

IOCFE
2025
Conference

The 1st International Online Conference on Fermentation

12–13 November 2025 | Online

Program and Abstract Book

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The 1st International Online Conference on Fermentation

12–13 November 2025 | Online



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Prof. Dr. Antonio Morata

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Welcome from the Chair

Dear Colleagues,

In **November 2025 (12-13)**, we are holding the **1st International Online Conference on Fermentation (IOCFE2025)**, organized by the MDPI journal [Fermentation](#) (ISSN 2311-5637, Impact Factor 3.3).

It will focus on interesting topics in the following four tracks:

1. **Fermentation and Micro-Organism/Biotechnology**
2. **Fermentation and Sensory Profiles/Impact**
3. **Fermentation Foods, Drinks, and Food Safety**
4. **Fermentation and Health (Nutraceutical Impact)**

The conference will feature keynote speakers in these topics. It will also be possible to participate through flash talks, e-posters, and oral presentations. All submissions will be evaluated by an expert scientific committee.

Feel free to submit your abstract and participate in this amazing event. All accepted abstracts will be available online in open access form on Sciforum.net during and after the conference.

All accepted abstracts will be available online in open access form on [Sciforum.net](#) during and after the conference.

With warm regards,



[Prof. Dr. Antonio Morata](#)

Department of Food Science
and Technology, Universidad
Politécnica de Madrid – UPM,
Madrid, Spain



fermentation

an Open Access Journal by MDPI

Fermentation (ISSN 2311-5637) is an international, peer-reviewed, open access, online journal publishing high quality original research papers, review articles, short communications and technical notes on all research areas of fermentation related to new and emerging products, processes and technologies including biopharmaceuticals and biotech drugs.

The journal aims at a broad multidisciplinary readership, which includes both academia and industries, and covers broad areas of research and technological advances on all aspects of fermentation. We aim to encourage researchers to publish their experimental, theoretical, and computational results in as much detail as necessary. We thus restrict neither paper length nor number of figures and tables.

Impact Factor: 3.3 (2024); 5-Year Impact Factor: 3.5 (2024)

Session Chairs



Prof. Dr. Paola Domizio
Department of Agriculture,
Food, Environment and
Forestry (DAGRI) - University
of Florence, Firenze, Italy



Prof. Dr. Alice Vilela
Chemistry Research Centre-
Vila Real (CQ-VR),
Department of Agronomy,
School of Agrarian and
Veterinary Sciences,
University of Trás-os-Montes
and Alto Douro, Vila Real,
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Prof. Dr. Iris Loira
Chemistry and Food
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**Prof. Dr. Manuel Malfeito-
Ferreira**
LEAF, Linking Landscape,
Environment, Agriculture and
Food Research Center,
School of Agriculture,
University of Lisbon, Lisboa,
Portugal

Keynote Speakers



Prof. Dr. Paola Domizio
Department of Agriculture,
Food, Environment and
Forestry (DAGRI) - University
of Florence, Firenze, Italy



Prof. Dr. Alice Vilela
Chemistry Research Centre-
Vila Real (CQ-VR),
Department of Agronomy,
School of Agrarian and
Veterinary Sciences,
University of Trás-os-Montes
and Alto Douro, Vila Real,
Portugal



Professor Vittorio Capozzi
Institute of Sciences of Food
Production, National Research
Council (CNR) of Italy, Foggia,
Italy



**Prof. Dr. Manuel Malfeito-
Ferreira**
LEAF, Linking Landscape,
Environment, Agriculture and
Food Research Center,
School of Agriculture,
University of Lisbon, Tapada
da Ajuda, Lisboa, Portugal

Invited Speakers



Prof. Dr. Maria Angeles del Pozo Bayón

Instituto de Investigación en Ciencias de la Alimentación CIAL (CSIC-UAM) [Institute of Food Science Research CIAL (CSIC-UAM)], Madrid, Spain



Professor Piergiorgio Comuzzo

University of Udine, Department of Agricultural Food Environmental and Animal Sciences, Udine, Italy



Prof. Dr. Francisco Carrau

Universidad de la República, Facultad de Química Av., Área Enología y Biotecnología de Fermentaciones, Montevideo, Uruguay



Prof. Dr. Iris Loira

Chemistry and Food Technology Department, Universidad Politécnica de Madrid, Madrid, Spain



Prof. Dr. Gustavo Cordero-Bueso

Departamento de Biomedicina, Biotecnología y Salud Pública, Universidad de Cádiz, Avenida República Árabe Saharaui s/n, Puerto Real, Cadiz, Spain

Program at a Glance

12 November 2025 (Morning)	13 November 2025 (Morning)
Session 1. Fermentation and Micro-Organism/Biotechnology Flash Poster list and presentation order available HERE	Session 3. Fermented Foods, Drinks, and Food Safety Flash Poster list and presentation order available HERE
12 November 2025 (Afternoon)	13 November 2025 (Afternoon)
Session 2. Fermentation and sensory profiles/impact Flash Poster list and presentation order available HERE	Session 4. Fermentation and Health (Nutraceutical Impact) Flash Poster list and presentation order available HERE

