isolates will be investigated for possible inhibition of biofilm formation by some important foodborne bacterial pathogens.

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sciforum-099850: Sustainable antimicrobial strategies: Exploration of grape phenolic extracts for combating foodborne pathogens

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Antimicrobial resistance poses a public health threat, necessitating urgent research on phenolic compounds which enhance antimicrobial efficacy and regulate bacterial gene regulation. The study aimed to investigate the antibacterial activity of polyphenols from the by-products of the Portuguese red grape variety Cabernet Franc against antibiotic-resistant bacteria associated with foodborne pathogens (*Escherichia coli* and *Listeria monocytogenes*). Polyphenols are obtained from grape skins, seeds, and stems. The polyphenol profile of the extracts was determined using high-performance liquid chromatography (HPLC). Antimicrobial susceptibility testing was performed on eight foodborne bacteria from livestock and food-products, four *E. coli* and four *L. monocytogenes*, using the Kirby–Bauer disk diffusion method. The initial extract of 100 mg/mL was diluted with dimethyl sulfoxide (DMSO) to 75, 50, 25, and 10 mg/mL, and the results were expressed as minimum inhibitory concentrations (MICs). The study reveals that the by-product extracts of Cabernet Franc red grape contains various polyphenols, including phenolic acids, flavan-3-ols, flavonols, stilbenes, and anthocyanins. The total polyphenol content is directly proportional to the inhibition zone diameter, suggesting that they play a role in antibacterial activity. The seed extract demonstrated the highest antibacterial activity, as evidenced by its inhibitory effect (MIC 25 mg/ml) against three of eight bacterial strains tested, particularly against *L. monocytogenes*. This study shows that high concentrations of catechin and epicatechin in seeds have antibacterial effects, including antibacterial effects against multidrug-resistant strains. Catechins have bactericidal effects by producing hydrogen peroxide, which damages bacterial cell membranes but is less effective against Gram-negative bacteria. The study reveals that polyphenols, including catechins, have antibacterial effects against food-borne pathogens. The sensitivity of bacteria to polyphenols varies based on the type and structure of the polyphenols. Polyphenols are promising therapeutic agents, increasing antibiotic effectiveness in

fighting foodborne bacteria. Their activity also suggests their potential as effective food preservatives.

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sciforum-101641: The Antibacterial Potential of the Bioactive Cinnamon Compound *Trans*-cinnamaldehyde against *Pseudomonas aeruginosa*: A Computational Biology and Chemistry Perspective

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Introduction

The increase in multi-resistant bacteria poses a global threat to public health and requires alternative strategies. One of these multidrug-resistant bacteria is the opportunistic Gram-negative pathogen *Pseudomonas aeruginosa*. Cinnamon, a widely used spice, contains bioactive compounds such as *trans*-cinnamaldehyde, which holds promise as a natural antibacterial agent due to its chemical properties. While the high attrition rate is a major obstacle in the development of antibiotics, advances in computational biology and chemistry offer exciting opportunities. By streamlining candidate selection and developing targeted antibacterial agents, these tools can significantly accelerate the discovery of effective new antibiotics against multi-drug-resistant bacteria and ensure that humanity stays one step ahead of the rapid evolution of antibiotic resistance.

Methods

The pharmacokinetic properties, pharmacological potential, and bioavailability of *trans*-cinnamaldehyde were investigated computationally using the SwissADME tool. The topological surface of the receptor protein was investigated using CASTp, while the molecular modelling simulations were carried out using the AutoDock Vina tool. These modelling simulations were performed in triplicate, and the resulting models were analyzed to determine binding affinity and key interaction patterns. The tools used for this purpose were UCSF Chimaera, PyMol, and DS Visualiser.

Results

Docking simulations showed that *trans*-cinnamaldehyde has a binding affinity for the active sites of key proteins in *Pseudomonas aeruginosa*. The compound demonstrated consistent interaction patterns, indicating a possible disruption of bacterial integrity. These results suggest that *trans*-cinnamaldehyde can effectively inhibit essential functions of *Pseudomonas aeruginosa*.

Conclusions

The use of a computational approach in biology and chemistry can facilitate access to resources for the development of new antibiotics. Confirmation of the potential of *trans*-cinnamaldehyde as an antibacterial agent against *Pseudomonas aeruginosa* requires in vitro testing to determine its efficacy.

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sciforum-099280: The Encapsulation of essential oils of rosemary, cinnamon, oregano, and thyme in *Saccharomyces cerevisiae* to enhance their antimicrobial activity in selected foods

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University of Lincoln

In this study, we aimed to investigate the potential of Saccharomyces cerevisiae cells (SCCs) as a vector and bio-preservative by encapsulating them with essential oils (EOs) from rosemary, cinnamon, oregano, and thyme. The encapsulation process was conducted through autolysis at temperatures ranging from 20 to 45°C for 15 minutes, with a non-autolysed control group. The morphological characteristics of the encapsulated cells were analysed using scanning electron microscopy, while the encapsulated EOs were quantified using gas chromatography–mass spectrometry. The antibacterial activity of free and encapsulated EOs was assessed against Escherichia coli using the agar well diffusion and overlay methods. Additionally, their potential as a bio preservative was evaluated by storing raw ham in vacuum- and non-vacuum-sealed containers at ambient (23 °C) and chilled (10 °C) temperatures. All experiments were conducted in triplicate. Our results indicate that autolysis at 45°C for 15 minutes yielded the highest quantity of encapsulated cinnamon (38.84 ±3.97 mg), oregano (35.54 ±3.16 mg), thyme (22.02 ±2.05 mg), and rosemary (20.58 ±4.51 mg) oil per 100 mg SCCs. The non-autolysed SCCs encapsulated lower amounts of each essential oil, ranging between 10.82 ±2.21 and 26.06 ±3.87 mg per 100 mg SCCs. The minimum inhibitory concentrations of encapsulated cinnamon, oregano, and thyme were 8.41 mg, 8.51 mg, and 23.06 mg, respectively, against E. coli. It was observed that coating ham with yeast cells loaded with the MIC of each essential oil and storing them in either vacuum- or non-vacuum-sealed containers at 10 and 23 °C was sufficient to completely prevent the proliferation of E. coli (1.5 x 10^8 CFU/ml) in the ham during six days of storage. The results of this study demonstrate the potential of encapsulated SCCs as a bio preservative, but additional research is needed to determine their effect on food quality and shelf life.

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sciforum-102831: The epiphytic microorganisms inhabiting rosehip and rowanberry

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Rosehip (*Rosa canina* L.) and rowanberry (*Sorbus aucuparia* L.) are two forest berries known for their nutritional content and historical use in traditional medicine. These berries are valued for their diverse bioactive compounds, including antioxidants, phenolic compounds, organic acids, minerals, vitamins, fatty acids, and dietary fiber; thus, they have high potential for human health and are attractive in the food industry. Therefore, it is important to characterize the berry-associated epiphytic microbial communities and uncover their beneficial constituents.

During our study, the fungal and bacterial microbiota of rowanberries and rosehips were investigated. Following DNA isolation, DNA fragments of the ITS2 rRNA gene region and the V3-V4 region of the 16S rRNA for each sample were individually amplified and subjected to high-throughput next-generation sequencing. The bioinformatics data indicated that the dominant fungal microorganisms on the rosehips were *Dothiora, Aureobasidium*, *Cladosporium*, and *Taphrina,* while the same genera and additionally *Vishniacozyma, Filobasidium*, and *Exobasidium* prevailed on the rowanberries. Bacterial species from the *Sphingomonas*, *Hymenobacter*, *Methylobacterium*, and *Pseudomonas* genera dominated on the rowanberries, whereas *Pseudomonas* and *Sphingomonas* were found on the rosehips.

For a comprehensive assessment of the wild berry-inhabiting microbial communities, analysis of the cultivable yeasts was performed. Comparable cultivable yeast profiles were obtained for the rowanberries and rosehips: representatives of the *Aureobasidium, Cryptoccocus, Rhodotorula, Hanseniaspora, Metschnikowia,* and *Curvibasidium* genera were found on both berries. Although potentially pathogenic to humans, beneficial microorganisms relevant as biocontrol microorganisms were also identified on the tested berries.

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sciforum-102464: The Green Synthesis of Silver Nanoparticles by Using Phyllanthus emblica and Adhatoda vasica Leaf Extract and their comparative study on microbes

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Introduction

In ancient times, silver played an important role in curing many diseases to fight against many infections. Now, silver is used as AgNPs for targeting many biomedical and physio-chemical reactions to fulfil research goals. But there are many drawbacks that have also been reported in reactions to AgNPs, like allergy and environmental risks, so to avoid these side-effects, plant-based AgNPs are synthesized by researchers. In our research, we have used silver nano-particles of *Phyllanthus emblica and Adhatoda vasica* Leaf Extract and their comparative study on microbes.

Methods

Amla and adusa leaf samples were first collected, then crushed into a powder. Next, we made a water-based extract solution by heating the mixture to 80 degrees Celsius for three to four hours using a magnetic stirrer. Finally, the leaf extract was combined with 1M silver nitrate solution, which was made by dissolving 1.7 grams of silver nitrate in 100 milliliters of water. Finally, the mixture of amla and adusa silver nitrate was centrifuged at 12000 rpm for 30 minutes, discarding the supernatant and collecting the dark pellet to form AgNPs from the leaf extract. Finally, the leaf extract was collected in the form of a powder and dried for two to three days in a dark place. Using the disc diffusion and well diffusion methods, we investigated the effects of these AgNP powders at varying concentrations against bacteria that cause disease, such as E. Coli, S. Aureus, Mucor, and Aspergillus strains. Additionally, we utilized the commercial antibiotic streptomycin to complete a comparative study.

Conclusions

In our research, AgNPs of amla and adusa leaf extracts, comparatively studied on microbes, generated positive results as compared to commercial antibiotic streptomycin for killing microbes that were clearly shown by zone-of-inhibition formation on petriplates.

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sciforum-102937: The Impact of Anthocyanins on Pathogenic and Probiotic Bacterial Growth: Potential for Novel Dietary Interventions

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Anthocyanins have gained significant importance in the food industry for their vibrant colorant properties and numerous health benefits. These compounds, found in various foods, exhibit diverse biological activities due to their structural variations. Research has shown that anthocyanins possess antioxidant, anti-inflammatory, and anticarcinogenic properties. They are also associated with protection against heart disease and certain cancers, and a reduced risk of diabetes and cognitive disorders. This study explores the potential health benefits of anthocyanins in an attempt to understand how these dietary components influence the growth performance of both pathogenic and probiotic bacterial strains, and influence the bioactive compounds, potentially leading to novel dietary interventions. Anthocyanin-rich extracts were obtained using microwave-assisted and conventional solvent extraction methods from three different sources, namely, blueberries, grapes, and beetroots. Their total anthocyanin contents (TAC) was quantified via a pH differential method using a UV-VIS spectrophotometer and estimated to be 4.5, 9.825, and 0.2003 mg/ml for blueberries, grapes, and beetroots, respectively. This study found that anthocyanins, particularly those isolated from blueberries (1 to 3 mg/ml), effectively inhibited the growth of pathogenic *Staphylococcus aureus* MTCC 96 and probiotic *Bacillus coagulans*. The growth inhibitory effects were confirmed through agar-well diffusion and broth dilution methods, indicating the need to optimize anthocyanin concentrations for selectively targeting harmful bacteria while preserving beneficial gut microbiota. In conclusion, it is clear that anthocyanins failed to promote the proliferation of the tested probiotic strain, and therefore further optimization and research on anthocyanins could lead to significant improvements in human health, underscoring the importance of these compounds in promoting healthier lifestyles.

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sciforum-103211: The IMPACT of the Mode of Culture on *Yarrowia lipolytica* Microbial Oil Fatty Acid Compositon

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Yarrowia lipolytica is an oleaginous yeast species recognized for its exceptional ability to produce and accumulate high levels of intracellular lipids. The fatty acid composition of the lipids produced by *Y. lipolytica* is diverse and highly dependent on culture conditions. This study aimed to investigate the effects of different culture conditions on the fatty acid composition of microbial oil derived from *Y. lipolytica* yeast. The primary objective was to identify the variations in oil composition produced under different culture conditions in the fed-batch mode.

Initially, inoculum cultures were prepared in 1.0 dm^3 YPG medium (yeast extract: 10.0 g; peptone: 20.0 g; glucose: 20.0 g; pH 5.0) and incubated at 28 °C for 24 hours with continuous shaking. Y. lipolytica was then cultured in a 4 L laboratory bioreactor using the fed-batch method. The bioreactor was maintained at 28 °C, with the agitator speed adjusted from 200 to 600 rpm during fed-batch culture to regulate aeration and to keep the oxygen level within 20% of the initial substrate oxygenation using a cascade system. The culture was periodically fed with fresh YPG medium at specific intervals to sustain yeast growth and lipid production. Two variants of culture conditions were employed, with a partial renewal of the growth culture at different time intervals (24 hours and 12 hours).

The results showed that changes in culture conditions did not lead to significant differences in the fatty acid composition. For instance, the fatty acid compositions obtained at 24-hour and 12-hour intervals were similar and mostly contained palmitic (C16:0), oleic (C18:1), and linoleic (C18:2) acids. The composition was mimicking rapeseed oil. Still, the culture mode influenced microbial oil yield. The obtained data may guide future research involving *Yarrowia lipolytica* as a platform for sustainable oil production.

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Session 5. Chemistry and Physicochemical Properties of Foods

sciforum-097633: Physicochemical composition of human milk at 0 to 4 months and its relationship with maternal diet and microbial content

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Maternal diet is an obvious factor that influences the chemical and microbiological makeup of human milk. Thus, the physicochemical composition of human milk (total protein, total fat, moisture, ash, pH, total soluble solids, and carbohydrate) from Filipino women with varied body mass indices (BMIs) and its correlation with the mother's diet and microbiological content (total plate count, Staphylococcus, lactic acid bacteria, and Bifidobacteria) were assessed at 0 to 4 months of lactation. Breast milk samples, sociodemographic data, and dietary recalls were gathered from 34 healthy breastfeeding Filipino women who were categorized based on their BMIs (underweight n=7; normal weight n=16; overweight n=11) using a cohort, semi-longitudinal study design. The physicochemical and microbial compositions of the milk samples were analyzed. All 34 lactating participants were interviewed three times each month for their 24-hour food recalls. Descriptive statistics were used to describe the study population, physicochemical and microbial characteristics of the milk samples, and the dietary intake of the participants. Pearson's Chi-square was utilized to determine the association between variables. The results show that the nutrient indexes for each weight classification throughout the four months were not significantly different from one another. Values for the physicochemical composition of the milk samples were generally highest in the first month and the lowest values were obtained in the fourth month. The crude fat content of the human milk was associated with the participants' fat intake, while the maternal dietary fat intake was related to the pH values of the milk samples. The physicochemical characteristics and selected cultivable microorganisms of the human milk showed that the total fat of the milk was linked with the count of Staphylococcus collected during the fourth month of lactation (p0.05). The results suggest that maternal diet can shape the physicochemical quality of human milk, which may indirectly influence microorganisms present in it.

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sciforum-103469: Transforming Vegetable Waste: Insect Flour Quality through *Tenebrio molitor* Larvae Supplementation

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Insect farming presents a viable solution to transform vegetable waste generated by the food industry into valuable products such as insect flours. Vegetable waste is rich in bioactive compounds and essential nutrients, which can potentially enhance the quality of insect flours. This study aims to investigate the impact of adding vegetable waste to the diets of *Tenebrio molitor* larvae on the quality of the generated flours during long-term storage.

The iets of *T. molitor* larvae consisted of supplementing (1:1) wheat bran with cucumber or tomato wastes for 6 weeks. Post-supplementation, the larvae were dried using a pilot infrared oven at 68°C for 4 hours, and then ground into flour. The quality attributes (moisture, color, lipid oxidation, and microbial load) of these insect flours were assessed over a 12-month storage period at room temperature.

During storage, moisture was around 5-7% in all flours, which is essential for avoiding microorganism growth. Thus, the presence of *Salmonella* spp., *Escherichia coli,* and *Listeria monocytogenes* was below the legislation limit. The color parameters of L*, a*, b*, and C* progressively decreased in all flours; this reduction was more pronounced in flours from larvae fed only with wheat bran. All flours darkened during storage, especially those from supplemented larvae. These results are consistent with the results of nutritional composition and lipid oxidation since flours from larvae fed with vegetable wastes have a higher proportion of unsaturated fatty acids (35% in supplemented versus 25% in control), and are more prone to oxidation, which provides a darker color. Lipid oxidation was stable until 3 months of storage.

Therefore, using tomato and cucumber wastes as supplements for *T. molitor* diet is a sustainable strategy to revalorize vegetable waste and produce flours that maintain acceptable quality attributes for at least 3 months of storage at room temperature.

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sciforum-102933: Chemical Composition Analysis of Sea Buckthorn (Hippophae) in Georgia and Development of Innovative Valorization Technologies for Plant Materials and Processing Waste

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Introduction

Sea buckthorn (*Hippophae*), widely found as a wild berry in Georgia, is a rich source of natural antioxidants, traditionally used for preparing food additives like sea buckthorn oil, carotenoids, tocopherols, and phospholipids. Despite its longstanding use, the physicochemical properties and potential applications of this berry remain underexplored. This study focuses on investigating the biologically active compounds in sea buckthorn berries harvested from different climatic and soil regions across Georgia.

Methods

UPLC-PDA-MS analysis identified and quantified bioactive compounds in wild sea buckthorn berry, juice, and waste. Gas chromatography was used to analyze its oil. The effects of traditional high-heat processing (100°C) on bioactive content were compared to those of innovative methods, including Ultra Sonic Extraction, High-Pressure, and Temperature Water Extraction. Antioxidant activity was assessed using the DPPH radical scavenging assay.

Results

The research successfully isolated fat, carotenoids, and polyphenols from the berries. Gas chromatography revealed that the fat fraction predominantly consists of C18 fatty acids (53.9%-56.3%), with oleic acid being the most abundant (38.3%-44.2%). Among the C16 fatty acids, palmitic acid was found to be dominant, comprising 36.2%-39.0% of the content. Beta-carotene was identified as the key carotenoid using UPLC-PDA and MS, with the highest yield (3120.6 mg/100g) achieved through the use of an ultrasonic probe and supercritical fluid extraction. Spectral analysis showed a total phenol content of 5160-5944 mg/100g, indicating significant antioxidant activity (50% inhibition of 0.1mM DPPH radical by 1-3.2 mg of sample). This study resulted in the extraction of three biologically active products from sea buckthorn berries: oil, carotenoid extract, and phenol extract.

Conclusions

This study demonstrates the high levels of bioactive compounds in raw materials and the effectiveness of innovative processing methods in preserving these compounds. The results suggest that optimizing innovative methods can enhance their nutritional value and health benefits.

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sciforum-099034: Comparative Study of Fatty Acid Composition of Fruit Oils from the Amazonian Region

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Introduction

Sinami (*Oenocarpus mapora* H. karst) and Aguaje (*Mauritia flexuosa* L.f.) fruits, species from the amazonian region, are mostly used to extract oil. These oils are consumed by Amazonian native communities as part of their daily diet. Previous research evidenced the crucial components in these oils, of unsaturated fatty acids and phenolic compounds in these oils (1,2). This study therefore compares the fatty acid content of Sinami and Aguaje oils with the profile of olive oil, which is widely consumed worldwide.

Methods

Sinami and Aguaje oils were obtained from freeze-dried pulps using a supercritical fluid extraction system equipped with CO_2 and co-solvent pumps. The conditions were as follows: 315.15 K, 20-MPa pressure, and a CO_2 mass flow of 42 g/min. Oils were stored at −20 °C until use. Fatty acids were identified using a gas chromatograph equipped with a silica capillary column and a flame ionization detector. Results were expressed as relative concentrations (3).

Results

The oleic > palmitic > linoleic acids were predominant in the composition of Sinami and Aguaje oils. In addition, these fruit oil compositions include ten and six kinds of fatty acids, respectively. Oleic acid was the most concentrated one in both samples (58.9 and 73.4 g/100g, respectively), with a concentration somewhat similar to that of olive oil (78.7 g/100g). Also, Sinami oil exhibited a higher concentration of linoleic acid (15.2 g/100g) compared to olive oil (5.10 g/100g).

Conclusions

These characteristics suggest possible applications of Sinami and Aguaje oils as potential ingredients with nutraceutical benefits in many products, according to the presence of unsaturated acids.

References

1. Muñoz AM, Casimiro-Gonzales S, Gómez-Coca RB, Moreda W, Best I, Cajo-Pinche MI, et al. Foods.2022;11(10):1518.
2. Ramos-Escudero F, Gómez-Coca RB, Muñoz AM, Fuente-Carmelino LDL, Pérez-Camino M del C. Frontiers in Sustainable Food Systems.2022;6.
3. Barriga-Sánchez M, Casimiro-Gonzales S, Ramos-Escudero F, Muñoz AM, Anticona M. LWT.2024;198:115956.

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sciforum-093615: Determination through ATR-FTIR Spectroscopy of the Structural Changes in Dietary Fiber from Pacaya (*Chamaedorea tepejilote* Liebm) Modified by Thermal, Acid, and Alkali Treatments

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Dietary fiber (DF) is important as it benefits intestinal function, obesity, diabetes, dyslipidemia, and cancer. However, the extraction methods can modify the structural characteristics of DF, which could influence its functionality. On the other hand, there are no studies regarding the DF of pacaya inflorescences, which is a traditional food consumed by indigenous communities in Mexico after applying a thermal treatment. Therefore, the objective was to characterize through ATR-FTIR spectroscopy the structural changes in the FD of pacaya using three extraction methods. The thermal treatment was carried out using a sequential method (step 1 at 60 °C and 60 min; step 2 at 100 °C and 30 min). In the acid and alkali treatments, 5% w/v NaOH solution and 1% w/v citric acid solution were employed, respectively, at 40 °C for 120 min. Subsequently, the dispersion was filtered to obtain soluble dietary fiber (SDF) and insoluble dietary fiber (IDF) and then characterized using ATR-FTIR. The results showed changes in the intensity of the absorption bands of some functional groups related to the structure of cellulose, some hemicelluloses, pectins, and lignin. In particular, the alkaline treatment caused the hydrolysis of some of these components of the FD, such as cellulose, hemicelluloses, and pectins. Nevertheless, the modified DF of the tepejilote has great potential for application in the food industry.

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sciforum-095367: Functionality and structure of protein isolate from decolorized moringa leaf

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The leaves of Moringa oleifera are rich in protein and could serve as an alternative protein source for food fortification, enhancing various products. However, their use in foods is limited due to their green coloration, which negatively impacts consumer acceptability. This project's aim is to examine the impact of decolorization on the functionality and structure of Moringa oleifera leaf powder (MOLP) protein isolate. Decolorization significantly ($p \leq 0.05$) changed the proximate composition of MOLP. In general, decolorized MOLP had a higher moisture, ash, and protein content compared to the un-decolorized MOLP (UDMP). Conversely, the fat (4.33%) and carbohydrate (53.75%) contents were higher in the UDMP than in the decolorized MOLP (DMP), which had 0.66% fat and 52.09% carbohydrate. Decolorization significantly influenced the water absorption capacity of the isolate but did not affect its oil absorption capacity. The decolorized protein isolate showed twice the water absorption capacity of the un-decolorized sample, presumably due to differences in the amount of charged and polar amino acids on the surface of the molecule. Scanning electron images revealed that the decolorized protein isolate particles were smaller than those of the un-decolorized isolate. The foaming and emulsion capacities of the isolates were dependent on pH. Glutamic acid and aspartic acid were the major amino acids in both isolates, but decolorization appeared to reduce the total amino acid content in the protein isolate. This study indicates the potential of Moringa protein as a food-fortifying ingredient, enhancing the nutritional and physicochemical properties of various food products. Future studies should focus on optimizing decolorization techniques, investigating long-term stability, examining other functional properties, conducting comprehensive nutritional and toxicological analyses, assessing consumer acceptability, and developing scalable industrial processes.

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sciforum-099004: Physicochemical and structural properties of brown rice flour pretreated with Rhizopus oligosporus and microwave radiation

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Introduction

Due to its high nutritional and bio-functional properties, brown rice, consisting of bran, endosperm, and germ, has great potential in food product development. However, the utilization of brown rice in food processing is limited because of its poor technological properties. Therefore, pretreatment of brown rice for improved quality is imperative. The objective of this study was to evaluate the effect of Rhizopus oligosporus (RO) and microwave radiation (MR) pretreatments on the physicochemical and structural properties of brown rice.

Methods

Brown rice flour (BRF) was pretreated with RO or a combination of RO and MR. The BRF sample that received no treatment served as the control. Physicochemical and structural properties of the pretreated BRF and the control were determined using standard protocols.

Results

Higher water absorption capacity, swelling index, and water solubility index were recorded for the pretreated BRF compared to the control; however, the control has a higher bulk density. The least gelation concentration of the control, RO-treated, and RO+MR-treated BRF was 3.5%, 2.5%, and 1.5%, respectively. RO treatment increased the peak, breakdown, final, and setback viscosities of BRF by 8.33%, 73.47%, 35.54%, and 65.45%, respectively while RO+MR treatment increased the parameters by 76.28%, 33.67%, 86.53%, and 85.82%, respectively. The treatments reduced pasting time and temperature significantly (p 0.05). There was an improvement in BRF morphology, as evident in increased surface smoothness, following its pretreatment with RO and MR. Similar FTIR and XRD spectra were obtained for the samples; however, there were slight changes in the selected peaks of the pretreated samples, relative to the control, indicating molecular structural re-adjustment.

Conclusions

The physicochemical and structural properties of BRF could be improved consequent to its pretreatment with RO and MW, suggesting improved technological properties that would enhance its applicability in food processing.

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sciforum-103350: Prediction and Validation of the Solubility of Date Seed Phytosterols Using Hydrophobic Natural Deep Eutectic Solvents

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Introduction

Date seeds, a by-product of date fruit production, are rich in bioactive compounds like fatty acids, tocopherols, and phytosterols. Efficient extraction methods, such as Heating--Stirring (HS) using Natural Deep Eutectic Solvents (NADES), can save time, thus reducing the environmental and economic impact. This study aims to assess the solubility of phytosterols in hydrophobic NADES, propose suitable NADES and compare their extraction efficiency against hexane as a control.

Methods

The solubility prediction was performed using the conductor-like screening model for the real solvent (COSMO-RS). For the extraction of phytosterols, HS was used under optimal extraction conditions previously determined by the Response Surface Methodology: a 1/3 (w/v) solid to liquid ratio and 45 minutes duration. Different temperatures (25, 45, and 65 °C) were tested to analyse differences in sterol content. The Total Sterol Content (TSC) in the extracts was measured using the colorimetric method Farbtest (R-Biopharm-AG) expressed in mg/g of dry date seed powder.

Results

After screening several NADES in COSMO-RS, five NADES with different molar ratios were selected: Menthol/Eucalyptol (Men:Eu, 1:1), Menthol/Lauric acid (Men:LA, 4:1), Menthol/Lactic acid (Men:Lact, 1:2), Octanoic acid/L-Proline (4:1), and Octanoic acid/Lauric acid (3:1). Hexane (Hex) was used as a control. Analysing both the in silico and experimental models, the Men:Eu extract contained the highest amount of phytosterols compared to the control in all temperature conditions. At 25 °C, Men:Eu (8.6 ± 0.9 mg/g) and Oct:Pro (2.0 ± 0.4 mg/g) showed significant differences with Hex (0.4 ± 0.0 mg/g). In recent studies on date seed oil, TSCs were found to be between 5.4 and 7.9 mg/g.

Conclusions

Hydrophobic NADES demonstrated effective phytosterol extraction from date seeds. COSMO-RS screening facilitated the identification of the most promising NADES formulations, reducing the need for extensive experimental assays to enhance the efficiency of the extraction.

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sciforum-091271: Qualitative analysis of volatile organic compounds on *Aegle marmelos L.* by GC-O-MS automation system

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The purpose of the current study was to assess the chemical composition of A*egle marmelos L.* (Bael fruit) extracted from naturally insect-infested small to medium-sized perennials which explore its potential therapeutic applications. The study of the volatile organic compounds (VOCs) composition in the Bael fruit was performed by gas chromatography-olfactometry-mass spectrometry (GC-O-MS) automation system.

The Bael fruit was grinded, boiled in 5mL deionized water, filtered and the VOCs major components analyzed by using head-space solid-phase micro-extraction (HS-SPME-GC-O-MS) automation. The DVB/CAR/PDMS SPME fiber was then exposed inside each vial to extract volatile compounds in headspace of the sample with the extraction time of 30 min at 50 °C temperature. The chromatogram results reveal the detailed peak identification, compound name, molecular weight, list of compounds the retention time and maximum peak area.

The qualitative analysis of GC-O-MS technique revealed the presence of 3 main different components sesquiterpene and terpenes group with chromatogram peak areas of major identified compounds were Gamma-Eudesmol , Cis-Thujopsene, Benzaldehyde which possess anti-inflammatory properties. According to literature, Gamma-Eudesmol can inhibit the enzymes COX and LOX, while Cis-Thujopsene is effective in inhibiting the growth of bacteria, such as Staphylococcus aureus and Escherichia coli, and some viruses. Benzaldehyde is described to inhibit inflammatory cytokines and the enzyme COX-2. Additionally, all three substances have anticancer effects by stimulating the apoptosis process in cancer cells.

In this study, Bael fruit, which is known for its anti-inflammatory, analgesic, and antioxidant properties, was studied by GC-O-MS analysis. This allowed to identify the major compounds found in the fruit which may corroborate its biological activity.

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sciforum-098511: A Comparation Analysis of Cold Brew Coffee's Aroma Using the GC-O-MS Technique: SPE and HS-SPME Methods for the Extraction of Sensory-Active Compounds

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Coffee, one of the most consumed commodities globally, embodies a sensory experience deeply rooted in social, cultural, and hedonic contexts. The Cold Brew (CB) method, characterized by cold extraction, provides a refreshing alternative to traditional coffee. Despite its growing popularity, CB lacks defined preparation parameters and exhaustive analysis of its aromatic composition. In this study, we aimed to obtain a representative extract of CB's volatile matrix and characterize the aroma of its sensory-active compounds using advanced techniques, such as headspace solid-phase microextraction (HS-SPME) and headspace solid-phase extraction (HS-SPE), followed by gas chromatography–olfactometry–mass spectrometry (GC-O-MS). The aroma descriptors for each compound were determined using a sensory panel trained to perform olfactometry. In addition, the odorant impact was estimated by calculating the modified frequencies (%MF) to determine the most essential compounds that had the most significant impact on the aroma. Mass spectra, retention indices (RIs), and aroma descriptors allowed us to identify compounds with sensory activity. Optimization of the HS-SPME parameters resulted in the identification of 36 compounds, while HS-SPE identified 28 compounds, including complementary and similar compounds. In HS-SPME, 15 compounds exhibited sensory activity with descriptors such as floral, caramel, sweet, and almond, whereas 7 exhibited sensory activity with descriptors such as chocolate, floral, coffee, and caramel. This comprehensive approach to HS-SPME and HS-SPE aroma extraction with GC-O-MS provides an efficient methodology for characterizing the aroma profile of CB, paving the way for future research and quality standards for this innovative coffee beverage.

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sciforum-091874: A New Visible Spectrophotometric (VIS) Method for the Quantitative Analysis of Vitamin E (alpha-D-Tocopherol) in Capsules of a Food Supplement

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Vitamin E is an very effective and powerful antioxidant which inhibits and blocks the synthesis of free radicals, with high carcinogenic potential for humans. Alpha-D-Tocopherol is always brought in through a balanced food intake that includes the regular daily consumption of nuts, seeds ,almonds, peanuts, hazelnuts, and oils, as well as certain fish such as salmon, vegetables, such as red sweet pepper, and fresh fruits like avocado, mango, and kiwi fruit. Our main aim was to exactly determine the pure amount of vitamin E (alpha-D-Tocopherol as single active substance) in a soft-release capsule using a new spectrophotometric method in a visible range. Finally, the obtained result was compared with the official amount of active substance in the soft release capsule, according to Romanian and European Pharmacopoeias rules. The method was based on the complete oxidation of alpha-D-Tocopherol with an acidified solution of **$FeCl_3$** in a **H_2SO_4 30% solution,** obtaining a final oxidation product with the terminal **CH_2-OH primary group** (omega oxidation). At the same time, the ferric ions were reduced to ferrous ions **Fe^{2+}**, which were quantitatively complexed in the dark with free unreacted ferric Fe^{3+} ions from a potassium ferricyanide **$K_3[Fe(CN)_6]$** solution. The **Turnbull blue** compound was quantitatively obtained and was dosed at its absorption maximum wavelength **λ = 705 nm.** The amount of alpha-D-Tocopherol found in the soft-prolonged-release capsule was **97.48 mg** pure active substance/soft capsule. The amount found was very close to the reference value of **100 mg** pure α-D-Tocopherol in prolonged-release capsules, in relation to the average mass of a capsule *270,2 mg*, and corresponded to a real content percentage found of **97.48 mg %** pure alpha-D-Tocopherol/prolonged-release capsule. The average percentage error was only **2.516 % below** the reference value **(100 mg). This method was subjected to full statistical validation and was validated. The sensitivity of the measurement** was found to be **S = 0.0158 μg/cm^3 = 15.8 ng / cm^3** for **97.48 mg** pure content of alpha-D-Tocopherol in the capsule.

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sciforum-102673: A study of bioactive compounds of wine production residues of some red grapes common in Georgia and the perspective of using the obtained preparations

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Historically, Georgia is a winemaker country (about 8000-year-old history). Wine has been made by several methods, which manifests in different times of fermentation of seeds and juice, which in turn affects the chemical composition of wastes after winemaking. Despite more than 500 cultivated species existing in Georgia, wastes after wine production are unexplored and unused. Therefore, our goal was to study the chemical composition of the post-production waste of some industrial red wine varieties by HPLC, UPLC-PDA, and MS methods and to obtain hydrophilic, alcoholic, and hydrophobic extractions and preparations by several methods: supercritical fluid extraction (SFE), ultrasonic extraction (US), cold press extraction, and high-pressure and temperature extraction.

Obtained preparations were different by chemical composition and antioxidant activity in different forms of grapes. The contents of total phenolics in Ojaleshi, Saperavi, and Otskhanuri Sapere skin were 7.085 g/kg, 9.71 g/kg, and 11.280 g/kg in dry mass; corresponding antioxidant activities were - 0.72, 0.44, and 0.37 units (0.1mM DPPH 50% inhibition mg of samples). In seeds of Ojaleshi, Saperavi, and Otskhanuri Sapere, the content of total phenolics was 5.472 g/kg, 7.572 g/kg, and 10.447 mg/kg in dry mass; corresponding antioxidant activities were 1.02, 0.65, and 0.52 units (0.1 mM DPPH 50% inhibition mg of samples). The yield of preparations of phenolics obtained from grape skin was 10-15%; from grape seeds, it was 14-18%. The yield from seeds' oil was 17-22%.

The produced oil was compared with the oil obtained by the extraction of the classic Soxhlet method.

Palmitic acid (C16:0), Stearic acid (C18:0), Oleic acid (C18:1), Linoleic acid (C18:2 *cis*-9), and Linolenic acid (C18:3) have been identified in the obtained oil.

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sciforum-103121: Antioxidant, anti-inflammatory, anti-diabetic, and cytotoxic potential of ethanolic leaf extracts from *Englerina woodfordiodes* M. Gilbert and *Oncocalyx fischeri* (Ebgl.) M. Gilbert

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Introduction

In patients with type-2 diabetes (T2D), oxidative stress is closely associated with chronic inflammation and plays an important patho-physiological role in T2D and its related complications. Therefore, antioxidants may be particularly beneficial in the treatment of diabetic patients, and therapies based on phytochemicals from plants are of great interest as a potential alternative and safer treatment for oxidative stress, chronic inflammation, and T2D. The aim of this study is to investigate the antioxidant, anti-inflammatory, and anti-diabetic potential of ethanolic extracts and subsequent fractions of *E. woodfordiodes* and *O. fischeri*.

Materials and Methods

The leaves of the plants were extracted with 99% ethanol and subsequently fractionated using n-hexane, chloroform, ethyl acetate, and n-butanol. The antioxidant, anti-inflammatory, and anti-diabetic activities, as well as cytotoxicity, of each extract/fraction were evaluated, respectively, by DPPH• inhibition and Ferric Reducing Antioxidant Power (FRAP) assays; xanthine oxidase inhibition (XOI); glucose uptake by Caco-2 cells; and cell viability.

Results and Discussion

The n-butanol fraction and the crude extract of *E. woodfordiodes* exhibited very high DPPH• inhibitory activities (84.3% and 85.9%, respectively). The crude extract of *O. fischeri* also showed a significant DPPH• inhibition activity (50.7%). In the XOI assay, the n-hexane fraction of O*. fischeri* (82.9%) and the ethyl acetate fraction of *E. woodfordiodes* (79.1%) demonstrated statistically significant reductions of peroxide formation. Regarding the Bradford assay, none of the fractions from either plant showed a significant reduction in cell viability. In comparison to the respective controls, most of the fractions of *E. woodfordiodes* and *O. fischeri* significantly reduced (*p*0.05) glucose uptake in Caco-2 cells.

Conclusions

The findings reveal the promising antioxidant, anti-inflammatory, and anti-diabetic potential of *E. woodfordiodes* and *O. fischeri* leaves, mainly of their crude extracts. Due to their safety compared to other solvents, these extracts could be applied in several food- and health-related areas.

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sciforum-102979: Characterization of the Phenolic Profile of Sacha Inchi (Plukenetia volubilis) Shell Extract

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Introduction

This research focused on the sacha inchi shell, a byproduct commonly discarded after oil extraction, which could be a source of bioactive compounds with potential health benefits.

Methodology

Two ethanolic extracts from the sacha inchi shell, named Sacha Inchi Estrella (SIE) and Sacha Inchi Almendra (SIA), were obtained using ultrasound-assisted extraction using the Benchmark Scientific Pulse 150 ultrasonic homogenizer at a frequency of 20 kHz and intensity of 150 W. The process was carried out over a period of 15 minutes at a temperature of 35 °C, with pulses of 1 second ON and 2 seconds OFF. The total phenolic content was determined using the Folin-Ciocalteu method, and the phenolic profile was characterized by high-performance liquid chromatography with a diode-array detector (HPLC-DAD).

Results

The results showed that SIA contained 8,86 ± 2.68 μg GAE/g dry shell, while SIE contained 13,35 ± 8.04 μg GAE/g dry shell. Both extracts contained phenolic acids and flavonoids. In the SIA extract, luteolin was the predominant compound (143.21 μg/g), although low amounts of 2-hydroxycinnamic acid were observed (0.45 μg/g). In contrast, the SIE extract had syringic acid as the major compound (286.62 μg/g), with ferulic acid being the least abundant (0.93 μg/g).

Conclusions

The SIE extract showed a higher concentration of total phenolic compounds compared to the SIA extract. Additionally, variations in the concentrations of each compound were detected between the SIA and SIE shell extracts. These findings highlight the variability in the composition of bioactive compounds between the extracts, which could significantly influence their functional properties.

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sciforum-103226: Chemical Characterization and Bioaccessibility Assessment of Bioactive Compounds from Juneberry (*Amelanchier Lamarckii)* pomace

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The Juneberry fruit belongs to the *Rosacea* family and is native to the northern prairies and plains of North America. The berries are edible, quite pithy and are an excellent source of bioactive compounds such as anthocyanins, flavonols, procyanidins and phenolic acid.

In this work, the extraction of Juneberry (*Amelanchier Lamarckii)* pomace was carried out by maceration with ethanol/water (80/20, 40/60, 0/100, v/v) for two hours at room temperature. The chemical composition and antioxidant and antimicrobial activity were evaluated; in addition, the profile of the phenolic compounds was determined by HPLC-MS. Also, the bioavailability of the compounds in the pomace of Juneberry from the selected extract was evaluated by measuring the relevant bioactives before and after gastrointestinal digestion in vitro using the INFOGEST 2.0 protocol.

The mean and standard deviation of triplicate amounts of total phenolic compounds before and after the gastrointestinal digestion of ethanolic June berry pomace extracts were 210.1 ± 0.8, 170.1 ± 3.8 and 72.9 ± 0.3 mg/g, respectively. It was observed that after simulated digestion, the total phenolic and flavonoid content of the Juneberry pomace extracts decreased significantly during the gastric and intestinal phases compared to the crude extracts. As far as antioxidant activity is concerned, a reduction in all the parameters studied was observed after gastric digestion.

Due to the high content of natural colourants and bioactive compounds in the pomace of *Amelanchier Lamarckii,* this species could, in the future, be useful for the food industry as a potential ingredient for functional food formulations, flavours or colourants.

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sciforum-099214: Diversity of color and phenolic profile correlation in citrus fruit peels

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Citrus fruits reach an annual worldwide production of more than 130 Mt, mainly constituting sweet orange (*Citrus sinensis*), lemon (*Citrus limon*) and grapefruit (*Citrus paradisi*), among others. Around 40 % of such production is lost during handling and processing activities, especially peel by-products, which contain a great amount of health promoting compounds that can be extracted and subsequently used in several industries. The main bioactive compounds identified in the citrus peels are flavonoids, specifically glycosylated flavanones. In this study, the total phenolic content (TPC) and the concentration of individual flavonoids extracted from the peels were quantified, and the color was measured by the CIELab* system. As significant differences were observed, the correlation between the color of orange, grapefruit and lemon peels and their TPC has been evaluated using principal component analysis (PCA).

The results showed up to ~27 % higher TPC in grapefruit and lemon peels compared to orange. The main flavonoids quantified (poncirin, diosmin, dydimin, hesperidin, naringin and narirutin) are found in varying proportions in orange, lemon and grapefruit peels. Grapefruit had the highest content of naringin, poncirin and narirutin (~680, ~150 and ~240 % higher than orange, and even more compared to lemon). Therefore, these compounds have a red-orange color. Lemon peel had a lower content of naringin, poncirin and narirutin, but up to eight-fold more diosmin than orange (and even more than grapefruit), so it correlates with smaller values of a* and b* (yellow color). Orange had the highest concentration of hesperidin and didymin (~114 % and ~20 % higher than grapefruit), so they are orange in color. In the valorization of citrus by-products, it is important to understand the differences in the phenolic profile of all species, and to be able to correlate them with simple measures such as color.

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sciforum-103055: Effect of different stabilisers on physicochemical, rheological and microstructural properties of chickpea-based yogurt

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The primary challenge in producing plant-based yogurt analogues (YAs) lies in achieving textural and rheological qualities comparable to those of dairy-based yogurt, due to differences in their nutritional compositions. This study aims to evaluate the effect of different types of stabilisers on the physicochemical, rheological and microstructure properties of chickpea-based yogurt. The samples included 0.5% commercial stabiliser, 0.5% LBG, combinations of 0.5% locus bean gum (LBG) + 0.5% pectin, and 0.5% LBG + 0.5% corn starch, while yogurt with no stabiliser served as the negative control. Results indicated a significant difference in protein content between raw chickpeas and other samples (p0.05) in terms of crude protein determination. The pH levels of the negative control and LBG + CS significantly differed from those of other samples (p0.05). Syneresis development over 14 days was significantly lower (p0.05) in samples containing a combination of 0.5% LBG + 0.5% pectin. A significant increase in yogurt viscosity (p0.05) was observed in samples with 0.5% LBG, 0.5% LBG + 0.5% pectin, and 0.5% LBG + 0.5% corn starch. Firmness and consistency were significantly enhanced with 0.5% LBG + 0.5% corn starch. In steady-shear measurements, all samples exhibited shear thinning behavior, where viscosity decreased as the shear rate increased. Yogurt containing 0.5% LBG + 0.5% pectin exhibited only a slight difference in overall quality compared to that with 0.5% LBG. All samples exhibited an amorphous-type molecular structure based on scanning electron microscopy. This finding indicates that the combination of LBG and pectin or corn starch has a synergistic effect, significantly enhancing the quality of chickpea-based yogurt. In conclusion, each stabilizer significantly influenced yogurt's characteristics in different ways. This research suggests further optimization of production conditions for chickpea YAs and extensive evaluation of yogurt qualities.