IOCFE 2025 Program

12 November 2025 (Wednesday)

Session 1. Fermentation and Micro-Organism/Biotechnology

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

CET	Speaker	Title
9:00–9:05	Prof. Dr. Antonio Morata Chair	<i>Opening Speech</i>
9:05–9:15	Mr. Peter Roth MDPI Representative	Publisher's Welcome
9:15–9:45	Prof. Dr. Paola Domizio Session Chair and Keynote Speaker	Welcome from the session chair and keynote speech Saccharomyces and non-Saccharomyces Yeast Derivatives as Biotechnological Tools for Improving Wine Quality
9:45–10:05	Prof. Maria Angeles del Pozo Bayón Invited Speaker	Yeast Derivatives and Their Impact on Wine Aroma
10:05–10:25	Prof. Piergiorgio Comuzzo Invited Speaker	Emerging technologies and biotechnologies for yeast derivatives tailor-made for specific winemaking applications
10:25–10:35	Yaiza Rodríguez Selected Oral Speaker	Evaluation of alternative sanitization treatments for sulfites to promote the implantation of <i>Lachancea thermotolerans</i> in winemaking
10:35–10:45	Chiara Nadai Selected Oral Speaker	Impact of nitrogen supplementation, cooling rate, and SO ₂ addition timing on yeast viability and acetaldehyde production during the post-fermentation phase of wine
10:45–10:55	Manuel Ramírez Selected Oral Speaker	A new strategy to increase the hybridization rate between wine strains of <i>Torulaspora delbrueckii</i>
10:55–11:05	Maria Soler Selected Oral Speaker	Improvement of acidification and sensory profile in Verdejo white wines through co-inoculation of <i>Lachancea thermotolerans</i> and <i>Metschnikowia pulcherrima</i>
11:05–11:15	Jasmine Hadj Saadoun Selected Oral Speaker	Exploring the potential of a new biostimulant created via the fermentation of agri-food leftovers for more sustainable agriculture practices
11:15–12:00	Flash Poster Presentations for Session 1 - 45 mins at the end of the morning session (4 mins per presenter) Please find the Session 1 Poster Presenters and their presentation order HERE	

BREAK

12 November 2025 (Wednesday)

Session 2. Fermentation and Sensory Profiles/Impact

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

CET	Speaker	Title
14:00–14:30	Prof. Alice Vilela Session Chair and Keynote Speaker	Welcome from the session chair and keynote speech Climate-Responsive Winemaking: The Role of Yeasts in Improving Quality Through Bio-Deacetication and Bio- Dealcoholization
14:30–14:50	Prof. Francisco Carrau Invited Speaker	Metabolic Contributions of <i>Hanseniaspora vineae</i> to Fermentative Flavor Complexity
14:50–15:00	Mariagiovanna Fragasso Selected Oral Speaker	Integrated Characterization of Lactic Acid Bacteria from Subappennino Dauno Sheep Milk (Gentile di Puglia) for Pecorino Cheese Production and Cereal-Based Fermented Beverage Development: a Case Study from Italian Marginal Areas
15:00–15:10	Maria Laura Raymond Eder Selected Oral speaker	<i>Vitis</i> -associated microbial communities shape volatile profiles of fermented grape juices without altering grape varietal identity
15:10–15:20	Alessio Altomare Selected Oral Speaker	Role of Yeast Derivative Products in enhancing alcoholic fermentation
15:20–15:30	Josep Blasco Selected Oral Speaker	Inoculated sourdoughs and associated bread aromatic profiles
15:30–15:40	Maria Lucia Valeria de Chiara Selected Oral Speaker	Kefir-enriched alginate coating for fresh-cut apples: a natural biopreservation strategy to enhance microbial stability and produce quality

15:40–16:50	Valentina Civa Selected Oral Speaker	Impact of <i>Saccharomycodes ludwigii</i> yeast derivatives on the chemical, physical, and sensory characteristics of Garnacha Blanca and Tempranillo Blanco wines
15:50–16:00	Ines Horcajo Abal Selected Oral Speaker	Impact of commercial cream yeast on acidity and sulphur dioxide combination in high quality wines
16:00–16:35	Flash Poster Presentations for Session 2 - 35 mins at the end of the afternoon session (4 mins per presenter) Please find the Session 2 Poster Presenters and their presentation order HERE	

13 November 2025 (Thursday)

Session 3. Fermentation: Foods, Drinks, and Food Safety

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

CET	Speaker	Title
9:00–9:05	Prof. Dr. Iris Loira Session Chair	<i>Welcome from the session chair</i>
9:05–9:35	Prof. Vittorio Capozzi Keynote Speaker	Promoting innovation of fermented foods: insight from COST Action PIMENTO (CA20128)
9:35–9:55	Prof. Dr. Iris Loira Invited Speaker	Ultra-high pressure homogenisation (UHPH) for controlling protein haze in wine after fermentation
9:55–10:05	Abrar Hussain Selected Oral Speaker	Exploring the Probiotic Potential of <i>Enterococcus faecium</i> Strains Through Skimmed Milk Fermentation
10:05–10:15	Joana Ferreira Selected Oral Speaker	Valorization of Orange Peel By-Products in Kefir Cream Cheese: Impact on Physicochemical, Microbiological, and Functional Properties
10:15–10:25	Antonia Corvino Selected Oral Speaker	Fermentation-Driven Improvement of Antioxidant Properties in Minimally Processed Fermented Plant-Based Beverages
10:25–10:35	Agustina Caffarratti Selected Oral Speaker	Cross-Tolerance to Sulfite (SO_3H^-) and Selenite (SeO_3^{2-}) in <i>Saccharomyces cerevisiae</i> Strains Carrying SSU1-Associated Chromosomal Rearrangements
10:35–10:45	Arianna De Risi Selected Oral Speaker	The influence of the type and geographic origin of the SCOBY starter culture on the microbiological and physicochemical quality of tea, milk, and rice types of Kombucha beverages
10:45–10:55	Rita Cepeda Selected Oral Speaker	Natural Biocontrol Strategies Against <i>Brettanomyces</i> for Sulphite-Free Wine Preservation
10:55–11:05	Andrii Tarasov Selected Oral Speaker	Microbiological stability of dealcoholised wines using SO_2 and sorbic acid
11:05–11:55	Flash Poster Presentations for Session 3 - 50 mins at the end of the morning session (4 mins per presenter) Please find the Session 3 Poster Presenters and their presentation order HERE	

BREAK

13 November 2025 (Thursday)

Session 4. Fermentation and Health (Nutraceutical Impact)

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

CET	Speaker	Title
14:00–14:30	Prof. Dr. Manuel Malfeito-Ferreira Session Chair and Keynote Speaker	Welcome from the session chair and Keynote Speaker Fermentation and Health: a critical appraisal of meta-analytic studies
14:30–14:50	Prof. Gustavo Cordero-Bueso Invited Speaker	Viruses and their Interaction with wine Yeasts: Impacts on adaptive evolution, fermentation performance, and Sherry wine ageing
14:50–15:00	Fazlurrahman Khan Selected Oral Speaker	Friendly Fermenters or Toxic Triggers?: Metabolic mapping and phylogenetic analysis of biogenic amines-producing and degrading lactic acid bacteria
15:00–15:10	Siham Moussaid Selected Oral Speaker	Functional properties of camel milk fermented by their probiotic lactic acid bacteria
15:10–15:20	Lina Ramanauskaitė Selected Oral Speaker	Effect of Certain Food Additives on <i>Lactococcus lactis</i> Strains Intended to be Used for Dairy Food Fermentation
15:20–15:30	Ilaria Mannazzu Selected Oral Speaker	Propionibacteria in Action: Unveiling the Hidden Value of Second Cheese Whey
15:30–15:40	Aldana Lucia Delgado Cuadros Selected Oral Speaker	Enhanced Carotenoid Production by <i>Rhodotorula mucilaginosa</i> Cultivated Under LED Illumination in a Photobioreactor

15:40–16:50	Mariagiovanna Fragasso Selected Oral Speaker	Microbial-associated Foods and the Mediterranean Diet: Implications for the Design of Microbial-depleted and Microbial-enriched Diets
15:50–16:00	Israel Bautista Hernández Selected Oral Speaker	Valorization of Residual <i>Spirulina platensis</i> biomass fermented by <i>Aspergillus oryzae</i> in biorefinery solid-state process
16:00–16:35	Flash Poster Presentations for Session 4 - 35 mins at the end of the afternoon session (4 mins per presenter) Please find the Session 4 Poster Presenters and their presentation order HERE	

Session 1. Fermentation and Micro-Organism/Biotechnology

sciforum-135736: Comparative Methodology for Assessing Natural Antifungal Metabolites Compared to Synthetic Compounds in Grapevine

Jose Luis Padilla Agudelo ¹, María Hernández-Fernández ¹, María Paz Villanueva-Llanes ¹, Jesús Manuel Cantoral ¹, Gianluigi Cardinali ², Ileana Vigentini ³ and Gustavo Cordero-Bueso ¹

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Grapevine (*Vitis vinifera*) is one of the most economically important fruit crops worldwide, but its high susceptibility to fungal diseases threatens yield and quality. Traditionally, disease management relies heavily on synthetic fungicides. Management typically depends on synthetic fungicides, which, although effective, raise concerns about environmental contamination, pathogen resistance, and chemical residues in grapes. In this context, natural antifungal compounds from native biocontrol agents represent a promising alternative. Notably, microbial volatile organic compounds (mVOCs) have attracted interest due to their ability to suppress phytopathogenic fungi without harmful residues. However, methodologies directly comparing the efficacy of these natural metabolites with conventional fungicides remain scarce.

This study establishes a comparative methodology to evaluate the antifungal potential of mVOCs versus synthetic fungicides. mVOCs previously identified via GC-MS include ethyl acetate, isoamyl acetate, 2-phenethyl acetate (PEA), and 2-phenethyl alcohol (PEOH). These compounds were tested using double-petri dish assays and ex vivo grape models. Antifungal activity against *Botrytis cinerea* was assessed through disease severity scales. Preliminary findings show that 0.5 g/L concentrations of PEA and PEOH achieved complete fungal inhibition in both assays. This work provides a structured approach to evaluating mVOCs, contributing valuable insights into integrated disease management and the advancement of eco-friendly strategies in viticulture.