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sciforum-101670: Effect of fermentation processes and starters on phenolic compounds in legume protein creams

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With trends driven by consumer health, vegetarianism, and other considerations, people are seeking healthier and more sustainable alternatives to animal-based nutrition. Legumes are excellent raw materials for such products, as they are important sources of dietary protein and bioactive compounds (such as phenolic compounds). Legume protein cream has a broad range of applications, attracting more consumers. This study aimed to evaluate the effects of fermentation temperature, protein concentrate, and starter culture on the phenolic compound content of legume cream. Protein concentrates, including yellow peas, gray peas, and fava beans, were used as the main raw materials. The cream mixture was prepared and heat-treated at 70°C for 30 seconds, then cooled to working temperature. F-DVS CHN-22 starter (fermented at 22°C, 26°C, and 30°C) and DANISCO® VEGE033 starter (fermented at 37°C, 40°C, and 43°C) were added to the prepared cream mixture. The Folin--Ciocalteu reagent method (Singleton et al., 1999) determined the total phenolic content (TPC). Analysis of variance (ANOVA) and the Tukey test (p0.05) were both used. Heat-treated protein concentrates from these legumes were used as controls. Results showed no statistically significant differences between the starters used. However, fermentation with F-DVS CHN-22 resulted in an average TPC increase of 20%, and with DANISCO® VEGE033, an increase of 33%. Generally, samples with fava bean concentrate had higher TPC after fermentation, regardless of the starter. The fava bean concentrate sample with F-DVS CHN-22 fermented at 26°C exhibited the highest TPC. The study demonstrated that both the type of protein concentrate and fermentation temperature significantly affected TPC in the analyzed samples. Future studies are planned to investigate the changes in specific phenolic compounds under these conditions.

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sciforum-102770: Effect of growth stages on polyphenols and secondary metabolites of haskap leaf varieties

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The haskap plant (*Lonicera caerulea L.*) produces a high leaf-to-berry ratio yearly. Although the leaves are considered agricultural waste, they can be an inexpensive source of obtaining polyphenols and secondary metabolites, with potential applications in the food industry. The concentration and distribution of polyphenols and metabolites within plants are subject to major factors, including genetics, growths stages and the environment, but little is known about haskap plants. In this study, the effect of growth stages on the concentration of polyphenol and secondary metabolites of underutilized haskap leaf varieties (Ruben, Rebeka and Tola) grown in Nova Scotia was investigated. Thirty young leaves (second from the top) per plant during the stages of leafing, flowering/fruiting and harvesting were plucked with five replicates in a row and ground with liquid nitrogen. The polyphenols and secondary metabolites of the haskap leaf extracts were analyzed using LC-MS/MS and TMIC PRIME plant assays, respectively. Apigenin, p-coumaric and naringenin decreased as the plant growth advanced, while catechin and vanillin increased at the harvesting stage of growth for all three varieties. Up to 50% of secondary metabolite concentrations were used during the flowering/fruiting stage. Malic, oxalic, shikimic and succinic acids decreased from 14.58 to 5.88 μmol/g, 2.22 to 1.76 μmol/g, 3.71 to 2.84 μmol/g and 1.74 to 0.84 μmol/g at the fruiting stage, respectively. They revealed that the leafing stage might be a promising optimum time to harvest haskap leaf to maximize the total concentration of targeted polyphenols and secondary metabolites. This is the first time the effect of haskap growth stages on polyphenol and secondary metabolite concentration in these haskap varieties has been reported. This could serve by bridging the knowledge gap while adding value to the by-product.

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sciforum-104009: Effect of various processing techniques on nutritional, techno-functional, structural, and molecular interactions of finger millet (*Eleusine coracana*)

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To determine the impact of anti-nutritional factors, in vitro protein and starch digestibility, in vitro protein bio-accessibility, techno-functional properties, and the structural and molecular interactions of finger millet due to soaking, germinating, fermenting, and a combination of aforesaid processing techniques were assessed with time in this study. Alterations in techno-functional properties were determined as water absorption capacity, water solubility index, oil absorption capacity, paste clarity, swelling power, emulsion activity, emulsion stability, and viscosity. Structural variations and the macromolecular arrangement of processed finger millet flours were assessed by using a Scanning Electron Microscope (SEM) and Fourier Transform Infrared spectroscopy (FTIR). Replicates were taken and their mean and standard deviation were calculated and presented by using SPSS software. Tannin and phytate content showed a reduction pattern in soaking, fermentation and the combination of soaking, germination, and fermentation treatments. However, saponin content increased (p 0.05) with time in the germinated finger millet samples (2.03 – 2.50%). The most profound in vitro starch digestibility effect was obtained by the combination of treatments (25.45 ± 0.01^{e} g/100g). Soaking, germination, fermentation, and treatment combination significantly increased (p0.05) water sorption isotherm and oil absorption capacity compared to the control sample and slightly modified the swelling power, emulsion capacity, and emulsion stability of finger millet flour. The treatment combination greatly improved most of the functional properties compared with each processing technique alone. SEM images of the combination of treatments showed the most uniform structural assembly and particle size distribution of starch granules with the most drastic degradation. In conclusion, the treatment combination has been found as the best way to improve the properties of finger millet flour. The increased levels of these constituents in the processed finger millet flours suggest their potential as functional ingredients in the development of novel bakery products and other food applications.

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sciforum-089454: Evaluating the Potential for Partial Reduction in Sugar in Milk Chocolate Using Sweet Whey Powder

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With the growing demand for healthier, reduced-sugar, and sustainable products, sweet whey powder has become an attractive ingredient for chocolate manufacturers who want to offer a healthier option to their customers. Because a significant volume of whey is disposed of as wastewater, whey is considered the major environmental contaminant in the dairy business in the absence of sustainable procedures. Whey can be repurposed into other ingredients, like sweet whey (produced by drying pasteurized fresh whey generated during cheese production) to be used in chocolate production to contribute to a circular economy. Sweet whey with fewer calories can reduce the calorie content when used to replace sugar for health-conscious individuals. This research therefore aimed to evaluate the potential for a partial reduction in sugar in milk chocolate using sweet whey powder.

Milk chocolate samples were produced by reducing the sugar content and replacing the sugar with sweet whey powder in different amounts (RO-0%, R1-5%, R2-7%, R3-10%, R4-12.5%, and R5-15%) w/w. The physicochemical properties (particle size, ash, and moisture) and the sensory properties (descriptive using 12 highly trained panel) were investigated.

The results indicated that the replacement of sugar with sweet whey significantly impacted the ash content (RO=2.55%, R1=2.79%, R2=2.94%, R3=3.11%, R4=3.36%, R5=3.54%), moisture content (RO=0.61%, R1=0.81%, R2=0.80%, R3=1.01%, R4=1.21%, R5=1.21%), and particle size (RO=25 μm, R1=16 μm, R2=16 μm, R3=14 μm, R4=12μm, R5=10.5 μm) as the sweet whey powder content increased. The following attributes showed similar results to those the control ($p \geq 0.05$),: texture, flavor, sweetness, and mouthfeel; saltiness, on the other hand, showed significant differences between the samples ($p \leq 0.05$).

It can be concluded that sweet whey powder has the potential to be used as an ingredient in reduced-sugar milk chocolate at levels of 12.5% and below.

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sciforum-098229: Evaluation of Physical and Chemical Parameters and Bioactive Compounds in Mango Nectars and Concentrated Juices

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Mango is a tropical fruit widely produced in Brazil and is rich in bioactive compounds such as carotenoids and vitamin C. There are several types of juices on the market, such as concentrated juices and nectars. Therefore, it is necessary to research the real benefits of these juices for the population and investigate whether they meet the requirements set forth in the legislation. The objective of this study was to characterize mango nectar and concentrated juice in relation to the Standards of Identity and Quality required by Brazilian legislation and to identify the content of bioactive compounds such as carotenoids and vitamin C. First, three brands of concentrated mango juice and three brands of mango nectars with different price ranges (maximum, medium and minimum values) were chosen. The following analyses were performed to characterize the nectar and concentrated juice: total solids, soluble solids in Brix, ascorbic acid, total titratable acidity and carotenoids. The nectars with maximum, medium and minimum values presented β-carotene contents of 334.85µg/100g, 1338.64µg and 1480.53µg/100g, vitamin C content of 21.01mg/100g, 36.85mg/100g and 25.48mg/100g, acidity contents of 0.29g/100g, 0.35g/100g and 0.30g/100g, soluble solid contents of 12.0°Brix, 13.0°Brix and 11.7°Brix and total solid contents of 11.30g/100g, 11.96g and 3.11g, respectively. The concentrated juices with maximum, medium and minimum values presented β-carotene contents of 911.29 µg/100g, 965.94 µg/100g and 2703.22 µg/100g, vitamin C contents of 16.40 mg/100g, 16.53 mg/100g and 53.02 mg/100g, acidity contents of 0.56 g/100g, 0.44 g/100g and 0.72 g/100g, soluble solid contents 8.4°Brix, 8.2°Brix and 12.0°Brix and total solid contents of 8.04 g/100g, 7.78 g/100g and 11.82 g/100g, respectively. Therefore, some samples did not measure up to the Brazilian Identity and Quality Standards provided put forth via legislation, and the quantity of bioactive compounds was slightly below what was expected in some samples.

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sciforum-103277: Evaluation of Selected Quality Parameters of Freshly Extracted and Commercial Walnut Oil

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Walnuts *(Juglans regia)* are a source of fat (oil) known for its distinctive nutty flavour, and it is a versatile ingredient in culinary applications. Walnut oil (WO), rich in mono- and polyunsaturated fatty acids (MUFAs and PUFAs), undergoes oxidation reactions and produces undesirable flavours when exposed to light and air. Commercially available WO is stored in glass bottles and kept under ambient temperature and fluorescent light conditions. The shelf life for walnut oil under such conditions is relatively short. This study compares the properties of oil that has been freshly extracted from mature kernels with commercial walnut oil just before its expiration date.

Oil extraction from nuts was performed using Soxhlet apparatus. The fatty acid composition determined using gas chromatography confirmed that unsaturated fatty acids are predominant in the composition of WO, with linoleic (58.0-59.9 %) and oleic (16.5-18.2%) acids being present in high amounts. The acid (AVs) and peroxide (PVs) values were evaluated using potentiometric and iodometric titrations in correspondence with ISO standards. The AV was slightly higher for the commercial than the extracted oil (2.85 mg KOH/g and 2.24 mg KOH/g, respectively). A similar trend was observed for peroxide values. The total phenolic content in the sample was quantified using Folin–Ciocalteu's reagent. Thermal analysis of WO was performed using pressure differential scanning calorimetry (PDSC). The maximum oxidation time (t_{max}), the time to reach the maximum heat flow, varied from 209 to 20 min for different experimental temperatures (100 to 130 °C) and was much lower than for the oil from hazelnuts.

A comparison of the data obtained for freshly extracted and commercial walnut oil does not show significant changes, proving that the cold-pressed oil purchased and used before the expiration date meets the requirements and maintains the quality after a few months of storage on the shelf.

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sciforum-100157: Evaluation of the Nutritional Composition and Bioactive Compounds from Hass Avocado Cake

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Originally from Central America, the avocado (*Persea americana* Mill.) has spread throughout the world, being used to extract oil, and is consumed fresh or in based-foods. However, fruit processing generates a waste that is still rich in macro- and micronutrients, as well as bioactive compounds. This work aimed to evaluate the nutritional potential of Hass avocado cake, generated after cold-pressing to oil extraction from its pulp and peel. Proximate composition, mineral profile, fatty acid composition, and bioactive compounds were evaluated. Results were expressed on a dry basis, except for moisture content. The Hass avocado cake, composed of pulp and peel, presented moisture, lipid, ash, protein, and carbohydrate content equal to 9.6% 27.2%, 8.3%, 10.2%, and 54.3%, respectively. Potassium (2621.7 mg/100 g), iron (6.0 mg/100 g), and zinc (4.0 mg/100 g) were the most abundant minerals in the sample. The residual oil had a fatty acid profile composed of oleic acid (54%), palmitic acid (20%), linoleic acid (15%), and palmitoleic acid (10%). Furthermore, the cake extract showed antioxidant potential via the assays ABTS•+ (159 µmol of Trolox/g), DPPH• (199 µmol of Trolox/g), and FRAP (552 µmol of Trolox/g). The Hass avocado cake showed a total phenolic compound content of 4326 mg GAE/100 g and a total carotenoid content of 2983 µg β-carotene/100 g, thus making it a potential source of bioactive compounds. Based on these results, this by-product can be used in the recovery of products with higher nutritional value, which aligns with the sustainable development goals of the 2030 Agenda.

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sciforum-099454: Experimental design for the determination of the antioxidant activity of the essential oil of "Toronjil blanco" (*Agastache mexicana* subsp*. xolocotziana*)

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Agastache mexicana subsp*. xolocotziana* is a Mexican endemic plant known in traditional medicine as "toronjil blanco" (Mexican giant hyssop). The aim of this study was to evaluate the effect of selected processing variables on essential oil (EO) extraction via surfactant-assisted hydrodistillation (SAH). The factors studied were the concentration of Tween 20 (0.001–0.007 g/mL), the solid--liquid ratio (15.8–45.8 g/L), and the extraction time (0.5–3.0 h). This analysis showed that of the three linear independent variables tested (as well as their interactions and quadratic effects), only the extraction time factor had a significant effect on the removal capacity of the ABTS• radical. Also, the antioxidant activity of the essential oil obtained via hydrodistillation was determined. The IC_{50} obtained via the ABTS method for the essential oil was found to be between 19.7 and 53.8 (mg/mL). A comparison was made with three synthetic antioxidants widely used in the food industry (BHT, Trolox, and ascorbic acid). The GC–MS analysis of the essential oil showed that nerol was the main component. The study concluded that the *Agastache mexicana* subsp*. xolocotziana* EO showed significant antioxidant activity. It is important to know the chemical properties of the essential oil of *Agastache mexicana* subsp. *xolocotziana* since they have not been reported so far and because it is consumed as tea in certain regions of Mexico and is a plant of commercial importance.

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sciforum-102943: Fat and fat-soluble biologically active compounds in the processing residue of sea buckthorn fruit

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The valorization of secondary raw materials allows us to reduce negative environmental impact while maximizing the raw material's phytochemical potential. Sea buckthorn berries consist of pulp and seeds. The pulp is mainly used in juice production, leaving behind the fruit skin and seeds. Our study aimed to investigate the chemical composition of the residue using the GC method and select the optimal method for extracting fat and fat-soluble compounds. The GC analysis of the obtained fat mainly identified C16 and C18 fatty acids. SFE (using carbon dioxide) allows the extraction of fat and carotenoid preparation (working regime: pressure 350 bar at 50°C, carbon dioxide supply rate 20 g/min). US extraction used a "green" solvent—ethanol of different concentrations (50%, 75%, and 96% ethanol). The relatively higher fat yield of 20% was recorded with 96% ethanol extraction. The optimal conditions for fat extraction were selected as a solid-mass-to-solvent ratio of 1/30 for dried samples, temperature of 30°C, amplitude of 90%, frequency of 40KHz, power of 130W, working cycle - pulse, time - 20 minutes. The carotenoid content in the obtained fat was determined by the spectroscopic method and was 1.75 g/100 g based on dry mass. The physicochemical properties of the obtained fat were studied. The obtained preparations are characterized by high antioxidant activity.

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sciforum-103178: Fatty acid profile and proximate composition of nuts grown in the Cuyo Region, Argentina

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Nuts are energy-rich foods with nutrients like monounsaturated and polyunsaturated fatty acids, high-quality proteins, fiber, minerals, tocopherols, phytosterols, and antioxidants. These components improve metabolic pathways and vascular physiology. Nut consumption is linked to a lower cancer incidence, improved cognitive function, and reduced depression and cholesterol. Nuts can be considered natural pleiotropic nutraceuticals. Their nutritional and functional composition is strongly influenced by environmental conditions. In the last decade, there has been a significant increase in the cultivation of walnuts and pistachios in the Mendoza and San Juan provinces (i.e., the Cuyo region), which have different agroclimatic conditions from the traditional growing areas. This study evaluated the impact of environmental conditions on the fatty acid profile and proximate composition of nuts from the Cuyo Region. Chandler-variety walnut samples were obtained from two farms in Mendoza, while Kerman-variety pistachios were recollected from San Juan. On each farm, three blocks were randomly selected, each with three adjacent trees with similar fruit load and crown size. Each block corresponded to contrasting environmental conditions (soil and altitude) within each farm. The proximate composition varied across the nuts evaluated. The highest moisture content, fiber, and carbohydrate content were found in pistachio. The total lipids content ranged from 44.5 to 68.1 g of oil per 100 g^{-1} dry solids for walnut and pistachio, respectively. The identification of fatty acids was carried out using gas chromatography–mass spectrophotometry. The most abundant fatty acids in walnut were linoleic acid (63.36 %), linolenic acid (17.18 %), and cis oleic acid (11.04 %), while cis oleic acid (56.70 %), linolenic acid (27.15 %), and palmitoleic acid (11.13 %) were the dominant fatty acids in pistachio. The results did not show variability in fatty acid concentrations between blocks (p0.05). This information provides insights into the fatty acid profiles and compositions of nuts from two new production areas.

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sciforum-099374: Fatty Acids and Tocopherol Profiles of Regular and Decaffeinated Instant Coffees

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Coffee is the most consumed beverage in the world, and in the form of instant coffee, it is highly appreciated for its ease of use. However, its frequent consumption may cause side effects like hypertension and arrhythmias due to the presence of caffeine. For this reason, decaffeinated coffee has become more popular. The decaffeination process affects both the chemical and nutritional profile. This study aimed to investigate these differences to evaluate nutritional aspects as well as the presence of descriptors for authentication issues. Six commercial brands (three decaffeinated and three normal instant brands of coffee) were analyzed for their fatty acid and tocopherol profiles by GC-FID and UHPLC-FLR, respectively. Four saturated fatty acids, three monounsaturated fatty acids, and two polyunsaturated fatty acids were identified. The most abundant were C16:0, C18:2, C18:0, and C18:1. α and β tocopherols were the only ones identified, with a total concentration ranging from 78 to 789 mg/kg in decaffeinated coffee and from 63 to 428 mg/kg in normal instant coffee. From the statistical analysis, β tocopherol registered the highest VIP score (3.5). While the t-test showed that C18:1 was statistically different (p 0.05) between the normal and instant coffees, no statistical difference was observed for β tocopherol in both coffee types. For this purpose, C18:1 could be a potential marker for discriminating between normal and decaffeinated instant coffees. Further research needs to be carried out to confirm these results.

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sciforum-099246: Flour composition and starch functional and physicochemical properties of runner bean (*Phaseolus coccineus*) starches

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There is an increasing demand for alternative sources of starch beyond conventional corn, especially for various food and industrial applications. Runner beans, an underutilised pulse grain, offer a promising alternative due to their relatively high protein and carbohydrate content, including starch. Understanding their functional and physicochemical properties is important for their adoption and utilisation. This study investigates the proximate composition of flour and the physiochemical properties of starch isolates from two varieties of runner bean (scarlet emperor and white swan) grown in the UK, comparing them with corn starch. Scarlet emperor runner beans exhibited 1.2 times higher protein content than the white swan, while their carbohydrate content was similar (average of 61%). Starch isolated from scarlet emperor and white swan beans showed similar water absorption capacity in comparison (approximately 100%), with both significantly outperforming the control corn starch (72.8%). The pasting properties and gel hardness of runner bean starches differed significantly from corn starch. For instance, the final viscosities were higher for scarlet (3942.17 cP) and white swan (3464.00 cP) starches compared to the control corn starch (3325.17 cP). Furthermore, the gels formed after pasting and subsequent cooling were 2.5 times firmer than those with corn starch on the initial day. However, after 5 days of storage, the firmness increased by a factor of 4. This is likely due to variations in amylose content. The higher viscosity of runner bean starches suggests their potential as effective thickening agents in food products and ingredient development. Further studies on morphology, crystallinity patterns, and thermal properties are needed to fully understand the potential use of these starches in various food applications.

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sciforum-103364: Food supplements analyses: from health benefits to challenges in safety and quality control

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Food supplements are concentrated sources of nutrients (such as minerals, vitamins or other bioactive compounds) and are taken in dose forms to supplement the normal diet. From the regulatory point of view food supplements are considered as food despite the fact that the appearance of food supplements is similar to pharmaceuticals, but the regulation of food supplements is not as strict as for pharmaceuticals. The increased awareness of health concerns, the ageing of the population and also the Covid-19 pandemic are some of the factors contributing to the increasing number of consumers regularly taking food supplements and by that contributing to the globally growing market of food supplements. The growing production and sales also brought new challenges for ensuring food supplement safety and quality as well as detecting fraudulent practices. Despite the regulations in place (for example in the European Union) there are still many cases of irregularities reported and these are often connected to internet sales. This presentation will focus on interdisciplinary challenges related to ensuring food supplement quality and safety ranging from labelling irregularities - including bioactive ingredients contents declarations - to analytical challenges - including the complex and diverse combinations of possible bioactive ingredients (bioactive compounds, vitamins, minerals, plant extracts, etc.). Other challenges discussed will be lack of available reference standards, SRMs and marker compounds of particular plant materials, plant extracts, or plant extract fractions. All these together with the variety of chemical structures and the limited number of published chromatographic (TLC, HPLC and GC) methods make the safety and quality control more difficult for both the manufacturers of food supplements as well as the regulatory authorities.

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sciforum-098515: Impact of Evaporation and Drying Methods on Color Parameters of Whole Milk Powder

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Milk is an essential food in the diet of billions of people worldwide. The demand for powdered milk products has increased considerably due to their durability, prolonged shelf life, and greater ease of transport and storage. However, the process of producing milk powder can significantly influence its physicochemical and sensory characteristics. Color is one of the most important sensory attributes of food quality because it is related to visual perception and acceptance by the consumer. Therefore, this research aimed to study the effect of different concentration methods—open pan (OP) and rotary evaporator (RE)—and drying techniques—spray dryer (SD) and freeze-dryer (FD)—on color parameters (L*, a*, and b*) and the browning index (BI) of whole milk powder. Four samples were assessed in triplicate, and variance (ANOVA) with a significance level of p 0.05 was used for the statistical analysis. The L* parameter (representing luminosity) and the b* parameter (representing the intensity of the yellow-blue colors) showed significant differences (p 0.05) between the treatments, indicating that the evaporation and drying conditions could have drastically affected the appearance of the product, which impacts visual perception and consumer acceptance. The OP-SD milk powder showed the highest b* value (23.12 ± 0.76), while the FD-SD treatment showed more negative BI values (-359.01 ± 21.90), suggesting the formation of dark-colored compounds. These findings can be attributed to processing conditions, such as high temperatures, which can promote non-enzymatic browning reactions, such as caramelization and the Maillard reaction. Overall, the processing method can affect the final quality of the product, especially its color and appearance, which are related to consumer acceptance of milk powder.

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sciforum-102250: Lemon-flavored gummy candies: Sourness, flavour and overall acceptance optimization using lattice-simplex mixture design implemented with Python programming language

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Acidulants are commonly used in gummy candies to enhance their flavour by intensifying specific notes and providing a tart taste. This study utilized the Python programming language, a free and open-source tool, to conduct a mixture design. This offers an accessible alternative to proprietary software and helps to bridge the digital divide between researchers and companies with different financial capacities. The main objective was to develop a Python script to implement a simplex-lattice mixture design to optimize the sourness, flavour, and overall acceptance of lemon-flavored gummy candies. The methodology involved creating mixture designs and analysing the impact of citric, malic, and fumaric acids on sourness, flavour, and overall acceptance. A combined model was also generated to measure the overall response of these sensory attributes. This study's results demonstrated high R^2 values across all models, indicating strong fit and significant coefficients for main effects and interactions. Contour plots and effect plots (Piepel direction) were also obtained. The optimal acidulant mixture calculated with the combined model was 5.85 g citric acid, 4.8 g malic acid, and 4.35 g fumaric acid, yielding a combined sensory score of 100.11, showcasing the potential of these models to fine-tune sensory attributes in confectionery products. Future confirmatory experiments are recommended to validate these findings. In conclusion, this research provided a practical example of using Python to enhance product development, offering a valuable resource for researchers, students, and food developers.

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sciforum-103369: Magnesium and manganese cations induced changes in chemical and bioactive profiles on purple and green basil

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This study examined the effects of high magnesium (+Mg), manganese (+Mn), and their combination (+Mg+Mn) on purple and green basil compared to a control (-Mg-Mn). Purple basil showed increased biomass and rosmarinic acid with Mn, while green basil had varied nutrient levels. Both had high protein and low fat, with the best antioxidant activity in purple basil (+Mg) and green basil (+Mg+Mn). Nutritional profiles were analyzed with AOAC, HPLC, and GC-FID; antioxidant, antimicrobial, cytotoxic, and anti-inflammatory activities were tested on hydroethanolic extracts. Mn enrichment increased purple basil biomass and altered Ca, Mg, Mn, and Zn levels, while Mg-treated plants had higher Mg and Mn but lower Zn. Green basil showed increased Mg with high-Mg treatment and higher nutrient levels with high-Mn treatment, though Na was reduced. The +Mg+Mn treatment caused variable nutrient content in green basil. Both basil types had high protein, low fat, and varied sugar content, with palmitic acid as the major fatty acid. Purple basil had 25 phenolic compounds, with rosmarinic acid being predominant in the control treatment and high α-tocopherol and γ-tocopherol levels with +Mg. Green basil's had the most rosmarinic acid in the +Mg+Mn treatment, and it had the highest amount of α-tocopherol in the -Mg-Mn treatment and γ-tocopherol with +Mg treatment. Antioxidant activity was the highest in purple basil with +Mg (IC50 = 47 ± 4 μg/mL) treatment and green basil with +Mg+Mn (IC50 = 45 ± 1 μg/mL) treatment. Purple basil showed no anti-inflammatory activity, while green basil with -Mg-Mn effectively inhibited NO production. Both basil types had antimicrobial activity, with Staphylococcus aureus being more susceptible to purple basil and Listeria monocytogenes being more susceptible to green basil. Overall, both types of basil show significant nutritional, chemical, and bioactive potential for the food industry.

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sciforum-095037: Measurement of the acoustic phase velocity of trade butters by means of the ultrasonic transmission technique

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There are different methods and ways to measure the internal properties of materials; this depends on the type of material and the grade of precision and resolution that is desired. In the case of food, there are different instruments to determine its quality, focussing on the main factors such as colour, texture, smell, flavour, pH, and microbial charge. In this work, a study is presented to determine the acoustic phase velocity of trade butter from the LALA® and Gloria® brands. The GAMPT acoustic tomography echoscope stage with 2MHz acoustic sensors was used to measure the thickness-dependent acoustic phase velocity [m/s] with a quasi-regular ambient temperature of 16°C. The method applied was the transmission technique with normal incidence. Measurements were performed in triplicate. The bulk density and acoustic impedance of the butter samples, as well as the rheological properties, were determined by indirect methods. The results show that the acoustic phase velocity of butter LALA®, Gloria® with salt, and Gloria® without salt were, APVLALA ≈ 1055.54m/s, APVGLORIAws ≈ 1224.46m/s, and APVGLORIAns ≈ 1169.44m/s, respectively. The bulk densities of the butters were rLALA ≈ 908.67gr/cm3, rGLORIAws ≈ 771.79gr/cm3, and rGLORIAns ≈ 825.57gr/cm3 at 15°C, respectively. Transmittance was evaluated as a function of frequency, where the effect of attenuation was observed and described as the thickness of the samples increased. However, the acoustic impedance was similar between the different types of butter samples, and this is because the acoustic phase velocity was different, but the product times the bulk density was compensated for, that is, GLORIA butter with salt presented a higher acoustic phase but lower density; on the contrary, LALA butter had the lowest acoustic phase velocity, but the bulk density was higher.

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sciforum-103441: Optimization of drying conditions and supercritical extraction to improve the antioxidant activity of three ecotypes of Chilean hops (*Humulus lupulus*) through response surface methodology

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Hops, an essential component in beer, provide flavor, aroma, and microbiological stability. Its chemical composition includes resins, polyphenols, and essential oils, offering anti-inflammatory, antioxidant, and antimicrobial properties. Native to temperate climates, its cultivation has expanded globally, and in the southern hemisphere, hop production is mainly limited by light conditions and day length. However, Chile is a potential contender for hop production due to its agro-climatic diversity. The chemical composition of hops represents a wide variety of compounds, and these are largely determined by the area of cultivation, agronomic factors, drying conditions, and the method of extraction. This study aims to understand the influence of different drying conditions and the supercritical extraction of three ecotypes of Chilean hops to determine the best extraction conditions of antioxidants using response surface methodology (RSM). The effects of drying temperature (50, 60, and 70 °C), extraction pressure with supercritical fluid (150, 200, and 250 bar), and ecotype variety (Ranco, Valdivia and La Unión) on the antioxidant activity were investigated. The Box--Behnken design was employed to optimize parameters in terms of antioxidant activity using 2,2-diphenyl-1-picrylhydrazyl radical scavenging activity, and a Pareto chart was used to identify the most significant factor. The results showed that the optimization of different drying conditions and the supercritical extraction of three ecotypes of Chilean hops were successfully examined using response surface methodology. The quadratic model was well fitted for the response variable, and the measured antioxidant activity in the optimized condition was found in accordance with the predicted value; therefore, it was fitted with the experimental values. We concluded that antioxidant activity highly depends on drying temperature and the extraction pressure with supercritical fluid. Moreover, this is the first report on optimizing antioxidant activity from ecotypes of Chilean hops.

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sciforum-103419: Optimization of fucoxanthin ultrasound-assisted extraction from *Himanthalia elongata*

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In this work, the brown seaweed *Himanthalia elongata* was evaluated as a potentially competitive starting material for fucoxanthin extraction for different food applications, taking advantage of the well-recognized dietary and health-promoting properties of this natural ingredient. Besides its bioactive properties, fucoxanthin deserves attention also for its natural abundance in brown seaweeds, in which it stands out as one of the most abundant carotenoids, representing as well one of the most relevant carotenoids in nature (it may comprise as much as 10% of all natural carotenoids). In previous works, fucoxanthin was highlighted for its consistent bioactivity, which may convey therapeutic benefits (considering, for instance, the reported antidiabetic, anti-inflammatory, anti-tumor, anti-hypertensive, or antiangiogenic properties) and interesting dietary effects (in result of its antioxidant and anti-obesity activity). Herein, response surface analysis was applied to optimize the operational conditions for the extraction of fucoxanthin from *H. elongata* by ultrasound-assisted extraction (UAE). The tested conditions were time (t: 5 to 55 min), power (P: 100 to 500 W), and temperature (T: 35 to 100 °C), which correspond to the independent variables X_1 (t), X_2 (P), and X_3 (T), considered in the optimization process that was studied by applying the usual circumscribed central composite design with five levels for each variable. The mathematical model design provided twenty-eight combinations of outcomes: twenty-two resulting from the interaction of the selected independent variables, and six others generated from the central point. The extraction yield and the content in fucoxanthin, quantified using a simple and short hands-on time HPLC-DAD method, were used as response variables. The operational conditions that maximize the level of fucoxanthin obtained through UAE were properly determined. The obtained results contribute to a sustainable and potentially profitable use of *H. elongata*, a highly abundant brown seaweed.

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sciforum-103378: Phenolic Compounds and Physical–Chemical Properties of Tropical Fruit Wastes

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Waste resulting from the processing of tropical fruits such as umbu (*Spondias tuberosa*), siriguela (*Spondias purpurea*) and juçara (*Euterpe edulis*) can be used as a source of bioactive compounds and nutrients. Fruits acquired in a local market in Rio de Janeiro were depulped and their wastes were dried and crushed to obtain flours from siriguela seed (FSS), siriguela peel (FSP), umbu seed (FUS), umbu peel (FUP), umbu pulp refine cake (FUC) and juçara pulp refine cake (FJC). They were evaluated for total phenolic content (TPC); antioxidant capacity using the $ABTS^{\bullet+}$, $DPPH^{\bullet}$ and FRAP methods; physical–chemical properties; and mineral composition. The results were expressed in dry basis. For the TPC content, FSS, FSP, FUS, FUP, FUC and FJC presented values of 249, 1492, 369, 1850, 1058 and 774 mg GAE/100 g, respectively. The antioxidant capacity by $ABTS^{\bullet+}$, $DPPH^{\bullet}$ and FRAP showed that FUP had the highest antioxidant potential and FSS had the lowest. The lipid content for FSP, FUS, FUP and FUC was approximately 1%, while for FJC it was 10% and for FSS it was negligible. Ash content varied from 1 to 4% with emphasis on FSP. Finally, the FSS presented the highest values for Ca (239.7 mg/100 g), Cu (27.1 mg/100 g) and Mg (183.3 mg/100 g) while for K, the FSP sample showed the highest value (1403.9 mg/100 g). The values for Mn ranged from 0.3 to 13.7 mg/100 g. Therefore, the flours obtained from processing the waste of tropical fruits can be used as a source of bioactive compounds and nutrients in developing new products or as total or partial replacements for conventional flours in bakery products.

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sciforum-104602: Physicochemical Properties and Storage Stability of octenyl succinic anhydrideTaro and Potato Modified Starch-Stabilized Pickering Emulsions in Chocolate Spread

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Chocolate spreads are complex emulsion-based food products, where starch-based particle emulsifiers offer a promising alternative to traditional emulsifying agents, specifically in the context of Pickering emulsions. Native taro and potato starches are characterized by low wettability, which limits their effectiveness in stabilizing Pickering emulsions. Therefore, the chemical modification of these starches, such as through octenyl succinic anhydride (OSA) treatment, is necessary to enhance their hydrophobicity and emulsifying capacity. This study aimed to evaluate the physicochemical properties and storage stability of chocolate spread formulations stabilized by both native and OSA-modified taro and potato starches. The physicochemical properties of chocolate spread, including droplet size distribution, rheological behavior, textural properties, water activity, pH, and color, were assessed. Additionally, the storage stability was evaluated by monitoring the emulsion stability and bloom resistance over time. The findings revealed that OSA modification effectively reduced the granule size of potato starch, which in turn decreased the average droplet size in the corresponding chocolate spread (30.80 μm) compared to that stabilized by native potato starch (50.08 μm). All formulations demonstrated shear-thinning behavior and exhibited solid-like characteristics. Notably, taro starches, both native and OSA-modified, showed superior emulsifying performance, as evidenced by their higher emulsion stability and minimal bloom formation after 28 days of storage. This research provides valuable insights into the potential of starch-based Pickering emulsifiers in the development of stable and desirable chocolate spread products, highlighting their application as viable alternatives in food formulation.

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sciforum-102012: Phytochemical characterization and antioxidant activity evaluation of the bioactive compounds in fruits (pulp and pits) of wild and cultivated forms of cherry laurel (P*runus laurocerasus)* in Georgia

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The endemic Georgian cherry laurel (Prunus laurocerasus) is widespread in both wild and cultivated forms, especially in western Georgia. Unfortunately, it is only used as a fruit and no information is available on its bioactive potential. We set out to investigate the chemical composition of the endemic fruit and obtain its juice and extract using modern methods. In the pulp of cherry laurel, total phenolic compounds (Folin–Ciocalteu method) were in the range of 1970.2-5182.05mg/kg, and anthocyanin content ranged from 132.53 to 694.98mg/kg (monomeric anthocyanin evaluated by pH-differentiated method). The UPLC-PDA,MS methods were employed to analyze various compounds, primarily cyanide derivatives, including cyanidin-3-arabinoside, cyanidin-3-glucoside, cyanidin-3-pyranoside, and cyanidin-3(p-coumaroyl-glucoside), etc. The phenolic acid content was in the range of 445.32-1225.87mg/kg, featuring compounds such as chlorogenic and neochlorogenic acids. These compounds were identified in the pulp of cherry laurel (wild and cultivated forms). Juice and juice concentrate were extracted from the pulp, and the content of these compounds was in the range of 20-105mg/l in juice and 195-700mg/kg in concentrate. These products are known for their anthocyanin, phenolic acid, and total phenolic compound content, which exhibit high antioxidant activity, measured at 5.03-13.41units (based on 0.1mM DPPH 50% inhibition mg of samples). Several extraction methods were used, such as supercritical fluid (SFE), ultrasonic (US), cold press, and high-pressure and temperature extractions. The obtained extracts are characterized by high antioxidant activity, at 0,1-0,5units (0.1mM DPPH 50% inhibition per mg of samples). The composition of seed oil was analyzed by GC. The oil yield was 27% (oleic acid C18:1, palmitic acid C16:0, stearic acid C18:0, palmitoleic acid C16:1, and amygdalin derivative benzaldehyde). Alcoholic extracts were prepared from the waste of the oil-extracted (defatted) pits, and the rest of the material was dried and used as an aromatic flour, which contained phenyl aldehyde. The main component of the flour was cellulose. All material from the pits was tested for cyanic acid residues.

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sciforum-099189: Phytochemical screening of *Calendula maritima* (Guss) flowers

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The genus *Calendula* belongs to the family *Asteraceae.* There are about 20 species that are native to the Mediterranean region and have been used by the Greeks, Indians, and Arabs.

Nowadays, *Calendula* is a plant cultivated all over the world for its ornamental, therapeutic, and health-promoting properties. In Italy, *C. officinalis*, *C. arvensis*, and *C. maritima* are the most widespread species along the coast. *C. officinalis* is the most used for medicinal, pharmacological, and wellness purposes, possessing a wide range of biological properties: antioxidant, antibacterial, antifungal, and antiviral. All these activities, which are usually extracted from the flowers, are related to the secondary metabolites. These mainly belong to the large classes of polyphenols and terpenes.

In this study, an ultrasound-assisted extraction (UAE) method was carried out on *C. maritima* flowers, using a hydro-alcoholic mixture (ethanol/water, 60/40 v/v) at various times in the dark. Afterwards, extracts were partitioned with solvents at increasing polarity (petroleum ether, dichloromethane, and butanol). Here, we report the chromatographic separation of butanolic extract, using a Sephadex LH-20 column, whose elution profile was monitored by means of thin-layer chromatography (TLC). The bioassay-guided separation was performed, allowing the identification of the main bioactive classes of compounds: saponins and phenolics. Further investigations for comprehensive chemical and biological activities are needed on *C. maritima* flowers to identify and characterize the complex system of phytochemicals.

To the best of our knowledge, this is the first time that a chemical and biological screening has been carried out on *C. maritima* using safe solvents. This is in response to the growing demand for natural products in the context of green and sustainable lifestyles.

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sciforum-098847: Polyphenols and anthocyanins in the juice from strawberries harvested at two stages of ripeness after High-Intensity Pulsed Electric Field (HIPEF) treatment

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In a world of globalization and big food consumption, there is an increasing demand for food processing technologies that leave food nutritionally unchanged; one of them is pulsed electric field technology. In this paper, we analyze the effects of high-intensity pulsed electric field treatment on the content of selected bioactive substances (phenolic compounds and anthocyanins), which are most present in red fruits. For this purpose, strawberry juices obtained from strawberries (*Fragaria × ananassa* Duch. cv. 'Albion') at two different stages of ripeness were treated with HIPEF at 40 and 50 kV cm^{-1} and frequencies of 100 and 200 Hzh for 3 and 6 minutes. The content of polyphenols (4-Hydroxy-3-methoxycinnamic acid, 4-Hydroxybenzoic acid, caffeic acid, trans-*p*-Coumaric acid, myricetin, catechin, ellagic acid, kaempferol and chlorogenic acid, quercetin) and anthocyanins in juice samples (pelargonidin-3-glucoside, cyanidin-3-glucoside, pelargonidin-3-rutinoside) was identified and quantified by the HPLC-DAD technique. Chromatographic separation was performed using a C18 column with 1 ml/min column flow and a gradient elution program. Juices from strawberries with a higher degree of ripeness have a higher content of polyphenolic compounds (ellagic acid, caffeic acid, myricetin, kaempferol, pelargonidin-3-rutinoside, pelargonidin-3-glucoside). The PEF treatment positively affects the composition of these analytes and increases their concentration in the juices, but only under ideal conditions (50 Hz /100 kV/cm/3 s). If the ideal conditions found are violated, their concentration decreases.

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sciforum-100053: Preperation and Characterization of Canola Oil-Based Nanoemulsions

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Within food and beverages, nanoemulsions are colloidal-based delivery systems, in which lipophilic compounds are incorporated, that prove most helpful in the preparation of better-quality food products in the food industry. In comparison to conventional emulsions, they have enhanced functional properties and great industrial applications, especially in relation to the development of nutrient component delivery systems. This study aimes to develop a vitamin A delivery system using nanoemulsions and to further characterize these systems. Refined canola oil was used in a water and surfactant system due to its nutritional benefits and oxidative stability against environmental stress. Response surface methodology (RSM) was used for the optimization of the preparatory conditions of independent variables. The effects of oil concentrations (6.5-9.5%), surfactant concentrations (0.4-0.8%), and homogenization time (5-8 min) on the particle size, refractive index, viscosity, vitamin A retention, P-Anisidine value, and thermal stability was assessed. The range of result values was as follows: particle size (106.78 - 124.62); refractive index (133-149 nm); viscosity (3.12- 4.92mPaS); vitamin A retention (58-97 IU); P-Anisidine value (4.27-6.87 %); and thermal stability (122.32-133.64 nm/c). The absorption band at approximately 3000 cm−1 denoted the stretching of the nanoemulsions for Tween® 80 and soy lecithin; the intensity of these peaks is diminished in the crystalline product. Across the whole pH range (2-8), no significant ($p > 0.05$) change in vitamin A nanoemulsion particle size was observed. Visual examinations of vitamin A nanoemulsions held at various ionic strengths showed that these nanoemulsions resisted phase separation, creaming, and sedimentation while being stored at ionic strengths ranging from 0 to 400 mM. Finally, it could easily be concluded that canola oil-based nanoemulsions could serve as an excellent tool for the encapsulation of Vitamin A acetate; thus, it is anticipated that this tool could retain the best properties upon use in food products.

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sciforum-095758: Production of exopolysaccharides through fermentation of secondary whey with kefir grains

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The disposal of whey, the main by-product of the cheese industry, represents a challenge as it is a significant pollutant due to its complex composition. In Mexico, whey is used to produce *Requesón*, a type of protein-rich whey cheese that generates another by-product, secondary whey. This residue has a lower protein content but still retains the lactose of primary whey, which means it still represents an environmental hazard. Therefore, simple and economical solutions are needed. In the present study, secondary whey was used as a fermenting substrate for kefir grains to produce functional bioproducts such as exopolysaccharides (EPSs) like kefiran. The secondary whey was pasteurized at 121 °C for 10 min before its inoculation with 10% (w/v) kefir grains and then incubated at 30 °C for 24 h. After the removal of kefir grains by filtration, the fermented whey was heated in a boiling water bath for 15 min and then centrifuged. The supernatant was adjusted to pH 7.0, and the EPSs were precipitated by the addition of two volumes of absolute ethanol and then kept at 4 °C for 24 h. The precipitate was separated by centrifugation, resuspended in deionized water, dialyzed for 24 hours using a 10 kDa pore-sized membrane and finally lyophilized. The phenol–sulfuric acid method was used to determine total carbohydrates and the Bradford method was used for protein content. The isolated solid had a composition of 57.96 ± 0.34 μg of carbohydrates/mg and 36.62 ± 0.59 μg of protein/mg. Hence, secondary whey fermentation with kefir grains is a suitable solution to reduce the environmental impact of whey and to produce functional bioproducts like EPSs.

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sciforum-101903: Properties of watermelon seed oil

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Watermelon seed oil (WSO) is distinguished by its characteristic fatty acid composition. The content of saturated fatty acids is approximately 16-25%. The content of monounsaturated fatty acids is about 15-30%. It is also characterized by about 55-65% content of polyunsaturated fatty acids. WSO is rich in vitamins A and E, as well as some minerals. It is notable for the presence of amino acids such as arginine and lysine. Furthermore, this oil is abundant in tocopherols, polyphenolic compounds, and carotenoids.

The aim of this study was to investigate the properties of WSO. The subject of this study included four commercial oils—three cold-pressed unrefined WSOs and one refined WSO. This study also included a self-obtained oil from Sugar Baby watermelon seeds, isolated using chemical extraction with hexane. The impact of oil type and storage time on the properties of the oil was determined. The degree of hydrolysis of the tested oils was determined based on the acid number and the content of primary oxidation products of the oils based on the peroxide number according to AOCS methods. Oxidative stability was determined by high-pressure differential scanning calorimetry (PDSC) and the fatty acid composition was determined by gas chromatography (GC). Tests were conducted immediately after the purchase of commercial oils and after the extraction of the oil. Subsequently, they were performed every 4 weeks and repeated over the next 3 months.

The results obtained show the varying quality of the oils. It was found that all the tested oils exhibited good hydrolytic stability—the obtained acid value results for individual oils met the requirements set by the Codex Alimentarius. The obtained peroxide value results mostly complied with the requirements contained in the Codex Alimentarius. It has been shown that WSO are a valuable source of omega-6 linoleic acid and omega-9 oleic acid.

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sciforum-100237: Proteomic profiling of lentil varieties by discovery high-resolution tandem mass spectrometry: nutritional, safety and authenticity perspectives

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Lentil is one of the major pulses produced in the world, and, as an excellent source of protein with a low fat content, it has a pivotal role in replacing meat products in the human diet. This communication will present a comparative analysis of the proteomic profile of four lentils varieties, namely Crimson, Eston, Laird and Black lentils, focusing on multiple objectives: (i) complete food profiling, (ii) in silico allergenicity assessment and (iii) screening of candidate varietal markers for authenticity purposes. Several protein accessions were unequivocally detected by untargeted HR-MS/MS analysis and software-based identification. The proteins were grouped based on protein families, with cupins representing the major component for all lentil profiles. Classification into families highlighted statistically significant differences among the lentil varieties studied; e.g., the highest vicilin abundance was reported for the Eston and Laird samples and the lowest abundance for Black and Crimson samples. Conversely, legumins were overexpressed in Black lentils compared to the other lentil samples. The Eston and Laird samples presented the highest values for the 7S/11S ratio, which is strictly correlated to seed nutritional quality. On the contrary, the same varieties presented safety warnings in terms of allergenicity prediction for sensitized individuals, according to sequence alignment with known allergens. Among the most important proteins that presented strong allergenic potential by in silico immunoreactivity prediction, a key role was played by the cupin family, i.e., 7S-vicilins and 11S legumins (about 43-44% and 14% of total proteins, respectively). It is noteworthy that the differential expression disclosed in specific protein accessions paved the way to the identification of candidate markers for varietal discrimination. Multivariate statistical analysis was carried out on the acquired abundances aiming at perspective application for authenticity studies. The significance of the reported investigation was very high due to the novelty of achieving multiple objectives via a one-shot analytical approach.

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sciforum-097891: Risks from copper present in edible mushrooms naturally growing in Leicestershire, England

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Objectives

Despite the potential risks from urban contamination, the popularity of home grown urban food products is increasing. We aimed to assess the risks from copper (Cu) present in wild edible mushrooms collected in Leicester city and a rural location (UK).

Methods

Twenty-two *Agaricus bitorquis* samples were collected from an open green area close to St Augustine Road, in the inner city; four *Marasmius oreades* samples were collected from the northeast of the city; and eight *Coprinus atramentarius* samples were collected from Bradgate Park, Charnwood Forest. Species identification was confirmed by DNA barcoding. Cu was detected in all the mushrooms collected by ICP-MS [LoD=2.224 mg/kg dry weight (dw)].

Results

Levels of Cu arguably showed species dependence across the species that we sampled, although further studies will be needed to dismiss the potential confounding effect of the geographical location (*p*-value0.001; all data presented as median and ranges, in mg/kg dw): *A. bitorquis* [114.908 (101.1-186.2)] > *C. atramentarius* [68.202 (29.040-106.660)] > *M. oreades* [65.810 (49.0-83.320)]. The very high levels of Cu found in *A. bitorquis* could be explained by the high-traffic density of the adjacent road, recommending the performance of a risk assessment study for traffic-related metals. Thus, the bioconcentration factor value calculated as an average (1.845) suggests that Cu was bioaccumulated in Leicester's native mushrooms. Cu also exhibited significant concentrations in the *A. bitorquis* caps compared to the stipes (114.908 vs. 93.303; *p*-value0.001), which is the portion that is more likely to be consumed. The content of Cu was much higher than that reported in wild edible mushrooms from Greece (32.6 mg/kg dw) and also exceeded the maximum limit of Cu of 40 mg/kg established by FAO/WHO/CODEX standards. However, all the toxic risk quotients calculated following US EPA protocols were below the following units: 3.29E-02 (*A. bitorquis)*, 1.73E-02 (*C. atramentarius),* and 1.74E-02 (*M. oreades)*.

Conclusions

The consumption of wild edible mushroom species in Leicestershire should be discouraged.

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sciforum-098395: Techno-functional characterization of starch extracted from smooth light green cidra

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The techno-functional properties of starch are crucial for a variety of industrial applications, ranging from food to the manufacturing of biodegradable materials. This is due to its hydration properties, such as water absorption capacity (WAC) and water retention capacity (WRC), swelling power (SP), solubility (S), and emulsifying capacity (EC), including foaming capacity (FC). The objective of this research was to determine some techno-functional properties of the starch extracted from the smooth light green cidra *Sechium edule* var. *Virens Levis*. The techno-functional properties (WAC, WRC, SP, S, EC, and FC) were evaluated at four temperatures: 23°C, 70°C, 80°C, and 90°C. The results showed an increase in solubility (1.86%, 26.38%, 43.12%, and 43.56%) with increasing temperature, while WAC (0.65 g/g, 0.91 g/g, 0.94 g/g, and 0.90 g/g), WRC (2.64 g/g, 4.63 g/g, 3.37 g/g, and 2.77 g/g), and SP (26.99 mL/g, 45.64 mL/g, 38.93 mL/g, and 42.08 mL/g) decreased, indicating that the starch granules experienced partial disintegration as the temperature increased beyond the gelatinization temperature, which in this case is above 70°C. WRC is higher than WAC, which may be due to the presence of fibers that help retain the absorbed water. Emulsifying capacity (EC) was observed at temperatures of 23°C and 70°C, indicating the influence of temperature; foaming capacity (FC) was not evident, possibly due to the absence of proteins in the studied starch, which is also related to the high SP. These properties are influenced by amylose content (34.36% ± 0.23) and granule size (6.0 and 13.0 μm), which determine its application; they also establish the gelatinization temperature (67.38°C). The cidra starch exhibits hydration characteristics that make it feasible for use in different industries.

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sciforum-099426: The Characterization of Dark and Sensory-Affected Honeys from Entre Ríos (Argentina) for Their Valorization as Food Ingredients

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Food color significantly influences consumer preferences, with darker honeys generally being less favored in Argentina compared to lighter ones, resulting in lower market prices for the former. Additionally, drought conditions have contributed to the production of honeys with unpleasant odors, which beekeepers find challenging to sell. This study aimed to analyze the botanical origin and physicochemical parameters of dark amber honeys and those with sensory defects to evaluate their potential use as ingredients. Fourteen honey samples from Entre Ríos, collected between 2022 and 2023, were analyzed. Melissopalynological analysis revealed that samples with unpleasant odors contained less than 30% Scutia buxifolia pollen, which is linked to undesirable sensory characteristics. In terms of physicochemical parameters, most honeys were classified as "Amber" and "Dark Amber" on the Pfund scale. The moisture content averaged 18.8% ± 0.42%, slightly exceeding the regulatory limit. The average values for conductivity, pH, and acidity were 1233 ± 292 µS/cm (some high conductivity values suggest that some samples may have a honeydew origin in addition to a floral one), 4.64 ± 0.32, and 26.38 ± 11 meq/kg of honey, respectively. All samples exhibited diastase activity greater than 8 DN, with an average of 31.8 ± 9.0 DN. The glucose content was 29.4% ± 3.44%. Regarding flavonoids, values of 2.64± 0.78 mg quercetin equivalents per 100 g of honey were obtained. These preliminary results offer insights into the characteristics of dark honeys. Based on these insights, new products could be developed that preserve and leverage their initial characteristics and improve their sensory properties in the resulting product, especially in sensorially affected honeys, reducing their unpleasant odour, thereby adding value to this type of honey.

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sciforum-103061: The Effect of Different Brewing Methods on the Sensory Properties of Coffee: A Systematic Review

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Coffee is a globally consumed beverage with species like Arabica, Robusta, Liberica, and Excelsa, each with distinct flavors and aromas influenced by roasting and brewing. This review analyzes how various brewing techniques affect coffee's sensory attributes: aroma, flavor, body, and acidity. Recognizing the importance of brewing methods in shaping the sensory experience, a systematic review was conducted using Science Direct, Wiley, CABI, Springer Link, and Research Gate databases for studies published between 2010 and 2021. Keywords included "coffee brewing methods", "sensory properties", "coffee flavor", and "brewing techniques". The inclusion criteria filtered studies focusing on multiple brewing methods, brewing times, and sensory properties, published in peer-reviewed journals. In total, 89 studies were included, covering the following methods: decoction, infusion, percolation, and pressure. The study examines six brewing techniques: boiled (100°C), cold brew (without hot water/refrigerated at 4-8°C for 8 to 24 hours), French press (brew time, 3-5 min), percolator (brew time, 5-15 min), moka (extraction time, 5 min at 93°C), and espresso (extraction time 1 min, using hot water, 88-93°C), along with the equipment used. Results show that brewing methods significantly impact coffee's sensory profile. Espresso, brewed under high pressure for a short time, gave strong aroma and intense flavor. In contrast, French press coffee, with its metal filter, produces a fuller body and pronounced mouthfeel. Pour-over methods (Chemex and V60) offer clarity and brightness, emphasizing acidity and delicate flavors. Cold brew, with its long steeping time, results in a smoother, less acidic cup and a mellow flavor. In conclusion, the review underscores the pivotal role of brewing methods in determining coffee's sensory characteristics. Coffee professionals and enthusiasts can enhance their coffee experience by choosing appropriate brewing techniques. Further research is needed to explore how brewing parameters affect coffee extraction, potentially leading to innovations that enhance the coffee experience.

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sciforum-103726: The Effects of Germination Periods on the Proximate, Mineral, and Antinutrient Profiles of Pearl Millet (*Pennisetum glacum*) and Grain Amaranth (*Amaranth cruentus*) Flours

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Abstract

This study investigated the effect of germination periods (24 h, 48 h, and 72 h) on nutritional and antinutritional components of flour from pearl millet and grain amaranth seeds under room temperature conditions (28±0.1°C). The aim was to determine the effect of varying germination period as a pre-treatment process on the nutritional profile of millet and amaranth flour. The results showed that there were significant differences at (p0, 05) in the proximate, mineral, and antinutrient factors of the samples. The protein in millet flour was 8.61% and 17.37% in amaranth after 24 h germination. The 24h germination period had the highest protein content for both millet and amaranth flours. The protein in millet after 24h germination (8.61%) was only significantly higher than after 72h (8.07%) and ungerminated millet (7.71%), respectively. The concentration of iron (Fe) in millet after 24 h, 48 h, and 72 h germination was 4.77 mg/100g, 4.90 mg/100 g, and 4.96 mg/100 g; in amaranth, the values were 4.10 mg/100g, 5.86 mg/100g, and 5.89 mg/100g. The concentration of iron in ungerminated millet was 3.31mg/100g and 3.50mg/100g in amaranth; these concentrations were significantly lower than germinated millet and 3.50mg/100g amaranth flours across the period. A similar trend was observed in other minerals. There was a significant reduction in the concentration of the antinutrient across the germination periods in the samples. The phytate concentration in millet was between 0.173 and 0.836g/100g. However, the concentration reduced significantly (p0.05) in ungerminated millet flour from 0.836g/100g to 0.326g/100g, 0.23g/100g, and 0.173g/100g after 24h, 48hrs, and 72h germination periods, respectively. Germination period could impact on the quality of cereal grains, as shown in this study.

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sciforum-091742: The Effects of Powdered Okra (Abelmoschus esculentus) on the Physicochemical and Sensory Properties of Chocolate Ice cream

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In English-speaking areas, okra (Abelmoschus esculentus) is known as "lady's fingers." Despite being popularly recognized as a vegetable, it is classed as a fruit. The primary polysaccharide in mucilage has been shown to have desirable rheological properties and the potential to be employed as a thickener and food stabilizer in foods such as ice cream. Stabilizers, despite being employed in very small amounts in ice cream formulations, perform critical functions such as increasing viscosity, improving aeration, providing cryoprotection, and minimizing melting. A number of stabilizers have been used, including both imported and domestic gums. Given this, this study sought to look into powdered okra as a potential stabilizer for chocolate ice cream. Powdered okra was added to the chocolate ice cream at various concentrations of 2%-6%. The findings showed that powdered okra has a swelling index of 133.33±208.17, a moisture content of 6.27 ± 0.79, and a total soluble solids content of 4.46 ± 0.51. The physicochemical properties of chocolate ice cream with powdered okra are as follows: the %overrun ranged from 6.8 to 11.5%, and it had a melting resistance of 92-100%, a pH of 5.5-5.73, and a total soluble solids content of 39.83-44.57. It was also discovered that the chocolate ice cream with okra powder was preferred by the sensory panelists. These results lead to the conclusion that powdered okra added to ice cream at a concentration of 2% may serve as a stabilizer. Further research is recommended for the shelf-life determination of chocolate ice cream with powdered okra.

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sciforum-099623: The fabrication and physicochemical properties of mackerel surimi gels modified by several polysaccharides

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In this study, five polysaccharides (κ-carrageenan, ι-carrageenan, gellan gum, chitosan and konjac glucomannan) were used as an additive to improve the quality of mackerel surimi gel, mainly in terms of textural properties, water holding capacity (WHC), water distribution, dynamic rheology, differential scanning calorimetry (DSC), chemical interactions, microstructure and SDS-PAGE. The results showed that the presence of ι-carrageenan obviously increased WHC (73.56%–82.63%) and shortened the relaxation time T_{22} (63.03–54.89 ms) , signifying the strong combination within surimi proteins and ι-carrageenan. In addition, the addition of κ-carrageenan, ι-carrageenan and gellan gum resulted in a significant improvement in the gel strength, hardness, chewiness and energy storage modulus (G). To be specific, the gel strength increased significantly from 6943.07 g·mm to 12456.99, 12603.14 and 8727.81 g·mm, but there was no apparent improvement in whiteness. DSC results indicated that different types of polysaccharides elevated the denaturation temperature and enthalpy of surimi gels, suggesting a high degree of cross-linking. Furthermore, the chemical forcing results indicated that disulfide bonds and hydrophobic interactions were dominant in the surimi gel system and the addition of carrageenan clearly enhanced the hydrogen bonds compared with the control group. Moreover, the microstructures of surimi gels combined with carrageenan showed homogeneous honeycomb network with dense and smooth pores and participation of polysaccharides could not change the aggregation and degradation of proteins. The present study might be necessary for promoting the high-value use of aquatic surimi products with the combination of polysaccharides and the application of polysaccharides in food industry.

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sciforum-100029: The stability of saffron stamen anthocyanin extracts in oxidation and reduction media

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Saffron stamens are placed next to red stigmas; yellow saffron stamens also have a saffron scent. Saffron stamen is a herbal product that is obtained from saffron flowers and added to foods as a spice to create flavor and color. The main constituents of saffron stamen are anthocyanins, which are natural flavonoid organic compounds that widely exist in natural fruits and vegetables and have been widely used in food, health products, cosmetics, and medicines, as well as in the chemical industry and other fields. The extraction and purification of anthocyanins from natural plants is the premise of anthocyanin application. Anthocyanins are easily changed to undesirable brown-colored compounds due to their low stability and high reactivity. In this study, the effect of ascorbic acid (10%, 20%, and 30%) and hydrogen peroxide (9.3, 18.6, and 27.92 mM) were investigated on the stability of the anthocyanin contents in saffron stamen at 35°C and 5 °C. The total anthocyanin content was determined according to the pH differential method based on cyanidin 3-galactoside (dominant anthocyanin). Ascorbic acid and hydrogen peroxide, compared with the control, showed a reduced anthocyanin stability at both 35°C and 5°C. The half-life of degradation increased with increasing concentrations of ascorbic acid. With increasing concentrations of hydrogen peroxide, the stability of anthocyanins was reduced. In the presence of ascorbic acid at 5 °C, anthocyanin was more stable than at 35°C.

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sciforum-099447: Thermal Treatments Affect the Color, Water Activity, and Fatty Acid Profile of Cachichín Seed (*Oecopetalum mexicanum*)

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Cachichín (*Oecopetalum mexicanum*) is a tree that grows naturally in the ecotone between low deciduous forest and high semi-evergreen forest in the Sierra de Misantla, Veracruz, Mexico. The fruit produces an oval nut-like seed, with a thin outer layer and a smooth texture. The region's inhabitants enjoy this food in its raw, boiled, and toasted forms, considering it a traditional and nutritious snack. However, its nutraceutical value remains largely unknown, while the effects of the processing methods it undergoes before consumption has not yet been explored. The aim of this study was to asses changes in the color, water activity, and fatty acid profile of the raw cachichín seed (T1) and compare it with three thermal treatments: boiling (T2), commercial toasting (T3), both performed empirically by local vendors in the region, and controlled toasting under laboratory conditions (25 min at 134 °C) (T4). Water activity (aw) and color (CIE*Lab**) were quantified using a Hunter-Lab colorimeter, also obtaining color difference (ΔE), chromaticity (C^*), and hue angle ($H°$). The fatty acid profile was analyzed using gas chromatography with a FID detector. The results demonstrated that thermal treatments, compared to raw seeds (T1), significantly affected the water activity and color parameters of the cachichín seed. Lipid analysis revealed the presence of oleic acid (ω-9), linoleic acid (ω-6), and linolenic acid (ω-3), with significant differences observed mainly between T1 and T3; treatments T2 and T4 showed intermediate values. Notably, commercial tasting (T4) resulted in significantly different water activity and color parameters compared to the boiled treatment (T2). Additionally, the raw seed retained a higher fatty acid content, while commercial toasting led to a greater loss of these compounds. These findings have important implications for the selection of the cooking method, depending on the desired characteristics of the final product, such as the texture, flavor, and preservation of bioactive compounds.

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sciforum-102380: Thermoanalytical and Kinetic study of sweeteners using thermal analysis

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In recent decades, obesity and overweight have reached epidemic proportions. The World Obesity Federation predicts that the continued rise in obesity will cost about USD 4 trillion by 2035 in terms of direct healthcare costs and indirectly through job loss and premature death. In this context, sweeteners have been used in the food industry as sugar substitutes in foods and beverages, providing intense sweetness at a low caloric content. When subjected to thermal variations, the characterization of these compounds becomes relevant to achieve the best use of sweeteners. Therefore, the present work aims to study the thermal decomposition process of sugar and sweetener samples (natural and artificial) to determine their kinetic parameters and their physicochemical characterizations. Thermal characterization by TG/DTG and DSC analysis was performed on SDT Q600 model, TA Instruments, with a heating rate of 5, 10, and 20 ˚C min−1 at a temperature range from 25 to 800 °C under nitrogen atmosphere and on DSC1, Mettler Toledo, at a heating rate of 10 ˚C/min, heated from 0 to 400 °C. Two methods (ASTM 2041 and ASTM E698) were used in the kinetic study of all samples. Samples marketed based on glycosidic natural sweeteners have more similarities regarding their thermal profiles, indicating the presence of a high erythritol or xylitol content in their composition. The thermal stability of sweeteners based on erythritol and xylitol was 170 and 200°C, respectively. In contrast, in the case of samples of artificial sweeteners (aspartame, saccharin, and sucralose), besides their a high dextrose content, their decomposition started at 65°C for all three. The results indicated that polyols influenced the decomposition kinetics of natural sweetener samples. According to thermal profiles, artificial sweeteners exhibit less resistance to degradation when subjected to heat treatments, such as in food processing. ASTM E-698 was the best method in terms of adjusting the kinetic profile of the decomposition of all sweeteners.

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sciforum-103019: Valorisation of Spent Coffee Grounds: Comparing Phenolic Content and Antioxidant Activity in Solid--Liquid vs. Subcritical Water Extraction Methods

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The agrifood industries generate tremendous amounts of waste. Spent coffee grounds (SCGs) have an estimated annual production of 60 million tons worldwide. This exemplifies that a way to enhance and reuse these wastes is necessary, with the aim of achieving a more sustainable, circular economy. Here, we assessed the antioxidant activity of SCG extracted by two different methods, solid--liquid extraction (SLE) and subcritical water extraction (SWE). The extracts were produced, the yield of the extraction was assessed and the total phenolic content (TPC) was evaluated, along with the antioxidant activity, by different assays ($DPPH^{\bullet}$ and $ABTS^{\bullet+}$ scavenging activities and FRAP assay). Two SLE extracts were produced at different conditions, with extract A (1g:50 mL 50:50 water/methanol, 1h extraction time, 40 °C) and B (1g:100 mL 50:50 water/methanol, 1h extraction time, 60 °C). The SWE extracts were produced by mixing 2 g of SCG with 200 mL of ultrapure water at 60 bar and a variation in temperature (100 or 150 °C). Extract A was the one displaying the highest TPC value (134.64 mg gallic acid/ g dry extract) and strongest antioxidant activity. We are currently analysing the SWE extracts for the same parameters. These results will offer valuable information on the impact of different extraction techniques in coffee grounds and their valorisation for food purposes.

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Session 6. Emerging Methods of Food Analysis

sciforum-098478: Design and development of a temperature-controlled chamber for e-nose in honey adulteration detection

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Adulteration of honey poses a significant threat to both consumer health and the honey industry, necessitating the development of reliable detection methods. This study explores the efficacy of electronic nose (e-nose) technology in identifying adulterated forest honey. Honey samples were collected from Periyar Wildlife Sanctuary, Thekkady, India, comprising both original forest honey and samples that were intentionally adulterated. Twenty samples each of authentic honey and adulterated honey were used in this study. The honey samples were adulterated with sugarcane syrup (Jaggery). The e-nose system employed in this research consisted of eight metal oxide semiconductor (MOS) gas sensors designed to detect volatile organic compounds associated with the distinct odor profiles of the honey samples. To enhance the accuracy of odor detection, a temperature-controlled chamber was developed, incorporating a Nichrome heater wire, a TEC Peltier cooler, LM35 Temperature Sensor, Arduino UNO, and a 5V-4 Channel relay module, ensuring optimal environmental conditions for the e-nose. In our methodology, the e-nose was used to capture odor signatures from both pure and adulterated honey samples within this controlled environment. The collected data were subjected to preprocessing before being analyzed using machine learning algorithms, specifically k-nearest neighbors (kNN) and support vector machine (SVM). These algorithms were chosen for their robust classification capabilities and suitability for pattern recognition tasks. Our findings indicate that the e-nose system, combined with these machine learning techniques, achieved an impressive accuracy of 98% in distinguishing between pure and adulterated honey. This high accuracy demonstrates the effectiveness of the e-nose technology in capturing subtle differences in odor profiles, which are crucial for detecting adulteration. The successful differentiation of honey samples suggests that the e-nose can serve as a valuable asset in the fight against honey adulteration, ensuring product integrity and consumer trust.

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sciforum-098807: Liquid Chromatography–Mass Spectrometry Fingerprinting to Authenticate Honey Origin

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Honey is a natural food sweetener made by bees (*Apis mellifera*) that contains an important number of bioactive substances, such as polyphenols, which provide health benefits, being therefore highly appreciated by society. These special characteristics, together with the great variability of products due to its worldwide production, have placed honey as one of the products most susceptible to manipulation for illicit purposes, with adulteration with sugars or botanical and geographical origin mislabeling being the most common fraudulent practices. The development of feasible analytical methodologies to assess honey authenticity is therefore required.

In this work, a non-targeted liquid chromatography coupled with mass spectrometry (LC-MS) fingerprinting methodology by employing a hybrid triple–quadrupole/linear ion trap mass analyzer in negative ESI mode, was evaluated to assess honey's geographical origin. For that purpose, one-hundred sixty-nine honey samples produced in eleven countries belonging to four continents (Europe, Asia, America, and Oceania) were analyzed in full scan acquisition mode by registering fingerprints from *m/z* 100 to 550. Sample treatment consisted of dissolving 1 g of the sample in 10 mL of water, and a 1:1 dilution with methanol prior to LC-MS analysis. The potential of the obtained honey LC-MS fingerprints as sample chemical descriptors for geographical origin authentication was evaluated by supervised partial least squares-discriminant analysis (PLS-DA), revealing good sensitivity and specificity values, as well as very acceptable calibration and prediction classification errors (below 25% for most of the sample classes) when employing a classification decision tree, using 70% of the samples as a calibration set and the other 30% as a prediction set. Taking into consideration the number of analyzed samples (and countries of origin under study), as well as the huge botanical variety and complexity among the analyzed samples, the proposed LC-MS fingerprinting methodology exhibited exceptional performance to assess honey's geographical origin and to fight against fraudulent mislabeling practices.

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sciforum-091954: Classification and Authentication of Meat by Non-Targeted HPLC-UV Fingerprinting and Chemometrics

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Meat is a highly consumed product widely susceptible to fraudulent practices. Among the authenticity issues that have begun to be considered by society are meat origin (geographical indication), production practices (organic), and ethical and religious aspects (animal welfare, Halal and Kosher foods, etc.). Although genetic analyses can resolve authentication aspects related to animal species, the factors discussed above cannot be solved genetically. Thus, metabolomics emerges as a strategy that could solve these cases of food fraud since it focuses on analysis of the metabolites present in meat, which will depend on external factors such as stress, diet, production area, etc.

The capacity of a non-targeted HPLC-UV metabolomic method for the classification and authentication of meat products was evaluated. A total of 200 meat samples were analyzed, including white meat (chicken, turkey, duck, and quail) and red meat (beef, lamb, pork, and rabbit). In the case of the lamb samples, they were analyzed from two different geographical origins (Catalonia and Aragon), and the chicken samples came from two different production systems (organic and conventional). Simple extraction of the metabolites was carried out (ultrasound with water), and the extracts were analyzed with the proposed non-targeted HPLC-UV fingerprinting method, using chromatographic fingerprints as the chemical descriptors for chemometric analysis by PLS-DA. The capacity of the proposed methodology to classify and authenticate the eight meat typologies using PLS-DA was excellent, with sensitivity and specificity values higher than 95.0% and 95.7%, respectively, and classification errors, in most cases, below 0.4% (2% only in the quail samples). The classification using PLS-DA was perfect (100% classification rate) when considering the white or red meat samples independently. This method was also excellent for authenticating the geographical origin of the lamb samples and the production system (organic vs. conventional) in the chicken samples, with PLS-DA classification errors lower than 2.3% and 0%, respectively.

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sciforum-101360: Comparison between two different mass spectrometry platforms (MALDI-TOF MS) for rapid Shiga toxin-producing *Escherichia coli* O157:H7 detection in food

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Escherichia coli O157:H7 is the most frequent Shiga toxin-producing (STEC) serotype associated with severe humans diseases related to foodborne illnesses. Different STEC-contaminated foods, such as undercooked ground beef, hamburgers, fermented sausages and lettuce, among others, have been identified as sources of contamination in sporadic cases or outbreaks associated with STEC infection. Mass spectrometry (MALDI-TOF MS) is a simple and rapid technique that can be applied for STEC O157:H7 strain detection from a presumptive colony on a culture plate. The technology is based on the analysis of protein spectra resulting from the impact of a laser on a sample crystallized with an organic matrix. The presence of some of the nine biomarker peaks (PBs) (3017m/z, 3083m/z, 3595m/z, 3770m/z, 4012m/z, 4939m/z, 5238m/z, 6037m/z, 6169m/z) and the absence of 9060m/z would allow the detection of STEC O157:H7 according to previous work carried out on the Bruker platform. A comparative analysis with Vitek MS Prime (VMSP) (bioMerieux) was necessary to investigate the presence of the same typical PBs. We tested 163 strains, STEC O157:H7 (n=86), EPEC (n=13), ETEC (n=10), EIEC (n=6), EAEC (n=13), non-toxigenic O157 (n=9) and non-O157 STEC (n=26), and strains of *Shigella:* flexneri1, flexneri2, flexneri6, dysenteriae1, dysenteriae2, boydii and sonneii. The IVD library was used to corroborate the identification and the RUO database was used to search for PBs. Due to the characteristics of the VMSP equipment and the peak analysis software, differences were found between the PBs detected. It was necessary to use other specific peaks: 5234-5238m/Z and 10163-10168 M/Z for STEC O157:H7 and 5229-5233m/z and 10137 and 10142 m/z for *E. coli*/*Shigella*. As a result, a new algorithm for the rapid detection of STEC O157:H7 was developed for the VMSP platform to be used in bacteriology laboratories.

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sciforum-103542: Detection of aflatoxin B1 using a lateral flow aptasensor

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Aflatoxin B1 (AFB1) has been classified as the most significant human carcinogen by the International Agency for Research on Cancer (IARC) of the World Health Organization (WHO). It is frequently present in foodstuffs, particularly agricultural products such as peanuts and cereals, and therefore represents a significant health risk to humans and animals.

Currently, aptamer-based AFB1 biosensors, including fluorimetry, electrochemical analysis, colorimetry, and surface-enhanced Raman spectroscopy, are showing great promise for the detection of AFB1. However, those traditional aptamer-based AFB1 biosensors often require skilled personnel and the utilization of costly instrumentation. Herein, we report a lateral flow aptasensor for the sensitive and rapid detection of AFB1. The detection of AFB1 was achieved through the utilization of aptamer-specific and target-induced chain release methodologies. Colloidal gold was employed as a signal reporter, facilitating a naked eye colorimetric readout in which the signal was proportional to the concentration of AFB1. The quantitative detection of aflatoxin can be achieved by testing the intensity of test line and combining it with a colloidal gold analyzer. Under optimal conditions, the detection limit of this strategy was as low as 5 ng/mL, with a detection time of 10 minutes. The results demonstrated that lateral flow aptasensors are capable of rapid quantitative and sensitive detection of aflatoxin and have significant potential for the field analysis of other toxins.

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sciforum-103296: Detection of Fumonisins in Maize Using Near-Infrared Spectroscopy

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Mycotoxins are toxic secondary metabolites produced by various fungi, commonly found in cereals, particularly maize. Common mycotoxins found in maize include aflatoxins, fumonisins, deoxynivalenol (DON), zearalenone, and ochratoxin A produced by fungi (such as *Aspergillus*, *Fusarium*, and *Penicillium* species). Detecting and controlling these toxins requires a multifaceted approach involving advanced analytical techniques, good agricultural practices, and stringent regulatory frameworks to ensure food safety and protect public health. Near-Infrared Spectroscopy (NIRS) is an increasingly used rapid and non-destructive analytical technique for detecting and quantifying mycotoxins. The objective of this study is to detect mycotoxin contamination in maize samples using near-infrared spectroscopy. In sixty maize samples, the mycotoxins levels were quantified using Ultra-High-Performance Liquid Chromatography (UHPLC) and NIR spectra were acquired in the range of 12,000–4000 cm^{-1}. Fumonisins were the only mycotoxins detected in all maize samples analyzed, with fumonisin B1 varying in the range of 0–2582 μg/kg and fumonisin B2 in the range of 0–838 μg/kg. Differences in NIR spectra between fumonisins contaminated and non-contaminated samples were observed, particularly in the first overtone region 7,700–6,000 cm^{-1} corresponding to O-H stretching vibrations and in the 5,500–4,000 cm^{-1} region associated with combination bands of O-H and C-H stretching vibrations of fumonisins. The NIR model for fumonisin detection achieved a R^2 of 0.98 and a root mean square error (RMSE) of 343. In conclusion, NIRS is a valuable tool used for the rapid detection of fumonisins in maize, offering a non-destructive and efficient approach to food safety. Continued advancements in calibration techniques and chemometric analysis are likely to enhance its accuracy and reliability, making it an indispensable method for ensuring food quality and safety.

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sciforum-103536: Detection of microRNA in food adulteration using lateral flow nucleic acid biosensor

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Food adulteration is a global concern, and developing countries are associated with having a higher risk of it due to a lack of monitoring and policies. Diarrhea, nausea, allergic reactions, diabetes, cardiovascular disease, etc., are frequently observed illnesses upon the consumption of adulterated food. Therefore, the detection of adulteration in food is essential to ensure the safety of the food we consume. Currently, chromatography and spectrometry are widely used analytical techniques. Protein- and DNA-based techniques are also in practice. More recently, authenticity has been identified by detecting the content of the microRNA (miRNA) in foods. Some studies have shown that some miRNA in plants can be directly absorbed by the human body through the digestive tract, thus regulating the expression of related target genes, and then affect a series of physiological functions of the human body. Using duck as mutton is the main means of adulterating mutton kebabs at present. Mutton contains miR-192 and miR-486.

The traditional methods used for detecting microRNA are Northern blotting, qRT-PCR, in situ hybridization, and so on, but these techniques are complex and tedious, and require expensive instruments and well-trained personnel. In this report, we developed a gold nanoparticle (AuNP)-based lateral flow nucleic acid biosensor (LFNAB) for the visual detection of miR-122. This method has the advantages of a short detection time, high sensitivity, and simple operation. When the sample solution contains miR-122, T and C lines are displayed in LFNAB, while when there is no miR- 122 in the sample solution, only C lines are displayed in LFNAB. Currently, we can detect 10 pM miR-122 in 15 min without complex instrumentation. The reported method offers great promise for applying LFNAB in food adulteration.

Keywords: food adulteration; microRNA; lateral flow biosensor

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sciforum-099344: Developing GC and HPLC methods for the γ-aminobutyric acid quantification in rice samples

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γ-aminobutyric (GABA) is a non-protein amino acid produced from glutamic acid, which acts as a neurotransmitter in humans playing a role in neurological functions and inhibiting chronic diseases like diabetes [1]. The consumption of GABA-rich foods and its extraction for supplements are of great interest. Chromatographic methodologies, the most widely used for GABA determination, require previous derivatization [2]. This work aimed at applying and comparing different derivatizations and chromatographic methods (gas chromatography and high-performance liquid chromatography) to separate and quantify GABA in simple ethanolic rice extracts. GABA was extracted from brown flour and rice bran of the Ariete variety using 70% ethanol for both methods. Separation and quantification were performed using GC-FID, after a BSTFA-1%TMCS derivatization, and using norleucine as an internal standard (IS) [3]. In the HPLC method, o-phthaldialdehyde (OPA) derivatization and a fluorescence detector were used. A linear regression between the relative area of IS and GABA standard solutions yielded 0.046-0.457mg/mL with an R^2=0.9975 for the GC method, and 0.011-0.083 mg/mL with an R^2 = 0.9929 for the HPLC method. The detection limit (LOD) and quantification limit (LOQ) were 0.058 mg/mL and 0.177 mg/mL for the GC method, and 0.018 and 0.054 mg/mL for the HPLC method. Although GABA quantification by means of GC gave good results with the standards, this did not happen with rice samples. Rice samples fortified with GABA standard and norleucine were analyzed, but the obtained chromatograms showed too many interfering peaks which probably came from the extraction process. Based on these results, testing other extraction/cleaning methods for GABA quantification in rice matrices will be necessary. On the other hand, it was possible to quantify GABA using the HPLC method in rice samples, where the concentration in bran was higher (222.1 ± 19.3 mg/100g) than in brown rice (131.0 ± 3.9 mg/100g). This method also proved to be more sensitive than the GC method.

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sciforum-098829: Emerging and Advanced Technologies for Halal Food Authentication

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Ensuring food authenticity is crucial for consumer trust, public health and market integrity. For Muslims, consuming halal food is a mandatory aspect of their faith and requires rigorous verification. The global demand for halal food necessitates reliable authentication methods as adulteration and mislabeled ingredients are widespread issues. There are several food products on the market in which actual ingredients and their sources are not mentioned on the label and cannot be observed by the naked eye. Commonly non-halal items include pig derivatives like lard, pork, and gelatin; dead meat derivatives; alcohol; blood; and prohibited animals. Traditional methods, such as sensory evaluation and basic chemical analysis, are often inadequate for modern food production complexities, leading to cross-contamination and mislabeling risks. Therefore, advanced techniques are essential for accurate halal food authentication. Various scientific databases were utilized to identify relevant articles, research papers and reports about halal food authentication. Methods like DNA-based Polymerase Chain Reaction, Fourier-Transform Infrared Spectroscopy, Raman Spectroscopy, Gas Chromatography, High-Performance Liquid Chromatography and Enzyme-Linked Immunosorbent Assay were examined. Additionally, emerging technologies like blockchain for traceability and artificial intelligence for data analysis were explored. These advanced techniques sufficiently enhance the accuracy, reliability and efficiency of halal food authentication, offering precise species identification, detailed compositional analysis and rapid detection of non-halal substances. They address the limitations of traditional methods and support the integrity of halal food products, ensuring they meet Islamic dietary laws. This integration is vital for industry stakeholders, regulators and consumers in upholding halal standards and maintaining consumer confidence. Specific products analyzed include gelatin-based products, meat products and dairy items utilizing DNA sequencing and spectroscopy for verification.

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sciforum-099260: Exploring DNA markers for species identification in honey

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Honey is a natural product widely consumed globally for its associated health benefits. This food product is also linked with environmental issues due to the importance of honeybees in biodiversity preservation. Consequently, various methods have been proposed and developed to assess the quality and origin of honey and to study environmental events. DNA-based approaches have gained particular attention for their utility in discerning the geographical, botanical, and entomological origins of honey. Additionally, different DNA markers have been explored to study diverse sources of honey DNA, aiming to assess the quality of the honeycomb's surrounding environment and monitor the presence of invasive organisms [1]. The aim of this work was to evaluate different target genes for the amplification of plant species from genera *Lavandula spp., Quercus* spp., and *Castanea* spp., as well as the ectoparasite *Varroa destructor,* in Portuguese honey samples. Honey samples from distinct regions of Portugal were acquired from producers and supermarkets. After DNA extraction [2], specific PCR amplifications were performed with primers targeting different genes, namely, the plastidial *matK* gene of *Lavandula stoechas* L. [2], the *rbcL* gene of *Quercus pyrenaica* (designed in this work), and the gene COX1 no mtDNA of *Varroa destructor* [3]. The results indicate the potential of primers targeting *matk* and *rbcL* genes in identifying three of the major plant genera found in Portuguese honey: *Quercus* spp., *Castanea* spp., and *Lavandula* spp. Additionally, the application of primers selected for the amplification of *Varroa destructor* demonstrated potential for detecting the presence of this ectoparasite in honey samples.

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sciforum-098639: High-throughput FIA-MS/MS and LC-MS/MS Polyphenolics for the Authentication of Teas adulterated with Chicory

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Tea is one of the beverages that is more susceptible to fraudulent practices due to its high worldwide consumption and because of the increase in prices for some specific varieties due to climate change and instability in the world of geopolitics. Tea adulteration with other plants, including chicory, is a common practice that is carried out to gain an illicit profit. Polyphenols are the most abundant bioactive substances in tea, determining its quality and health function. In addition, they can be employed as secondary markers to address authentication issues. The present contribution evaluated the potential of polyphenolic profiling using high-throughput FIA-MS/MS and LC-MS/MS methodologies to assess tea authenticity. A total of 100 tea samples belonging to different varieties (green, black, red, oolong, and white teas), as well as 20 chicory samples, were analyzed with both methodologies after a simple tea brewing process, obtaining the corresponding polyphenolic profiles by monitoring 55 polyphenols belonging to different families. The corresponding profiles were then employed as sample chemical descriptors to address tea classification and authentication using partial least squares discriminant analysis (PLS-DA). An excellent classification performance was accomplished using PLS-DA, with sensitivity and specificity values being higher than 90% and 88.9%, respectively, for FIA-MS/MS, and higher than 85% and 86%, respectively, for LC-MS/MS. A good accuracy was also attained, with calibration errors below 10.5 and 14.5% for FIA-MS/MS and LC-MS/MS, respectively. Overall, FIA-MS/MS showed a better performance than LC-MS/MS, with the advantage of requiring a lower analysis time due to the fact that no chromatographic separation was necessary. The capability of the obtained polyphenolic profiles to detect and quantify tea adulterations with chicory was also assessed using partial least squares (PLS) regression, showing excellent adulterant level determination, with prediction errors below 10.9 and 14.8% for FIA-MS/MS and LC-MS/MS, respectively. Thus, both methodologies demonstrated feasibility in assessing tea authentication issues when adulterations with chicory are involved.

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sciforum-099279: Honey fraud detection: Use of electrochemical genosensors to determine the safety and quality of honeys

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Food fraud has long been an issue for the food and beverage industry. The impacts of these malicious acts have, however, contributed to food safety and quality awareness and the implementation of legislations to minimize their effects on the economy and human health. Nevertheless, with consumers' increasing interest in and purchase of novel foods, it is difficult to monitor the safety and quality of all products on the market. In the European Union, honey is one of the most adulterated products found on the market. As a natural sweetener, with a rich composition and several health benefits, honey is often consumed as a healthy alternative to sugar. To keep up with product demand, or simply to increase their monetary gain, some producers resort to fraudulent acts such as the adulteration of high-quality honey with lower-quality substances and the mislabelling of its origin and nutritional profile. In this study, a disposable electrochemical genosensor based on the DNA hybridization reaction between two complementary probes of *Calluna vulgaris*, the heather flower, was developed. These sequences were specifically cut and designed to identify the heather flower DNA in real honey samples. A sandwich format for the DNA target probe was designed using a complementary fluorescein isothiocyanate-labelled DNA signaling probe. To maximize the hybridization reaction, a mixed self-assembled monolayer of the heather-specific DNA capture probe and mercaptohexanol was employed. Using chronoamperometric measurements, the enzymatic amplification of the electrochemical signal was obtained with a concentration range of 0.13 to 2.00 nM. Preliminary results indicate that the developed sensors can detect the presence and estimate the concentration of heather flower DNA in real honey samples and thus be used in honey origin authentication, safety and quality control. As such, the developed genosensors appear as an innovative and cost-effective analytical method to combat honey fraud and promote honey quality and safety.