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sciforum-136777: Enhancing Spanish Olives with the Microbial Alliance *Lachancea thermotolerans* and *Lactiplantibacillus plantarum*

Alberto Martínez ^{1,*}, Francisco Pérez-Nevaldo ^{2,3}, Luis Miguel Hernández ¹ and Manuel Ramírez ¹

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Traditionally, Spanish-style table olive fermentation is driven by lactic acid bacteria (LAB) for acidity, preservation, and sensory profiles. Recently, there has been growing interest in using other microorganisms, especially yeasts, to improve fermentation. *Lachancea thermotolerans*, a yeast often isolated from wine fermentations, has metabolic properties beneficial for table olive fermentation. This study evaluated co-inoculating *L. thermotolerans* and *Lactiplantibacillus plantarum* on the fermentation dynamics and quality of Spanish-style table olives. Green olives were inoculated with pure cultures of *L. thermotolerans* and *L. plantarum*. Single inoculations and a spontaneous fermentation (control) were also included. All fermentations ran for 120 days at 20°C. *L. thermotolerans* appeared to stimulate LAB growth during the initial 20 days. Co-inoculation of *L. thermotolerans* and *L. plantarum* resulted in the highest organic acid concentrations, leading to a more pronounced pH decrease than that in the control. This combined inoculation improved key quality attributes like olive texture and colour and achieved the best tasting scores. Mixed starter cultures of *L. thermotolerans* and *L. plantarum* positively influence the fermentation dynamics and final quality of Spanish-style table olives. This represents a viable strategy for producing table olives with distinctive sensory and technological characteristics.



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sciforum-143774: The effect of rehydration media, freezing temperature, and combinations of cryoprotectants on the survival rate of freeze-dried lactic acid bacteria

Reasme Tan ^{1,*}, BROSS Dolla ², PHOURNG Sophak ², Socheata Mao ³ and Yve Wache ³

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Freeze-drying is currently a commonly drying technique for lactic acid bacteria (LAB) used in vegetable fermentation. The objective of this study is to investigate the effect of freezing temperature, rehydration media, and combinations of cryoprotectants on the survival rate of freeze-dried LAB (*L. plantarum* OMCb1-1 and *L. pentosus* OP1-1) isolated from fermented vegetables in Cambodia. First, pre-freezing was performed under two conditions, -20°C and -80°C for 24 h, continuing with primary drying (-36°C for 24 hours) and ending with secondary drying (-42°C for 2 hours). To determine the viability of the LAB after freeze-drying, different rehydration media were used. The different cryoprotective agents were used alone or in combination to protect the bacteria cells. The best protectant for obtaining the highest viability after freeze-drying was 10% skim milk + 8% sucrose + 1.5% gelatin (pre-freezing at -80°C) with a maximum viability of 94.75% and 93% for *L. pentosus* OP1-1 and *L. plantarum* OMCb1-1, respectively. Their highest survival rates were obtained when rehydrated with MRS broth (63%) and 10% skim milk (94%), respectively. After freeze-drying, their residual moisture contents were between 2.03% and 9.3821%, and the water activity was between 0.182 and 0.4847, depending on the nature of the protective agents.



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sciforum-143939: The Role of Microbial Fermentation in Upcycling Agricultural Waste into Value-Added Bioproducts

Abid Hussain

Department of Biological Sciences, Thal Univeristy Bhakkar, Bhakkar, 30000, Punjab, Pakistan

Agricultural byproducts such as wheat straw are abundant, low-cost feedstocks suitable for bioconversion into value-added chemicals. This study focused on developing a single-stage solid-state fermentation (SSF) process for the co-production of cellulolytic enzymes and lactic acid. A synergistic co-culture of *Aspergillus niger* and *Lactobacillus casei* was employed for the bioconversion of mild alkali-pretreated wheat straw. Key process parameters, including temperature, moisture content, and initial pH, were systematically optimized to enhance product yields. Enzyme activity was determined using spectrophotometric assays, while lactic acid concentrations were quantified using HPLC. Under optimized conditions, the process achieved the concurrent production of cellulase at a high activity rate of 75 U/g of the dry substrate and a final lactic acid titer of 98 g/L. The efficient enzymatic hydrolysis of the substrate by *A. niger* supplied the necessary fermentable sugars for *L. casei*, resulting in a sugar-to-lactic acid conversion efficiency of over 85%. These findings demonstrate that an integrated co-culture SSF is a highly effective strategy for the valorization of lignocellulosic waste. This process presents a viable and robust model for producing multiple biochemicals from a single feedstock, offering a practical contribution to the circular bioeconomy.



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sciforum-142558: A new strategy to increase the hybridization rate between wine strains of *Torulaspora delbrueckii*

Manuel Ramírez *, Luis Miguel Hernández and Alberto Martínez

Área de Microbiología. Departamento de Ciencias Biomédicas. Facultad de Ciencias. Universidad de Extremadura. Avda de Elvas s/n. 06006-Badajoz. Spain

Genetic improvement through hybridization offers a promising approach to enhance the biotechnological properties of non-conventional yeasts such as *Torulaspora delbrueckii* (Td), which typically exhibit lower fermentation efficiency compared to the conventional yeast *Saccharomyces cerevisiae*. Previous attempts to hybridize different Td strains have shown that mixing spores or vegetative cells is not an effective method.

We developed a novel strategy based on recent insights into the Td life cycle. Vegetative cells were mixed in a sporulation medium to induce their need for conjugation just before entering meiosis, which marks the onset of the sporulation process. The killer phenotype and resistance to cycloheximide were used as genetic markers to identify the resulting hybrids.

The frequency of new Td strains exhibiting both phenotypes varied depending on the parental strain pair and the specific experiment, but was consistently above 10^{-3} . The hybrid yeasts that demonstrated the greatest stability with respect to the genetic markers were selected for wine fermentation trials.

This method enables the combination of specific traits from two different strains into a single hybrid yeast. Moreover, it provides a means to generate genetic variability, facilitating the selection of new yeasts with improved fermentation efficiency compared to parental strains.



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sciforum-136761: Bioremediation of Soil Contaminants Using Lactic Acid Bacteria: A Fermentation-Based Approach for Sustainable Environmental Cleanup

Abid Hussain

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Introduction:

Soil contamination remains a critical environmental challenge in the world including Pakistan, where traditional remediation methods are often economically and ecologically unsustainable. This study investigates *Lactic Acid Bacteria* (LAB) as a bioremediation agent, leveraging Pakistan's agro-industrial byproducts (molasses-based media) for cost-effective fermentation.

Methodology:

We isolated LAB from local soil samples and assessed their capacity to degrade contaminants such as lead, cadmium, and benzene. The strains were cultured in a 15 L Stirred Tank Bioreactor using MRS broth (pH 6.2) supplemented with 10% sugarcane molasses as a low-cost carbon source. Fermentation was performed under controlled conditions (37 °C, 150 rpm, 1.0 vvm aeration, 72 h). The fermented broth was applied to contaminated soil at 10% (v/w), with nutrient modulation achieved through the addition of 5% compost. Pollutant degradation was analyzed using atomic absorption spectrophotometry (AAS) for heavy metals and gas chromatography (GC) for benzene, while nutrient availability was assessed through soil profiling.

Results:

LAB reduced heavy metals and organic pollutants by up to 45% within 14 days, with the highest degradation observed for cadmium and benzene, alongside improved soil N, P, and K levels.

Conclusion:

LAB fermentation offers a scalable and sustainable approach for soil bioremediation.



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sciforum-136532: Comparative Study of Biochar-Enhanced Anaerobic Digestion of Sewage Sludge: Performance and Mechanisms

Lei Zhao

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Biochar addition is a promising strategy for enhancing anaerobic digestion (AD), however, the mechanisms underlying its effectiveness, particularly the impact of biochar origin, remain unclear. This study directly compares the impact of corn stover-derived biochar (CSBC), mixed straw-derived biochar (MSBC), and digested sludge-derived biochar (SSBC) on methane production from AD. Results revealed that CSBC addition (10 g/L) yielded the most significant enhancement, increasing cumulative methane yield by 122.1% to 153.7 mL/g VS compared to the control. This superior performance correlated strongly with CSBC's abundant oxygen-containing functional groups (OFGs), which facilitated higher redox activity (kapp 12-15% greater than SSBC/MSBC) and electron transfer system (ETS) activity (81.1% increase over control). Microbial analysis indicated CSBC enrichment of key electron-transferring bacteria (e.g., Bacteroidota) and fostered syntrophy with methanogens. Conversely, MSBC primarily enhanced hydrolysis, while SSBC showed benefits in promoting hydrogenotrophic methanogens. These findings elucidate the critical role of biochar's surface chemistry and redox properties in mediating microbial interactions and electron transfer, providing crucial insights for designing tailored biochars to optimize waste valorization and energy recovery in AD. This study highlights the potential of SSBC in a circular economy context, and underscores the importance of linking biochar properties to functional microbial activity.



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sciforum-142803: Effects of Sequential Inoculation of Non-*Saccharomyces* and *S. cerevisiae* Strains on the Fermentation Process of High-Sugar Chardonnay

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² Department of Biotechnology, Middle East Technical University, Ankara, Turkey

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Climate change has caused sugar concentrations in grapes to rise, consequently leading to higher alcohol levels in wine. One of the strategies to mitigate ethanol production is the use of non-*Saccharomyces* yeasts. This study evaluated five separate sequential inoculation treatments, each involving a different non-*Saccharomyces* strain (*M. guilliermondii* P40D002, *M. pulcherrima* P01A016 or D11, *W. anomalus* O37, or *L. thermotolerans* O9), followed by a commercial *Saccharomyces cerevisiae* strain in chaptalized Chardonnay must. The final alcohol concentrations of the treatments were similar to those in fermentation using only *S. cerevisiae*. However, wines inoculated with *M. pulcherrima* P01A016 exhibited an alcohol reduction of 0.6–0.7% (v/v) compared to those inoculated with *M. guilliermondii*, *L. thermotolerans*, or *W. anomalus*. Although the two *M. pulcherrima* strains had similar ethanol concentrations, their organic acid profiles, especially acetic and succinic acids, demonstrated significant variation, illustrating the importance of strain selection. Overall, diminished growth, YAN consumption, and the limitations of non-*Saccharomyces* strains in alcohol reduction indicate that high-sugar environments may pose challenges to their performance in the early stages of fermentation. The findings explain yeast performance under osmotic stress and highlight the importance of selecting non-*Saccharomyces* strains for alcohol reduction and the modulation of wine composition.