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sciforum-092724: Potential of HPLC-UV Fingerprints to Assess Honey Geographical Production Region

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Honey is a natural product, highly appreciated by society as a natural sweetener and for its important health benefits. It isproduced by bees from nectar and other non-floral secretions. The great diversity of botanical varieties and the various countries of production have given rise to products with disparities in quality and prices, while also increasing fraudulent practices. In this line, developing methods capable of characterizing honey and authenticating and certifying not only its botanical variety but also its geographical origin is essential in order to avoid distrust within society or economic losses in the beekeeping sector.

The potential to use HPLC-UV fingerprints to assess honey geographical production regions via chemometrics was evaluated. One hundred and fifty-seven honey samples produced in different countries (Spain, Italy, France, The Netherlands, Serbia, Japan, China, Costa Rica, and New Zeeland) were analyzed after simple sample treatment (1 g of honey dissolved in 10 mL of water and diluted in a ratio of 1:1 with methanol). Reversed-phase C18 HPLC-UV (at 280 nm) fingerprints showed that there were chemical descriptors with which to assess honey geographical production region via partial least squares-discriminant analysis (PLS-DA). Results obtained via PLS-DA classification based on a decision tree showed cross-validation calibration sensitivity and specificity values of 100% (except for Japanese samples, 76.5%) and > 81.3%, respectively; prediction sensitivity and specificity values of 100% (except for French samples, 75%) and >82.4%, respectively; and calibration and prediction errors below 18.0% and 12.5%, respectively. The obtained fingerprints were also evaluated for the detection and quantitation of honey adulterations via partial least squares (PLS) regression based on blended adulterated honey produced in two different countries (adulteration levels from 15 to 85%). Calibration and prediction errors below 15% were achieved. Thus, HPLC-UV fingerprinting is a simple, cost-effective, and reliable classification technique with which to authenticate honey and to prevent fraudulent practices involving blended honey from different production regions.

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sciforum-098439: Quantitative and qualitative evaluation of microplastic contamination of shrimp using Vis-NIR multispectral imaging technology combined with a modified self-organizing map

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Microplastics (MPs) severely impact ecosystems and human health. Therefore, detecting and identifying them is essential for assessing environmental problems. Visible-Near Infrared Multispectral Imaging (Vis-NIR MSI) technology is effective for polymer detection because it captures spatial and spectral data and provides fast and non-destructive measurements. However, this technique faces challenges, such as the high number of spectra per image, resulting in a high number of spectra as well as complex spectra per sample. To address this, chemometrics is needed to extract crucial information. Self-organizing maps (SOMs) are a remarkable area of chemometrics, revealing complex correlations in polymer detection. Herein, we propose a novel approach using the Vis-NIR MSI technique combined with modified SOMs to detect and characterize 1-4 mm MPs, including polyethylene (PE) and polypropylene (PP) in a biological sample (shrimp in this case) both quantitatively and qualitatively based on the number of pixels present in the object image. The modified SOMs were applied to the Vis-NIR MSI image to generate a color index, which was projected onto the object image, with different classes represented by different color shades. In qualitative analysis, the results allow for the visual identification and differentiation of PE and PP, providing insights into the types and distribution of MPs in the samples. In quantitative analysis, individual PE and PP were mixed with minced shrimp samples at concentrations ranging from the limit of quantification (LOQ) of 0.04% to 1% w/w. The results show that the modified model achieved a high R^2 over 0.99 for PE and PP. This suggests a strong correlation between the predicted and actual concentrations, indicating that the model can accurately predict concentrations of MPs in shrimp samples. The research shows that advanced imaging technologies and machine learning could be used to detect microplastic contamination in seafood products. Future efforts might focus on different types of seafood and MPs to improve food safety and safeguard consumer health.

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sciforum-103048: Synthesis and characterization of magnetic molecular imprinted polymer (MMIP) for extraction of vitamin B12 from milk

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Estimating vitamin B12 levels in milk is challenging due to its low concentration (0.5 µg per 100 mL). A selective method using magnetic molecularly imprinted polymers (MMIPs) was developed to extract vitamin B12 from milk. The synthesis process included the preparation of oleic acid-coated iron magnetite particles obtained through co-precipitation using $FeCl_2$ and $FeCl_3$ under alkaline conditions, which were further used for magnetic molecularly imprinted polymers (MMIPs) and non-imprinted polymers (MNIPs). In this study, five different MMIPs were prepared by varying ratios of template (T) and functional monomer (FM) as 2, 4, 6; FM and cross-linker (C) as 5, 10; and initiator (I) and FM as 5, 16. Among them, the combination of T:FM- 4; C:FM-10; FM:I- 16 demonstrated the highest binding capacity (2.4±0.11 µg B12 per mg polymer) with good imprinting factor (6.48) and selectivity (84.58%). A cross-reactivity study demonstrated minimal interference from other B vitamins on B12 binding, with binding efficiencies ranging from 2.30% (B1) to 8.43% (B6). The effects of solvent type (water, acetonitrile, methanol, NaCl) and pH (4.5-7.5) on binding were studied, showing good selectivity in aqueous solutions at pH 6.5-7.0, making the MMIP suitable for vitamin B12 extraction from milk, which has a similar pH range. The MMIP was used to extract vitamin B12 from milk. For this, milk (F: 5.25 ± 0.98 %, SNF: 8.75 ± 0.13%, protein: 3.20 ± 0.16%) was spiked with vitamin B12 at 0.1, 0.3, 0.5 and 0.7 µg/mL (three trials at each concentration). Every 5 mL of spiked milk sample was incubated with 20 mg of MMIP/MNIP for 1 h with continuous shaking. The MMIPs/MNIPs were then collected using magnets and suspended in methanol/acetic acid (9:1) for 30 min with stirring. The supernatant was filtered and analyzed using RP-HPLC, resulting in a 60.18% recovery of B12.

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sciforum-099617: The Development of a novel o,p’-DDT-specific probe for food safety monitoring and risk assessment

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The compound 1,1,1-trichloro-2-(p-chlorophenyl)-2-(o-chlorophenyl) ethane (o,p’-DDT) has historically been used as a pesticide, but is now recognized as an endocrine-disrupting chemical with the potential to accumulate in the food chain and cause adverse effects on wildlife and humans. Given its persistence in the environment, the detection of o,p'-DDT residues in food products has become a matter of significant concern for food safety and public health. Aptamer are short, single-stranded nucleic acid (DNA or RNA) molecules that have the ability to bind to a specific target molecule with high affinity and specificity. In this study, employing the powerful SELEX (Systematic Evolution of Ligands by EXponential Enrichment) technique, we have successfully identified aptamers that specifically bind to o,p'-DDT. From an initial pool of seventeen candidates, we narrowed down this number to five for preliminary assessment using the SYBR Green I assay. One of the candidates, DDT_13, exhibited a pronounced fluorescent response to o,p'-DDT. Subsequent analysis revealed DDT_13's dissociation constant (Kd) to be 412.3 ± 124.6 nM, indicating a robust binding affinity. Furthermore, DDT_13 displayed negligible non-specific interactions with other small molecules, emphasizing its exceptional specificity. The aptamer's efficacy in analyzing food samples underscores its promising bioactivity, positioning it as a novel tool for o,p'-DDT detection in the context of food safety monitoring and risk evaluation initiatives.

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sciforum-098889: The Use of the FT-IR Technique to Predict the Content of Oleaginous Yeast Biomass

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Microbial oil, also known as single-cell oil (SCO), is a promising sustainable alternative for plant- and animal-derived oils and fats. Oleaginous micro-organisms can produce SCO amounts of more than 20% of their dry mass. This study aimed to evaluate if it is possible to predict the composition of a yeast biomass based on its infrared spectrum. The oleaginous yeast Yarrowia lipolytica was cultured in batch and fed-batch bioreactors to compose a collection of samples of varying oil and protein contents. Yeast samples were characterized using standard analytical techniques, e.g., the Soxhlet method for yeast oil determination and the Kjeldahl method for protein measurements. A Perkin Elmer System 2000 instrument was used to register the FT-IR spectra of yeast, as was a TQ Analyst and GRAMS IA software. The selected region was 4,000–450 cm^{-1} with a resolution of 2 cm^{-1}. Ten scans were taken for the background spectrum and each sample. Within the scope of this work, two steps of experiments were carried out. The first step covered the recording of FT-IR spectra for freeze-dried defeated yeast samples enriched with microbial oil. The samples contained 0, 10, 20, 30 , 40 and 50% m/m oil. Registering and analyzing the spectra allowed for the preparation of discriminant models that used spectral data alone, with a high correlation coefficient. To validate the created discriminant model, an RMSEP parameter was calculated and reached 0.98. For the second step, the FT-IR spectra for different yeast samples containing varied amounts of storage lipids and proteins were registered. The samples fit the created model and led to the promising conclusion that the technique can be used for protein determination in yeast as well. Studies demonstrated FT- IR to be a fast, low-cost and reliable analytical technique to monitor the composition of yeast biomass.

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sciforum-102385: The Validation of a chromatografic method to dose neonicotinoids in wheat

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Neonicotinoids (NEOs) are used as pesticides to combat plant-damaging insects, but they can also pose risks to human health, potentially causing cancer, infertility, and congenital disabilities. Therefore, monitoring food residues is essential to protect human health and maintain ecological balance. This study developed and validated a new method for measuring residues of clothianidin, acetamiprid, imidacloprid, dinotefuran, nitenpyram, thiamethoxam, and thiacloprid in wheat. A STRATA XPRO column (Solid-Phase Extraction) was employed to remove interferents and concentrate the NEOs, and a reverse-phase high-performance liquid chromatography equipped with a Kinetex C18 column and Diode Array Detector (DAD) for dosage was also used. The NEO recoveries using the STRATA XPRO cartridge were compared to those obtained with the commonly used QuEChERS method. The STRATA XPRO technology was faster and provided better recoveries for clothianidin (97.7-98.2%) compared to QuEChERS (69.8-80.3%). The accuracy profile strategy, recommended by the Commission of the Société Française des Sciences et Techniques Pharmaceutiques (SFSTP), was used to validate the entire analytical procedure. The method demonstrated recoveries between 70% and 110%, a robust linear relationship between observed and predicted values (R^2 = 0.999), a limit of quantification higher than the maximum concentration of NEOs to be determined, an accuracy below 10%, (meeting the European Commission's requirements), and a minimum of 95% of outcomes within the acceptance limits of ±15%. The low cost, along with the speed (~40 min) and simplicity of operation, recommend its application for routine analyses.

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Session 7. Novel Preservation and Packaging Technologies

sciforum-103144: A comparative study of the effects of starch, glycerol, and clay contents on the morphological and mechanical properties of corn starch nanocomposite films

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In the present study, biodegradable starch films were prepared using the casting method with varying concentrations of corn starch (4.5 to 7.5% w/w), glycerol (20 to 40%), and sodium montmorillonite (NaMMT) (0 to 25% w/w), based on the amount of dry starch. The morphology of the corn starch-based films was investigated using optical microscopy and confocal scanning electron microscopy. ANOVA results indicated that the tensile strength of the corn starch-based films was significantly affected by the starch, glycerol, and clay content, as well as by their interactions. Statistical analysis showed that the highest tensile strength values were obtained for the films with high starch content. The interaction between starch and glycerol revealed that films with low glycerol content and high starch content exhibited better tensile strength properties. The mechanical properties of the films were further enhanced by the incorporation of NaMMT, even at lower montmorillonite clay content. The interaction between starch and NaMMT indicated an increase in tensile strength with higher clay content. Microscopic examination revealed a uniform distribution of clay particles within the starch film matrix. The best mechanical properties were observed in the nanocomposite films containing starch concentrations of 6.5 to 7.5% w/w, glycerol concentrations of about 20-40% w/w and a NaMMT clay content ranging from 10 to 15% w/w.

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sciforum-098886: Antimicrobial photodynamic coating on glass surfaces for food preservation

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Food preservation plays a vital role in achieving sustainable development goals, ensuring food security, reducing food waste, and promoting health and economic stability. As global populations continue to grow and environmental challenges persist, the importance of effective food preservation methods will only increase. In particular, glass surfaces contribute significantly to food preservation by maintaining food quality, ensuring safety, and enhancing shelf life through their inert, impermeable, and hygienic properties. In this work, glass surfaces (GSs) were covalently coated with photosensitizers (GS-PS) to eliminate microbial contamination through the photodynamic inactivation of microorganisms (PDI). Thus, 5,10,15,20-tetrakis(pentafluorophenyl)-2,3-[methane(*N*-methyl)iminomethane]chlorine ($TPCF_{20}$) and its metal complex with Zn(II) ($ZnTPCF_{20}$) were used as photodynamic agents. Morphological studies of GS-PS revealed a uniform distribution of the PS on the surfaces. The contact angles indicated an increase in the lipophilicity of the surfaces coated with the PS. The absorption and emission spectra of the GS-PS surfaces exhibited the characteristic bands of the corresponding monomers in solution. Photodynamic studies revealed that the GS-PS surfaces were capable of generating singlet molecular oxygen. The photoinactivation efficacy of these surfaces was assessed against *Staphylococcus aureus*. Bacterial cells on GS-PS surfaces were eradicated (over 6 log, >99.9999% reduction in survival) after 45 min of white light irradiation. Furthermore, the potential for sustainable use through recycling was evaluated after a round of PDI treatments. These surfaces were also effective in photoinactivating individual bacteria of *S. aureus* attached to the GS-PS. Therefore, the GS-PS materials exhibited suitable properties to eliminate microbial contamination and maintain aseptic conditions for food preservation.

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sciforum-098849: Photodynamic antimicrobial decontamination of food packaging using a chitosan–Zn(II) protoporphyrin IX conjugate

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Effective decontamination methods are essential for minimizing the presence of harmful microorganisms in fresh foods. The incorporation of bioactive compounds in packaging processes stands out as one of the most effective approaches to maintain food quality and enhance food safety. This study focuses on the synthesis of a conjugate, CS-ZnPPIX, formed by linking Zn(II) protoporphyrin IX with chitosan. The aim was to create a naturally derived polymeric material capable of reducing microbial contamination in food packaging through the photodynamic inactivation (PDI) of pathogens. The CS-ZnPPIX film displayed a homogeneous coating of the surfaces. Its absorption and emission spectra showed characteristic Zn(II) porphyrin bands, along with a fluorescence quantum yield of 0.054. Photodynamic analysis indicated that CS-ZnPPIX could generate singlet oxygen (Φ_Δ = 0.49) and superoxide anion radicals. In vitro experiments with the Gram-positive bacterium *Staphylococcus aureus* revealed that exposure to 1 μM CS-ZnPPIX followed by 30 min of white light irradiation led to effective bacterial eradication (> 7 log, 99.9999% reduction in survival). Additionally, this study evaluated the effectiveness of PDI in reducing *S. aureus* contamination on food packaging materials. CS-ZnPPIX proved effective in decontaminating surfaces made of polyethylene terephthalate, expanded polystyrene, glass, and aluminum packaging materials. Treatment of these bacteria-laden surfaces with 0.54 nmol CS-ZnPPIX and subsequent 30 minutes of irradiation resulted in more than a 5 log reduction (99.9998%) in bacterial survival. Furthermore, this procedure effectively eliminated individual pathogen cells attached to surfaces. The merit of this conjugate, compared to other methods of surface sterilization, primarily lies in its economic and sustainability benefits due to its low production cost. Furthermore, the natural origin of the polymer helps maintain a safe profile, minimizing environmental contamination. Consequently, the CS-ZnPPIX conjugate demonstrates promising properties for decontaminating packaging, achieving aseptic packaging materials, and aiding in food preservation.

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sciforum-102370: Selected Biological Properties and Practical Importance of Polylactide Films Containing Dyes

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Background and Aims

Film materials were made of biodegradable polylactide and dyes, which were introduced into a polymer matrix. The additional substances used were fuchsin, crystal violet, safranin and malachite green. The aim of this work was to produce colored films and analyze them from a biological perspective.

Methods

We measured the biological oxygen consumption of microorganisms (BOD) using an OxiTop Control measurement system. The structure of the film was checked using SEM. The NGS sequencing of the 16SrRNA gene was performed. Mutagenicity analyses were performed according to the Ames test. Biocidal properties were confirmed according to ISO standards.

Results

The most biodegradable foil turned out to be the foil made of PLA containing fuchsin, where the highest oxygen consumption results expressed in mgO_2/L were recorded. In turn, the most favorable environment for biological degradation was soil. A number of bacterial strains were also isolated, which showed the greatest impact on the biodegradation of the analyzed materials. Biopreparations were prepared from them. It was also confirmed that none of the foils produced showed mutagenic properties, while their biocidal properties were confirmed.

Conclusions

During the biodegradation processes, the colonization of the film by specific strains was observed, thanks to which it was possible to select a vaccine influencing the biodegradability of the given films. The films can be used in the food packaging industry due to their biocidal properties and lack of mutagenicity.

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sciforum-098775: A Comprehensive study including polyethylene-based food packaging and its substitutes on the European market focusing on GWP, water scarcity and fossil energy

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Introduction

Plastic packaging is used in many applications, from transporting goods and packaging products to protecting and preserving food. The topic of waste and the potential environmental impacts from the use of plastic in packaging continues to be a discussion topic globally and is a focus of key EU legislation on packaging and packaging waste. Noting that polyethylene (PE) is the main polymer type in the packaging sector, a comprehensive study of PE packaging, and its comparison with alternatives (paper, glass, metal), for more than 35 applications was performed for the European region to better understand the potential environmental impacts. Of these, 17 applications were primary food packaging.

Methods

A life cycle assessment study was conducted according to ISO 14040 and 14044 with a European regional scope. The potential environmental impacts assessed were global warming potential (GWP), fossil energy use and water scarcity. Use phase impacts, e.g., breakage and shelf life, were excluded in this study.

Results

This study found that PE packaging showed the lowest GWP among assessed alternatives in 11 of the 17 primary food packaging applications. This study also showed that PE-based packaging had a lower potential impact than market alternatives in 5 of 17 applications for water scarcity and 6 of 17 applications for fossil resource use.

Conclusions

This study showed that banning or restricting the use of plastics such as polyethylene for food packaging could potentially lead to higher GWP (i.e., greenhouse gas emissions) for many packaging applications. The selection of packaging formats to enable the lowest overall environmental impact is a complex process that requires comprehensive analysis.

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sciforum-102941: Advancing Circular Economy: Assessing Compound Migration in Recycled PE for Food Packaging

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The problem of plastic requires a necessary change from a linear global economy into a circular one. The economic model that is currently in use relies on extraction, production, use, and disposal, leading to resource depletion, biodiversity loss, waste, and pollution, threatening the planet's ability to meet future needs. Poor end-of-life management and packaging design errors have led to low recycling rates. The use of recycled plastic for food contact is limited by regulations which require it to come from a closed-loop recycling process. Alternatively, recycled plastic can be used without direct food contact, with only virgin plastic touching the food, thus reducing the use of virgin plastic. Overall migration testing for food contact materials was conducted in a three-layer PE plastic package designed for contact with field crops and shelled nuts. The package combines a recycled middle layer, which was strategically contaminated with an anti-UV additive, and outer layers of virgin plastic. Contaminated samples were compared with control samples, which were also three-layered and also contained recycled plastic as the middle layer, presenting the same thickness. The tests occurred in a 10-day period; the samples were incubated at 40 °C, according to European regulation (UE) N. o 10/2011, in ultra-pure water. The results were promising and showed no compound migration. More tests need to be carried out, with different simulators, but preliminary results show that it may be possible to use recycled material within multilayered plastic packaging without jeopardising consumer health through contaminant migration onto food.

This study had the support of national funds through Fundação para a Ciência e Tecnologia (FCT), under the funding from the research centre strategic programme under reference numbers UIDB/04292/2020 and UIDP/04292/2020 and under the project LA/P/0069/2020 granted to the Associate Laboratory ARNET. This work was also supported by the Packaging for the Future project, Green Agenda for Business Innovation, investment project no. 59, financed by the PRR, NextGenerationEU.

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sciforum-099077: Antioxidant and antibacterial properties of red macroalgae protein hydrolysates and their potential use as bio-preservatives ffor beef

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Recently, numerous bioactive peptides derived from algal protein hydrolysates with potential nutritional and health benefits have been isolated from macro- and microalgae. In this study, we investigate the effect of different Enzyme/Substrate (E/S) ratios on the antioxidant and antibacterial properties of two unexplored red macroalgae (*Sphaerococcus coronopifolius* and *Gelidium spinosum*) protein hydrolysates, namely SCPH and GSPH, respectively. Their antioxidant properties were evaluated using four assays, including their scavenging capacity ffor DPPH radicals, reducing power, ferrous ion-chelating ability, and total equivalent antioxidant capacity. For antibacterial property evaluation, agar diffusion and minimum inhibitory concentration (MIC) methods were applied to six indicator bacterial strains (*Listeria monocytogenes*, *Staphylococcus aureus*, *Kocuria rhizophila*, *Micrococcus luteus*, *Escherichia coli*, and *Salmonella Newport*). Then, their effects on the quality of minced meat during 11 days of storage at 4 °C were evaluated. Lipid oxidation status (malonaldehyde, metmyoglobin, and heme iron contents) and bacteriological (total viable, coliform, yeast, and mold counts) evaluations were made in minced beef under refrigerated conditions. The results demonstrated the high antioxidant activities of both hydrolysates, whatever the E/S ratio. Particularly, DPPH radical scavenging activities ranging from 90.84% to 100% were seen, especially at an E/S ratio of 1/2 (w/w). Moreover, these peptidic hydrolysates exhibited important in vitro antibacterial activities against all the tested bacteria, with MIC values of 1.56-25 mg/mL. In addition, lipid peroxidation and microbial growth were significantly reduced (*p* 0.05) following the incorporation of SCPH and GSPH into the minced meat during 11 days of storage at 4 °C. Overall, these results suggest that both protein hydrolysates demonstrate a positive effect on quality bio-preservation and the extended shelf life of refrigerated minced beef. SCPH and GSPH could be considered natural preservative additives that could be used to prevent unwanted changes to food, including meat and meat products, during storage.

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sciforum-104748: Assessment of Antibacterial Edible Coatings derived from Coffee Husk Pectin for extending Grapefruit Shelf life.

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By 2050, the global population is expected to reach 9.7 billion, with a majority living in urban areas. This growth will increase food demand and reliance on processed foods, raising contamination risks. A composite coating made from coffee husk pectin (CHP) and clove oil (CO) was tested to extend grapefruit shelf life. Coated and uncoated grapefruits were evaluated for their physicochemical properties (weight loss, color, pH, total soluble solids, titrable acidity), bioactive compounds (total phenolics, total flavonoids), and antioxidant and antimicrobial activities over 14 days at room temperature (25 ± 1°C) and cold storage (4 ± 1°C). The coated grapefruits maintained better visual quality, color, texture, and freshness over 14 days compared to the uncoated ones. The uncoated samples showed significant weight loss, increasing from 1.69 ± 0.24% after 7 days to 3.89 ± 1.63% after 14 days at room temperature ($^{\$}$p 0.05). Grapefruits coated with CHP-CO (**p 0.001) and FD-CHP-CO (***p 0.001) had significantly lower weight loss, with the freeze-dried coating (FD-CHP-CO) being the most effective. The pH of the coated grapefruits remained more stable, particularly with FD-CHP-CO. The coated grapefruits also retained more total phenolics and flavonoids. The coated samples showed enhanced antioxidant and antimicrobial properties. The microbial load increased from 4000 to 46000 CFU/g in the uncoated grapefruits, from 1800 to 31500 CFU/g in the CHP-CO-coated samples, and from 1500 to 29000 CFU/g in FD-CHP-CO-coated samples. These results highlight the potential of FD-CHP-CO and CHP-CO edible coatings to prolong grapefruit shelf life and quality. For FD-CHP-CO, freeze-drying was used to further increase the coating's efficacy by forming a strong barrier against microbial invasion and moisture loss. These results highlight the potential of FD-CHP-CO and CHP-CO edible coatings to prolong grapefruit shelf life and quality, hence lowering food waste and raising consumer satisfaction. To promote sustainability and food security, future research should investigate the underlying mechanisms that can be used to optimize these coatings for greater application in the agricultural and food industries.

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sciforum-098353: Bread Fortification and Insecticidal Effect of *Origanum syriacum* and *Cymbopogon winterianus*

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Chemical compounds obtained from two plants grown in Lebanon, namely *Origanum syriacum* (Syrian oregano plant) and *Cymbopogon wimterianus* (Java citronella plant) have been employed in different applications such as food preservation, and insecticidal activity. The objective of this research is to conduct phytochemical screening to identify secondary metabolites, assess the antioxidant properties of the extracts, explore their effectiveness in food preservation, and evaluate their insecticidal capabilities. Flatbread was prepared with additions of Syrian oregano and Java citronella powders, followed by analysis of moisture content, visual appearance, and sensory characteristics. Weevils (*Sitophilus granarius L.*) were exposed to Syrian oregano and Java citronella essential oils. The phytochemical screening indicated a rich presence of secondary metabolites in the extract. The hydro-distillation of plant leaves resulted in extraction yield of 4.3% Syrian oregano essential oil. The major component of the essential oil was carvacrol (79.30%). The Syrian oregano ethanolic extract contained 110.674 ± 1.842 mg GAE/g total phenols and 52571 ± 86 µg RE/g total flavonoids, and it exhibited a high antioxidant activity with a half-maximal inhibitory concentration (IC_{50}) equal to 168.28 µg/mL. Results showed that the powders of Syrian oregano and Java citronella have promising food preservative effects. These findings were supported by a significant decrease in fungal growth in several samples. The inclusion of a 2% mixture of Syrian oregano and Java citronella powder in the flatbread resulted in the sample receiving the highest overall acceptability mark from consumers, while also extending its shelf life. These two plants displayed effective insecticidal activity that was at its peak when Syrian oregano and Java citronella essential oils were combined resulting in 7% lethal dose (LD_{50}) towards grain weevils.

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sciforum-103818: Characterization of edible films from croaker (Pseudotolithus senegalensis), tilapia (Oreochromis niloticus) and mullet (Mugil cephalus) scale gelatin

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The global seafood industry generates about 60–70 million tons of fish scales as waste. This poses significant environmental and societal challenges by increasing the volume of methane emissions. The valorization of seafood waste for the generation of value-added products like gelatin, applicable in edible film formulations, offers an innovative solution to mitigating these impacts, in addition to increased economic value. Moreover, replacing synthetic edible films with natural alternatives could promote eco-friendly packaging practices amidst global efforts to reduce plastic usage. In this study, selected physical, structural, thermal and microbiological qualities of edible films produced from the scales of three commonly consumed fish species, croaker (*Pseudotolithus senegalensis*), tilapia (*Oreochromis niloticus*) and mullet (*Mugil cephalus*), were examined.

Edible films were produced by combining fish scale gelatin from the three fish species with starch and glycerol. Gelatin yield, film thickness, transparency, opacity, colour, water vapour permeability (WVP) and swelling power were evaluated using standard procedures. The gelatin-starch films were further assessed by SEM, DSC and FTIR for morphological, thermal and structural properties.

The gelatin yield from croaker, tilapia and mullet fish scales was 9.1, 20.38 and 8.19%, respectively. Mullet gelatin-based films showed the lowest values for thickness (0.10 mm) but the highest for swelling (207%) and opacity (5.73). Film transparency ranged from 10.87 to 27.00 for all samples, whereas tilapia gelatin-based film had the highest hydrophilicity, as depicted by its high WVP. However, the SEM, DSC and FTIR showed distinct variations in structural morphology and functional groups with preserved film integrity. The films showed varied antibacterial and antifungal activities.

The produced edible films offer sustainable packaging alternatives, with acceptable transparency, water vapour barrier properties, and microbial stability for food preservation, showing promise in enhancing food preservation while promoting environmental sustainability.

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sciforum-102781: Conductive Hydro-Drying of Red and Brown Seaweed Sources from Southern Coastal Zones

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Introduction

Conventionally, seaweed is sun- or shade-dried. As a novel drying approach, Conductive Hydro-Drying (CHD), a low-temperature drying technique, is finding several applications in the food industry. This study focused on the use of CHD to dry seaweed (red and brown) sourced from the coastal region of Ramnad, Tamil Nadu, India.

Materials

This study investigates the drying behavior of red and brown seaweed to optimize the drying process and improve product quality. The seaweeds were subjected to three temperature treatments: 50, 70, and 90 °C. Due to these temperature treatments, the impact on the seaweeds was identified by analyzing the key parameters, including the drying time, temperature, moisture content, water activity, and color.

Results and conclusion

The initial moisture content was around 78-82% for both types of seaweed. With high temperatures (90°C), the drying time was significantly more reduced than the other temperatures, and the low moisture content was observed (~10%). The drying rate during the constant rate period was relatively high, which allowed for rapid moisture removal. As the moisture content decreased, the drying rate slowed significantly during the falling rate period, indicating the diffusion-controlled nature of moisture removal at lower moisture contents. However, the final moisture content of dried seaweed is 10-11% in the case of red and 14-17% in the case of brown. Significant differences in terms of color and water activity values were observed for both the seaweeds. The low-temperature (50℃) CHD-dried red and brown seaweed had better color retention than that of the other temperatures. This is the first work reported using CHD to dry seaweeds.

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sciforum-099787: Development of active packaging film based on quaternary chitosan and procyanidin-*g*-guar gum

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The development of active packaging films based on polysaccharides and plant-originated polyphenols has emerged in recent years. However, the low stability of polyphenols greatly limits the practical use of polysaccharide/polyphenol films. Recently, studies have revealed that the stability of polyphenols can be elevated by grafting them with biomacromolecules. In this study, a typical polyphenolic compound, procyanidin (PA), was covalently linked to guar gum (GG) through graft copolymerization. The synthesized PA-*g*-GG was characterized by UV–vis, FT-IR, ^{1}H NMR spectroscopy, and TGA. Afterwards, PA-*g*-GG was incorporated into a quaternary chitosan (QC)-based film matrix to obtain QC/PA-*g*-GG film. QC/PA-*g*-GG film was characterized for its structure, physicochemical properties, and antioxidant and antibacterial activities. The results showed that PA-*g*-GG had a UV absorption at 280 nm, an IR absorption at 1610 and 1520 cm^{-1} ,and a proton peak at 6.8 ppm, indicating that PA was successfully grafted with GG. PA-*g*-GG presented a higher stability than PA. The QC/PA-*g*-GG film had a smooth surface and compact inner structure. PA-*g*-GG and QC formed hydrogen bonds within the film. PA-*g*-GG increased the barrier ability of QC film against UV–vis light, moisture, and oxygen gas. In addition, PA-*g*-GG enhanced the tensile strength, elongation at break, and antioxidant and antibacterial activities of QC film. In conclusion, the QC/PA-*g*-GG film has a good active packaging potential in the food industry.

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sciforum-099381: Edible Films with Protein and Bioactive Compounds from *Arthrospira* sp. Microalgae

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Arthrospira sp. (Spirulina) is rich in natural nutrients, and it consists of 60–70% protein, including essential amino acids, vitamins (B-complex and vitamin E), minerals (Fe and Ca), and γ-linolenic acid. It also contains antioxidants and carotenoids, such as phycocyanin and lutein. These compounds are associated with therapeutical properties, such as anti-aging and anti-UV radiation, and they increase immunity [1]. Spirulina was used as a source of protein and bioactive compounds to produce an edible film. The bioactive compounds were extracted through hydroethanolic maceration [2]. The protein was extracted with water (50 °C, 2 h), cellulase, and protease at an adequate pH and temperature (40 ˚ C, 2 h), followed by centrifugation and freeze drying. The total phenolic content (TPC) and the antioxidant activity (ABTS, DPPH, ORAC) of the extracts with bioactives were determined. Casting was the method used to investigate the edible films. Their antioxidant activity (ABTS, DPPH) and physico-chemical properties were determined. The TPC of the bioactives extract was 0.973±0.061 mg GAE/100 mg DW, and the ABTS, DPPH, and ORAC were 2.846±0.452, 2.284±0.064, and 18.378±1.004 μmol TE/100 mg DW, respectively. The edible film with 2% alginate and 0.5% protein extract presented ABTS=922.36±129.06 and DPPH=95.93±15.91 μM TE/mg film. The color parameters of this film were L*=61.16±9.54, hue=75.5±1.9°, and chroma=7.02±0.49; its thickness was 0.063±0.004 mm; its water vapor permeability (WVP) was 14.388±3.636 ($g.mm.m^{-2}.day^{-1}.kPa^{-1}$); and its solubility was 100% in hydroalcoholic solutions (0–50%) and 27.34±6.77% in 3% acetic acid. The incorporation of the bioactive extract in the film formulation resulted in significantly higher ABTS and DPPH values and a lower WVP. However, the color became darker, with significantly lower L* and hue values. The thickness and solubility were not significantly different. Therefore, *Arthrospira* sp. is a good source of protein and bioactive compounds, allowing for the production of edible films with potential to be used in food applications.

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sciforum-099102: Effects of Alginate and Glycerol Concentrations Combined with Calcium Chloride as Edible Coatings on Mass Transfer During Osmotic Dehydration of Ginger Slices

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Fresh ginger has a high moisture content, and improper storage makes it susceptible to microbial contamination, leading to product deterioration. Thus, drying is a pivotal step. Osmotic dehydration is widely used as a pre-treatment in the drying process due to its simplicity and potential for reducing energy consumption. During this process, samples are immersed in a hypertonic solution, utilizing osmosis to facilitate two main mass transfer mechanisms: water loss and solute gain. However, excessive solute gain can negatively impact the final product's texture and organoleptic qualities, thus limiting its application in the food industry. To mitigate this, extensive research has explored the use of edible coatings before osmotic dehydration to minimize solute gain. This study employed the central composite design technique to examine the effects of alginate and glycerol concentrations, mixed with calcium chloride, on water loss and solute gain during the osmotic dehydration of ginger slices. Alginate and glycerol concentrations were tested at levels ranging from 1% to 3%. The influence of these variables was evaluated using a second-order polynomial multiple regression model. Analysis of variance (ANOVA) showed high coefficients of determination (R^2) values of 0.9 for both water loss and solute gain. Alginate significantly increased water loss (p 0.05), indicating that alginate's hydrophilic properties improve the barrier, facilitating greater water loss during osmotic dehydration. For solute gain, glycerol significantly reduced solute gain (p 0.05), suggesting that glycerol enhances the barrier properties of the coating, preventing excessive solute absorption. Interaction effects between alginate and glycerol were not significant for water loss but were significant for solute gain, indicating that the combined effect is crucial for controlling solute absorption during dehydration. Thus, optimizing alginate and glycerol concentrations is essential to improve mass transfer efficiency during the osmotic dehydration of ginger slices.

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sciforum-098868: Evaluating growth-inhibitory effects of plant volatile compounds against food pathogenic microorganisms in vapor phase using new microplate disk volatilization method

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Foodborne illnesses, caused by food pathogens, highlight the need for novel preservation techniques [1]. Plant-derived volatiles offer a safe and eco-friendly alternative, as their vapors effectively protect food through atmospheric distribution [2]. Despite contributions to advances in antimicrobial susceptibility testing in liquid matrices [3], there is also a need for high-throughput quantitative methods using solid matrices for the development of antimicrobial volatile agents for food packaging. Therefore, the growth-inhibitory effects of the vapors of plant volatile compounds, namely thujaplicin, carvacrol, citral, menthol, thymol, and thymoquinone, were tested against food pathogens like *Aspergillus niger*, *Bacillus cereus, Clostridium perfringens, Enterococcus faecalis, Escherichia coli, Listeria monocytogenes, Salmonella enterica Typhimurium, Shigella flexneri, Vibrio parahaemolyticus,* and *Yersinia enterocolitica* using a new microplate disk volatilization method developed in our laboratory. This method allows for multiple screening of volatiles using paper discs on lids of microplates inhibiting microbial growth in the wells. β-Thujaplicin was the most active compound, with MICs ranging from 1 to 32 μg/disk (2.5-80 μg/cm^3), lower than previous reports on respiratory pathogens in vapor phase (MICs 320-640 μg/cm^3) assayed using the broth macrodilution volatilization method [4]. Thymoquinone produced a slightly weaker effect, with MICs in the range of 1-64 μg/disk (2.5-160 μg/cm^3), compared to MICs of 2-8 μg/cm^3 achieved using the broth microdilution volatilization method. Carvacrol and thymol produced higher antimicrobial effects (MIC ≥16 μg/disk or ≥40 μg/cm^3) compared to previously observed MICs (32-64 μg/cm^3) [3]. Citral produced MICs of ≥64 μg/disk (≥160 μg/cm^3), lower than the MICs (3.13-12.5 μg/cm^3) observed using the modified disk diffusion method [5]. Despite variations in volatilization matrices, our novel microplate disk volatilization method proves valid for the high-throughput screening of volatile agents. The method would be efficient for testing in various matrices such as nanofibers or carbon dots, used as carriers of volatile antimicrobials. β-Thujaplicin and thymoquinone show promise for antimicrobial atmosphere packaging, but further testing for their safety, organoleptic properties, and efficacy in food models is needed before practical incorporation.

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sciforum-103220: Evaluation of Alternative Models for Respiration Rate of Ready-to-Eat Strawberries (cv. 'Ágata')

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The actual growing demand for ready-to-eat (RTE) fruit and vegetables is driven both by consumers' quest for convenience and by an increasing demand for healthy food options, transforming consumption habits all over the world. Modified atmosphere packaging (MAP) is an essential technology for maintaining quality attributes and extending fresh-cut products' shelf-life. When designing MAP conditions, it is necessary to determine the influence of internal gaseous atmosphere (oxygen-O2 and carbon dioxide-CO2) and temperature on fresh-cut metabolism, allowing us to predict the best conditions for shelf-life extension. While respiration rate models for various strawberry cultivars are well documented, there is limited literature specifically addressing fresh-cut strawberries. The aim of this work was to evaluate alternative models for the respiration rate (RR) of ready-to-eat strawberries as a function of O2, CO2, and temperature. Strawberries (cv. Ágata) were washed, sanitized (peracetic acid - 80 ppm), dehulled, and dried. The effect of gaseous atmosphere and temperature on RR was determined in a total factorial experiment where 45 treatments were obtained by combining factors: oxygen (0-22%) and carbon dioxide (0-15%) concentration at three levels and temperature (4 - 26°C) at five levels. Different mathematical models were used to fit RR data using both phenomenological (Michaelis--Menten and Langmuir) and non-phenomenological (exponential, power, and linear) approaches. The temperature effect was modelled by Arrhenius, exponential, and power models. Model selection was performed based on R2-adjusted, RMSE, IAC, and BIC indicators. Models with an R2 greater than 0.80 and higher AIC and BIC were selected. An integrated mathematical model based on strawberry respiration activity and the influence of oxygen, carbon dioxide, and temperature was obtained, allowing its use for MAP modelling.

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sciforum-101030: Exploring Extract from Chestnut By-product as Natural Preservatives in Atlantic Bonito Fish Burgers

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Fish products are highly perishable due to the rapid growth of microorganisms that are present either naturally or through contamination. Synthetic preservatives are commonly used to extend shelf life and ensure quality and safety. However, the increasing consumer preference for natural preservatives and concerns over synthetic ones have driven the food industry to seek natural alternatives. Chestnut by-products, rich in antioxidant compounds such as hydrolysable tannins, phenolic acids, and flavonoids, offer potential as natural food additives to enhance nutritional value and prevent oxidation. This study aimed to assess the potential of phenolic-rich extract from male chestnut flowers (*Castanea sativa* Mill.) as a natural antioxidant preservative in Atlantic Bonito (*Sarda sarda*) fish burgers. The experiment evaluated the shelf life of fish burgers stored at 4 °C over ten days. The following four fish burger formulations were prepared: a negative control (no added preservative), a positive control with 0.02% butylated bydroxytoluene (BHT), and two test groups with 0.25% and 0.5% chestnut flower extract (CFE). The initial pH levels of all formulations were around 5.90. By day 10, the pH of the negative control group had slightly decreased to 5.83, while the pH levels in the positive control and CFE groups remained stable, showing no significant differences compared to the initial pH. The thiobarbituric acid reactive substances (TBARS) assay indicated a significant increase in lipid oxidation in the negative control group, reaching 6.80 mg malonaldehyde/kg by day 10. Both concentrations of the CFE effectively reduced the TBARS levels, demonstrating that their antioxidant capabilities are linked to the phenolic composition of the chestnut flowers (1.73 and 2.08 mg MDA/kg by day 10 for 0.25% and 0.5% CFE, respectively). These results suggest that CFE could be an effective natural preservative, improving the shelf life and quality of fish burgers for a duration of 10 days in a refrigerator. Future research should explore the mechanisms of CFE's antioxidant effects and conduct a sensory evaluation to determine the organoleptic properties of the fish burger formulations.

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sciforum-094160: Fabrication of Composite Packaging Films Composed of Apricot (*Prunus armeniaca*) Kernel Protein, Corn Starch and Mint Oil: A Novel Approach

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In the present scenario, one of the most important ways to minimize waste and protect the ecological balance is to transform agricultural by-products into profitable commodities. A considerable quantity of apricot kernels produced from canning industries remains largely underutilized and undervalued. An initiative to advance sustainable development goals was undertaken by harnessing these apricot kernels. In this study, the impact of various film-forming matrices on the quality attributes of composite packaging films composed of apricot kernel protein isolate (AKPI), corn starch (CS) and mint oil (MO) at varied ratios of 100:0:0, 90:10:1, 80:20:1; 70:30:1, 60:40:1, and 50:50:1 was explored. The study outcomes revealed that each film-forming solution produced self-supporting and easily peelable packaging films. A composite film comprising 50% AKPI, 50% CS, and 10% MO ($P_{50}C_{50}O_1$) was observed to have favorable properties among the explored formulations. The $P_{50}C_{50}O_1$ film showed 1.96-fold superior thermal stability, 1.35-fold higher tensile strength, and a 1.65-fold reduction in water vapor permeability than the AKPI film, indicating a smaller presence of moisture and the enhanced tortuosity of the vapor diffusion pathway. Microstructure analysis exhibited smoother and more uniformly entrapped MO in $P_{50}C_{50}O_1$ film, while X-ray diffraction patterns indicated a rise in crystallinity and improved interactions between molecules. Compared to AKPI film, $P_{50}C_{50}O_1$ composite film showed the highest color difference of 6.19, suggesting a reduction in the purity of the dark greenish color. The study outcomes thus demonstrate a novel approach to fabricating composite packaging films by utilizing agro-food waste (apricot kernels), providing a sustainable solution for utilizing by-products from apricot processing industries.