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sciforum-136452: Evaluation of alternative sanitization treatments for sulfites to promote the implantation of *Lachancea thermotolerans* in winemaking

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The use of non-*Saccharomyces* yeasts, such as *Lachancea thermotolerans*, is gaining increasing interest in winemaking due to their capacity to enhance the sensory and chemical profile of wines, notably through lactic acid production. However, their low tolerance to conventional sanitizing agents like sulfites limits their broader application. In this context, ozone has emerged as a promising alternative for grape sanitation, offering strong antimicrobial activity while degrading naturally into oxygen, leaving no harmful residues. Compared to other physical methods such as ultraviolet light and pulsed light, ozone presents several advantages, including greater penetration capacity and more uniform action on irregular grape surfaces. These characteristics contribute to a more effective reduction in native microbiota, creating a favorable environment for the implantation of selected non-*Saccharomyces* yeasts. Ozone treatments, both in gaseous form and dissolved in water, not only reduce indigenous yeast populations efficiently but also promote the metabolic activity of *L. thermotolerans* during fermentation, as evidenced by increased acidification. These findings highlight ozone as a sustainable and efficient sanitization technique that facilitates the use of unconventional yeasts in winemaking, offering an alternative to sulfites and expanding the possibilities for aromatic and compositional modulation of wine.



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sciforum-136897: Exploring the Glucose Transport System of *Torulaspora delbrueckii*: Genomic and Functional Characterization

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The fermentative capacity of yeasts largely depends on how efficiently they transport sugars into the cell, a step that is often considered rate-limiting in sugar metabolism. While glucose transport has been extensively studied in *Saccharomyces cerevisiae*, less is known about *Torulaspora delbrueckii*'s, despite its growing industrial relevance. *T. delbrueckii* contributes positively to flavour and aroma and displays high stress tolerance in bread and wine fermentations, but the mechanisms behind its sugar uptake are still not well understood. The characterization of its sugar transport system is fundamental to improve its performance in fermentative processes.

In this context, we have been characterizing *T. delbrueckii* glucose transporters and their transport kinetics. Analysis of the genomes of 41 strains allowed to identify potential glucose transporter genes. Besides the previously characterized Lgt1 and Igt1, at least four additional transporters were found across all strains and their expression throughout the fermentation process is being studied. Furthermore, we are exploring whether it is possible to improve the fermentative capacity of *T. delbrueckii* by expressing the most ethanol-resistant *S. cerevisiae* transporters, addressing a key limitation of *T. delbrueckii* transporters, which are more sensitive to ethanol and therefore contribute to its lower fermentative performance compared to *S. cerevisiae*.



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sciforum-136864: Exploring the potential of a new biostimulant created via the fermentation of agri-food leftovers for more sustainable agriculture practices

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Every year, a large amount of waste is generated throughout the food chain; about 13% of it comes from large retailers, originating from products that are not sold and are thrown away. In recent years, research has focused on the valorisation of food waste by transforming it into new products, but there is a lack of research into these products' use as biostimulants. The use of biostimulants from food waste would be a viable alternative to synthetic fertilisers, making agriculture less impactful. The aim of this study was to evaluate the use of fermented food waste as a biostimulant using a multidisciplinary approach. The fermentation process was studied and optimised with an experimental design (DoE). Lettuce was fermented with *Lactiplantibacillus plantarum* and tested in a greenhouse with strawberry plants at different concentrations. A morpho-physiological characterisation of the plants during vegetative development and harvest was performed, revealing that the application of the biostimulant increased the number of fruits and the chlorophyll content. The soil microbial community was studied with Biolog EcoPlate to understand changes in relation to treatment. Using this system, changes in the metabolic activity of the microbial soil community in relation to the phase of the plant cycle were highlighted.



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sciforum-135921: From Cells to Bioactives: Assessing Postbiotic Potential in Non-conventional Yeasts

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Postbiotics—defined as non-viable microbial cells together with their wide repertoire of polymers, peptides, nucleotides, and metabolites—have emerged as promising bioactive agents with antimicrobial, antioxidant, and immunomodulatory functions. Compared to probiotics, postbiotics provide enhanced safety, extended shelf-life, and improved compatibility with food matrices. Despite their potential, yeast-based postbiotics remain underexplored, as most current studies focus on lactic acid bacteria.

In this context, *Kluyveromyces marxianus* and *Kluyveromyces lactis* stand out as non-conventional yeasts with desirable traits. Both exhibit rapid growth, thermotolerance, and versatile metabolic capabilities and are increasingly regarded as probiotic candidates due to their tolerance to gastrointestinal stresses. Their cell wall components further support postbiotic relevance: *K. marxianus* produces branched α -mannans and nucleotide-rich lysates upon autolysis, whereas *K. lactis* generates β -glucans even under stress. These features highlight their dual role as emerging probiotics and valuable sources of postbiotic bioactives.

This study compares the postbiotic potential of *S. boulardii* YUS5—a clinically established probiotic yeast—with *K. lactis* ATCC8585 and *K. marxianus* BSK105, using both whole-cell lysates and cell-free supernatants, as well as co-culturing strategies. By linking probiotic candidacy to postbiotic functionality, this work introduces yeast-only systems as innovative platforms for food and health biotechnology.



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sciforum-143747: Glycolipid Biosurfactant from *Stenotrophomonas maltophilia* Produced from Agro-Industrial Waste: Characterization and Potential Application as a Surfactant

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The present study addresses the production and characterization of a biosurfactant for application in the surfactant industry. The bacterium *Stenotrophomonas maltophilia* UCP 1601 was used to produce a biosurfactant through the reuse of agro-industrial waste as substrates, including glycerol, corn steep liquor, and waste soybean frying oil. Characterizations of the biomolecule produced were performed, including surface tension and critical micelle concentration (CMC), zeta potential, FTIR, and determination of carbohydrates, lipids, and proteins. The foaming activity and hemolytic activity were evaluated. The biosurfactant exhibited a surface tension of 31 mN/m and a CMC of 1.3 g/L, with an anionic chemical nature and a glycolipid biochemical profile. The foaming activity showed 75% efficiency at 0 min at a concentration of 10% of the produced biomolecule. Hemolytic activity was positive for alpha-type hemolysis, indicating low toxicity for human use. The results point to a functional biomolecule with potential application in the surfactant industry, in addition to presenting a sustainable production process that contributes to the SDGs, particularly Goals 12 and 13.



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sciforum-136900: High Sporulation of *Bacillus* XT13, XT14, and XT17 in Submerged medium for Drought-Stress Applications

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Latin America faces increasing challenges due to climate change, with drought and desertification. In this context, AGROSAVIA selected three *Bacillus* strains (XT13, XT14, and XT17) with plant growth-promoting effects and potential in mitigating water-deficit stress. A culture medium for the three strains was developed by assessing 6 liquid media (Landy, DSM, GYS, Pandey, Flour Mix, and JM). Assays were performed individually in microcultures (24-well plates), with a working volume of 2 mL and 1% of inoculum. Microplates were incubated at 30°C and 150 rpm, with sampling times at 48 h and 72 h. The results showed that the Landy medium promoted the most growth of the strains evaluated, obtaining concentrations of 2.7×10^8 , 1.7×10^7 , and 6.3×10^7 UFC/mL for vegetative cells, while obtaining spore values of 5.1×10^8 , 6.7×10^7 , and 1.0×10^5 UFC/mL, respectively, for the strains XT13, XT14, and XT17 at 48 h. At 72 h, the vegetative cell results were 1.0×10^8 , 6.3×10^6 , and 4.2×10^8 UFC/mL, and the spore counts were 7.1×10^8 , 2.1×10^7 , and 4.3×10^8 UFC/mL. The results demonstrate the sporulation potential of Landy medium, with the highest productivity achieved at 72 h of fermentation, demonstrating its technical feasibility for obtaining a bioproduct based on the strains evaluated.



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sciforum-135851: Impact of Climatic Conditions on the Growth and Population Dynamics of Flor Yeasts in Biologically Aged Sherry Wines

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INTRODUCTION

The biological aging of certain fortified wines from the D.O. Jerez/Xérès/Sherry is characterized by the development of a surface yeast biofilm known as *velo de flor*.

Among the most influential stress factors affecting *flor* yeast development are the thermohygrometric conditions within the aging cellars (Navia-Osorio et al., 2023).

This study examines three soleras of Fino wine to investigate the relationship between temperature and humidity variations and the yeast population dynamics and analytical composition of the wines aged in these areas.

MATERIALS AND METHODS

Temperature and humidity within the cellar were monitored by meteorological stations in three distinct zones. Additionally, an external environmental monitoring system was installed outside the building.

The population distribution of *velo de flor* yeasts in the three *soleras* was assessed using molecular biology techniques: PCR–ITS region of ribosomal DNA (Kurtzman et al., 2011) and multiplex microsatellite analysis (Vaudano et al., 2008).

The volatile composition of the wines was analyzed by gas chromatography (GC).

RESULTS

The results correlate the environmental thermohygrometric conditions and the development of the *velo de flor*. The architecture of the cellar allows for the identification of areas with more favorable climatic inertia for the development of the biological aging of Finos.



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sciforum-141538: Impact of Environmental Disruption on Microbial and Enzymatic Dynamics of Chornozem Soils

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Severe anthropogenic disturbances can induce long-term ecological shifts, particularly in sensitive biological systems such as soil microbial communities. In this study, we investigated the impact of intensive environmental disruption on microbial fermentation processes and associated enzymatic activity in black soils (chornozem) of the Kharkiv region (Ukraine). Microorganisms were determined using tenfold dilution techniques and selective media. To assess fermentation-related activity, we quantified key soil enzymes. Results revealed a two-to-three-order-magnitude decline in total microbial abundance, especially among agronomically important fermentation-related groups such as phosphate-mobilizing, nitrogen-fixing, and cellulolytic microorganisms. Enzymatic activity showed a parallel collapse: invertase, urease, and protease, critical to organic matter fermentation and nitrogen transformation, decreased significantly, indicating stalled biochemical turnover. Phosphatase and dehydrogenase activities dropped, reflecting impaired phosphorus release and microbial respiration. Meanwhile, oxidative enzymes such as catalase, polyphenol oxidase, and peroxidase showed altered activity, suggesting oxidative stress and disrupted humus formation pathways. The degradation of microbial fermentation potential and enzymatic function in disturbed chornozem soils highlights the urgent need for biological restoration. Our findings provide a biochemical basis for developing remediation strategies focused on reactivating microbial fermentation and enzymatic networks critical for ecosystem recovery and sustainable soil management.