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sciforum-102643: Impact of Pulsed electric field processing on cranberry juice's bioactive compounds and physiochemical Characteristics

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There is a growing interest among researchers in exploring non-thermal food processing technologies, which can help preserve nutritional content and enhance the stability of food products during storage. This research examined the impact of pulsed electric fields (PEFs) on the bioactive components and physical–chemical characteristics of cranberry juice. This study involved treating the juice with varying intensities of PEF (0, 7, 14, and 21 kV/cm) at a flow rate of 45 ml/min, a frequency of 1 kHz, and a temperature of 30 ± 2°C for a duration of 700 μs. Following that, an analysis was conducted on the juice's antioxidant activity, phenolics, flavonoids, and physicochemical properties. Moreover, Fourier-transform infrared spectroscopy was used to examine the alteration in functional groups of biological substances. According to the results, the treated sample showed no significant changes in pH, Brix, or colour compared to the untreated sample, even at higher PEF intensities. PEF treatment led to a significant increase in antioxidant activity, cloud value, phenolic compounds, and flavonoids, while reducing the browning index. This indicates that PEF processing can improve the quality and stability of the sample without substantially altering its biological composition. The greatest rise in phenolics and flavonoids was noted for the sample treated at 21 kV/cm. These trends were not observed in the per cent inhibition (DPPH). The results indicate that utilizing PEF treatment during food processing at 21 kV/cm could be an effective method for maintaining the nutritional value of food products, such as fruit juice, by preserving their natural quality.

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sciforum-095887: Microbial Spoilage Mitigation in Biodegradable Cheese Packaging via Protective Lactobacillus Coating

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Growing environmental concerns are driving the disposable packaging industry to rethink its practices. While biodegradable options often shorten product shelf lives, edible coatings made from food materials offer a solution. These coatings maintain food quality and safety, acting as an additional preservation layer. Whey, a dairy industry waste product, can serve as a base for edible coatings, forming transparent, flexible films with good barrier properties when heat-denatured, offering both environmental and economic benefits. Incorporating antimicrobial compounds like protective lactobacilli into these coatings further enhances food preservation.

Thus, the objective of our study was to assess the effectiveness of various combinations of biodegradable shrinkable cheese packaging, a whey-based edible coating, and antimicrobial *Lactobacillus helveticus* in reducing spoilage and maintaining quality in Gouda cheese over a 45-day ripening period and 135 days of cold storage. Microbiological evaluation included total lactic acid bacteria, *Enterobacteriaceae*, yeast, and mold, alongside with cheese pH and moisture content assessed on days 1, 45, and 135.

The utilization of bioshrinkable packaging alone for blank cheese packaging revealed its limited protective capabilities during ripening and storage compared to conventional packaging. However, the combination of such biopackaging with the plain coating exhibited protective attributes against *Enterobacteriaceae* and mold, while also maintaining cheese moisture and pH levels during ripening and storage. Furthermore, the incorporation of *L. helveticus* at a concentration of 6 log^{10}CFU ml^{-1} into the coating suppressed fungal growth during ripening and significantly reduced its growth during cold storage.

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sciforum-094551: Multifunctional Composite Nanomaterial of in situ-Formed Silver Nanoparticles on Tannic Acid-Loaded Halloysite for Food Packaging Applications

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Increasing the production and marketing of food will inevitably demand more packaging materials in the agri-food sector, which in turn will increase the contribution of this industry sector to plastic pollution. Developing biopolymer-based alternative packaging materials and strategies to improve the degradability of synthetic polymers are two major promising approaches to mitigate plastic pollution. Nanomaterials designed to achieve multifunctionality hold immense potential in realizing such goals. One such example is a nanocomposite (Nc) of tannic acid-loaded halloysite clay grafted with nanosilver. This material, when incorporated with soy protein isolate (SPI)—a biopolymer used as alternatives to synthetic polymers for developing food packaging films—improved the mechanical and barrier properties and exhibited antibacterial efficiency against pathogenic bacteria. Nc/SPI films resisted changes in pH, lipid oxidation, and microbial growth in packed chicken fillets, demonstrating their potential to improve the functional and mechanical properties of biopolymers. Further, we successfully demonstrated the applicability of this Nc to improve the mechanical and antimicrobial properties of synthetic plastic linear low-density polyethylene (LLDPE) film. More importantly, we demonstrated the possibility of degrading Nc/LLDPE films when exposed to light, highlighting the possibility of mitigating plastic pollution at the end of life of synthetic packaging films. In this talk, I will explain my research philosophy, and elaborate the above-mentioned studies as examples of nanotechnology enabling sustainability in the agri-food sector.

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sciforum-093142: Per- and poly-fluoroalkyl incidence, fate, impacts and detection in food matrices

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Introduction

Per- and poly-fluoroalkyl substances (PFAS) have been used in consumer and industry applications for ages. However, PFAS is pervasive and persistent in the environment, leading to appreciable public health risks. Exposure to some PFAS at elevated levels is implicated in high blood cholesterol, higher risks of high blood pressure and reductions in vaccine efficacy. Presently, PFAS exposure pathways to humans via food and food packaging/contact materials (FCMs) are poorly elucidated.

Methodology

Through a detailed literature review, we conducted a comprehensive overview of PFAS dietary exposure pathways . VOSViewer software was used to perform a bibliometric analysis of the available literature. Furthermore, the mechanism explaining the introduction of PFAS from FCM sources into food was studied.

Results

Current techniques for PFAS detection in food matrices, its routes of exposure and its health consequences were reported. Specifically, detection methods including chromatography and ultrasound techniques were discussed while moisture, salt, and fat contents, as well as pH, were factors identified to affect PFAS in food matrices. Interestingly, PFAS at significant levels have been reported in food matrices including breast milk, animal protein, fish product, and vegetables, and traced to FCMs, such as popcorn wrappers. Entry into humans is largely facilitated via ingestion, and worsened by the use of certain cookwares and FCMs. The current situation of regulations and actions to set policy standards for the reduced incidence of PFAS in food was reported. Interestingly, improved FCMs are at the development and evaluation stages of ascertaining their suitability as alternatives in food packaging.

Conclusions

PFAS incidence in food is a global public health challenge due to their low, pervasive concentrations. The incidence of PFAS in foods, including breast milk, suggests enormous risks. The need to hasten research to achieve an efficient reduction in PFAS in food is most pressing at this time.

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sciforum-099228: Radiofrequency (RF) Treatment for Shelf-Life Extension of Whole Tomato Fruits: A Novel Approach to Post-Harvest Preservation

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Introduction

Tomatoes are a climacteric fruit with high perishability, leading to significant loss post-harvest. Amidst the various technologies gaining attention in scientific platforms, radiofrequency heating can be a promising non-chemical, green technology for extending the shelf life of tomatoes. Therefore, this study aims to explore the potential of RF heating treatment at two different temperatures on tomatoes with/without calcium chloride pre-treatment (1%) at different storage conditions.

Methods

Freshly harvested tomatoes were subjected to RF heating at 45°C for 6 minutes and 50°C for 2 minutes, with a constant current applied. Half of the samples at each temperature were treated with a calcium chloride solution before RF treatment. The treated tomatoes were then stored under ambient and refrigerated conditions. Physiological (respiration rate, physiological loss of weight), physical (total color difference, tomato color index, firmness), and chemical (pH, titratable acidity, TSS) properties were assessed at intervals of 7 days over 28 days.

Results

RF heating at both temperatures significantly affected the physiological, physical, and chemical properties of stored tomatoes. The treatment at 50°C with calcium chloride showed the most pronounced effect, resulting in the lowest respiration (5.38 μL CO_2 kg^{-1} h^{-1}) and minimized physiological loss of weight (5.26 %), and loss of firmness (8.95 %), higher TSS (4.73 °Brix), and lower titratable acidity (0.58 % citric acid equivalent) were observed in treated tomatoes, particularly under refrigerated conditions. Interestingly, color parameters were retained better in RF treatment at 50°C without calcium chloride under both storage conditions.

Conclusions

RF heating, particularly at 50°C for a short time, can be an effective method for preserving the quality of tomatoes during storage. The addition of calcium chloride further enhances the benefits, suggesting a synergistic effect that could be exploited in commercial post-harvest handling of tomatoes.

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sciforum-104537: Synergistic effects of combining multiple plant-based preservatives

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The growing demand for clean label products has intensified research into plant-based preservatives as alternatives to synthetic additives. Synergistic combinations have demonstrated enhanced antimicrobial and antioxidant activities compared to individual compounds, allowing for potentially lower usage concentrations and broader spectrum effectiveness. The combination of oregano and basil essential oil showed a 25-30% reduction in minimum inhibitory concentration (MIC) against Escherichia coli and Listeria monocytogenes compared to individual oils. The combination of green tea and grape seed extract exhibited a 2-3 log CFU/g greater reduction in Listeria monocytogenes population in cooked chicken compared to individual extracts. Citric acid (0.5%) combined with thyme essential oil (0.6%) resulted in a 3.8 log CFU/mL reduction in Escherichia coli O157:H7, compared to 1.6 and 1.9 log reductions for citric acid and thyme oil alone, respectively. The combination of rosemary and sage extract extended the shelf life of cheese by 7-10 days compared to untreated samples while also reducing lipid oxidation by 35-40%. The mechanisms underlying these synergistic effects include complementary modes of action, an enhanced penetration of active compounds, and modulation of microbial stress responses. The challenges in implementing these combinations include sensory impact, the stability of complex food matrices, and regulatory considerations. Future research directions, such as nanotechnology-based delivery systems and combination with other preservation technologies, may further enhance the efficacy and applicability of synergistic plant-based preservative systems. The findings suggest that these combinations could play a significant role in developing more effective and consumer-friendly food preservation strategies.

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sciforum-102492: Synthesis and Characterization of Starch Films from Green Banana Peel for the Food Packaging Industry

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The use of plastic in the food industry has led to adverse environmental impacts due to the generation of solid waste. Therefore, the food packaging industry must adopt eco-friendly alternatives. In this study, starch was extracted from green banana peels using two different methods: using only the aerenchyma and using the whole peel. Nine formulations (F1-F9) of biodegradable starch/glycerol films were prepared and analyzed. FT-IR spectroscopy identified the presence of characteristic functional groups. XRD analysis revealed that the films' crystallinity increased for F7, F8, and F9, which utilized the entire peel, as opposed to the others that used only the aerenchyma. Scanning electron microscopy (SEM) illustrated that the films exhibited similar morphologies, roughness, heterogeneity, and variability attributed to the films' preparation technique. The films' thermal degradation was evaluated using TGA, showing approximately 80% total mass weight loss at around 700 °C, with the highest loss occurring around 290 °C. The degradation peak in the thermogravimetric derivative was primarily attributed to the depolymerization of organic components. Finally, the films' mechanical, solubility, and vapor permeability properties were optimized to identify the most suitable formulation for food packaging. F3 was determined to be the most appropriate formulation due to its highest mechanical properties and lower vapor permeability and solubility compared to a commercial polyethylene film.

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sciforum-097056: The Development of highly stable tapioca-starch-based coating formulations functionalized with essential oils and ultrasonication: An application in the postharvest management of Khasi mandarin (*Citrus rediculata*)

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This study aimed to develop tapioca-starch (2% w/v)-based edible coatings for the postharvest shelf life extension of Khasi mandarin (*Citrus rediculata*) during storage. The tapioca-starch-based coating formulations were prepared with the incorporation of essential oil compositions (clove, rosemary, basil, oregano, cinnamon, lavenders, tea tree, and thyme) with orange peel essential oils. The coating formulations were treated with the optimized conditions of ultrasonication (30 min at 50% amplitude).

The results showed that all the coating formulations maintained their nano size ranges between 206.9±4.51 nm and 656.5±3.47 nm, and zeta potential ranged between -20.8±1.1 mV and -9.7±0.9 mV on 85 days. The significantly (p0.05) higher particle size (3564±6.51 nm) and lower value of zeta potential (-3.6±0.4 mV) were found in CF0 (tapioca starch without the addition of EO and ultrasonic treatment) coating formulations. The shelf-life study result showed that the application of starch-based nano-formulations was significantly effective in maintaining higher postharvest characteristics in fruits as compared to controls (distilled water) throughout the storage period. The control samples were spoiled at up to 20 days. They showed (p0.05) higher weight loss (34.36 g), higher total soluble solids (10.03°Bx), firmness (1709.476 g. Force), and higher respiration rate (16.26 mL CO2 kg-1 h1) with a higher maturity index on 20 days of storage, significantly. A significantly higher reduction in antioxidant activity (21.65%) and total phenolic content (38.01 mg/g) was also observed in control samples with higher microbial load (yeast and mold) on 20 days of storage. The CF3 and CF8 nano-coatings were most effective in maintaining the higher postharvest quality attributes of Khasi mandarin during storage as primary packaging and combined with secondary packaging. **This study suggests that the incorporation of essential oils and ultrasonic treatments has the potential to maintain the integrity of coatings and improving the shelf life of mandarin fruits.**

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sciforum-100006: The effect of microencapsulating with walls of sodium caseinate and beta-cyclodextrin on the shelf life of Angelica essential oil

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This study examined the effect of microencapsulation on effective compounds of Angelica (Heracleum persicum) essential oil during storage. To this end, oil-in-water emulsions containing 10% Angelica (wall material basis) in an aqueous solution of 5 and 10% wall materials (β-cyclodextrin and sodium caseinate) were prepared by ultrasound (40% intensity for 3 min and a frequency of 200 kHz); then, the mixtures were dried by freeze-drying. The characteristics of the microcapsules, such as encapsulation efficiency (EE), moisture content, bulk density, particle size, scanning electron microscopy (SEM), phenolic compounds, and the Ferric Reducing Ability of Plasma (FRAP), were evaluated. During the 45 days of storage at varying temperatures (4 and 25°C) and relative humidity (RH) (52.89±0.22%, 75.29±0.12%), the quick release of the active compounds was evaluated. The results indicated that microencapsulating with sodium caseinate provided better protection for the compounds compared to beta-cyclodextrin. Increasing the concentration of wall material from 5% to 10% led to higher amounts of active ingredients in the microcapsules. The microcapsules containing beta-cyclodextrin were spherical in shape and had numerous indentations, voids, and cracks. Meanwhile, the microcapsules containing sodium caseinate had thin and uniform walls without pores, appearing in the form of flakes. The microcapsules with 10% beta-cyclodextrin wall material had the highest bulk density at 593 kg/m3, while the microcapsules with 5% sodium caseinate wall material had the lowest bulk density at 49.67 kg/m^3. The diameter range of the particles was consistent, with the 10% sodium caseinate microcapsules being slightly larger. Over the 45 days of storage, the number of active compounds decreased, with microcapsules containing 10% sodium caseinate showing the least reduction in phenolic compounds, which was considered the optimal treatment. The optimal microencapsulated powder can be used as a natural flavoring agent in food.

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sciforum-099309: The Effect of Vacuum Storage on the Preservation of Extra Virgin Olive Oil After Opening

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Introduction: When a bottle of Extra Virgin Olive Oil (EVOO) is opened and used by consumers, its degradation accelerates, leading to a gradual loss of its bioactivity and sensory attributes. This study aimed to assess if vacuum storage can be regarded as an effective method to increase the shelf life of EVOO after opening, simulating domestic use. It also examined how different closing systems affect the quality and sensory attributes of EVOO in these conditions. **Methods:** Two chemically distinct samples of commercial EVOO were obtained, one from the northern region (N) of Portugal and the other from the southern region (S). One set of bottles were sealed using a conventional closure system employing plastic stoppers (C) and the other set of samples were sealed using a manual vacuum system (V). To simulate domestic usage, approximately 20 mL of oil was collected every 2 days from each bottle over 84 days, with analyses conducted every 8 days. Parameters assessed included acidity, oxidation indicators such as peroxide value and UV absorption, fatty acid composition, hydrolysable phenols, and vitamin E. **Results:** The acidity and fatty acid composition remained stable over time for both samples. Although oxidation occurred in all samples, as expected (measured via the peroxide value and UV absorbance), vacuum storage delayed oxidation rate, ranging from -7% (N) to -18% (S) for the peroxide value and from -3% (N) to -20% (S) for UV absorbance. Concurrently, there was a decrease in the antioxidant pool irrespective of the closure system used, particularly in vitamin E. However, the vacuum-stored samples showed a higher preservation of vitamin E, with a reduction of only 3% (S) to 6% (N). **Conclusion:** These findings suggest that, under the tested conditions, the benefits of using vacuum storage are apparently diminished.

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sciforum-100759: The Photodynamic antimicrobial decontamination of food packaging using a chitosan-Zn(II) protoporphyrin IX conjugate

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Effective decontamination methods are essential for minimizing the presence of harmful microorganisms in fresh foods. The incorporation of bioactive compounds in packaging processes stands out as one of the most effective approaches to maintain food quality and enhance food safety. This study focuses on the synthesis of a conjugate, CS-ZnPPIX, formed by linking Zn(II) protoporphyrin IX with chitosan. The aim was to create a naturally-derived polymeric material capable of reducing microbial contamination in food packaging through the photodynamic inactivation (PDI) of pathogens. The CS-ZnPPIX film displayed a homogeneous coating of the surfaces. Its absorption and emission spectra showed characteristic Zn(II) porphyrin bands, along with a fluorescence quantum yield of 0.054. Photodynamic analysis indicated that CS-ZnPPIX could generate singlet oxygen (Φ_Δ = 0.49) and superoxide anion radicals. In vitro experiments with the Gram-positive bacterium *Staphylococcus aureus* revealed that exposure to 1 μM CS-ZnPPIX followed by 30 min of white light irradiation led to effective bacterial eradication (> 7 log, 99.9999% reduction in survival). Additionally, this study evaluated the effectiveness of PDI in reducing *S. aureus* contamination on food packaging materials. CS-ZnPPIX proved effective in decontaminating surfaces made of polyethylene terephthalate, expanded polystyrene, glass, and aluminum packaging materials. The treatment of these bacteria-laden surfaces with 0.54 nmol CS-ZnPPIX, and a subsequent 30 minutes of irradiation, resulted in more than a 5 log reduction (99.9998%) in bacterial survival. Furthermore, this procedure effectively eliminated individual pathogen cells attached to surfaces. The merit of this conjugate, compared to other methods of surface sterilization, primarily lies in its economic and sustainability benefits due to its low production cost. Furthermore, the natural origin of the polymer helps maintain a safe profile, minimizing environmental contamination. Consequently, the CS-ZnPPIX conjugate demonstrates promising properties for decontaminating packaging, achieving aseptic packaging materials, and aiding in food preservation.

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sciforum-101853: The use of pulsed magnetic field-assisted freezing to minimize the freezing losses in strawberries

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Conventional freezing of perishable fruits results in the loss of bioactive compounds and antioxidants, having a bad impact on their nutritional quality. Preserving the natural attributes of perishable food commodities is an emerging trend these days. Strawberries are perishable fruits that are very sensitive to high temperatures and humidity, so their preservation in frozen form requires some efficient and advanced techniques. The use of pulsed magnetic field (PMF)-assisted freezing is an effective way to preserve the natural nutritional characteristics of strawberries. In this research, strawberries were subjected to four PMF-assisted freezing treatments: for T1 (control), the strawberries were frozen at –35 °C without the application of a PMF, while all the samples under the other treatments, from T2 to T4, were placed in a 3D-printed acrylonitrile butadiene styrene container inside an electromagnet with varied frequencies (T2 = 44.7 mT/60Hz, T3 = 44.7 mT/90Hz, and T4 = 44.7 mT/120Hz) and subjected to freezing at –35 °C ± 1 °C. PMF-assisted freezing (from T2 to T4) was evaluated according to the different parameters of phase change time, nucleation time, temperature, and degree of supercooling. The parameters for T3 exhibited better results because smaller crystals were formed and the cellular structures were well preserved. T3 also promoted the highest antioxidant capacity (4.8 mg TE/g), and the amounts of polyphenols (3.25 mg GAE/g) and anthocyanins (2.5 mg C3G/g) were greater as compared to those in the other treatment samples, as T1 had a 3.4 mg TE/g antioxidant capacity, a 2.36 mg GAE/g phenolic content, and a 1.17 mg C3G/g anthocyanin content. T2 had a 3.9 mg TE/g antioxidant capacity, a 2.62 mg GAE/g phenolic content, and a 2.11 mg C3G/g anthocyanin content. Similarly, T4 had a 4.4 mg TE/g antioxidant capacity, a 3.08 mg GAE/g phenolic content, and a 2.39 mg C3G/g anthocyanin content.

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sciforum-099391: Validation of active biopolymer packaging and its combination with high hydrostatic pressure for shelf-life extension of fishery products

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The environmental impact of plastic waste has become a critical global issue, with traditional food packaging contributing significantly to the accumulation of nonbiodegradable materials in landfills and oceans. This has spurred extensive research on sustainable alternatives that can replace conventional plastics without compromising the functionality essential for food preservation. The ideal substitute must not only be eco-friendly but also maintain or extend the shelf life of food products to reduce food waste. This study aimed to establish the effectiveness of an active biopolymer based on chitosan, olive leaf extract, and rosemary essential oil on the shelf life of tench (*Tinca tinca*) fillets and their combination with high hydrostatic pressures.

The shelf life of the tench fillets packed in biopolymers after 10 days of refrigerated storage was determined by plate counts of mesophilic aerobic microorganisms, enterobacteria, and psychrophilic microorganisms. The results showed that packaging of the fillets increased the shelf life of the product by more than 10 days compared to that of the controls (traditional packaging). The subsequent combination of biopolymers with high hydrostatic pressure treatments was carried out by optimizing the time and intensity of the treatment by response surface analysis inoculated with *Salmonella enterica* into the tench. Response surface analysis showed that for effective reduction of *S. enterica* in fillets, treatments above 420 MPa or 108 s (reductions of 3 log CFU·g-1) are necessary, with an optimum treatment of 600 MPa for 27.85 s a maximum reduction.

Our findings indicate that the combination of high hydrostatic pressure with packaging in active biopolymers decreases the initial microbiology and ensures that good conditions for consumption are maintained over time. The development and application of these sustainable packaging solutions are essential to achieve a circular economy in the food industry, ultimately contributing to environmental conservation and food safety.

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Session 8. Food Quality and Safety

sciforum-103247: Food hygiene behaviour improvement with nudge tools

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Improper food handling practices can cause food contamination. Food safety knowledge and training alone cannot be effective enough to change food handlers' hygiene behavior in practice. Employees' behavior is significantly influenced by various factors at the individual and organizational levels. Nudge tools in food businesses are not well researched, but they could have an important impact on improving employee hygiene behaviour. The aim of this study was to assess the impact of nudge tools on behavioural change in food handlers' hygiene behaviour in selected kitchens of educational institutions. We used a qualitative research methodology (five-stage semi-concealed observation of food processing employees' hygiene behaviour, design of a visual nudge tool with short text). The sample consisted of 11 employees in two kitchens at the same educational institution. The results were presented as compliance rate (%) of hygiene behaviour. Compliance with hand washing techniques increased with the use of nudge tools. The greatest improvement was achieved with the combination of citrus sense and text (up to 38%). Adherence to hand washing techniques was different in Kitchen A and Kitchen B. When using the image of a man's eyes or the combination of citrus sense and text, compliance with avoiding hand contact with ready-to-eat food was up to 65%. The nudge tools influenced the hygiene behaviour of the food handlers in the kitchens observed, but the efficiency of the different nudge tools was not the same.

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sciforum-098982: Effect of the physical environment of Santorini Island on Assyrtiko grape ripening and its wine's characteristics

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Introduction: The factors that influence the quality characteristics of wine depend on the vine as well as the soil and its microclimate (terroir) and extend to the winemaking and maturation stages. The Assyrtiko winegrape variety has been adapted to the volcanic soil of Santorini for 3500 years. The preservation of quality PDO Santorini wines involves finding the ideal location to allow full grape ripening in light of climate change. Thus, this study aims to evaluate the effect of location and harvesting time on the quality of Assyrtiko wine.

Methods: This study evaluated the effect of the location (three distant plots of land, in three different areas of the island) during the grape ripening process by monitoring weight per 100 berries, sugar concentration, total acidity, pH value, and malic and tartaric acid in grape juice. The grapes from three distant vineyards were vinified separately using the same winemaking procedure, and the quality characteristics of the produced wines were studied. Moreover, the aromatic volatile profile of the wines was evaluated with GC-MS.

Results: A two-way ANOVA analysis revealed that, besides location and harvest time, their interaction is also significant for the parameters studied, except for the interaction effect involving sugar content. An analysis of volatile aromatic compounds revealed that the wine harvested later than the others has a higher aromatic intensity with notes of citrus, white fleshed fruits, and tropical fruits. This wine surpasses the levels of 2-phenylethanol, isoamylacetate, linalool, and 2-phenylethyl ester with 17.8%, 7.7%, 21.1%, and 15.6%, respectively, compared to the immediate next in descending order.

Conclusions: The highest terroir expression was revealed in the wine derived from grapes harvested later than in the other locations, showing that perhaps when full grape ripeness is reached by the end of the growing season, the grapevine variety is better suited to the local climatic conditions.

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sciforum-091504: The Potential of Microalgae-based Biosensors in Food Safety Applications

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Microalgae have been recognized as a promising source for biosensors due to their ability to detect various environmental pollutants. Microalgae-based biosensors have emerged as a promising technology for enhancing food safety applications due to their unique capabilities in detecting hazardous substances and monitoring food quality parameters.In this study, we investigate the potential of microalgae-based biosensors in food safety applications.

Microalgae were isolated and cultured in specific growth conditions. The biosensors were constructed by incorporating microalgae into a sensing platform that responded to specific contaminants commonly found in food products. The biosensors were then tested for their sensitivity and selectivity towards targeted analytes.

The microalgae-based biosensors demonstrated high sensitivity and selectivity towards various food contaminants such as pesticides, heavy metals, and pathogens. The biosensors exhibited rapid response times and could detect contaminants at low concentrations. Furthermore, the biosensors showed robustness and stability over multiple testing cycles.

Microalgae-based biosensors show great promise in improving food safety applications by providing rapid and reliable detection of contaminants. These biosensors offer a cost-effective and environmentally friendly alternative to traditional methods of food safety testing. Further research and development are warranted to optimize the performance of these biosensors for practical use in the food industry. Overall, microalgae-based biosensors have the potential to revolutionize food safety monitoring and ensure the quality of food products for consumers.

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sciforum-100320: ^{137}Cs and ^{40}K radioactivity of wild edible mushrooms from Podlaskie Voivodeship, Poland

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Wild culinary fungi can be a source of secondary exposure to radioisotopes. Natural radiation from the Earth's crust is the largest source of the ^{40}K isotope. ^{137}Cs radiation mainly results from nuclear weapons testing and accidents at nuclear power plants (e.g., Chernobyl, near the eastern border of Poland in 1986, or Fukushima in Japan in 2011). Both isotopes tend to accumulate in food.

This study aimed to determine the radionuclide content of ^{137}Cs and ^{40}K in fruiting bodies of wild edible mushrooms to check whether they are safe in terms of radiation exposure.

The material for the study consisted of nineteen species of wild edible mushrooms from six communes located in the southeastern and northeastern parts of Podlaskie voivodeship. The acquisition of particular mushroom species from particular locations depended on their availability. Mushrooms were collected between 2017 and 2021, with 1 to 9 samples of each species. The samples consisted of edible parts of fruiting bodies (mostly stems and caps), which were then cleaned, freeze-dried, and crushed. Radioactivity was measured by gamma spectrometry using a germanium semiconductor detector (30% efficiency, model GX3020) and a computer system for collecting and analyzing spectra, Genie-2000 (Canberra).

The range of ^{137}Cs activity concentration was from 1.80±0.82 Bq/kg fresh weight in *Macrolepiota procera* to 178.30±74.13 Bq/kg fw in *Sarcodon imbricatus*. The range of mean ^{40}K activity concentration was from 64.85±18.96 Bq/kg fw in *Suillus bovinus* to 150.673±43.86 Bq/kg fw in *Tricholoma equestre.*

On a fresh weight basis, the results showed that none of the mushrooms from the study area exceeded the ^{137}Cs activity limit (1250 Bq/kg)* for mushrooms intended for human consumption. Although there are no corresponding limits for ^{40}K, it is necessary to estimate the effective radiation dose to humans.

* Council Regulation (EURATOM) No. 3954/87, (1987).

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sciforum-097659: A case study about the perception of food safety in consumers of fresh produce from local and small farms in the North of Portugal

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Introduction

The consumption of fruit and vegetables from small and local producers has increased over the years, due to the benefits associated with this type of supply chain.
Due to this increase in consumption, there has been an increase in foodborne outbreaks associated with this type of market.

Consumers are increasingly concerned about the food they eat and how it is produced, and this type of market allows consumers to access this information more easily and directly. But is food safety one of their concerns?
The aim of this study was to understand what these consumers think about food safety both in general and in relation to this type of market.

Methods

A survey was conducted in the North of Portugal among consumers of fresh produce from local and small farms to understand their awareness of food safety in fresh produce, as well as their confidence in the products they consume.

Results

Only 25% of respondents admitted to having little knowledge about food safety, while 46.9% said they had a good level of knowledge about the subject and 25% replied that they knew a lot about it. In total, 50% said they had obtained this information through individual research and 36.4% said they had obtained it through professional practice. A total of 76.7% did not believe that these products could pose a risk to their health and 16.7% said they did not know whether the products are hazardous or not.

Conclusions

The majority of consumers perceived that they have a general understanding of food safety and also that the fruit and vegetables they consume from small and local producers do not pose a risk to their health. Given that 50% of consumers have obtained information about food safety on an individual basis, is this information sufficient for them to make informed choices when purchasing? This question remains to be answered.

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sciforum-093052: Acrylamide-forming capacity of different flours in heated glucose/flour systems

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Wheat flour is typically the primary ingredient in the recipes of traditional cereal-based foods. However, food companies are increasingly exploring the development of new products, using alternative ingredients to enhance food properties. Although substituting wheat with other flours can modify or even improve the nutritional content and sensory attributes of the final baked goods, this substitution can also influence the formation of potentially harmful compounds, such as acrylamide. The objective of this study was to assess acrylamide-forming capacity during the baking process of various flours commonly used in the food industry, considering both the type of flour and the addition of glucose to a dough model system. Sixteen flour samples from cereals, pseudocereals, legumes, fruits, and roots were characterized based on their content of acrylamide precursors (reducing sugars and free asparagine) and their acrylamide-forming capacity. The samples were mixed with water/sodium chloride and glucose/sodium chloride to mimic the conditions of bakery dough and biscuit dough, respectively. They were then baked at 150°C for 30 minutes in a forced air convection oven. Acrylamide levels were analyzed using HPLC-ESI-QQQ-MS/MS. Only the water systems formulated with wheat, coconut, rye, and soy flours exhibited detectable acrylamide levels, ranging from 21 to 48 µg/kg. The addition of glucose increased acrylamide formation in all the systems, except in cassava formulations, where it as not detected. The highest levels were found in lentil flour (154 µg/kg), while the lowest concentrations were observed in corn flour (20 µg/kg). In conclusion, careful consideration should be given to the potential formation of acrylamide in new food products made with alternative flours rather than traditional wheat flour, particularly aspects of concerning food safety.

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sciforum-102176: Analysis of Honey Samples from Aveiro Region (Portugal)

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Introduction: Honey is a natural food produced by the bee *Apis mellifera* from the nectar of plants. It has been used for many years for its sweetening power and has gained particular interest in traditional medicine, with its therapeutic benefits being highlighted in recent decades. Its composition varies from region to region, from the north to thesSouth of Portugal, but it is essentially composed of water, sugars, proteins, vitamins, minerals, organic acids, and enzymes. Its composition and physicochemical properties confer various activities, including antioxidant, anti-inflammatory, apoptotic, antimicrobial, and wound-healing properties, as well as an energy-providing role. To assess the quality and potential adulteration of honey composition, several qualitative and quantitative tests can be conducted.

Methods: The aim of this study was to perform qualitative tests on different honey samples from the Aveiro region, such as organoleptic characteristic tests, microscopic examination, the Jagerschmidt reaction, Lugol's reaction, the search for diastase enzymes, the search for dyes, and pH measurement.

Results: Most samples showed a negative result in the Jagerschmidt reaction (96.7%). Regarding Lugol's reaction, all samples obtained a negative result; however, 2 samples presented an anormal coloration. In the search for diastase enzymes, 2 samples showed no alteration, 2 showed a decrease in diastase activity, 3 samples showed high enzymatic activity, and 23 samples tested positive for diastase activity. In the search for dyes, all samples tested negative. Finally, regarding pH values, values ranged from 3.97 to 4.75, with an average value of 4.37.

Conclusion: Overall, 96.7% of the samples did not show any adulteration in the performed tests; however, it would be important to conduct quantitative tests for a more detailed analysis. These preliminary results are indicators of the highquality of honey samples tested.

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sciforum-098882: Antibacterial activity of fat extracts from black soldier fly fat larvae (*Hermetia illucens*) against antibiotic-resistant *Campylobacter* spp strains

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Campylobacter is considered the main food-borne pathogen causing gastrointestinal illnesses worldwide, with chicken being the main source of infection in humans. Strategies for controlling *Campylobacter* in the food chain are gaining attention due to rising antibiotic resistance. The use of natural antibacterial compounds can help minimize *Campylobacter* contamination. Insect ingredients are emerging as a source of antibacterial compounds which offers an innovative and sustainable approach to enhancing food safety and addressing the growing concern of antibiotic resistance. Black soldier fly larvae (BSFL) (*Hermetia illucens*) have a great potential as an alternative protein source for food and feed, and from an antibacterial point of view, BSFL fat has recently been reported to exhibit relevant antibacterial activity. Our main objective was to explore the antibacterial activity of fat extracts obtained from *H. illucens* using different processes against antibiotic-resistant *C. jejuni* and *C. coli* strains. Three different *C. jejuni* and three *C. coli* strains were used. Bacterial strains were incubated with fat extracts at 37°C for 24 h, and the number of CFUs was counted. The free fatty acid content of insect fat extracts was analysed by means of GC-MS-FID. Results showed that the antibacterial activity of BSFL fat extracts was related to the free fatty acid content. The fat extract obtained after slaughter by means of blanching, drying using freeze-drying, and defatting using supercritical fluid extraction was the most effective, being bactericidal for all *C. coli* strains and significantly reducing bacterial growth from 4.1 to 5.6 log CFU/mL for *C. jejuni* strains. The evaluation of the antibacterial activity of the main fatty acids present in the BSFL fat extracts showed that lauric and linoleic acids were both bactericidal. The antibacterial activity of BSFL fat extracts against *Campylobacter* indicates that these fat extracts may be useful as a source of bioactive compounds, which could potentially be applicable in the chicken food chain.

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sciforum-101860: Application of ultrasound treatments to enhance the suspension stability of cloudy phalsa (*Grewia asiatica*) juice

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Natural drinks prepared from fresh fruits and vegetables are nutritious with minimum health risks. The raw juices obtained from fruits have certain quality and sensory issues, including large particle sizes, poor suspension stability, and cloudiness, which result in low consumer attraction. Thus, the efficient processing of natural juices to manage these issues is the current focus of food processors. Conventional techniques employed to resolve these issues have bad impacts on the nutritional profile of natural drinks. Ultrasound is one of the efficient non-thermal processing techniques that causes minimum damage to the nutrients present in juices and has beneficial effects against these issues. In this research, phalsa juice was prepared by blending fresh phalsa fruit with clean water and subjected to ultrasound treatments at different power levels of 510, 850, and 1070 watts at 40, 50, and 60 °C temperatures. The effects of ultrasound treatments on particle size, suspension stability, and microbial populations of the prepared juice samples were examined. The optimized conditions for ultrasound treatment were at 50 °C with 1070 W power for 10 minutes. At optimized conditions, the juice showed enhanced suspension stability, a decrease in mean particle diameters (from 216.92 ± 2.76 µm to 106.26 ± 1.98 µm), cloudiness (less absorbance was measured in the UV-visible spectrophotometer, showing a 660 nm reduction from 0.43 to 0.18), and microbial load (from 3.75 ± 0.03 to 2.07 ± 0.37 log CFU/ml).

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sciforum-099082: ArtisaneR: An online generic process risk model for sausage-making

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Artisanal fermented foods may pose health risks to consumers, as they are often produced with variable, mostly non-standardised productive processes and are generally consumed without any cooking. Within this context, the objective of this study was to develop a freely available online generic process risk model (PRM) for sausage-making (ArtisaneR) to estimate the prevalence and concentration of *Salmonella* spp., *Staphylococcus aureus,* and *Listeria monocytogenes* along the sausage-making processing stages, considering the application of natural extracts and/or starter cultures as bio-intervention strategies.

The PRM was programmed in R shiny and required input data on the process variables, the probability and level of contamination in the main ingredients and casings, the probability of cross-contamination, the kinetic parameters of the pathogens under study, and the effect of bio-preservative(s) on the numbers of the pathogens. The PRM consists of six functions validated with actual data: (1) the generation of contaminated lots, whose contamination levels are dictated by the levels in the meat, fat and spices, and the recipe; (2) stuffing, which simulates potential cross-contamination of the batter from the casings; (3) bio-intervention, which models the level of microbial reduction due to the addition of extracts or starter cultures; (4) maceration, which models the microbial growth during maceration or early fermentation; (5) maturation, which optionally simulates the death of the pathogens based on a pH-driven dynamic model; and (6) packaging, which groups the sausages into packages of finished products. The ArtisaneR shiny model displays summary statistics and distributions at both the lot level and the individual level (sausage/package), with each of the five panels corresponding to a processing stage, and its results were validated for Portuguese *alheira* sausage, Spanish *salchichón,* and Moroccan *merguez* sausage.

The tool can be employed by artisanal producers to evaluate the lethality of their current manufacturing processes and assess the effectiveness of their control measures. ArtisaneR is freely available at https://pif.esa.ipb.pt/shiny/artisanefood/prmodels/sausage.

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sciforum-100364: Assessment of nitrates, nitrites, and selected heavy metal contaminants in the microgreens of rare oilseed plants.

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Introduction: Microgreens are rich in health-promoting phytonutrients, although they can also be a source of contaminants. This study aimed to determine nitrates and nitrites as well as cadmium (Cd), arsenic (As), lead (Pb), and aluminium (Al) in the microgreens of three rare oilseed plants: nigella (*Nigella sativa* L.), camelina (*Camelina sativa* L.), and safflower (*Carthamus tinctorius* L.).

Methods: The plants were grown in the greenhouse of the Agricultural University of Krakow under strictly controlled conditions. The microgreens were cut with scissors when they had 1 true leaf. An AQ2 discrete analyzer was used to determine the concentrations of nitrites and nitrates. The Cd, As, and Pb levels were analyzed using ICP-MS/MS with a triple quadrupole spectrometer (iCAP TQ ICP-MS). The Al level was measured using the ICP-OES technique. Analyses were conducted in triplicate.

Results: In the tested microgreens, the amount of Cd fluctuated from 0.022 to 0.063 mg per 100 g dry matter (d.m.). The lowest statistically significant Cd level was found in the microgreens of nigella. The cadmium content in camelina and safflower did not differ significantly. The As content varied between 0.009 and 0.021 mg/100 g d.m., with nigella microgreens having the highest statistically significant As level. The statistically significantly highest levels of Pb, Al, and nitrates were found in the microgreens of camelina, with respective values of 0.071 mg, 13.81 mg, and 6131 mg/100 g d.m. No nitrites were detected in all analyses performed.

Conclusions: The examined species may be a source of contaminants and nitrates. In the present study, limits were not exceeded for Cd, As, Pb, Al, and nitrate levels, assuming a potential consumption of microgreens at 20 g per day based on TWI standards (*Tolerable Weekly Intake*) for Al and Cd, BMDL01- standards (*Benchmark Dose Lower Confidence Limits*) for Pb and As, as well as ADI-based standards (*Acceptable Daily Intake*) for nitrates.

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sciforum-102539: Assessment of Polycyclic Aromatic Hydrocarbon in Fish Smoked with Traditional Fuels (Firewood and Wood Charcoal) and Charcoal Briquette

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Polycyclic Aromatic Hydrocarbons (PAHs) are genotoxic carcinogens that contaminate fish smoked with firewood (FW). In Nigeria, traditional smoking is the primary method for processing fish, which is the most widely consumed animal protein. In this study, the concentration of PAHs deposited on three fish species (*Clarias gariepinus, Labeo senegalensis* and *Synodontis membranaceus*) smoked with FW, Wood Charcoal (WC), and Charcoal Briquettes (CBs) were measured. The smoked fish samples were analyzed to determine the levels of 16 priority PAH pollutants. For smoked *C. gariepinus,* the total PAH concentration was the highest with WC (28.40±0.40 µg/kg) and the lowest with CBs (20.30±0.09 µg/kg). In *L. senegalensis,* PAHs were the highest with WC (19.00±0.09 µg/kg) and the lowest with FW (7.88±0.16 µg/kg). The permissible PAH concentration in fish smoked for consumption is ≤ 5 µg/kg (Benzo(a)pyrene) and ≤ 30 µg/kg for PAH4 (Benzo(a)pyrene +Chrysene +Benz(a)anthracene + Benzo(b)Fluoranthene). Hence, *C. gariepinus and L. senegalensis* are within the European Union's permissible PAH limits. However, FW-smoked *S. membranaceus* exceeded the PAH limits for safe consumption with Benzo(a)pyrene concentrations of 7.94±0.11 µg/kg, whereas the total PAHs were 38.00±0.30 µg/kg, 17.00±0.16 µg/kg and 14.03±0.07 µg/kg for FW, WC and CB, respectively. The findings suggest that smoking fish with CB results in low PAH contamination. This study found low PAHs in fish smoked once and completed within 24 hours, indicating that intensity and rounds of smoking influence the product quality, as well as the quantity of PAHs.

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sciforum-103215: Assessment of Preservation Techniques on Lipid Peroxidation and Microbiological Quality of Atlantic Bonito Fillets During 15 Days of Storage

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Nowadays, developing effective preservation methods to extend the shelf-life of fish is essential for reducing waste and enhancing consumption. Additionally, it is important to improve the organoleptic qualities of fish. Given that fish is a highly perishable product, special precautions are necessary throughout the stages from fishing to consumption to prevent rapid deterioration caused by chemical reactions, physical damage, and microbial proliferation.

This study aimed to evaluate the effects of different preservation techniques—vacuum (50%), modified atmosphere (80%N_2 + 20%CO_2), and refrigeration (control)—on the physicochemical and microbiological properties of Atlantic bonito fillets over 15 days of refrigeration storage at 4°C. The physicochemical properties, including peroxide index and Thiobarbituric Acid Reactive Substances (TBARs), were measured, and microbiological analysis was conducted according to Regulation n°2073/2005 and Health Protection Agency (HPA) guidelines.

The results indicated that the peroxide value increased gradually over time for all preservation methods, with refrigeration showing the highest values and modified atmosphere showing the lowest, at 23,40±0,08 and 1,10±0,05mEq./kg by day 15, respectively.

TBARs values also increased over time, with a slight increase for modified atmosphere and vacuum, at 1,29±0,06 and 0,78±0,06mgMDA/kg by day 15, respectively, and a more significant increase for refrigeration, at 7,32±0,10mgMDA/kg.

Both methods quantify primary oxidation compounds, revealing an increase in lipid oxidation over the storage period. Among the techniques, modified atmosphere packaging yielded the lowest oxidation values.

Microbiological analysis demonstrated that Atlantic bonito fillets preserved in a modified atmosphere met satisfactory microbiological quality standards after 15 days, outperforming other techniques in maintaining microbial safety. The parameters analysed included total viable count at 30°C, moulds, yeasts, *Enterobacteriaceae, Coagulase Staphylococci (+), Listeria monocytogenes, Salmonella spp., Sulphite-reducing Clostridium spores, Lactic Acid Bacteria,* and *Vibrio Parahaemolyticus*.

In conclusion, modified atmosphere preservation is recommended for extending the shelf-life and maintaining the quality of Atlantic bonito fillets, offering a lower peroxidation activity and microbiological quality compared to vacuum and refrigeration methods.

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sciforum-103089: Assessment of thermal properties of hull-less pumpkin seeds using differential scanning calorimetry

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Today, people are focusing on maintaining a healthy lifestyle and controlling what they eat. By choosing healthy snacks, we are able to avoid the negative consequences of regularly eating unhealthy food. For this reason, one of the most valued products may be the oil-rich hull-less pumpkin. Seeds are a great alternative to the snacks available on the market, but they can also be used to enrich dishes with characteristic features. These seeds can be eaten raw, dried, roasted or as an oil extracted from the seeds. The aim of this research was the analysis of hull-less pumpkin seeds, including the determination of theirmelting parameters using DSC thermal heating curves, and the crystallization parameters, using DSC cooling curves. Ten genetic varieties of hull-less pumpkin seeds were used to conduct the DSC heating and cooling analysis. Two peaks present on the DSC heating curves of seeds providedevidence of low-melting triacyclglycerols with polyunsaturated fatty acids (first peak), and a medium-melting fraction rich in triacyclglycerols with monounsaturated and saturated fatty acids (second peak). The third peak present on the heating DSC curves of pumpkin seeds was related to the decomposition of low-molecular weight saccharides and poly- and oligosaccharides. On crystallization curves, two exothermic peaks were observed. Two peaks indicated the crystallization temperature of the oil contained in the hull-less pumpkin seeds. A negative temperature of the peak on the heating curves indicated the presence of valuable unsaturated fatty acids. A lower peak temperature was evidence of the presence of fatty acids, with a greater number of unsaturated bonds. A similar pattern was observed for the cooling curves in relation to the fat crystallization process. An analysis of DSC heating and cooling curves showed the similarity of the thermal profiles of all of the samples with respect to each other, which suggestes a correlation between their thermal properties and chemical composition.

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sciforum-099043: Biogenic Amines In Fermented Soy Food Consumed In Serbia

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Fermented foods, including fermented soy products, are of particular concern regarding formation of biogenic amines, which arise as a consequence of microbial activity. Histamine and tyramine are of the greatest toxicological importance due to their adverse effects on the neurological and cardiovascular systems. For healthy people, the threshold for such effects is 50 mg of histamine and 600 mg of tyramine in one dose (i.e., daily).

In this work, 28 samples of fermented soy products (sauces, meat substitutes, dairy substitutes, tofu and related products) collected on the Serbian market were analyzed for thepresence of biogenic amines (histamine, tyramine, tryptamine, phenylethylamine, putrescine, cadaverine, spermidine, and spermine) by the HPLC-UV method.

The results revealed the presence of at least one of the targeted biogenic amines in all except one sample. Overall, the most frequently found amine was putrescine (71.4%), followed by tyramine (64.3%) and phenylethylamine (57.1%), while histamine was detected in 39.3% of the samples. The concentration range of total biogenic amines was 10.9-2766 mg/kg. Soy sauces exhibited the most frequent presence and the highest concentrations of histamine (63.6%, up to 503.7 mg/kg) and tyramine (90.9%, up to 948 mg/kg), followed by tofu and related products (up to 100 and 83.3 mg/kg, respectively). In contrast, dairy substitutes contained only phenylethylamine and putrescine in low concentrations.

In conclusion, considering that the mere presence of histamine could pose a risk for individuals with histamine intolerance, they should be informed about potentially risky foods, including fermented soy products. On the other hand, as the probability of adverse health effects in healthy people depends not only on the level of biogenic amines in food but also on the amounts of food consumed, small portions of fermented soy products could be a good protective strategy. Thus, the findings of this study are of practical value for food producers, nutritionists, public health professionals, and consumers.

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sciforum-102648: Colorimetric Paper Strip Sensor for Detection of Microbial Quality of Raw Milk

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A biosensor is an analytic device that employs biological reactions to detect target analytes and convert these reactions into quantifiable signals. Colorimetric biosensors, such as the PANI-PEC strip, represent a rapid, simple, accurate, and cost-effective detection method. The PANI-PEC strip, composed of polyaniline (a conducting polymer) and pectin (a stabilizer), is distinguished by its eco-friendly properties, excellent conductivity, strong biomolecule interactions, and multiple color transitions. This biosensor can detect food spoilage organisms like E. coli, coliforms, and total bacterial counts, identifying bacterial levels ranging from 10^8 to 10^4 in just 20 minutes.

The developed assay is based on the principle that bacterial growth in a carbohydrate-rich medium produces acidic metabolites. These metabolites interact with pH-sensitive polyaniline nanoparticles on paper strips, which enhances conductivity through proton doping, causing a color shift from blue to green as the base form transitions into the salt form.

For detection, the developed paper strip sensor was dipped into 500 µL of raw milk (after milking) and incubated at 37°C for 20 minutes. To validate the sensor's effectiveness, it was tested on 150 raw milk samples and 50 pasteurized milk samples.

Observed color changes on the paper strips were graded as being of very good (blue), good (bluish green), fair (greenish-blue), and poor (green) quality with microbial loads of $\leq 10^4$, $10^5 - 10^6$, $10^7 - 10^8$, and $\geq 10^8$ cfu/ml, respectively.

This newly developed sensor provides a sensitive, cost-effective, and user-friendly method for evaluating raw milk quality at the reception dock, offering an alternative to traditional methods like the methylene blue reduction test (MBRT), direct microscopic count, and aerobic plate count (APC). It facilitates real-time analysis, reduces testing time, and is applicable to raw milk, pasteurized and dried milk. Incorporating this sensor into routine testing can enhance product quality, ensure regulatory compliance, and streamline operations, thereby improving overall dairy product safety and quality.

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sciforum-100374: Comparative Analysis of Coffee Quality and Chemical Composition Across Farming Methods

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Coffee is the second most consumed beverage globally and is a vital agricultural product for Colombia, the world's third-largest producer. This study examines whether excellent post-harvest practices can ensure high-quality coffee regardless of farming methods. We analyzed metabolites (caffeine, trigonelline, chlorogenic acids) using HPLC, mid-infrared spectrum fingerprints, volatile composition, and SCA sensory evaluation of *Coffea arabica* L. coffee cultivated in neighboring plots in Cauca, Colombia, under consistent soil, climate, and altitude. The selected varieties were Bourbon (Organic), Tabi (Export-oriented), Castillo (Export-oriented), and Castillo (Traditional), chosen based on their proximity and cultivation in neighboring plots. Soil parameters evaluated included %OC, %OM, NH_4^+, NO_3^-, total nitrogen, phosphorus, pH, texture, %of sand, clay, and silt, Ca, K, Mg, Fe, Mn, and cation exchange capacity. Significant differences were observed in available P, pH, % silt, Ca, K, Mg, and CEC, with PCA and DA revealing some group differentiation.

No significant differences were detected in the HPLC-analyzed metabolites across the four groupings. In the infrared analysis, PCA suggested differences between some traditional management samples and the rest; moreover, DA classification had low accuracy. GC-MS identified 28 common volatile compounds. There were no significant differences between Tabi and Bourbon coffees, with only one volatile compound differing between Tabi and Castillo (export-oriented). Significant differences were found in 46% of volatiles between organic (Bourbon) and export-oriented (Tabi and Castillo) coffees, 71% between export-oriented and traditional Castillo coffees, and 64% between export-oriented and traditional coffees, regardless of variety. PCA and DA analyses demonstrated moderate classification accuracy, indicating some differentiation by management practices. Sensory analysis showed no statistically significant impact of farming methods on overall scores, though distinct cupping notes correlated with volatile profile differences, potentially due to variety differences. All samples scored above 80 on the SCA scale, suggesting that good post-harvest treatment ensures high-quality coffee, irrespective of farming practices.

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sciforum-099295: Comparative analysis of flavor characterization in duck meat prepared by sous vide and conventional cooking methods

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This study investigated the effect of different cooking methods (sous vide—SV, steaming—ST, boiling—BT, microwaving—MW, roasting—RT, and sous vide combined with microwaving—SM) on the flavor characteristics of duck meat by gas chromatography—ion mobility spectrometry (GC-IMS), gas chromatography--mass spectrometry (GC-MS) with odor activity values (OAVs) and sensory evaluation. The GC-IMS identified forty-eight flavor compounds, including their monomers, dimers, and trimer. The contents of esters and furan in SV samples were higher than in other samples, while the contents of aldehydes and hydrocarbon in ST were relatively higher. Seventy-two flavor components and fourteen odor-active compounds were detected by GC-MS combined with OAVs. The concentration of total volatiles was the highest in ST samples, and this was followed by SV and MW. Among them, the characteristic aroma compounds including hexanal, octanal, (E)-2-octenal, nonanal, (E)-2-nonenal, cis-4-decenal, decanal, 2,4-decadienal, (E,E)-2,4-decadienal, 1-octen-3-ol, and 1-octen-3-one were the key contributors to duck meat in different cooking methods. A principal component analysis (PCA) of GC-IMS and GC-MS with OAVs data indicated that there were significant flavor distinctions among duck meat processed in different cooking methods. Sensory evaluation revealed that the scores of overall acceptability were relatively higher in BT, SV, and MW samples than other samples, and the umami value was the highest in MW. Thus, ST, SV, and MW could be used to better maintain the flavor quality of duck meat, and the results provided guidance for duck meat producers.

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sciforum-098577: Comparing the Drama location effect in red wines: international varieties vs. native Greek

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Introduction: Terroir is considered an essential factor in producing wines with unique quality. This region can give distinct terroir expressions of the same grape variety, which, in turn, can produce wines differing in quality parameters, phenolic compounds, and antioxidant activity. The present work evaluated the effect of diverse locations in the PGI region of Drama on the main quality parameters of red wines and their phenolic and antioxidant activity.

Methods: Two international and one native grape variety, grown during the 2022 cultivation season, were obtained from diverse locations of the PGI Drama. The wines were made using the same procedure to avoid variation. The berries of properly mature intact grapes (25 kg batch-scale) were crushed to obtain the juice, inoculated (25 g/hL) with the same *Saccharomyces cerevisiae* strain, and allowed to ferment. Fermentation was performed in duplicate in 30L vessels under controlled temperature conditions. Besides wine quality parameters such as pH, titratable acidity (TA), sugars, alcohol (%vol), and colour, total phenolic and flavonoid contents (TPC, TFC) were determined, as well as antioxidant activity, by three different analytical assays (DPPH, ABTS, FRAP).

Results: The wines produced differ not only in their quality attributes but also in the amount of phenolics and flavonoids and their antioxidant capacity, suggesting that terroir plays a primary role in this variation. On the other hand, altitude correlated positively with the red colour proportion (0.484, p0.5) and alcohol content (0.590, p0.01) and negatively with the blue colour proportion (-0.597, p0.01) and pH (-0.457, p0.5) of the wines.

Conclusions: Apart from the wine quality parameters, the TPC and TFC are revealed as distinct terroir expressions of the three wine varieties examined in the present work. The native grape variety showed stability among the locations regarding the phenolic content and the antioxidant capacity of the produced wine.

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sciforum-099286: Crushed eggplant: gamma irradiation vs. sous vide

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The objective of this research was to evaluate and compare the effect of gamma irradiation and the sous vide technology on the sensory shelf life and compounds with antioxidant capacity in crushed eggplant. Eggplant (*Solanum melongena*) of the black nite variety from the province of Buenos Aires,Argentina was disinfected (NaClO 150 ppm-3 min), drained, peeled, and cut into 2 cm cubes. After that, it was crushed in a processor with 1% w/w of ascorbic acid. Samples of 100 g of were vacuum packed in 80 µm polyethylene bags and divided into two batches: IR: subjected to an irradiation treatment with a dose of 1kGy; SV: pasteurized in a bath at 93 °C for 12 minutes (this temperature--time combination was previously optimized using response surface methodology). Finally, all samples were stored at 3 °C for 70 days, periodically extracted in triplicate from each treatment, and the following were evaluated: sensory characteristics (general appearance, browning, texture, and odour) using a numerical assessment test, with a trained panel of 12 judges, and antioxidant capacity (DPPH• method). Regarding the sensory characteristics, for all the attributes evaluated, the samples treated with SV showed better results (P 0.05) than the irradiated ones. The sensory shelf life was 5 days for the IR, limited by the odour attribute, and 60 days for the SV, limited by the texture. On the other hand, no significant differences were observed in the initial values of antioxidant capacity in both treatments. However, for the IR samples, a 58% decrease in content was observed with respect to its initial value on day 5, while for the SV samples it remained practically constant (P>0.05) until the end of storage.

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sciforum-098846: Effect of Added Carbohydrates on the Quality of Sourdough and Sourdough Bread

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Introduction: Sourdough bread is made through the fermentation of dough using naturally occurring lactobacilli and wild yeast, unlike common bread, which uses commercial baker's yeast. It utilizes a starter culture of flour and water that captures wild yeast and bacteria, giving it a distinctive tangy flavor and chewy texture. Nutritionally, sourdough offers several advantages: the fermentation process breaks down gluten, making it easier to digest for those with gluten sensitivities. Additionally, lactic acid bacteria improve nutrient bioavailability, and the lower glycemic index of sourdough can help maintain stable blood sugar levels.

Methods: To investigate the influence of adding selected carbohydrates (beet sugar, honey, active malt flour) on sourdough bread's parameters, a modified three-stage sourdough management method was chosen. The dough, consisting of 65% rye and 35% wheat flour, was kneaded for 5 minutes for optimal ingredient homogenization and gluten development. It was then fermented at 28 °C for 160 minutes. The content of organic acids in the dough was measured using ion chromatography, and the increase in dough volume and pH was monitored. Oval loaves were baked from 350 g pieces of dough. Each loaf was cut transversely, and the cut from its middle was measured for resistance to pressure applied at right angles using a Brookfield LFRA 1500 texturometer.

Results: According to the analysis, sourdough fortification with honey tends to produce the maximal volume for the loaf and the most tender crumb at the same time. Higher additions of beet sugar increase the total acidity of the dough the most significantly. In contrast, malt flour provides a smooth, sweetish aroma to the bread. The addition of malt flour causes the inhibition of acetic acid production during sourdough fermentation. Unfortunately, a lower concentration of acetate and a higher content of remaining sugars at the same time shortened the microbial shelf-life of the bread after baking.

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sciforum-100323: Effect of added carbohydrates on the quality of sourdough and sourdough bread

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Introduction: Sourdough bread is made through the fermentation of dough using naturally occurring lactobacilli and wild yeast, unlike common bread which uses commercial baker's yeast. It utilizes a starter culture of flour and water that captures wild yeast and bacteria, giving it a distinctive tangy flavor and chewy texture. Nutritionally, sourdough offers several advantages: the fermentation process breaks down gluten, making it easier to digest for those with gluten sensitivities. Additionally, lactic acid bacteria improve nutrient bioavailability, and the lower glycemic index of sourdough can help maintain stable blood sugar levels.

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Results: Based on the analysis, enhancing sourdough with honey leads to the largest loaf volume and the softest crumb simultaneously. Greater amounts of beet sugar significantly elevate the dough's total acidity, while malt flour imparts a smooth, mildly sweet aroma to the bread. The inclusion of malt flour inhibits acetic acid production during sourdough fermentation. Regrettably, the reduced acetate concentration and increased levels of residual sugars together result in a shorter microbial shelf-life for the baked bread.

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sciforum-102036: Elemental Impurities in Soy Isoflavone Food Supplements

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Toxic metal(loid)s are commonly suspected impurities in food supplements, especially herbal ones.

This study aimed to analyze their presence in soy isoflavone supplements, represented by 21 products collected in the central Balkan countries (Serbia, Bosna and Hercegovina, Croatia) and tested by an inductively coupled plasma mass spectrometry technique after microwave digestion. The performance of the analytical method was monitored by the analyses of certified reference materials, as well as by the regular participation of an accredited laboratory in proficiency testing.

The elemental profiles consisted of 23 elements, most of which (18) were detected in more than half of the products, in extremely variable concentrations—in the case of Sr, Fe and Zn, over three orders of magnitude. The elements are classified according to the ICH Guidelines for Elemental Impurities. Regarding Class 1 elements (systemic toxicants causing multiple organ injuries/failure; limited/no use production of pharmaceuticals), the frequency of detection of As (91%), Pb (77%) and Cd (68%) was significantly higher than that of of Hg (41%). The highest concentrations of elements covered by Regulation (EU) 2023/915 complied with the maximum that was allowed (Pb 0.30 vs. 3.0 mg/kg, Cd 0.38 vs. 1.0 mg/kg, Hg 0.08 vs. 0.10 mg/kg). Class 2A elements (route-dependent toxicants; high probability of occurrence), Co, V and Ni, were found in all samples, in concentrations up to 1.37, 0.65 and 2.58 mg/kg, respectively. The Class 2B elements (route-dependent toxicants; low probability of occurrence) Se and Tl were rarely detected. The Class 3 elements (low oral toxicity) Ba and Cu were found in all, and Cr in all but one supplement, Sb in half and Sn in none. Among the non-classified elements (low inherent toxicity), Te, Be and Sr were detected.

Considering that toxic metal(loid)s can pose a serious concern for the health of consumers, the sources of such impurities (raw materials, production equipment, etc.) should be strictly controlled.

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sciforum-092238: Ensuring Food Safety and Quality: An Integrated Approach

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Food safety and quality are paramount concerns for consumers, regulators, and food producers alike. In an era marked by globalization, technological advancements, and evolving consumer preferences, the need to maintain high standards in food production, handling, and distribution has never been more critical. This abstract provides an overview of current research efforts aimed at addressing challenges and improving practices in the realm of food safety and quality.

Methods:

A comprehensive review of the recent literature and studies related to food safety and quality was conducted. Various databases were utilized, including PubMed, Scopus, Web of Science, and Google Scholar, to identify relevant articles published from 2018 to 2024 to ensure that current information was included. Keywords such as "food safety" and “quality assurance”, among others, were used to refine the search and ensure the inclusion of diverse perspectives. Various disciplines, including microbiology, public health, and food science, and methodologies, both qualitative and quantitative, were employed to ensure an inclusive exploration of the concept.

Results:

This review revealed a multifaceted landscape of research initiatives and interventions focused on enhancing food safety and quality across different stages of the food supply chain. Key themes identified include implementing risk-based approaches to food safety management, advancements in detecting and controlling foodborne pathogens, adopting novel technologies for food preservation and packaging, and the importance of regulatory frameworks and industry standards in ensuring compliance and accountability.

Conclusions:

In conclusion, the pursuit of food safety and quality is an ongoing endeavor that demands collective action and commitment from all stakeholders involved in the food industry. Potential hazards should be identified and effectively evaluated to ensure the proper implementation of measures to mitigate them. I recommend the active involvement of all stakeholders in the food industry to collectively address the challenges and exploit the opportunities that ensure food safety and quality.

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sciforum-098727: Evaluation of Deoxynivalenol in Foods of São Paulo State, Brazil

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Deoxynivalenol (DON) is a mycotoxin produced by *Fusarium* species, commonly contaminating cereals such as wheat, corn, and others. This mycotoxin is a significant food contaminant due to its high prevalence and stability during storage, milling, and processing, as it withstands high temperatures. DON may give adverse health effects, including abdominal issues and immune system impairment in severe cases. Consequently, its presence in food is strictly monitored and regulated worldwide. Brazilian legislation sets a maximum limit of 1,000 µg/kg for cereal and bakery products, while the European Commission's limits are 400, 600, and 750 µg/kg for bakery products, pasta, and popcorn, respectively. This study aims to analyze DON in wheat and corn products marketed in São Paulo state, Brazil. In total, 56 samples, with different brands and batches, were collected in 2024 from commercial establishments, including 3 mini bread roll, 17 toast, 11 instant noodle, 13 pasta, and 12 popcorn sample. DON extraction was performed with deionized water, followed by purification using an immunoaffinity column (DONtestWB, Vicam), and quantification by liquid chromatography and ultraviolet detection (Shimadzu). The limit of quantification (LOQ) was 200 µg/kg. DON was quantified in 51.8% of samples, with concentrations ranging from 240.0 to 658.4 µg/kg. The mean values of the quantified results were 463.8 µg/kg (mini bread rolls), 389.4 µg/kg (toast), 410.7 µg/kg (pasta), and 378.9 µg/kg (instant noodles). All popcorn showed levels below the LOQ. No sample exceeded the limit of Brazilian legislation. However, considering the European Commission's limits, 66.7% of the mini bread rolls, 27.3% of the toast, and 12.5% of the instant noodles exceeded the maximum value allowed by legislation. The recurrent presence of DON reinforces the need for effective control by government authorities, given the high consumption of these products by the Brazilian population, and the possible health hazards related to this mycotoxin.

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sciforum-094712: Exploratory survey of qPCR-HRM potential in differentiating *Saccharomyces cerevisiae* var. *boulardii* in probiotic-enriched matrices

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Introduction: Currently, the only probiotic yeast with clinically proven health-promoting effects for several gastrointestinal disorders in adults and children is *Saccharomyces cerevisiae* var. *boulardii* (*Sb*). The probiotic properties of this yeast have been proven to be strain-dependent. Of note, probiotics were taken in the past as a common panacea for lifestyle diseases. Therefore, probiotic preparations are accessible worldwide as preventive agents. Dietary supplements, including thosen that are *Sb*-fortified, are regulated as food is in the market. The current state of regulations and the growing supplement availability create an environment conducive to food adulteration, necessitating rapid testing for product verification.

Method: Due to the significant genetic similarity of *Sb* to *Saccharomyces cerevisiae*, qPCR-HRM analysis was was used for testing, which has a very high sensitivity for polymorphism detection and enables the simultaneous identification of the microorganism in the presence of a reference sample. The effectiveness of interspecies and intragenus primer pairs designed to amplify heterogeneous regions was examined.

Results: qPCR-HRM analysis using interspecies *18SrRNA* and ITS sequences optimized in culture-dependent analysis identified *Sb* at the species level, while intraspecies *HO* and *RPB2* sequences were identified at the variety level in single-yeast dietary supplements. The region amplification test of *HXT9* and *MAL11* verified additionally the physiological properties of the strains used in probiotic supplements. The low variability in sequences amplified by interspecies primer pairs in qPCR-HRM analysis prevented the differentiation of *Sb* in yeast mixtures. In contrast, identifying *Sb* with designed intragenus-specific primer pairs succeeded in establishing multi-yeast suspensions. The *RPB2* sequence showed the highest intraspecies differentiation power. However, qPCR-HRM analysis identified *Sb* only with the prevalence of the variety quantity in the microbial matrix.

Conclusions:

The predominant presence of probiotics in a matrix is essential for qPCR-HRM identification.

There is limited differentiation capacity for qPCR-HRM using interspecies primer pairs for rDNA regions in a multi-yeast matrix.

There is a high differentiation power of qPCR-HRM using the *RPB2* selected sequence in a multi-yeast matrix.

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sciforum-099354: Health Claims, Precautions and Warnings on Omega-3 Fatty Acid Food Supplements

Jelena Banovic Fuentes * and Ljilja Torovic

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Health claims listed on the labels of food supplements contain voluntary information that should facilitate consumers' choices, while mandatory precautions and warnings are intended to safeguard consumers' well-being. Consumers' interest in health has fueled the expansion of the market of omega-3 fatty acid (w-3-FA) supplements.

This is a cross-sectional study focused on the evaluation of the regulatory compliance of health claims (according to the EU register of health claims) and *mandatory statements* on the labels of w-3-FA supplements, produced in numerous European countries and marketed in Serbia, whose regulatory framework is harmonized with the one in the EU, but in contrast requires the premarket registration of food supplements.

Verbal health claims related to the active substance were listed on the labels of 76 out of 97 supplements, but only 68 related to w-3-FA, 59 of which had claims that were compliant with regulations (31 supplements presented a single claim and 28 presented multiple ones, with 107 claims in total). The most frequently encountered claims targeting the general adult population were the following: EPA and DHA contribute to normal heart function (42); DHA contributes to normal brain function (13) and vision (10). On supplements intended for pregnant women, the dominant claims were that DHA maternal intake contributes to the normal brain (10) and eye development (10) of the foetus and breastfed infants. Normal visual development was the main proclaimed benefit on supplements for infants. However, the calculated intake of w-3-FA, based on the labelled content and recommended use, was not always appropriate to support the given claims (one supplement provided only 6% of the required dose). Additionally, although the majority of the supplements contained mandatory statements, that was not always the case.

Along with questionable consumer understanding of health promotion claims, the volume and severity of misleading claims is posing considerable concerns for public health, urging stricter control of supplement labeling.

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sciforum-102040: Health Risk Associated with Elemental Impurities in Algae Omega-3 Fatty Acid Food Supplements

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The ability to accumulate toxic metal(loid)s from the aquatic environment makes algae and their products susceptible to contamination.

This study aimed to assess the health risk associated with toxic metal(loid)s in omega-3 fatty acid supplements made from microalgae oil. According to the labelled consumption recommendations, the eight supplements, collected in the central Balkans (Serbia, Bosnia and Herzegovina and Croatia), were aimed at infants, children, adolescents, adults and/or pregnant women. The supplements were tested in an accredited laboratory using the technique of inductively coupled plasma mass spectrometry after microwave digestion. Analyses included certified reference materials, complementing regular participation in proficiency testing.

Of the 23 tested elements, 22 were detected in highly variable concentrations. The highest concentrations of elements were covered by Regulation (EU) 2023/915, complied with the maximum allowed (Pb 0.82 vs. 3.0 mg/kg, Cd 0.004 vs. 3.0 mg/kg, Hg 0.005 vs. 0.10 mg/kg). The risk indicators, the hazard quotient (HQ), and the minimum risk level (MR), calculated based on supplement usage instructions, were below the 1% threshold levels for all elements, with the exception of As, Co, and Cu in the case of infants under one year of age. HQ levels for As and Co were the highest for infants aged 1–3 months, peaking at 4.6 and 3.5%, similar to the MR for Cu of 3.6%. The cumulative exposure indicator (the hazard index) was also highest for the youngest infants (10.2%), followed by toddlers (4.1%) and adults (2.8%). The margin of exposure showed no risk from Pb and As, while the lifetime cancer risk estimates for the two infant supplements were above the limit of one additional cancer case per 100,000 people.

Although the study findings indicate safe elemental profiles of algal oil supplements, manufacturers' recommendations for supplement consumption by infants and young children should be carefully considered by parents in consultation with pediatricians.

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sciforum-103355: Highly Hazardous Pesticides in Fruits and Vegetables: Analysis of food surveillance in Chile between 2015 and 2023

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Using pesticides in Chile has increased crop production and agricultural exports. However, this benefit has challenges, particularly regarding public and environmental health, due to the indiscriminate use of Highly Hazardous Pesticides (HHPs). Our study aimed to evaluate the national surveillance program for pesticide residues in fruits and vegetables in Chile between 2015 and 2023. The official data were obtained from the Agricultural and Livestock Service of Chile. The total samples evaluated were 9145, of which 2634 and 6511 were vegetables and fruits, respectively. According to Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO), we classified HHPs into eight groups: pesticide formulations (PFs) or active ingredients (AIs) classes IA or IB; carcinogenic pesticides that meet criteria IA and IB of the Globally Harmonized System on Classification and Labeling of Chemicals (GHS); PFs and AIs that meet criteria of mutagenesis IA and IB of the GHS; PFs and AIs that meet the criteria of mutagenicity IA and IB of the GHS; PFs and AIs that meet the requirements of reproductive toxicity IA and IB of the GHS; PFs and AIs listed by the Stockholm Convention in its annexes A and B; PFs and AIs listed by the Rotterdam Convention in its annexes III; PFs and AIs listed under the Montreal Protocol; and PFs and AIs that have shown adverse effects on human health or the environment. The results show that from 1449 currently authorized pesticides, 193 formulations are categorized as HHPs. Our evaluation of all samples shows that fenhexamid, lambda-cyhalothrin, captan, and iprodione have 12,3%, 5,2%, 4.7%, and 3.2% appearances, respectively, in fruit and vegetables. The results demonstrate the importance of strengthening Chile's pesticide regulation and surveillance programs. It is essential to align with international standards to protect human health and the environment.

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sciforum-099258: Impact of Food Allergies on Food Safety and Life Quality of Adults in Spain:Labeling

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Food allergies reduce the quality of life of allergic people. To prevent this, adequate labeling practice plays an essential role in avoiding unnecessary exposure to allergens.

To investigate the impact of food allergies amongst Spanish adults, an online survey with a shortened version of the Adult Food Allergy Quality of Life Questionnaire (FAQLQ), and some complementary questions, was distributed to AEPNAA (Spanish Association of People with Food and Latex Allergies) members. Some of the questions included were about their perceptions regarding food safety and labeling, and how allergens are generally managed in restaurant businesses.

Regulation (EU) No 1169/2011 on the provision of food information to consumers establishes, among other things, the obligation to include allergens listed in its Annex II on food labeling. However, despite this regulation, consumers with food allergies surveyed (n=134) believe that the labeling is incomplete (81.3%), that there is an excessive use of the phrase “may contain traces” (66.4%), and that the inclusion of pictograms would facilitate their understanding (74.6%).

Regarding the presentation of information on unpackaged food in restaurants, they express dissatisfaction with the lack of uniformity between establishments (76.9%), a consequence of the regulatory flexibility in this respect (Royal Decree 126/2015). This creates insecurity and has led them to change their choice at some point (84.6%).

In conclusion, food allergies not only pose health risks, but also have a social and emotional impact on the quality of life of allergic individuals. The information provided to consumers through labeling or menus should be accurate, clear, and complete to ensure food safety and improve the perceptions that allergic consumers have of it.

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sciforum-099836: Impact of milk quality on physico-chemical characteristics of Cow milk concentrate (khoa)

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Khoa is a milk concentrate made by simmering milk, primarily buffalo milk, until it thickens, and contains about 60-70% milk solids. In India's tropical climate, milk spoils quickly, so around 50-55% of milk production is used to make traditional dairy sweets, with khoa being a key ingredient. Surplus or leftover milk is often used for this purpose. Although cow milk makes up about 30% of total milk production, it is less commonly used for khoa due to its lower solid-not-fat (SNF) and fat content. Due to limited research on cow milk khoa, a study was conducted to gather data on how the acidity development and neutralization of milk affect the quality of cow milk concentrate (khoa) made from fresh, sour, and neutralized cow milk. The study examined physical, compositional, and textural properties, SDS-PAGE, as well as the fatty acid profile during storage at 30°C for 7 days and 5°C for 21 days. The findings revealed that the developed acidity and subsequent neutralization of milk caused significant changes (p0.05) in pH, ash, color, tyrosine value, lactulose, HMF, furosine, induction period, FFA content, peroxide value, and textural and sensory attributes. Over the storage period, acidity, ash content, tyrosine value, furosine, HMF, free fatty acids, peroxide value, TBA value, butyric acid, and stearic acid increased, while pH and oleic acid decreased. From a textural perspective, khoa made from neutralized milk was stickier and less hard compared to the control. Textural attributes significantly differed (p0.05) in terms of lightness, redness, springiness, chewiness, and hardness values during storage. However, the fatty acid profile (except butyric acid), TBA value, SDS-PAGE analysis of caseins, and mineral composition (except sodium content) of altered khoa samples showed minimal nonconformity ($p>0.05$).

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sciforum-102004: Influence of maceration process of selected cold-pressed oils with lyophilized mullein flowers (*Verbascum thapsus* L.) on their oxidative stability and chemical composition.

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This study aimed to investigate the antioxidant properties of mullein macerates (Ms) in selected cold-pressed oils (CLOs). Macerates were obtained by combining lyophilized mullein flowers with CLOs and their subsequent ultrasound-assisted maceration and filtration. After the maceration process, the oxidative stability of the oils was assessed (80-120°C), and based on the obtained results, their kinetic parameters were calculated. Oils before and after maceration were also evaluated for their quality and safety. The acid value (AV), peroxide value (PV), *p*-anisidine value (*p*-AnV), and Totox index of the oils were analyzed. Furthermore, the influence of maceration with mullein flowers on the total antioxidant activity of oils, as well as on their pigment content, phenolic compounds, sterols, tocopherols, and the composition of fatty acids, was determined. After the maceration process, the oils remained of good quality; their fatty acid composition and the content of sterols and tocopherols had changed only slightly. The hydrolysis levels after maceration were lower, but the oxidation degree increased. The biggest change was determined for hemp seed oil, where the Totox index amounted to 17.19 and 28.96 before and after maceration. Based on the results, it was concluded that the best antioxidation effect was obtained for chia and linseed oil. The induction time for those oils was 4.32 and 6.04and 2.25 and 3.77 h, respectively, at 100°C. The protection factor at 100°C was 1.40 and 1.68 for linseed and chia seed oil. A higher content of polyphenolic compounds, especially polyphenolic acids, and overall antioxidant activity increased oxidative stability, inhibiting the oxidation process and increasing the energy required to initiate it.

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sciforum-098416: Influence of technological processing on selected parameters of fruit-based baby foods

Blanka Tobolková *

National Agricultural and Food Centre - Food Research Institute, Department of Chemistry and Food Analysis

Baby foods in "pouches" are special canned products designed to meet the nutritional needs of infants and young children. They are made from fruit and vegetables without the addition of preservatives. Raw materials of the highest possible quality should be used for their production.

Antioxidant properties (TPC, TEAC, AAE), colour characteristics in the CIE L*a*b colour system, ascorbic acid (AA) and 5-hydroxymethylfurfural (HMF) were monitored by a combination of EPR spectroscopy, UV-VIS-NIR spectroscopy and HPLC in apple–carrot–banana baby foods during long-term storage (24 months, shelf life 18 months). The effect of different sterilisation regimes (90 °C/30 min = autoclave (A) vs. 92 °C/4 min = pasteurisation (P)) on the monitored parameters was evaluated.

The results showed a gradual decrease in the AA concentration, TEAC, AAE and TPC values during the 24 months of storage, which was more dynamic in the first half of this period. The most significant changes occurred in the AAE values (reflecting the presence of organic acids in the sample), for which a 95% decrease was observed. On the contrary, the AA concentration decreased by 84-87%, TEAC values by 42% and TPC values by 12-14%. In general, higher decreases of monitored parameters were observed in the autoclaved samples. Higher concentrations of HMF were found in autoclaved samples compared to pasteurised samples. However, a higher increase in HMF was observed in pasteurised samples (50%).

The use of different sterilisation regimes influences the monitored parameters, although not statistically significantly. The results showed that the use of pasteurisation was gentler in preserving the antioxidant properties, colour stability and ascorbic acid concentration. Although HMF increased by more than 50% during storage, it remained below the maximum permitted level of 20 mg/kg.

Acknowledgement: This publication was supported by the project "Supporting Slovak food production by improving its quality and safety with an emphasis on fruit and vegetable products" (ITMS 313011W508), co-financed by ERDF.

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sciforum-098608: Influence of vineyard location on the quality parameters and phenolics of must and wine from two white grape varieties

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Introduction: Nowadays, native grape varieties are considered important for their regions of origin, since they respond less to global warming compared to international varieties, increasing the suitability of winemaking regions, which are likely to decrease in the future. The aim of this study was to monitor the adaptation of two white wine grapes to different environments of the Drama PGI (Protected Geographical Indication) region and evaluate their impact on the qualitative characteristics and phenolic content of must and wine.

Methods: Two white varieties, one international (Sauvignon blanc, SB) and one native Greek (Assyrtiko, AS), grown in different locations (7 and 2, respectively) of the Drama PGI region during 2023 were used. Parameters such as harvest date and 100-berry weight were determined immediately after harvesting. Properly mature intact berries were removed from stems and crushed (25 kg batch-scale), and the juice was fermented (*Saccharomyces cerevisiae* 0.25 g/L) in 30 L vessels. The same winemaking procedure was applied to all grape samples. The parameters pH, titratable acidity, sugars, and total phenolic content, flavonoids, and anthocyanins (TPC, TFC, TA) were measured in must and the respective wines.

Results: The weight of 100 berries and the harvesting date of SB varied among locations (96-176 g, 233-283 days). Assyrtiko had heavier berries (>325 g) than SB and is a late-maturing variety (> 261 days). At higher altitudes (820m), SB grape maturation was delayed by 40 days. The must and respective wines differed regarding the quality attributes measured among the regions. Vineyard altitude correlated positively with must acidity (0.581, p0.5) and negatively with wine pH (-0.548, p0.05).

Conclusions: Although there exists a variation in the quality parameters of must and wines among the locations, in general, for the vintage 2023, the two varieties differ only on the acidity, TPC, and TFC values of wine. Moreover, the native Greek variety showed lower acidity and total phenolic content but higher flavonoid content than the Sauvignon blanc.

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sciforum-102178: Isolation and Identification of Aflatoxin-Producing Fungi in Spices in Some Parts of Zaria, Kaduna State, Nigeria

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Introduction: Spices are widely used food ingredients globally, serving as additives, flavour enhancers, or medicinal agents, which add depth and value to various culinary and therapeutic applications. Aflatoxins are toxic compounds produced as secondary metabolites by certain moulds, and pose a significant threat to public health by contaminating foods including spices, compromising food quality, and resulting in economic losses and reduced crop yields.

Aim: This study aimed to isolate and identify aflatoxin-producing fungi in parts of Zaria, Kaduna state, Nigeria.

Methodology: Ten samples each of ginger, chili, and cloves were purchased from Sabon-Gari and Samaru Markets and analysed for proximate composition. The samples were also processed using standard microbiological procedures, inoculated on freshly prepared potato dextrose agar (PDA) and incubated at 25°C for 7days, followed by observation for colonial morphology and microscopic characteristics. Moulds isolated were then observed for aflatoxin production under 365nm wavelength of ultraviolet (UV) light, after inoculating and incubating on desiccated coconut agar (DCA) for 3 days at 25°C.

Results: Proximate analysis of the spices revealed varying nutritional contents of moisture, crude protein, lipid, crude ash, fibre and carbohydrates content. Fungal isolates included *Aspergillus niger* (40.00%), *Aspergillus flavus* (33.33%), *Penicillium* species (20.00%), and *Aspergillus clavatus* (6.67%). Only A. *flavus* from chili and cloves produced aflatoxins, detected by blue fluorescence under UV light. The presence of aflatoxins in these samples poses a significant risk to consumer health.

Conclusions: This study found varying levels of nutrients in spices, and identified aflatoxin-producing fungi in some chili and cloves samples from Sabon-gari and Samaru markets, but not in ginger. Public awareness and effective control measures are necessary to mitigate aflatoxin contamination in spices as well as other food substances. Improved farming practices, storage facilities, and regular testing are recommended to ensure the safety of spices for consumption.

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sciforum-099234: Knowledge, attitude, and practice of dairy workers about toxoplasmosis and other zoonoses on the farm in the Eastern Cape Province, South Africa

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Toxoplasma gondii is a zoonotic parasite of medical and veterinary importance. This study evaluated dairy workers knowledge, attitude, and practices regarding toxoplasmosis in the Eastern Cape Province, South Africa. Using a close-ended-structured questionnaire, the data were collected from 150 registered dairy farms in five district municipalities (Amathole, OR Tambo, Chris Hani, Cacadu, and Alfred Nzo). The structured questionnaire was utilized to collect data. Responses from the farmers were analyzed against various potential risk factors and the public health implications assessed for them to be monitored. Of the respondents, 15.8% correctly acknowledged knowing about toxoplasmosis. The majority of the respondents could not correctly recognize the following parasitic zoonosis as being food-borne pathogens: Toxoplasma (84.2%), Cryptosporidia (82.0%), Entamoeba (93.5%), Trichinella (88.5%), Hymenolepis (92.1%), Giardia (90.6%), Cysticercus (92.1%), Echinococcus (87.8%), and Dicrocoelium (92.8%). Most respondents (77%) responded that they assisted infected cows during calving without the use of gloves or sanitation practices, which could cause infection in humans. This study contributed to the knowledge and awareness of the parasitic disease that is *Toxoplasma gondii.* The study highlighted a deficiency in knowledge about toxoplasmosis and food-borne illnesses. Hence, it presents an opportunity for various stakeholders in the health, veterinary, and other government parastatals to institute mitigation measures aimed at training and re-training farm workers to always practice hygiene.

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sciforum-099255: Meta-Analysis on Efficacy of Autochthonous Lactic Acid Bacteria Supernatant from Dairy Goods in Suppressing *Staphylococcus aureus*

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This systematic review assessed the antimicrobial activity of lactic acid bacteria (LAB) supernatant against *Staphylococcus aureus*, a common contaminant in dairy products. A comprehensive search of the PubMed, Scopus, and Web of Science databases was conducted for articles published between 2000 and 2022 using key terms such as dairy, starter cultures, and biopreservation. After thorough screening, articles written in English or Portuguese and presenting original results on the in vitro inhibition of *S. aureus* by LAB of dairy origin were selected, resulting in twenty-five relevant studies providing 190 observations. Using the 'metafor' package in R 4.1.2, meta-analysis models and graphs were constructed. The primary outcome measured was the mean inhibition zone diameter (ID) in mm and its standard error (SE). Results from the initial meta-regression model, employing a pathogen concentration of 7 log CFU/mL and an incubation time of 24 hours, indicated that the highest inhibition values against *S. aureus* were obtained by *Lacticaseibacillus* (11.89 ± 0.573), followed by *Lactobacillus* (11.35 ± 1.096), *Lactococcus* (11.33 ± 9.578), and *Enterococcus* (11.01 ± 2.105). A second model considered the susceptibility test method as a moderator, revealing that studies applying the well diffusion susceptibility test yielded higher inhibition values compared to spot and disk diffusion tests. The best fitted regression model for *S. aureus* evaluated the effect of LAB genus, pathogen concentration, incubation time, and susceptibility method. Notably, a positive correlation (p0.001) between time and inhibition values was observed, with longer incubation periods (e.g., 72 hours) resulting in higher inhibition values (>20 mm). Moreover, the association between pH and inhibition diameter showed a significant inverse correlation (p0.001). In conclusion, LAB strains naturally occurring in dairy products present variable activity against *S. aureus* and could be exploited in developing biocontrol strategies for the dairy industry.

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sciforum-101203: Microalgae-based food additives for improved shelf life and nutritional value

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It has been demonstrated that microalgal bioactive chemicals have beneficial health effects, including cardiovascular protection, as well as antihypertensive, anti-obesity, antioxidative, and anticancer properties. However, because of species diversity, biomass variations, and cultivation parameters, the functional food business has encountered numerous difficulties in utilizing microalgal biomass. Microalgae are an example of these novel foods; they are aquatic microorganisms rich in a variety of bioactive compounds. Over the past decade, significant advances in genetic engineering techniques have led to the effective modification of many model microalgae to facilitate the accumulation of specific value-added chemicals. The food industry is interested in obtaining preservative chemicals from microalgae biomass because it can enhance the production of bioactive compounds under controlled conditions. Several microalgae species have been used as natural resources because of the variety of chemicals they contain that have been successful in terms of both nutritional and technological criteria when added to meals or animal feeds. However, as stated earlier, due to species diversity, differences in biomass, and cultural parameters, the functional food industry has faced several difficulties in utilizing microalgal biomass. This study aims to investigate the effect of various applications of microalgae between two type of microalgae, as follows: (i) the incorporation of Spirulina platensis in yogurt whose antioxidant activity increased by 35% in 2% Spirulina yogurt, and (ii) the incorporation of Chlorella vulgaris in bread products, which demonstrates an antioxidant activity increase of 40% in 2% Chlorella bread.

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sciforum-093362: Microbial Contamination and Antibiotic Susceptibility of Local Drinks in Elele Town Rivers State: Nigeria

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Introduction: Local refreshments are crucial in cultural customs, embodying symbols of festivity and ancestral legacy within societies.

Aim: This study investigated the diversity of microbes and their susceptibility to antibiotics in frequently consumed local beverages in Elele town, Rivers State, Nigeria. The beverages include soy milk, tiger nut drink, Nigerian gin (ogogoro, fermented palm wine), hibiscus drink (zobo), and lemon drink.

Method: This study extracted and isolated viable aerobic microbiological contaminants from the analyzed drinks. The antibiotic susceptibility of these contaminants was then evaluated using an agar well diffusion experiment. Pathogenicity testing of the isolates was carried out on mice with the approval of the Ethical Committee (Ref: MAU/DRC/HD/E/2023/0350). This involved inoculating the isolates in mice followed by the determination of white blood cell counts and a histological study.

Results: The analysis showed that the drinks had a pH range of 3 to 5. The viable bacteria counts ranged from 990 CFU/mL (for lemon drink) to 247 CFU/mL (for Nigerian gin). Only the tiger nut drink displayed a fungal count of 500 CFU/mL. There was no coliform present in any of the drink samples. The most common isolates were *Staphylococcus aureus* (100%), *Bacillus spp*. (80%), *Shigella spp.* (40%), and *Candida spp*. (20%). Antimicrobial susceptibility tests revealed different resistance levels, with certain isolates showing resistance to multiple drugs. The Multiple Antibiotic Resistant Index (MARI) values suggested a high prevalence of resistance to multiple antibiotics. The inoculation trials revealed no statistically significant (p 0.05) disparities in weight and temperature among the groups. However, there were variations in immunological responses, indicating possible health consequences. Histopathological investigation indicated inflammation and edema in liver and stomach tissues, underlining health hazards linked with microbial infection.

Conclusion: This study underlines the significance of strengthening hygienic standards and developing effective monitoring systems in local drink production.

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sciforum-099358: Modelling the microbial competition of *Listeria monocytogenes* and selected lactic acid bacteria strains in reconstituted milk

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Lactic acid bacteria (LAB) and/or their antimicrobial metabolites limit the growth of pathogenic bacteria. This study aims to determine the growth kinetics of *Listeria monocytogenes* (LM) in heat-treated reconstituted milk, as affected by three LAB strains from the species *Leuconostoc mesenteroides* (LME), *Lacticaseibacillus paracasei* (LP*)* and *Loigolactobacillus coryniformis* (LC) isolated from goats' milk cheeses. Challenge tests of each LAB strain in monoculture (MC) and coculture (CC) with LM in milk adjusted to three initial pH (5.5, 6.0 and 6.5) were performed. Inoculated milk samples were left to ferment at 12°C for 8 days. A pH-driven dynamic growth model was fitted in separate to the LM and LAB experimental curves from MC and CC; and a Jameson-effect growth model was fitted to the CC growth curves. In MC, LME showed the highest growth rates at the three initial pH levels; whereas in CC, this strain was able to better control the growth of LM, by decreasing their growth rates [day-1] to 1.469 ± 0.205 at pH 5.5; 2.293 ± 0.284 at pH 6.0 and 1.552 ± 0.132 at pH 6.5. LP and LC were only able to inhibit and reduce the growth of LM at pH 5.5. In relation to the maximum concentration of LM (LMmax), LME was again the most effective at all initial pH tested. The LMmax [ln CFU/ml] values were reduced to 15.05 ± 0.367; 16.32 ± 0.204 and 16.91 ± 0.132 at pH 5.5; 6.0 and 6.5, in comparison to the values obtained in MC (20.85 ± 0.060; 21.10 ± 0.212 and 21.31 ± 0.085, respectively). This indicates that the strain of LME has a broader and more inhibitory effect on LM growth across different pH, whereas the strains of LP and LC are effective in more acidic conditions. These results provide insights into the use of LAB as a natural biopreservative in dairy products.

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sciforum-099356: Olive Oil Authenticity: A Critical Issue in Non-Regulated Markets

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Background and Aim: The recent rise in olive oil prices due to production shortages over the last two seasons has increased the risk of counterfeiting activities, particularly in unregulated markets where consumer protection is weak. This study aimed to investigate the prevalence of adulterated and/or misclassified olive oils sourced from these markets, thereby highlighting the associated risks to consumer safety and product authenticity. **Methods:** This study engaged the academic community in the Faculty of Pharmacy, leading to the collection of over 30 samples marketed as "extra virgin olive oil" (EVOO) from various unregulated sources, often unlabeled. Parameters assessed, in accordance with international guidelines, included free acidity and ultraviolet spectrophotometric analysis (COI/T.20/Doc n° 34 and 19, respectively) for olive oil categorization, as well as both fatty acids (COI/T.20/Doc n° 33, by GC) and vitamin E (ISO 9936:2016, by HPLC) profiles for authenticity. **Results:** Over half of the samples were not authentic, corresponding to unlabeled mixtures with vegetable oils. Among those identified as olive oil, the majority failed to meet the specifications for any commercial category due to excessive oxidation. Some mixtures with vegetable oils also had very high levels of oxidation. Interestingly, some samples were correctly labeled mixtures of vegetable oils and olive oil, overlooked by consumers, indicating a lack of awareness. **Conclusions:** These findings show how challenging it is to obtain authentic olive oil outside the regulated market. There is a critical need for enhanced consumer education and awareness regarding the risks of purchasing from these sources. Additionally, stricter regulatory oversight and quality control measures are necessary to protect consumers from health risks and economic fraud. Potential solutions include public awareness campaigns, stronger labeling requirements, and stricter penalties for fraudulent practices.

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sciforum-097510: Origanum vulgare essential oil from Southern Albania: preliminary results.

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Introduction

Origanum vulgare (Lamiaceae species) is an herb used in food preparations for its aroma, but also as medicinal plant. This plant is found across the Mediterranean. In Albania, it has also been used for centuries as a holistic remedy. The collection of aromatic medical herbs is one of the relevant, sustainable sources of income for families living in rural areas. This study presents data on Origanum vulgare essential oil from plants collected from different areas of Southern Albania to assess their characteristics within the Mediterranean area.

Methods

Fifteen different samples of *Origanum vulgare* were taken in 7 stations located in different areas of Albania and dried after collection. The areal parts were used. The essential oil was obtained using a Clevenger-type apparatus. Its chemical composition was analyzed via Gas Chromatographic Flame Ionization (GC-FID) , and compound identification was conducted based on a comparison of Kovats indices and data from the literature. Nineteen main compounds were identified, constituting 86.4 – 98.9% of the total identified compounds.

Results

The essential oils were characterized by a high concentration of the phenolic monoterpenes Thymol and Carvacrol. The distribution of identified compounds was dependent on the geographic areas. In general, the distribution was as follows Carvacrol (67.6%) > para-Cymene (8.4%) > Thymol (4.3%) > gamma-Terpinene (2.5%) > beta-Cariophyllene (2.4%) > Limonene (1.2%) Linalool (1.1%) > alpha-Terpinene (1.0%). The chemical profile of Origanum vulgare samples was, overall, as expected, due the minor compounds indentified that contributed to its specificity; these findings agree in part with data reported for the Balkan and Mediterranean areas.

Conclusions

The differences observed in the composition could have been related to the geology and composition of the soil and atmospheric conditions, e.g., humidity, air temperature, sunny hours, altitude, etc. The harvesting period and drying process may also have influenced the results (in this study, samples were collected in June) and may explain the differences observed in the composition of the minor constituent among the samples analyzed.

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sciforum-103135: Oxidative stability of roasted and unroasted pumpkin seed oils

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Pumpkin is a vegetable appreciated by consumers due to its health-promoting properties that positively affect the human body. Roasting is a process that influences the nutritional value and sensory traits of seeds. This process affects resistance to oxidation and is essential to form the flavor chemical components of pumpkin seed oil. Roasting should be carried out at temperatures higher than 100°C. The aim of the research was to analyze the oxidative stability of two commercial cold-pressed oils from roasted and unroasted pumpkin seeds. Pressure differential scanning calorimetry (PDSC) under isothermal conditions was applied to measure oxidative stability of studied oils. The test was carried out at three different temperatures (120, 130, and 140 °C) and at an oxygen pressure of 1350-1400 kPa. The acid value, peroxide value, and fatty acid composition were also determined in the analyzed oils. Roasted and unroasted pumpkin seed oil contained mainly mono- and polyunsaturated fatty acids. Monosaturated fatty acids were present in roasted pumpkin seed oil (36.14%) and unroasted pumpkin seed oil (29.85%). A higher proportion of polyunsaturated fatty acids was found in unroasted pumpkin seed oil (49.55%) than in roasted pumpkin seed oil (45.26%). Roasted pumpkin seed oil was characterized by a significantly lower peroxide value and longer induction time in each temperature (from 106.61 minutes in 120˚C to 20.90 minutes in 140˚C) than unroasted pumpkin seed oil (from 83.47 minutes in 120˚C to 17.67 minutes in 140˚C). The oxidative stability of roasted pumpkin seed oil was higher than that of unroasted pumpkin seed oil.

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sciforum-097559: Paper-based strip sensor for monitoring of contaminants in milk

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Introduction: Milk and dairy are vital but face contamination risks. Current methods like chromatography, culture-based assays, and PCR are costly and centralized. In contrast, low-cost paper strip sensors with spores and enzymes provide rapid, selective detection of contaminants, offering an alternative for food safety in decentralized settings.

Methods: Whatman filter papers were modified with Bacillus spores and chromogenic substrates to detect antibiotic and pesticide residues. Enzyme-specific chromogenic substrates targeted mastitis, hygiene, and safety indicator organisms. The PANI-PEC paper strip sensor utilized conducting polymer and selective medium. Samples (100-250 µl) underwent incubation with paper strips under optimized conditions: 1.5 h for antibiotic and pesticide residues, 6 minutes for mastitis, 20 min. for total plate count, and 6-10 h for hygiene and safety indicators. Developed sensors were evaluated using various milk (pasteurized milk, dried milks, indigeneous dairy products, ice cream, butter) and food samples (cereals, fruits and vegetable, meat and egg) (n=1000), with results compared against established regulatory methods. Statistical analysis was conducted.

Results: Bacillus spores inhibited marker enzyme activity in milk samples containing antibiotic and pesticide residues, preventing blue color development on strips; residue-free samples exhibited enzymatic hydrolysis, resulting in blue coloration. Mastitis detection correlated marker enzyme activity with somatic cell counts in milk, with higher counts indicating mastitis. PANI-PEC strips detected hygiene indicators via pH and conductivity changes, altering strip color from blue to green. Specific marker enzymes targeted *E. coli, Listeria monocytogenes,* and *Salmonella*, inducing color changes on strips to yellow, blue, or bluish-green. Paper strips demonstrated 100% correlation with regulatory methods.

Conclusions: These paper strips offer a rapid, sensitive method for monitoring chemical contaminants and hygiene indicators in milk at reception docks, manufacturing units, and food testing labs. While effective for screening large sample sizes and providing semi-quantitative and qualitative results, these methods currently do not allow for quantitative detection of specific antibiotic and pesticide residues.

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sciforum-098265: Paper-strip-based biosensor for rapid detection of *Listeria monocytogenes* in milk

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Listeria monocytogenes, responsible for listeriosis, poses a high fatality rate of up to 30%, surpassing other foodborne illnesses. This pathogen contaminates various dairy products, including raw and pasteurized milk. The conventional detection method (ISO 11290-1:2017) for *L. monocytogenes* is labor-intensive, requiring 5-7 days. While rapid detection methods exist, they are often costly and require skilled personnel. Addressing these challenges, our study developed a practical, cost-effective assay for rapid *L. monocytogenes* detection in milk. The assay employs a highly specific enzyme–substrate reaction, yielding a green color on the strip when the *L. monocytogenes*-specific enzyme interacts with the loaded selective substrate. The initial optimization focused on parameters like time–temperature combinations and substrate volumes to achieve a low detection limit. The assay comprises two stages: first, the pre-enrichment of dairy samples in Listeria Selective Enrichment Media (LSEM) for 24 hours to recover injured cells, indicated by a black color, presumptively confirming the presence of *Listeria* spp. Subsequently, the enriched sample is applied to the strip-based assay, where green color development confirms the presence of *L. monocytogenes*. Detection takes just 9 hours, with a 24-hour enrichment step which is optional for highly contaminated samples. Out of 70 raw and pasteurized milk samples tested, the developed assay confirmed the presence of *L. monocytogenes* in one sample. The validation of the obtained results against the ISO method further supported the reliability of our study. This method's 9-hour detection time contrasts sharply with ISO's week-long confirmation process. Further optimization of our developed assay for other dairy products is necessary to expand its application in industry. The developed assay is a translation of our patented technology (Indian Patent No. 410633) and is a rapid, user-friendly, and economic advancement which enhances food safety in dairy processing.

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sciforum-103164: Physicochemical and microbiological evaluation of urban honey from stingless bees

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The stingless bee, native to Brazil, are fundamental for the preservation and balance of ecosystems, and they produce honey with high added value. There are still few reports about its quality characteristics, especially in terms of physicochemical and microbiological evaluations. The aim of this study was to elucidate the physicochemical and microbiological profile of honey from stingless bees in urban areas. To achieve this, fresh stingless bee honey produced for local consumption in Curitiba and Almirante Tamandaré was analyzed. Two 50g samples of stingless bee honey from the species *Melipona marginali* (A) and *Melipona bicolor* (B) were collected in aliquots and analyzed in duplicate for color, moisture, water activity, pH, aerobic mesophile count, lactic acid bacteria, yeasts and molds, and the most probable number of total and thermotolerant coliforms. The samples had a light amber color, high humidity (36.06% and 33,41%), high water activity (0.72 and 0.69), and acidic pH (3.41 and 2.55). For sample A, the microbial count of mesophilic aerobes was 4.6 log UFC/mL, for lactic acid bacteria (BAL), 5.44 Log UFC/mL, for molds and yeasts, 3.51 Log UFC/mL, and there was no detection of total or thermotolerant coliforms. For sample B, the mesophilic aerobic counts were 5.39 Log UFC/mL, for lactic acid bacteria, 5.05 Log UFC/mL, and for yeasts and molds, 5.88 Log UFC/mL, and there was no detection of total or thermotolerant coliforms. Thus, the honeys evaluated were characterized by high humidity, but low water activity, acidic pH, the presence of beneficial bacteria (BAL), and for containing environmental contaminants (mesophiles, yeasts, and molds). The absence of total and thermotolerant coliforms is indicative of the good hygiene and health quality of the products evaluated. Further studies are needed to better understand the characteristics of these products.

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sciforum-099086: Physicochemical and microbiological quality benchmarking of RTE chouriço sausages produced in Northeastern Portugal

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Chouriço de carne is a traditional Portuguese RTE dry-fermented sausage made from wine-marinated pork meat, fat, and seasonings. In Northern Portugal, it is still made by traditional methods, using spontaneous fermentation and old smoking/drying techniques, to ensure microbial safety and the desired organoleptic properties.

This study aimed to evaluate the physicochemical and microbiological properties of *chouriço de carne* traditionally produced in Northern Portugal and to understand the associations between these attributes. Water activity (a_w), moisture, pH, ash, protein, fat, carbohydrates, counts of mesophiles, lactic acid bacteria (LAB), *Staphylococcus aureus, Clostridium* spp., and detection of *Listeria* spp. and *Salmonella* spp. were determined for 14 producers, in five sausages each. The resulting data were subjected to multivariate analysis.

Principal component analysis (PCA) generated three components which accounted for 60% of data variation: PC1 (26%), positively correlated to moisture and protein and negatively to fat and pH, described sausages with more meat in the formulation; PC2 (19.3%), highly correlated to LAB, characterised a longer/rapid fermentation; and PC3 (14.5%), which was associated negatively to ash, and positively to a_w, and to a lesser extent, to *Clostridium* spp. and *S. aureus*, defined sausages with poorer hygiene.

Cluster analysis identified three groups: i) *chouriços,* with high moisture, more meat and very low pH; ii) sausages with low moisture, more fat, and high pH; and iii) chorizos with high moisture, high in meat but very low in fat, low pH, and improved hygiene.

Factor analysis yielded a three-factor solution that explained 65% of the data; PC1 (23.5%) depicted chorizos with low pH but high moisture, PC2 (20,8%) described sausages with more meat, and PC3 (20,6%) longer/rapid fermentation.

Globally, the results displayed significant variability amongst sausage producers, emphasising differences in recipes, ingredients, and manufacturing practices. Nonetheless, the producers' between-batch variability highlighted the need for standardising processes and improving microbiological control.

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sciforum-096256: Potato Protein Concentrate: Enhancing Quality Through Sustainable Phenolic Reduction Method

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Introduction: Potatoes are a worldwide staple food and a valuable source of high-quality protein. Potato fruit juice (PFJ), a by-product of starch production, contains protein with a complete essential amino acid profile rivaling eggs. However, high concentrations of phenolics in PFJ can impact the taste and other sensory qualities of potato protein concentrate (PPC), making the protein undesired by humans. This study aimed to improve the quality of PPC for human consumption using novel adsorption resins to selectively remove phenolics from PFJ.

Methods: The resins were evaluated for binding phenolics in both pure solutions and PFJ. Resins were categorized as Strong Anion Exchange (SAX), Weak Anion Exchange (WAX), Reverse Phase (RP), and Weak Cation Exchange (WCX). Potato protein was precipitated from resin-treated PFJ using acid and heat, and the total phenolic content (TPC) of the PPC was measured using the Folin–Ciocalteu spectrophotometric method.

Results: The resins demonstrated varying degrees of effectiveness in binding phenolics, with SAX resins showing superior performance. The most effective SAX resin reduced the TPC in PFJ by approximately 3.5 times compared to the control. WAX resins also exhibited notable phenolic reduction capabilities, decreasing TPC by up to 2 times. However, a trade-off between phenolic reduction and PPC yield was observed. The most effective phenolic-binding resin resulted in a lower PPC yield compared to the control, while a moderately effective WAX resin achieved a higher yield, ranging from 60 to 90% of the control.

Conclusions: SAX resins demonstrated superior performance in lowering phenolic content in both PFJ and PPC through adsorption. The findings demonstrate the feasibility of using these specialized resins to enhance the quality of PPC for human consumption. Employing this sustainable method can unlock the full potential of potato protein as a nutritious food ingredient, which can contribute to the development of a more sustainable protein source.

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sciforum-095903: Robust HPLC determination of synthetic food colorants in alcoholic beverages

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Synthetic food colorants are widely added to alcoholic beverages to enhance their visual appeal and marketability and sensory experience by evoking color–flavor associations, drawing consumers' attention and reinforcing brand identity. These additives ensure uniformity and stability across batches, resist degradation caused by light and heat, and allow for a wide range of shades for flexible formulations while offering a more cost-effective and easily accessible alternative to natural options. Unfortunately, these substances can pose several health risks, including allergic reactions, carcinogenic concerns, behavioral changes, potential genotoxic effects, and toxicity affecting liver and kidney function, hence necessitating vigilant monitoring. To address these concerns, the present work aimed to develop a robust analytical method using minimal sample processing and high-performance liquid chromatography (HPLC) for accurate and rapid determination of synthetic colorants in alcoholic beverages. Analytical determinations were performed on an Agilent 1100 system equipped with a diode array detector (DAD), with separations accomplished on a C18 column using gradient elution with ammonium acetate buffer and acetonitrile as the mobile phase. The diode array detector was programmed to monitor the analytes at an Lmax value in the range of 350–800 nm. Quantification was based on the external standard method. The HPLC method was optimized and validated, demonstrating a fast run-time of less than 20 minutes, sensitivity, accuracy, and suitability for the routine analysis of alcoholic beverages containing a broad range of colorants (E 102, E 110, E 122, E 124, E 126, E 129, E 131, and E 133). Application of this method to commercially available alcoholic beverages on the Romanian market revealed compliance with the Romanian and EU regulations, with only a few products containing certain undeclared colorants in addition to those listed on their labels (E 110, E 126, and E 133). This highlights the method's suitability for addressing current concerns related to consumer safety and regulatory compliance in the alcoholic beverage industry.

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sciforum-102035: Safety Assessment of Brown Seaweed Species and Their Extracts

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Macroalgae are a source of important substances including lectins, carotenoids, flavonoids, phytosterols, and peptides. These chemicals have a variety of biological functions, including antibacterial, neuroprotective, antioxidant, and anticancer effects. As a result, much research has been conducted to produce algae extracts for use in the food, cosmetic, and pharmaceutical sectors, among other industries.

This study investigates the safety of three edible algae species and their extracts from the European Atlantic coast: *Bifurcaria bifurcata* (BB), *Ascophyllum nodosum* (AN), and *Fucus spiralis* (FS). The algae were analyzed for iodine, arsenic, plumb (ICP-MS), and mercury (hydrate generator). Possible organic pollutants of the algae and algal extracts were analyzed by gas chromatography with electro-capture detection (GC-ECD) and gas chromatography with flame photometric detection (GC-FPD) for the presence of pollutants, such as 22 pesticides, 4 PCBs, and 15 flame retardants. Additionally, the presence of 17 polycyclic aromatic hydrocarbons was also evaluated by liquid chromatography with fluorescence and diode array detection (HPLC-FLD).

Safety assessments, including Estimated Daily Intake (EDI), Target Hazard Quotient (THQ), and Total Cancer Risk (TCR), were calculated. The results indicated that while algae are rich in beneficial compounds, certain contaminants, particularly arsenic, can pose some health risks. The calculated Hazard Index (HI) was always below 1, and Total Cancer Risk (TCR) values were within the acceptable limit of 10^{-4}, indicating no significant health impact from the tested algae and extracts. Organic pollutants were absent except for trace levels of PAHs. Additionally, iodine levels, a critical safety parameter, were measured in all algae and their extracts, with some showing high concentrations. This study concluded that consuming algae within the recommended iodine limits—set by the European Food Safety Agency (EFSA) at no more than 0.15 mg per day—is safe and consistent with typical levels in the European diet.

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sciforum-098376: Safety of Organic Herbs and Spices – Overview of Rasff Notifications

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The EU Rapid Alert System for Food and Feed (RASFF) represents a fast and efficient way of transmitting information related to food safety, thus playing a crucial role in safeguarding public health. In light of the increased awareness of food safety and environmental protection, organic production has gained media, technological and research significance, as it excludes the use of pesticides, synthetic fertilizers and genetic modifications. Herbs and spices are widely used in culinary practices, playing a role in enhancing food flavor and thereby satisfying the organoleptic needs of consumers.

The aim of the present study was to gain insights into the contamination of the food category "herbs and spices" based on data from the RASFF database for the period 2011–2023 and thereby determine the risk to public health.

As a result of the company's own checking (50 notifications), official control of the market (26) and border control (18), a total of 94 notifications were reported in various types of organic products, with the highest number of notifications concerning paprika (19.1% of the total number of notifications), ginger (11.7%) and turmeric (7.4%), with raw materials originating mostly from India (26.6%), but also from Spain, Egypt, Germany, etc. Mycotoxins (28.7%), pesticide residues (25.5%), pathogenic micro-organisms (22.3%) and environmental pollutants (9.6%) stood out as the most common contaminants. The presence of pesticide residues (the most frequently found being ethylene oxide and chlorpyrifos) contradicts organic production rules, whereas increased presence of mycotoxins is expected because the exclusion of pesticides, primarily fungicides, increases crop contamination by fungi, leading to higher levels of their secondary metabolites—mycotoxins (up to 52.6 μg/kg of aflatoxin B1 in chillies). The majority of notifications (74) were characterised by a serious risk, with 54.2% of notifications categorized as alerts.

In conclusion, the presented findings should serve as serious warnings to public health protection authorities.

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sciforum-099314: Study of the presence of biogenic amines in silage destined for animal feed

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Silage is a technique that preserves animal fodder via fermentation. The health hazard associated with silage is the presence of pathogenic microorganism and/or their metabolites, including mycotoxins or biogenic amines (BAs). BAs can also occur in the rumen produced by microbial flora during normal fermentation. Then ruminants could receive these substances from both dietary and microbial sources. High exposure to BAs provokes lowered intake and is also linked to acute and subacute toxicity. Moreover, several studies have demonstrated that low levels of BAs have adverse effects on both growth performance and meat quality.

This work aimed to evaluate the presence of 6 BAs (putrescine, cadaverine, histamine, tyramine, spermine, and spermidine) in different types of silage (corn, grass, ryegrass, and unifeed mix) destined for animal feed. For this purpose, 18 silage samples were analyzed, determining pH, dry matter (DM), and BA content. The quantification of BAs was carried out by extracting the amines with trichloroacetic acid from the freeze-dried samples, followed by a Dansyl-chloride derivatization procedure and further HPLC-DAD analysis. The pH levels of the silages analysed were within the range of 3.7-8.3, and no correlation with the type of raw material was found. The results obtained showed the presence of putrescine, cadaverine, histamine, and tyramine in all of the samples, with tyramine being the BA providing the highest values, ranging from 10 to 227 ppm (DM basis). Putrescine came in closely, raising data ranging from 13 to 197 ppm (DM basis). The concentration of each amine varied among samples, indicating that factors such as the raw material and the fermentation process could determine the accumulation of BAs in silages. Due to the effect of BAs on animal performance and meat quality, more studies are needed to characterize this chemical hazard and to establish control strategies to prevent their presence in silage.

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sciforum-103258: The antigenicity of goat milk casein hydrolyzed using papain under optimum condition

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Cow milk allergy (CMA) is one of the most common food allergies worldwide, most frequently affecting infants and young children. Goat milk (GM) is widely advocated as a potential alternative source to cow milk due to its high digestibility, nutritional value, and hypo-allergenicity. Notwithstanding, protein homology between goat and bovine milk may still cause cross-reactivity and, hence may lead to allergic manifestations. Caseins are identified as one of the major milk allergens. In allergy management context, purified proteins are useful to precisely identify the specific milk protein the allergic individual is sensitive to. While enzymatic hydrolysis is commonly used to modify proteins to reduce their allergenicity, there is a lack of research on its efficiency with GM proteins. Therefore, the present work was undertaken to examine the effect of proteolysis using papain on the antigenicity of GM casein. Beforehand, Ion-exchange chromatography (IEC) was employed to study its effectiveness in extracting and purifying GM casein subunits. The one-factor-at-a-time (OFAC) approach was applied to optimize the process conditions to yield the highest degree of hydrolysis (DH). The antigenicity of the casein hydrolysate was evaluated based on the antibody binding capacity. The result showed that IEC was effective in purifying casein subunits of GM based on the distinctive bands observed on the SDS-PAGE of the collected fractions. The papain treatment (6 hours, 50 °C, pH 6.0, 1:20 enzyme: substrate (E:S) ratio) was determined to be the most optimum condition for GM casein hydrolysis (DH>50%) as assessed by the o-phthaldialdehyde (OPA) method, with E:S yielding the most significant difference (p0.05). Both indirect and sandwich enzyme-linked immunosorbent assay (ELISA) approaches indicated that hydrolysis using papain can effectively reduce the allergenic potential of GM casein. The findings suggest papain-generated GM casein hydrolysate may be useful as an alternative protein source, particularly to produce innocuous foods for CMA patients.

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sciforum-099882: The quality of organic kefirs produced with kefir grains and freeze-dried starter cultures

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Organic dairy products made from organic milk, are gaining popularity among consumers. Fermented dairy beverages are products with excellent nutritional properties. Among them, we can distinguish kefir, which is produced with the use of started culture containing lactic acid bacteria and yeasts. Traditionally, for kefir production, kefir grains are used; however, the modern dairy industry often produces kefir with the use of freeze-dried cultures. This study aimed to analyse the quality of kefirs produced from organic cow milk with two fermentation times (12 and 24h) with the use of kefir grains (G12 and G24) or freeze-dried cultures (L12 and L24). This study was conducted during a 3-week refrigerated storage period. Within the study, physicochemical properties, color, index of syneresis, texture, sensory properties, and microbiological quality were evaluated. The results proved that organic cow milk is a suitable raw material for kefir production. Both the type of starter culture and the fermentation time affected the quality characteristics of organic kefir. Using the freeze-dried culture and a fermentation time of 24 h, a kefir with the lowest tendency to syneresis (3.65-9.62%) and the best textural properties and desired sensory characteristics was obtained. Kefir grains had a better acidification ability and the resulting products had higher count of yeasts (5.69-6.88 log cfu/g) compared with kefirs obtained with freeze-dried cultures (3.81-4.71 log cfu/g). The count of lactobacilli and lactococi was at a similar level in all kefir variants. The study showed that both freeze-dried cultures and kefir grains are appropriate to produce organic kefir. However, kefir grains, as a traditional form of kefir culture, may be preferred in organic kefir production. The longer fermentation time of 24 hours is more appropriate for the production of kefir with both traditional kefir grains and freeze-dried culture. The obtained organic kefirs can be introduced to the market due to their good quality properties.

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sciforum-099538: The removal of pesticide residues and their effects on tomato quality using cold plasma

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Pesticides control pests and diseases in fresh vegetables. However, their overuse impacts the environment and human health. Tomatoes are the main fresh vegetable consumed in Chile and are reported by the national food surveillance as one of the most contaminated due to pesticide residues. Cold plasma is an oxidation process suitable for reducing chemical contaminants and improving food quality. This study aimed to evaluate the effect of cold plasma on removing pesticides in tomatoes (iprodione, chlorothalonil, linuron, lambda-cyhalothrin) and some quality indicators. Tomatoes were sprayed at a double field rate (to emulate an overuse) and subjected to cold plasma for 3 minutes at 40 KHz. Treatments and controls were stored at 7°C for 21 days. Tomato samples were collected on the 1st, 6th, 11th, 16th, and 21st days after treatment, and the following parameters were evaluated: firmness, soluble solid, titratable acidity, phenolic content, lycopene, and ascorbic acid. The pesticide residues were analytically validated according to ISO 17025:2017 and SANTE guidelines. The pesticides were extracted via the QuEChERS method and analyzed using GC MS/MS and LC-MS/MS. The results showed a reduction in all pesticide residues after 24 hours for iprodione, chlorothalonil, linuron, and lambda-cyhalothrin: 37%, 36%,36%, and 39%, respectively. The firmness values ranged between 15 and 35 Newtons; the soluble solid values between 4.3 and 6.4 brix; the titratable acidity values between 0.24 and 0.50 dry matter/100 g tomato; the phenolic content values between 0.14 and 0.47 mg gallic acid/100 g tomato; the lycopene value between 2 and 5.7 mg quercetin /100 g tomato; the ascorbic acid between 5.6 and 16.5 mg lycopene/100 g tomato. This study's findings demonstrate the high effectiveness, safety, and convenience of cold plasma in removing tomato pesticide residues, which have the potential to significantly enhance dietary safety and provide a crucial reference for tomato cleaning.

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sciforum-099386: Use of a time-to-failure model to evaluate the shelf-life of freeze-dried, carrot juice-fortified apples stored under controlled conditions

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The consumption of β-carotene has been shown to offer several health benefits, including a reduced risk of diseases such as cancer, a bolstered immune system, and protection against age-related eye degeneration. However, modern lifestyles often hinder the intake of this essential nutrient due to the increasing consumption of processed foods for convenience. Dehydrated foods provide an alternative option as they are convenient, possess a long shelf-life, and retain many of their nutrients. The aim of this study was to enhance the total carotenoid (TC) content in Pink Lady apples through vacuum-impregnation with carrot juice at various concentrations (20, 30, 40, and 50° Brix) and to determine the shelf-life of the treated apples after freeze-drying. The highest TC concentration (12.30±0.48 mg β-carotene/100 g) and minimal shrinkage were achieved using 20° Brix juice (20BJ). The freeze-drying of vacuum-impregnated apples with 20BJ reduced the time to reach equilibrium compared to fresh apples. The shelf-life of the freeze-dried impregnated samples was examined using time-to-fail (TTF) models under various conditions, including package permeability ($P=2.17\times10^{-15}$ and 1.04×10^{-6} g / s Pa m), temperature (T=15, 25, and 35 °C), and relative humidity (H=0, 35, and 75%). The TTF predictions indicate a shelf-life exceeding 105 days for $P=1.04\times10^{-6}$ g/ s Pa m evaluated at H35%. Consumers preferred the impregnated freeze-dried apples with intermediate hardness textures (above 18.14N) and TC>0.81 mg β-carotene/100 g when stored at H=35% and T=15°C. The model predicts the time when the TC value of 100 g of the sample does not provide the minimum recommended daily intake of β-carotene for an adult. Optimal storage conditions were at intermediate H and low temperatures. These findings demonstrate the effectiveness of vacuum impregnation with carrot juice and freeze-drying as methods to enhance the nutritional value and shelf-life of apples.

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sciforum-095684: Validation of a chromatographic method to dose ochratoxin A in green coffee

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Green coffee and its derivatives, which include beverages, dietary supplements, additional foods, and nutraceuticals, are appreciated for their potent antioxidant properties. However, there is a significant risk of the contamination of green coffee and its products by fungi and their mycotoxins, particularly ochratoxin A (OTA). This contamination can happen in traditional and organic green coffee during various stages, such as berry picking, crop storage, and transportation. Ochratoxin A (OTA) is known to have harmful effects on the kidneys (nephrotoxicity), liver (hepatotoxicity), and nervous system (neurotoxicity) and can cause congenital disabilities (teratogenicity) and cancer. This work validated a chromatographic method to measure OTA levels in green coffee following the UNI CEI EN ISO/IEC 17025: 2018. The analytical method's validation is essential to guarantee data traceability and avoid measurement errors. The experimental design involved four steps: extraction with polar solvents, elimination of interfering substances using an affinity column, toxin separation by reversed-phase chromatography, and spectrophotometric identification of toxins. The validation process demonstrated that the method can recover OTA levels (76%) while conforming with the performance criteria required for toxins by Regulation (EU) no. 519/2014. The regression coefficient (r-value = 1) and residual analyses proved the linearity of the calibration curve; LOD, LOQ, and the measuring range confirmed that the test detects the minimum OTA levels permitted by the current legislation in coffee (3 μg/kg - 5 μg/kg). The test's precision (with a standard deviation of 0.0073) and accuracy (within ± 0.64 μg/kg) were considered statistically satisfactory. The method's results were trustworthy, with a confidence level of 95%, based on uncertainties determined through the metrological approach. Therefore, the analytical method was considered sensitive, precise, accurate, and suitable for determining ochratoxin concentrations in compliance with the regulations in force.

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Session 9. Food Cultures, Policy and Consumer Science

sciforum-099736: Perceptions of handmade food: A questionnaire survey exploring their impact on food evaluations

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People's preferences and perceptions of food change depending on the information they receive prior to eating. According to previous studies, preferences and sensory perceptions change with positive naming and self-production. In this study, we focused on information regarding the food preparation process and aimed to investigate the influence of the presence of a person cooking on food evaluation. An online questionnaire survey was conducted with 2233 participants (57.9% male, 42.0% female, M_{age} = 43.6 years) recruited through a crowdsourcing service. For the same-food-photo (rice ball or miso soup), participants had to complete a nine-item questionnaire related to their food evaluation using a seven-point Likert scale, divided into cases where only the name of the food was written and where it was written as being machine-made or handmade. We also administered the same questionnaire divided into cases with text-only recipes, with photos of cooking utensils and ingredients, or with photos of the cook. The groups labeled with only the food names and the handmade label had significantly higher scores than those labeled as being machine-made regarding healthiness, time and effort, and whether the food was made with love. The text-only versions significantly improved the appearance of the miso soup compared to photos with the cook. This study revealed that information regarding food being handmade had a more positive impact than that which was machine-made, but this was comparable to text-only photos. Because the handmade label can be influenced by context, future research should investigate in more detail the circumstances in which the handmade label influences it .

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sciforum-103439: Australian Indigenous fermented bush food culture

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Introduction: The ‘bush tucker diet’ is the heritage of Australian Aboriginal people and signifies their identity, culture, and a way of healthy eating. The Indigenous population has been subjected to limited food supplies, a lack of affordable quality produce and nutritional education, and the non-accessibility of traditional bush foods. This diet is diverse including fruits, seeds, and fermented food with antioxidative potential, as shown in vitro for the following species: *Santalum spicatum*, *Acacia ligulata*, *Beyeria leshnaultii*, *Acacia kempeana,* and *Euphorbia drumondii*. This review aims to explore data about Australian Indigenous fermented bush foods.

Method: A non-systematic search on databases was conducted during July-Oct 2023 (PubMed, Web of Science, and Google Scholar) using the following key terms: ‘Australian Aboriginal fermented foods’, ‘fermented foods in Indigenous Australian culture/history’, and ‘Indigenous fermented foods’. Two authors independently reviewed the published articles during the last five years. The paucity of available data led to narrative synthesis, and to our knowledge, this is the first narrative review in this area of study.

Results: There is evidence that Australian Aboriginal people produced several fermented drinks including *mangaitch* from flowering cones of Banksia in Western Australia, *way-a-linah* from Eucalyptus tree sap in Tasmania *kambuda* from crushed nuts of the palm-like Pandanus tree in the Northern Territory, and *Damper bread,* involving the fermentation of locally produced seeds. Torres Strait Islanders produced *tuba* from the fructifying buds of coconut palms. The drinks have diverse microflora profiles: *Proteobacteria (65%), Firmicutes (3%), Actinobacteria (2%), and Bacteroidetes* with the fungal species *Saccharomycetes, Dothideomycetes, Tremellomycetes, Leotiomycetes, and Sordariomycetes* (50%). However, for fermented indigenous foods to have far-reaching benefits beyond the gut, it is imperative to investigate the taxonomic profile of microbial species, followed by well-defined human feeding studies.

Conclusion: Indigenous fermented food culture could have health, social, and nutritional benefits and we need further studies to explore the gut microbial data.

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sciforum-094517: Combating Food Fraud in Egypt: A Policy Implementation Evaluation

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This research investigates the efficacy of Egyptian government policies in combating the deliberate adulteration of food, often termed "food fraud," for personal gain. Combating the deliberate adulteration of food products has become a growing policy priority for governments around the world. Food fraud not only poses a significant risk to public health and undermines the reputation of Egypt's food sector, but also hinders efforts to attract investment, tourism, and exports.

The study delves into Egypt's existing legal framework and the current practices employed to address food fraud across the entire food production chain, from initial production to consumption. Utilizing in-depth interviews with policymakers and enforcement personnel, the research identifies critical obstacles hindering effective prevention. These obstacles encompass inconsistencies within regulations, deficiencies in management systems, and limitations in inspection and laboratory capacities. Furthermore, a lack of public communication, awareness, and education regarding food fraud is identified as a contributing factor.

The research culminates by proposing a comprehensive set of recommendations to bolster Egypt's efforts in combating food fraud. These recommendations prioritize updating regulations, fortifying management systems, augmenting inspection and laboratory services, and fostering public education and communication. By implementing these measures, Egypt can establish a more robust food safety system, safeguarding its citizens and food industry.

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sciforum-099871: Consumer perspectives on meat analogues in Ukraine: Insights from an online survey

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Interest in a healthy lifestyle and sustainable foods has led to the development of innovative plant-based meat analogues in many countries. However, acceptance of these analogues varies among countries. In this study, we examined acceptance of meat analogues by Ukrainian consumers using an online survey. The participants (n=360, 19-66 years) were asked about their background and dietary habits, and then, they evaluated agreement with several statements by giving the scores from 1 to 100. The statements included the importance of certain ingredients in meat analogues, the presence of additives, attractive appearance, taste and texture, protein content, and price. The data were analysed with SAS 9.4 (SAS Institute, Cary, NC, USA), using GLM to investigate the effects of gender and education on the scores for each statement. A total of 48% of the participants in the survey stated that they had never tasted plant-based meat analogues before, and 42% reported that they are interested in eating meat analogues. Generally, no differences between male and female participants were found in the interest in meat analogues and the scores of importance ($p>0.05$). Participants with education above a master's degree were more sceptical towards new foods ($p=0.038$). The attractive appearance, taste and texture, and protein content were less important for this group of participants (p005 for all). The presence of additives was less important for participants with education below a master's degree. Tastiness and healthiness were deemed most important in consuming meat analogues, while sustainability was least (p0.05 for all). Participants with education above a master's degree more often selected beans in meat analogues as attractive, whereas those with a master's degree or below preferred cereals. We concluded that interest and attitudes towards meat-based analogues did not differ between genders but differed between the participants with different education. This work was supported by the Swedish Institute (SI), project number 00122/2022.

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sciforum-103393: Determinants of cow's milk and plant-based milk substitute consumption: cross-cultural study of Portuguese and Irish young adults

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Introduction: Among European countries, consumption of milk has recently declined, while plant-based milk substitutes (PMBSs) have gained popularity, especially among young adults. Understanding the dynamics underlying these changes is particularly relevant to the agri-food sector. This study aimed to explore the determinants of cow's milk and PBMS consumption among Portuguese and Irish young adults.

Methods: A self-administered online questionnaire was distributed to young adults (18-35 years) recruited through the academic communities of the University of Porto and University College Cork. The reasons for consuming or not consuming cow's milk and PBMSs were assessed using 10-item seven-point Likert scales. Exploratory factor analysis was used to identify factors within each scale, and multigroup confirmatory factor analysis was used to confirm measurement invariance across countries. Binary logistic regression was performed to quantify the relationship between sociodemographic characteristics, diet-related attitudes and behaviours, and the consumption of cow's milk and PBMSs.

Results: A total of 645 participants was obtained, of which 57.2% consumed cow's milk, mostly UHT milk (among Portuguese) and fresh milk (among Irish) and 54.4% consumed PBMSs (mainly almond and soy). The most important reason for consuming cow's milk was complementarity (among Irish) and familiarity and taste (among Portuguese); for PBMSs, in both countries, it was health and sustainability. The most important reason for not consuming cow's milk was health/environmental concerns, while for PBMSs it was taste. Gender, level of trust in different sources of diet-related information, dietary patterns, and food restrictions showed significant associations with cow's milk and PBMS consumption, although differently among Portuguese and Irish individuals.

Conclusions: These results highlight the importance of targeting specific product characteristics, namely through the optimisation of production and development processes, to approach young consumers' expectations. Educational strategies on the advantages and disadvantages of each product would also be important to enable informed food choices.

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sciforum-101399: Effects of Red Wine Consumption on Cardiovascular Health: A Review of Hypertension and Lipid Profile Studies

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Background

This review aims to elucidate the clinical impact of Red Wine (RW) on Cardiovascular Disease (CVD) parameters and assess the relevant compounds in RW.

Methods

This review analyzed 29 randomized controlled trials (RCTs) to assess the impact of RW consumption on lipid profile and blood pressure. A comprehensive PubMed search was performed using the following keywords: “red” AND “wine” AND “humans” AND “hypertension” AND “lipids”. The studies included were published in English on PubMed between January 1, 2000, and February 28, 2023, and they were selected through a rigorous search and screening process.

Results

The review identified 13 studies focusing on hypertension and 16 studies examining lipid parameters. For hypertension, five studies reported a reduction in systolic blood pressure (SBP), three studies reported an increase, and four studies reported a reduction in diastolic blood pressure (DBP), using RW types including standard RW, dealcoholized RW (DRW), and polyphenol-stripped RW (PSRW). Regarding lipid profiles, cholesterol efflux decreased in one study. Triglyceride (TG) levels increased in two studies and decreased in two studies. Total cholesterol (TC) levels increased in three studies and decreased in three studies. Low-density lipoprotein (LDL) levels increased in two studies and decreased in two studies. High-density lipoprotein cholesterol (HDL-C) levels increased in four studies and decreased in one study. The LDL/HDL ratio decreased in two studies. F2-isoprostane levels decreased in three studies and increased in one study. Lipid peroxidation decreased in two studies. Homocysteine (HCY) levels increased in one study.

Conclusions

Moderate RW consumption shows a mixed impact on blood pressure and lipid profile, influenced by ethanol and polyphenols such as resveratrol, flavonoids, and tannins. Short-term studies often report on the beneficial effects on SBP, DBP, and lipid profiles, particularly with standard RW, DRW, and PSRW. However, long-term observational studies show an increased risk of CVD associated with ethanol in RW.

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sciforum-098640: Evaluation of food waste reduction in German private households—Development of an app approach

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A declared goal of the German Federal Government is to halve per capita food waste in Germany at the retail and consumer level by 2030. Many initiatives have been working for some time on contributing to this goal by, e.g., educating households about food waste and providing them with help to reduce food waste. The effectiveness of these efforts has hardly been systematically investigated to date. The German Federal Government has therefore implemented the "Dialogforum private Haushalte 2.0" project.

Within this project, the development of an app is being driven forward. This app is meant to enable the systematic measurement and evaluation of food waste generated in private households. The app is currently under development. With its measurement function tool, it provides a basis for private households to track food waste and receive information and incentives to further reduce food waste. Supplementary mechanisms facilitate the evaluation of different means to reduce household food waste, e.g., (i) live-generated statistics can be used to compare food waste quantities with socio-demographically similar households in Germany; (ii) practical tips could be provided, for example, on the shelf life of food and reasons for throwing it away (behavior-based threshold values); and (iii) gamification elements such as awards or badges offer incentives to positively change individual behavior. Beyond this, it is possible to evaluate various actions (also externally organized and/or corporate) with the aim of reducing food waste in private households, including automated data reports for data analysis by the action organizers. As part of the conference, possible pitfalls and hurdles to implementation are discussed.

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sciforum-101895: Exploring University Student Perspectives on Food Insecurity

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Food insecurity (FI) can create situations of hopelessness and increased difficulties with life activities. It can be harmful to the population of college students. Having inadequate access to sufficient and nutritious foods during college can affect academic performance and career success, in addition to other negative consequences. In much of the current research on FI at U.S. college campuses, demographic categories including race and socioeconomic status show trends of greater vulnerability to FI in minority groups and first-generation students. At one university, concerns about FI have been addressed with the creation of programs such as an open pantry, but there is a lack of evidence on the experiences of students affected by this phenomenon. This study focused on exploring personal accounts of students with FI conveyed through a survey and interview process. Student perspectives, initiatives, and concerns regarding the frequency of food insecurity and how it is addressed by the university were gathered as data and analyzed. The results of the survey indicated that around 40% of student respondents could be food-insecure based on their frequency of limiting meal quantity due to financial burdens. The interview data suggested that many students are passionate about addressing FI concerns, which was evident in the suggestions for improvement in terms of policy and administration to facilitate a more food-secure campus. Understanding the students' experiences and insights offers an opportunity for additional support and programs for students struggling with food insecurity.

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sciforum-099529: Innovative Approaches to the Inheritance of Cooking Skills and Food Culture in Rural Taiwan

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Rural areas in Taiwan are currently confronting substantial challenges in the preservation and transmission of cooking skills and food culture. This study aims to employ an innovative, interdisciplinary methodology to address these issues comprehensively. By engaging in the critical reflection and validation of foundational theoretical frameworks, conducting on-site examinations of rural cooking practices, and performing qualitative interview research, this study investigates the pivotal concerns related to the inheritance of culinary techniques and food culture in these regions. Focusing on elderly individuals in rural Taiwan, the research utilizes micro-ethnographic methods and in-depth interviews to formulate a robust model for the transmission of culinary skills and food culture.

The findings reveal that the cultivation and development of food culture in rural areas require active involvement from the younger generation returning to their ancestral homes. Furthermore, the preservation and dissemination of cooking skills can be significantly enhanced through the application of new media technologies. Traditional culinary skills, passed down by rural elders, can be effectively transformed into professional recipes within the framework of modern restaurant business models. These insights contribute valuable knowledge to practical applications in the rural catering industry and provide a referential framework for the sustainable development of food culture.

This study further elaborates on the complexities rural areas face in maintaining traditional cooking techniques while adapting to contemporary cultural evolution. By integrating advanced technologies with traditional practices, the research proposes a sustainable model applicable to various regions encountering similar challenges. This holistic approach not only aids in the preservation of the rich culinary heritage of rural Taiwan but also incentivizes younger generations to engage with and perpetuate these traditions, thereby ensuring their continued relevance and vitality.

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sciforum-101999: Knowledge and opinions of Polish students regarding gluten-free diet

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A gluten-free diet is the mainstay of treatment for people suffering from gluten-related conditions such as coeliac disease or wheat allergy. There is also a growing popularity of the gluten-free diet among people who do not suffer from gluten-related diseases, who attribute to it such benefits as improved well-being or weight reduction. The aim of this study was to assess the knowledge and opinions of Polish consumers regarding gluten-free food. This study was carried out using an original online survey questionnaire. The research group consisted of 345 university students in Warsaw (Poland) aged 18-25 years old (85%). The results obtained indicated that nearly 14% of the students have been in the past or are currently on a gluten-free diet, and more than 47% of the respondents know at least one person following this type of diet. The reason for switching to a gluten-free diet was mainly indicated to be due to health issues. Following a gluten-free diet adversely affects many aspects of daily life for students and their relatives (high cost, limited choice of products in shops and restaurants, lack of understanding from those around them, and inferior taste and composition of products). Respondents' main source of knowledge about gluten-free foods and diets was the Internet (41%), and the most common place to buy the products was a supermarket (51%). The most important factors when purchasing gluten-free products were taste, product composition, and price. In questions testing the knowledge of gluten-free foods, those studying majors related to food science and life sciences were more likely to select the correct answers than students of engineering, medicine, and economics. There is a need to increase students' awareness of gluten-free food knowledge. The results obtained can provide feedback to producers, retail chains, and food services in terms of meeting consumer expectations.

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sciforum-100893: Multisensory Interaction Patterns in Food Innovation Development: A Case Study of Gustatory Interaction

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The quantification and optimization of food sensory quality based on sensory interactions have become important research directions in the field of food perception. Among these, the study of multisensory flavor interactions is particularly extensive. Fundamental taste interactions, such as sour-sweet perception, and how they affect consumer perception and cognition, as well as the application of umami-salty interactions in the development of salt-reduced products, are current research hotspots. This report will delve into the interactions of basic tastes like sour-sweet and umami-salty, and their significance in guiding actual product development by combining quantitative methods from perceptual physiology and psychology.

Firstly, in the study of sour-sweet interactions, the weakening effect of sourness on sweetness perception is well-known. However, in real yogurt systems, we found that consumers' perception of sour-sweet balance or harmony is not solely determined by the intensity of sourness and sweetness. It is also influenced by the relative release speed and proportion of sourness and sweetness in the mouth. In the study of umami-salty interactions, we found that the enhancement of salty taste intensity by umami agents depends on whether the umami agent is from a single source or a combination. At the same sodium ion concentration, a combination of umami agents can enhance the salty taste. This result has been partially verified through organoid cell receptor experiments and event-related potential (ERP) experiments.

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sciforum-097397: The Living History Connoisseur—an unexpected consumer of traditional fermented products

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The Living History Connoisseur—an unexpected consumer of traditional fermented products

Introduction:

Traditional fermented products were once part of the human diet in many cultures worldwide. Industrialisation and the introduction of refrigeration have led to reduced home fermentation practices in the Western world. The prevalence of traditional fermented products in Western diets is currently unknown. Identifying a suitable cohort is challenging and costly. Living History practitioners (LHPs) have expertise and knowledge of historical and traditional practices, including food processing methods such as fermentation, which they may utilise in their daily lives outside re-enactment to incorporate traditional fermented products into their diet. They represent a unique cohort for future studies of the effects of traditional fermented foods on the gut microbiome of populations following a Western diet, as differences in the microbial composition and microbial metabolites in commercial and traditional fermented products may lead to different health outcomes in different populations.

Methods:

The aim of this cross-sectional observational study was to evaluate whether LHPs consume traditional fermented products as part of their diet. A Qualtrics survey was distributed to 311 LHPs and filled out by 77 respondents. The questionnaire included enquiries regarding the frequency of consuming traditional and conventional fermented food, as well as determining the product types that were consumed. Data were analysed using Qualtrics software.

Results:

The results of this study indicate that 69% of LHPs consume traditional fermented products at least occasionally. A total of 68% of participants were female. More middle-aged and older LHPs consume traditional products compared to younger LHPs. The most commonly consumed products were traditional fermented vegetables, traditional fermented grains, fruits, and traditional fermented milk products.

Conclusion:

LHPs are a unique Western cohort for studies of the effects of traditional fermented products on the gut microbiome.

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sciforum-098731: Time to Cessation of breastfeeding and association factors among women of child aged 2 to 3 years in Bishoftu Town, Oromia regional state, Ethiopia, 2022.

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Background: Breastfeeding is the process of giving a child breast milk that is either expressed or given straight from the breast. It is advised that nursing begin as soon as the baby is born, be continued exclusively for six months, and then resumed for up to two years. The study aims to assess the time to nursing cessation and related factors among mothers of children ages two to three in Bishoftu town, Oromia regional state, Ethiopia, in 2022.

Methods: A cross-sectional study design centered on the community was carried out. The study comprised 389 mothers in total. Through in-person interviews, a pretested, structured questionnaire was used to gather data. After that, it was imported into EpiData 4.4.2 and exported to SPSS 25 for examination. To describe the data, descriptive statistics were calculated. Cox-proportional hazards regression models, both univariate and multivariable, were utilized to find the factors linked to the time until nursing cessation. The intensity of the link was reported using both crude and adjusted hazard ratios (AHR) with a 95% confidence interval. A HR of P0.05 was deemed statistically significant.

Result: A total of 389 mothers participated in the study, with a response rate of 97.7%. The incident rate of cessation of breastfeeding before 2 years of age is 48.09 per 1,000-person month. In the multivariate Cox regression model, mother's occupation (AHR = 1.593, 95% CI; 1.130, 2.247), having a younger child (AHR = 2.40, 95% CI, 1.735, 3.319), singleton pregnancy (AHR = 0.483, 95% CI, 0.335, 0.697), use of formula milk (AHR = 1.588, 95% CI, 1.217, 2.071), reactive HIV status (AHR = 18.89, 95% CI, 10.44, 34.16), and unknown HIV status (AHR = 0.418, 95% CI: 0.217, 0.806) were significantly associated with time to the cessation of breastfeeding.

Conclusion: There is a significant incidence of breastfeeding discontinuation.

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sciforum-103281: Unveiling consumers' awareness, attitudes and motivations behind entomophagy in Greece: A Theory of Planned Behavior approach

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Introduction: Entomophagy is a promising solution to global food security challenges, offering a sustainable and nutritious alternative to traditional animal protein sources. We sought to investigate consumer behavior toward entomophagy and define the determinants of insect-based food consumption and purchase intentions. We explored motivational factors focusing on food and socio-cultural environment, past experiences and potential neophobic reactions. Also, we addressed the perceived barriers to insect-based food alternatives' availability in food markets and restaurants.

Methodology: Qualitative exploratory research was performed employing personal in-depth interviews based on a semi-structured questionnaire with open-ended questions. Data were selected from a non-probabilistic purposive sample of 70 adults and included information on the awareness and acceptability of entomophagy and insect-based food products organized according to the theory of planned behavior.

Results: Consumers were opposed to entomophagy, expressing their disappointment at the prospect of edible insects being sold in supermarkets and restaurants in the future. A strong aversion to insect-based food products was revealed, with individuals expressing feelings of disgust and repulsion. Health concerns about food safety and potential food poisoning were prevalent, leading to a general reluctance to incorporate edible insects into dietary practices. Personal beliefs, lifestyle factors and associated cultural stereotypes seemed to influence edible insects' acceptability; however, the lack of awareness of entomophagy's benefits, especially in younger consumers, might be attributed to inadequate information.

Conclusions: Dietary preferences in Greece were found to be mostly related to cultural norms, health consequences and perceived food attributes, whereas sustainability considerations in insect-based food choices were prevalent only in a niche segment. This emphasized the necessity for consumers' education and exposure to novel foods that will curb neophobic reactions, and a carefully designed marketing strategy to alter consumers' well-rooted, negative beliefs; generate the acceptance of insect-based foods; and promote sustainable alternatives of meat products in dietary habits.

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sciforum-103297: Up-to-date and comprehensive data on the evolving consumption patterns of energy drinks: in search of a nutrigenomics approach

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Energy drinks (EDs) have surged in popularity, becoming the fastest-growing products in the beverage industry after bottled water. Children consume them before school, athletes use them for performance enhancement, and adults rely on them for energy and mood improvement. Nearly 70% of European teenagers consume EDs, according to the European Food Safety Authority (EFSA). However, this widespread use is concerning due to the lack of regulation and the low nutritional quality of these beverages. EDs have been linked to various health issues, including cardiac arrhythmias, gastrointestinal disturbances, neurological effects (anxiety, depression, insomnia), and organ inflammation, exacerbated by their high sugar content (12 ± 3 g/100 mL). With a caffeine content of 160 mg per 500 mL, EDs pose health risks beyond caffeine alone, intensified by other ingredients like taurine, carnitine, ginseng, and guarana. Systematic review results indicate a rise in ED consumption across age groups, correlating with increased blood pressure and sleep disturbances. Nutrigenomics research, exploring gene–nutrient interactions, offers potential for optimizing ED consumption to enhance benefits and reduce risks. In conclusion, there is a pressing need for further research, public education, and the development of safer ED alternatives. This study aims to provide comprehensive data on the evolving use of EDs to support targeted interventions and policy development. A systematic review was conducted following the PRISMA guidelines, searching PubMed and ScienceDirect for terms like "epidemiology," "prevalence," and "energy drink" without restricting the publication year.

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Session 10. Application of Artificial Intelligence (AI) and Machine Learning in The Food Industry

sciforum-099400: Data analysis of protein–flavor interactions using classification and deep-learning techniques

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Analyzing molecular interactions among food components is of key interest for novel food formulations and for optimizing their shelf-life, but the complexity of food matrices often poses difficulties. In this work, we formulated model systems with gelatin placed in indirect contact with different flavors (citral, cinnamaldehyde, and vanillin) and stored at room temperature during 60, 120, and 150 days. We analyzed how protein characteristics changed over time using Fourier transform infrared spectroscopy viaattenuated total reflectance (FTIR-ATR). The spectra included the amide I, II, and III regions and the region associated with glycation products (altogether around 1850-1100 cm-1). The data (N=37, 750 features) werethen analyzed using Python, and principal components analysis (PCA) was also performed, obtaining a separation into classes depending on flavor and storage time. Features associated with the first principal component were correlated with protein–flavor interactions (wavenumbers in amide III, glycation products, and amide I regions), while the second was associated with changes undergone during storage (wavenumbers in amide I region, including C=O stretching). Afterwards, data were sorted into classes according to flavor or storage time using two models with a 70-30% train–test split: random forest classification (RFC; with leave-one-out cross-validation) and a neural network consisting of a multi-class perceptron (MCP, with 1024 entry nodes and 4 or 3 output nodes, with cross-entropy loss). In both cases, the data were classified (accuracy for flavor classification: 81%—RFC and 83%—MPC; accuracy for storage time: 88%—RFC and 92%—MPC). The most relevant features selected for the RFC model corresponded to the key features previously obtained by PCA, while the MPC showed a greater degree of accuracy in the classification of the systems. This work showcases a novel application of data analysis techniques to simplify protein–flavor interaction complexity and analyze its key features, which could be useful for food formulation development.

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sciforum-099304: Machine learning and isotopic composition of foods: determination of the geographical origin of milk and eggs

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Knowing the geographical origin of food products is crucial to guaranteeing their authenticity and quality, as it helps prevent fraudulent practices in the food industry. The isotopic composition of food products varies depending on the agroclimatic conditions of origin.

The milk dataset (142 samples) used included measurements of various stable isotopes in whole milk ($\delta^{13}C$, $\delta^{15}N$, $\delta^{18}O$, and $\delta^{2}H$). On the other hand, the eggs database (180 albumen samples) included measurements of $\delta^{13}C$, $\delta^{15}N$, and $\delta^{34}S$. Both databases were obtained externally. These isotopic compositions were analysed using machine learning algorithms that are currently widely used in different fields.

In this research, random forest (RF), support vector machine (SVM) and artificial neural network (ANN) were used to evaluate their effectiveness in predicting geographical origin according to the literature and digital data sources.

The selected algorithms presented different behaviours in the testing phase. In this sense, the ANNs presented the best performance in determining milk's geographical origin (accuracy upper than 89%); on the other hand, the RF model presented the best performance in predicting eggs' geographical origin (upper than 90%).

The results obtained from this research proved the capacity of this learning algorithm to ensure the authenticity of these products; however, further research is necessary to optimize the developed models using different distribution data, adding more experimental cases or modifying the variability of the groups, among others.

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sciforum-101569: Artificial Intelligence in Food Safety Assessment and Monitoring: A Comprehensive Review

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Introduction

Artificial Intelligence (AI) technologies are revolutionizing the field of food safety assessment and monitoring by offering advanced tools for the prediction, detection, and management of food-borne hazards. This paper explores the combating of food fraud and adulteration using Artificial Intelligence. Food fraud and adulteration are critical issues that threaten public health, consumer trust, and the integrity of global food supply chains. Despite regulatory efforts, traditional methods for detecting and preventing food fraud are often insufficient due to their reliance on manual inspections and limited testing capabilities. The complexity and scale of modern food supply chains require more advanced solutions. These illicit practices involve the intentional misrepresentation or alteration of food products for economic gain, including mislabeling, dilution, and contamination. This abstract explores the role of Artificial Intelligence (AI) in addressing these issues, focusing on detection, traceability, and prevention strategies.

Methods

AI-based methods such as machine learning, deep learning, natural language processing and block chain integration are analyzed for their ability to enhance various aspects of food safety. AI technologies, particularly machine learning and deep learning, offer new capabilities for identifying and mitigating food fraud.

Results

These AI methods can significantly enhance the detection, prevention, and management of food fraud and adulteration by providing more accurate, efficient, and scalable solutions than traditional methods.

Conclusions

In conclusion, AI holds tremendous potential to revolutionize food safety by improving quality control, risk assessment, traceability, monitoring, personalized nutrition, and regulatory compliance across the food supply chain. By leveraging the power of AI, food manufacturers, regulators, and consumers can work together to ensure a safer and more secure food system for all.

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sciforum-096226: Artificial-intelligence-driven nondestructive detection and Internet of Things monitoring for improving the postharvest quality of fruits and vegetables

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Introduction

Artificial intelligence is a powerful tool that can be used to support the sensing detection and monitoring of the postharvest quality of fresh fruits and vegetables, which can ensure product standardization and high value, reduce postharvest losses, and improve the comprehensive utilization rate.

Methods

The optical transmission characteristic parameters of fruit and vegetable tissue were calculated using the reverse doubling method, and the light scattering characteristics, penetration depth, and energy field distribution of fruit and vegetable tissue were analyzed. The correlation between optical characteristic parameters and fruit and vegetable quality was established using machine learning, which provided method support for the structural design of a fruit and vegetable quality nondestructive detection system. On the other hand, a fruit and vegetable storage monitoring and early warning system integrating temperature, humidity, and gas sensors was developed, and a dynamic monitoring and early warning model of the fruit and vegetable deterioration process was established using combining deep learning.

Results

The intelligent optimization algorithm was used to extract the spectral feature signal and was combined with the artificial intelligence algorithm. Moreover, the stable and high-precision prediction model of the key indicators of fruit and vegetable quality was established, and the correlation coefficient of the prediction models was found to be above 0.90. The spatio-temporal dynamics model (used to find the relationship between multi-source environmental factors and quality) and the early warning and discrimination model (used to identify the interaction between environmental factors) were established, and the early warning accuracy was found to be greater than 92%.

Conclusions

A series of fast, high-precision, nondestructive, online, and intelligent detection systems used for improving main quality and safety indexes of fruits and vegetables were developed. The offline detection time was less than 2 seconds and the online detection speed was 3 samples per second. IoT sensing and Internet technologies were established as intelligent real-time monitoring, evaluation, and early-warning technologies for fruits and vegetables. Artificial intelligence drives the intelligent, green, sustainable, and high-quality development of agricultural products.

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sciforum-098610: Bioinformatical characterization and machine learning classification of seed storage proteins

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Introduction: Seed storage proteins have traditionally been classified using T.B. Osborne's sequential extraction method, categorizing them into albumins (water-soluble), globulins (salt-soluble), prolamins (alcohol-soluble), and glutelins (acid/base-soluble). While this classification system is widely used, the molecular differences between these protein classes remain unclear. Therefore, this study aims to identify the distinct properties of proteins in each class to provide insights into their solubility in different systems. Additionally, this study focuses on constructing an efficient classification model to discriminate between Osborne classes, which could aid in the design of transgenic proteins with desirable functional and nutritional properties.

Methods: The physicochemical properties of 898 seed storage proteins from 175 species were characterized using both protein sequences and predicted structures from AlphaFold 2. Bioinformatics tools such as ChimeraX and Quilt were used to extract key features. Classification models, including linear discriminant analysis (LDA), support vector machine (SVM), and k-nearest neighbors (KNN), were developed to categorize these proteins into Osborne classes. Additionally, all-atomic and coarse-grained molecular dynamics simulations (MDS) were employed to study the behavior of selected model proteins in different solvent systems.

Results: Among the four Osborne classes (albumin, globulin, prolamin, and glutelin), albumins and prolamins exhibited distinct characteristics, with albumins showing higher sulfur content and prolamins having greater hydrophobicity. Globulins and glutelins had similar profiles. Non-linear SVM performed best, achieving 96.02% accuracy on an independent test set, whereas conventional methods like PCA and PLS-DA were less effective. MDS revealed how solvent environments impact protein dynamics and aggregation.

Conclusion: This research provides an effective model for identifying seed storage proteins and a fundamental dataset on their characteristics. It also showcases how model plant proteins behave in different solvent systems. Therefore, this study offers insights that can be applied to improve crop quality, protein engineering, and understandings of plant protein behavior in various environments.

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sciforum-091726: Designing Personalized Dietary Supplements for Alzheimer's Patients Using Machine Learning and Network Algorithms Applied to Clinical Data, Lifestyle Factors, and Microbiota

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Introduction

Diet significantly influences Alzheimer's disease (AD) progression and management. Research indicates certain dietary patterns may reduce AD risk and cognitive decline. Gut microbiota composition also impacts AD development. Personalized dietary interventions, tailored to individual needs and their microbiota profiles, could benefit AD patients. By employing machine learning and bioinformatics, a data-driven approach aims to design personalized food supplements addressing specific deficiencies to promote brain health in AD patients. The study protocol's main objective is to implement a protocol for designing personalized dietary supplements for AD patients using artificial intelligence and bioinformatics tools.

Method

The study protocol utilizes predictive modeling, employing machine learning algorithms to forecast Alzheimer's disease (AD) progression or risk based on patient data. Concurrently, causal inference techniques like network analysis uncover the interrelationships among their clinical data, lifestyle factors, and microbiota composition. By integrating diverse datasets, the protocol aims to identify modifiable variables influencing AD and pinpoint effective intervention targets.

Results

The study protocol allows us 1) to prescribe personalized dietary recommendations tailored to an individual's specific needs; 2) to predict the dietary modifications necessary to target specific nutritional deficiencies; 3) to obtain insights into the relationship between lifestyle factors, gut microbiota composition, and the progression or prevention of AD; 4) to detect biomarkers associated with AD progression, such as butyrate levels, LPS (lipopolysaccharide), and microbiota markers; 5) and finally, to develop a data-driven approach to designing personalized food supplements for AD patients, incorporating artificial intelligence and bioinformatics tools.

Conclusion

This personalized dietary supplement protocol utilizing AI and bioinformatics holds promise for improving Alzheimer's disease management by targeting individual nutritional needs and microbiota profiles. This comprehensive approach provides actionable insights for personalized dietary and lifestyle interventions tailored to mitigating AD's progression and reducing its risk, potentially enhancing patients' outcomes and quality of life.

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sciforum-103910: Detection of internal fruit rot in apples using x-ray imaging and machine learning techniques

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Ensuring the quality and safety of apples is vital in the agriculture and food industries, particularly in detecting internal fruit rot, a common and often invisible defect. Traditional inspection methods can be inefficient and imprecise, prompting the exploration of advanced technologies such as machine learning for more accurate detection. This study presents a machine learning-based approach for assessing the quality of apples, specifically identifying the presence of internal fruit rot. A total of 116 apples were analyzed; for training, 43 apples with internal fruit rot and 50 fresh apples were used, and for testing, 11 apples with internal fruit rot and 12 fresh apples were set aside. X-ray images of the fruits were obtained, followed by the segmentation of the region of interest to isolate the affected areas. Gabor feature extraction was applied to enhance texture representation, and t-distributed Stochastic Neighbor Embedding (t-SNE) was used for dimensionality reduction to facilitate effective classification. The AdaBoost algorithm was employed for classification, with a 10-fold cross-validation approach being used during training. The training results demonstrated an accuracy of 94.6%, a precision of 96.2%, a recall of 91.3%, and an F1 score of 93.5%. Isotonic Regression was applied to calibrate the model, ensuring the predicted probabilities accurately reflected the likelihood of internal rot. The model was then tested on the separate test set, where it achieved an accuracy of 91.4%, a precision of 92.8%, a recall of 88.3%, and an F1 score of 90.2%. These results highlight the potential of machine learning techniques, particularly when combined with advanced imaging and feature extraction methods, to enhance the accuracy and efficiency of quality inspection processes in the fruit industry. This study suggests that such approaches could be widely adopted for non-destructive quality assessment, leading to better product safety and consumer satisfaction.

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sciforum-100591: EnzyRxn-Transformer: A generative platform for rational experiment design in biotransformation

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Enzymatic reactions play a pivotal role in the biotransformation of agricultural products, significantly influencing experimental design and final product outcomes. Establishing a robust platform promises substantial benefits for food science and broader research communities alike. For instance, the "beany" flavor of vegetable proteins may deter consumers. Such a platform enables researchers to identify novel enzymes and their associated micro-organisms to effectively eliminate these off-flavors.

However, the insufficient training data of enzymatic reactions have hindered studies on prediction model development. In addition, the integration of enzymes from biology and molecules from chemistry is also challenging. Pretrained protein/chemistry large language models are trained on millions of protein sequences and molecules to possess a vast reserve of prior knowledge in the respective fields and have the capacity to generate a remarkable numerical representation of protein sequences and molecules, respectively. Those language models represent general knowledge of biochemistry and can be used to enhance model performance in a smaller dataset.

This study aims to develop a generative model as an expert assistant for predicting enzymatic reactions in bioconversion. We innovatively fused two cutting-edge pretrained language models (ESM and MolFormer) for protein and chemical substrate representation, respectively. The fusing model exhibited remarkable performance in predicting a small molecule substrate of an enzyme with a state-of-the-art accuracy of 96.9%.

Furthermore, EnzyRxn-Transformer was developed for enzymatic reaction prediction by integrating the ESM model for enzyme embedding. Finally, the model can predict the products if given the inputs of an enzyme and reactants with a top-1 accuracy of 39.58 %. With enzyme substrate prediction models serving as gatekeepers in practical application, EnzyRxn-Transformer can be used in for bioconversion planning (such as off-flavor elimination) with higher confidence and save more resources in trial-and-error experiments.

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sciforum-099184: Harnessing the Potential of Different Machine Learning Algorithms for Linking Structural and Functional Properties of Plant Proteins

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The food industry is observing a surge in demand for specialized protein-based functional ingredients for gelling, thickening, and emulsifying applications. There exists a complex relationship between a protein's structural and functional properties, which can be affected by species, cultivars, and processing that have a direct bearing on the protein's structural characteristics; in turn, this governs their functional properties. This complex behavior can be modeled using various machine learning (ML) algorithms. In this study, different ML algorithms have been used to predict the protein solubility, emulsifying activity index, emulsification capacity, and gel strength of different plant proteins (soy (*Glycine max*), pea (*Pisum sativum*), chickpea (*Cicer arietinum*), rice (*Oryza sativa*), hemp (*Cannabis sativa*), camelina (*Camelina sativa*), and pennycress (*Thlaspi arvense*)) using structural predictors (surface hydrophobicity, zeta potential, undenatured protein content, soluble protein polymer content, and β-sheet content). The plant protein structure–function dataset comprised 150 data points, with a 70:30 split into training and testing sets. Model performances were assessed by metrics such as R^2, mean absolute error (MAE), and root mean squared error (RMSE) as well as the non-violation of physical constraints. Data visualization and principal component analysis were also carried out to investigate the associations between the dependent and independent variables and to learn about the inherent patterns and linear or non-linear relationships between the variables. The Gaussian-based support vector regression model accurately predicted solubility (R^2 = 0.8906), emulsifying activity index (R^2 = 0.7383), emulsification capacity (R^2 = 0.7978), and gel strength (R^2 = 0.8822). These predictions demonstrated the potential value of ML algorithms for the prediction of plant protein functionality from macromolecular structural characteristics with a high accuracy and without the need for wet experiments and excessive protein purification.

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sciforum-103214: How blockchain can propel international trade and transform the food supply chain

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Blockchain technology, with its unique features, holds significant potential beyond cryptocurrencies, particularly in the food supply chain and international trade. As a disintermediation technology, Blockchain enables unknown and mutually untrusted parties to create secure and reliable records of events. The inherent complexity of supply chains makes traceability and product integrity challenging, while the lack of real-time visibility complicates decision-making, leading to delays and inefficiencies. Addressing these issues is crucial to achieving a resilient food ecosystem. In the food sector, implementing Blockchain could enhance the traceability, origin, and quality of products by establishing a common IT infrastructure that streamlines information exchange and avoids incompatibilities. This would increase transparency, boost consumer trust, and improve food safety by facilitating quicker responses to contamination or fraud. In international trade, Blockchain simplifies and secures complex processes by providing an immutable record of every transaction and product movement, which is vital for ensuring food quality. However, technical and regulatory challenges such as standardization, scalability, and interoperability must be addressed. Additionally, manual data entry remains a concern due to its susceptibility to errors. Integrating Blockchain with the Internet of Things (IoT), where sensors capture and store data directly on the Blockchain, can significantly enhance the reliability of the solution. This study aims to explore how integrating Blockchain can be useful in overcoming existing challenges in the food supply chain. The expected results include improved traceability, increased transparency, and enhanced food safety. The implications of these findings suggest a more resilient and efficient food supply chain, fostering greater consumer trust and potentially setting new standards for international trade.

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sciforum-107301: MicroRNAs as Therapeutic Targets in Cancer: Insights into Drug Design and Nutritional Interventions

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MicroRNAs as Therapeutic Targets in Cancer: Insights into Drug Design and Nutritional Interventions

microRNAs (miRNAs) are gaining recognition as crucial biomarkers and therapeutic targets in cancer due to their role in regulating gene expression. microRNAs (miRNAs) are small, endogenous, non-coding RNA molecules that play a vital role in post transcriptional gene regulation. miRNAs are responsible for developing cancer and unchecked cell growth when affected by any kind of mutation or disruption. oncomiRNAs are one of those miRNAs that are responsible for tumor formation acting not less than oncogenes. This research is focused on how such miRNAs can be modified leading to regulating gene expression that can help to restore the cell to function as a normal cell. This study aims to investigate the interplay between miRNAs and cancer where miRNAs acting as potential targets are docked to explore possibilities of cancer therapies and drug design methods. As cancer remains the second leading cause of death globally, targeting miRNAs in pharmaceutical research presents a significant opportunity for developing novel anti-cancer treatments. MicroRNAs (miRNAs) influence cancer development and can be modulated by dietary factors, with certain foods potentially restoring normal miRNA function. The study also explores how dietary interventions may complement cancer treatments by targeting miRNA pathways.

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sciforum-103586: Modeling and simulation of ion channels and action potentials in taste receptor cells

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Taste perception involves intricate processes occurring in taste receptor cells (TRCs), where ion channels and action potentials (APs) play crucial roles. This research focuses on modeling and simulating these biophysical phenomena to better understand the cellular mechanisms underlying taste detection. Ion channels mediate the flow of ions across the cell membrane, initiating the depolarization necessary for APs. In TRCs, the opening and closing of specific ion channels in response to taste stimuli lead to changes in membrane potential, which are then propagated as APs.

The modeling of ion channels in TRCs involves the use of Hodgkin–Huxley equations, which describe the ionic currents through these channels and their voltage-dependent properties. By simulating the kinetics of sodium, potassium, and calcium channels, we can replicate the dynamic response of TRCs to various tastants. The simulation results are validated against available experimental data on ion channel kinetics, ensuring the accuracy of our models. Once validated, all relevant ion channels are incorporated into a comprehensive model to simulate APs, enabling further computational investigation.

Our simulations reveal how different types of taste stimuli induce distinct patterns of ion channel activity and AP generation. For instance, sweet and umami tastants predominantly activate G-protein-coupled receptors, leading to the opening of TRPM5 channels and a cascade of intracellular events. In contrast, salty and sour tastants directly affect ion channels such as ENaC and PKD2L1, respectively.

These simulations enhance our understanding of the electrophysiological basis of taste perception and may inform the development of artificial taste sensors and treatments for taste disorders. This computational approach provides a powerful tool for elucidating the complex interactions within TRCs that govern taste sensation. Future work will focus on refining these models to account for the heterogeneity of TRCs and their adaptive responses to prolonged stimuli.

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sciforum-098962: pLM4CPPs: Protein Language Model-Based Predictor for Cell-Penetrating Peptides

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Cell-penetrating peptides (CPPs) are short peptides that can penetrate cell membranes, making them valuable for drug delivery and targeting the inside of cells. Predicting CPPs accurately can streamline experimental validation in the lab. This study aims to assess pretrained protein language models (pLMs) for their effectiveness in representing CPPs and to develop a reliable model for CPP classification. We evaluated the performance of several PLMs including BEPLER, CPCProt, SeqVec, different variants of ESM (ESM, ESM-2 with expanded feature set, ESM-1b, and ESM-1v), ProtT5-Port-BERT, ProtT5-XL-UniRef50, and ProtT5-XL-BFD. We developed pLM4CCPs, a novel deep learning architecture using CNNs as the classifier for binary classification of CPPs. pLM4CCPs demonstrated superior performance over the existing state-of-the-art model for CPP prediction. Specifically, pLM4CCPs achieved improvements in ACC by 4.9%-5.5%, MCC by 9.3%-10.2%, and Sn by 14.1%-19.6%. Among these models, ESM-1280 and ProtT5-XL-BFD demonstrated the highest overall performance on the KELM dataset. ESM-1280 achieved an ACC of 0.896, an MCC of 0.796, a sensitivity (Sn) of 0.844, and a specificity (Sp) of 0.978. Similarly, ProtT5-XL-BFD exhibited superior performance, with an ACC of 0.901, an MCC of 0.802, a Sn of 0.885, and an Sp of 0.917, making both models noteworthy for CPP prediction. pLM4CCPs combines predictions from multiple models to provide a consensus on whether a given peptide sequence is classified as a CPP or non-CPP. This ensemble approach enhances prediction reliability by leveraging the strengths of each individual model. A user-friendly web server for bioactivity predictions, along with a source code, datasets, and templates for adapting pLM4CCPs to other tasks, will be accessible on GitHub. This platform aims to advance CPP prediction and peptide functionality modeling, aiding researchers in exploring peptide functionality effectively.

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sciforum-098891: Predicting Bread Volume Class of Hard Red Winter Wheat Cultivars Using Machine Learning Models

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Background

Wheat is the most essential food grain produced in the US. The primary goals of US wheat breeding programs include developing cultivars with high end use quality, such as milling and baking efficiency, with desirable agronomic traits and resilience to environmental stresses. Cultivar selection is guided by achieving the recommended target values for several key parameters, including protein content, mixing properties, and baking performance. Bread volume is among the most important targets.

Objective

This study compares and combines machine learning models, including Random Forest, XGBoost, and Support Vector Machine, with the physicochemical (PC) properties and rheological parameters (Farinograph and Alveograph) of 359 Hard Red Winter (HRW) wheat cultivars. Our goal is to classify HRW wheat into three bread loaf volume categories, low (≤942 cubic centimetres), moderate (943-1080 cubic centimetres), and high (≥1081 cubic centimetres), and to allow for the rapid assessment of the bread loaf volume of new HRW cultivars, potentially bypassing the need for baking the bread and conducting rheological evaluations, and thereby conserving resources. We utilized HRW data from Wheat Quality Council (WQC) reports from 2010 to 2023.

Method

We optimized model prediction accuracy by employing a feature selection process and fine-tuning model hyperparameters.

Result

Model performance varied with different combinations of PC and rheological features. The optimal combination of PC with Farinograph and Alveograph parameters (23 features) yielded the highest accuracy with the use of a Random Forest model, achieving a test accuracy of 81% and a cross-validation (CV) accuracy of 76%. However, using only the 14 PC features, the Support Vector Machine model achieved a test accuracy of 83% and a CV accuracy of 74%. Despite the varying feature combinations, the sedimentation volume consistently ranked as the most important feature for high bread volumes. Other significant features included dough extensibility, elasticity index, swelling index, breakdown time and wheat protein.

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sciforum-085918: Revolutionizing the Food Industry: AI and Machine Learning Applications for Enhanced Efficiency and Sustainability

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In recent years, the food industry has undergone a profound transformation, driven by the integration of artificial intelligence and Machine Learning technologies. This paper explores the multifaceted applications of AI and ML in revolutionizing various aspects of the food supply chain, production, and consumer experience. The first dimension of this technological revolution lies in supply chain optimization. AI and ML algorithms analyze historical data, market trends, and external factors to precisely forecast demand. This, in turn, enables efficient inventory management, reducing waste and enhancing the overall supply chain resilience. Additionally, these technologies are instrumental in logistics and route optimization, ensuring timely deliveries and minimizing transportation costs, which are particularly critical for perishable goods. Quality control and inspection represent another critical facet. Leveraging image recognition and sensor data analysis, AI and ML models empower the industry to detect defects and ensure the highest standards of quality throughout the production process. This not only enhances product quality but also contributes to increased consumer trust. Precision agriculture, a rapidly evolving field, benefits immensely from AI and ML applications. By processing data from sensors, satellites, and drones, these technologies provide actionable insights for farmers. Predicting crop yields, identifying diseases, and optimizing resource allocation contribute to sustainable and efficient farming practices. Furthermore, the integration of AI in personalized nutrition signifies a paradigm shift towards consumer-centric approaches. Analyzing individual dietary habits, health records, and genetic data allows for tailored nutritional recommendations, creating a personalized and holistic approach to dietary well-being. This not only enhances food safety but also aligns with the growing consumer demand for transparent and ethical food production practices. This study highlights the pivotal role of AI and ML in reshaping the food industry, fostering efficiency, sustainability, and consumer-centric solutions.

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sciforum-100042: The application of artificial intelligence and machine learning in the food industry

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The food processing and handling sector represents one of the largest global industries, contributing significantly to employment and economic activity. Historically, human labour has been relied upon to oversee critical tasks in food production and packaging. However, this reliance has often led to challenges in maintaining supply chains and ensuring food safety. In order to address these issues, the adoption of industrial automation, particularly through the use of technologies such as artificial intelligence (AI), machine learning (ML), and deep learning (DL) algorithms, is becoming increasingly necessary. These AI-driven systems offer efficient solutions for managing food production and delivery processes, thereby enhancing operational efficiency. This article explores the applications of AI in the food industry, highlighting its potential to achieve substantial cost savings and optimise resource utilisation by minimising human error. The application of AI and data science to food service establishments, including restaurants, cafes, online delivery services, hotels, and food outlets, has the potential to enhance various aspects of the industry. These include the prediction of sales, the improvement of packaging techniques, the extension of shelf life, the optimisation of menu combinations, and the assurance of food safety through transparent supply chain management systems. Looking forward, AI and ML are poised to revolutionise the food industry with innovations such as smart farming, robotic farming, and drone technologies.

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sciforum-098616: Trends and Perspectives of AI-based technology in food safety and toxicity prediction

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AI, or artificial intelligence, is a rapidly growing field in computer science, involving machine learning and deep learning. It has evolved through stages of knowledge-based rules, pattern design, and automation using deep learning. In the first stage, human experts define rules, while in the second stage, ML classifies and recognizes patterns. Artificial intelligence (AI) is transforming the food industry by enhancing microbial metabolic engineering, food safety, and toxicity, thereby reducing human intelligence requirements for tasks typically performed by humans. AI tools are increasingly crucial in food biotechnology sectors, including food microbiology, microbial fermentation, food safety and toxicity and understanding the relationship between food and the gut microbiome. This paper emphasizes the growing significance of AI in food safety and toxicity and emphasizes the use of AI and machine learning (ML) in food quality management, highlighting their numerous applications in assessing food toxicity. The detection of toxic compounds of both chemical and biological origin has been significantly enhanced in terms of speed and cost-effectiveness. AI tools enable rapid detection and classification of toxic compounds in large datasets, addressing food toxicity risks through chemical migration from package to food. AI-based food sorting and packaging like TOMRA and TensorFlow increase productivity by 90% through laser technology, IR spectroscopy, X-ray systems, defect detection, and natural language processing. The food industry uses optical and ultrasonic sensors to monitor food material removal, reducing consumer health risks and integrating data from sensors and IoT devices for real-time food safety monitoring.

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sciforum-094180: Use of electronic nose technology to predict acrylamide formation in roasted almonds

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Acrylamide is a chemical process contaminant naturally formed when foods are heat-treated. The presence of amino acids and reducing sugars in significant quantities in almonds can facilitate the occurrence of the Maillard reaction, when they undergo the roasting process, leading to the formation of aromatic substances as well as the production of acrylamide. Despite previous research on the production of acrylamide in almonds under different roasting conditions, the potential relationship between this compound and the resultant aroma remains unexplored, an aspect that could be evaluated using chemometric techniques such as the electronic nose (E-nose). The aim of this study was to assess the viability of employing the E-nose as a prospective instrument for predicting the generation of acrylamide during the roasting of almonds. Raw almonds in two forms (whole and ground) were subjected to roasting in a convective and an air-forced oven, utilizing temperatures ranging between 120 and 200°C for a duration of 20 minutes. An analysis of acrylamide concentrations in the roasted almond samples was carried out using HPLC-MS/MS, while the detection of aromas was conducted through the utilization of the electronic device. Significantly diverse acrylamide level profiles were observed between whole and ground almonds, with values varying from 25 to 466 µg/kg in whole almonds and 19 to 397 µg/kg in ground almonds. The electronic signals captured by the E-nose exhibited a strong correlation with the acrylamide content in both whole ($R^2_{CV} > 0.83$) and ground roasted samples ($R^2_{CV} > 0.88$). These findings imply that the E-nose has the potential to serve as a valuable instrument for assessing the quality of roasted food products based on their sensory attributes and safety with regards to harmful compounds. To summarize, the electronic nose could prove to be a beneficial predictive chemometric tool for monitoring the generation of acrylamide in almond processing.

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