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sciforum-136537: Impact of nitrogen supplementation, cooling rate, and SO₂ addition timing on yeast viability and acetaldehyde production during the post-fermentation phase of wine

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Introduction

The post-fermentation phase plays a key role in wine quality, as yeast viability and acetaldehyde production affect sensory attributes and stability. This study evaluated the impact of nitrogen supplementation, cooling strategies and sulfur dioxide (SO₂) addition timing under winery conditions using Glera grape juice.

Methods

Two commercial *Saccharomyces cerevisiae* strains were tested in pilot-scale fermentations involving a decanting rest, two rackings (with either fast or slow cooling), and bottling, all in presence of wine lees. Nitrogen was supplied as ammonium (NH₄⁺) or as a combination of ammonium and amino acids (MIX). Yeast viability and acetaldehyde concentrations were monitored throughout post-fermentation and 67 days after bottling, with yeast cells remaining in contact with the wine. Mixed statistical models were applied to separate treatment effects from strain variability.

Results

MIX supplementation significantly improved yeast viability without increasing acetaldehyde concentration. Fast cooling and no SO₂ addition were associated with a higher number of viable cells and lower acetaldehyde concentration, whereas SO₂ addition increased the acetaldehyde concentration regardless of addition timing. Acetaldehyde concentration ranged from 12.1 to 36.2 mg/L across treatments.

Conclusions

Improving nitrogen management and post-fermentation cooling can positively influence wine quality by preserving yeast viability and limiting acetaldehyde concentration. The persistence of viable cells into the post-fermentation phase suggests their potential role in oxidation protection and wine maturation.



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sciforum-136240: Impact of novel biotechnological strategies in the fermentation of Sicilian wines on the content of total polyphenols

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Catarratto is the main white grape variety in Sicily, and enhancing its value is a key goal. This study investigated how different fermentation strategies affect the total phenolic content (TPC) in wines made from Catarratto grapes under different winemaking protocols. Three biotechnological approaches were explored: (i) sequential inoculation using three non-*Saccharomyces* yeast strains (*Starmerella lactis-condensi*, *Candida oleophila*, and *Lachancea thermotolerans*) followed by *Saccharomyces cerevisiae*; (ii) Catarratto wines that are non-macerated or subjected to short- or long-term maceration with seeds and peel, with/without sulfites, and fermented using *St. lactis-condensi*, *S. cerevisiae*, and lactic-acid bacteria; and (iii) traditional sparkling wines with *S. cerevisiae* strains. TPC was measured using the Folin–Ciocalteu method. Fermentation generally led to a reduction in TPC compared to must. In approach (i), the highest and lowest TPC values were observed in wines fermented only with *S. cerevisiae* and in those pre-fermented with *St. lactis-condensi* and *L. thermotolerans*, followed by *S. cerevisiae*, respectively. In approach (ii), maceration increased TPC, particularly when *St. lactis-condensi* was followed by *S. cerevisiae*. In sparkling wines (iii), TPC varied significantly depending on the selected non-commercial *S. cerevisiae* strain. These results suggest that tailored fermentation strategies can enhance the phenolic content and quality of Catarratto-based wines.



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sciforum-135854: Improvement of acidification and sensory profile in Verdejo white wines through co-inoculation of *Lachancea thermotolerans* and *Metschnikowia pulcherrima*

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Wineries in warm areas have had problems in winemaking due to rising grape pH as a result of the higher temperatures, which reduces the perception of freshness and has a negative impact on wine quality. To address this, biological acidification strategies have been implemented. This study evaluated the acidifying potential of two strains of *Lachancea thermotolerans*, *Laktia* and *Blizz*, which allow pH to be reduced by their ability to produce lactic acid. Microfermentations were performed using Verdejo grape must, with the strains tested alone and in co-inoculation with *Metschnikowia pulcherrima* (Mp29) and *Hanseniaspora opuntiae* (A56). Periodic analyses of oenological parameters by FTIR, lactic acid determinations, and microbiological analyses were carried out to evaluate yeast implantation and fermentative performance. Post fermentation, volatile compounds, redox potential, color, and sensory attributes were analyzed. The results indicated that the *Blizz* strain had the highest acidifying capacity, reaching 4.24 g/L. Co-inoculation with Mp29 enhanced lactic acid production, reaching 7.11 g/L. Sensory evaluation confirmed that tasters perceived the increased acidity positively, noting improvements in visual and aromatic qualities. Fermentations with *Lachancea thermotolerans*, especially in combination with strain Mp29, are an effective strategy to increase acidity in white wines, improving sensory properties and chemical characteristics in white wines.



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sciforum-143657: Indigenous yeast biodiversity revealed by bioprospecting methods in South West Switzerland

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Yeasts are known to colonize various natural and anthropogenic habitats, notably vineyards and wineries. The recent literature shows that there is a growing interest in indigenous yeast starters, reflective of the local yeast biodiversity and potentially adapted to cultivated grape varieties. This assumes that native yeast strains could be linked to the notion of “terroir”. Within this biodiversity, yeasts participate in complex microbial communities associated with distinct niches in the vineyards and wineries. This natural yeast biodiversity could represent a unique microbial signature of the “terroir” and an invaluable resource for winemakers. The present study revealed the diversity of yeast species in South-Western Switzerland. Comprehensive sampling was conducted across eight Swiss vineyards and their associated wineries. Yeasts were isolated from collected samples encompassing vineyard niches (flowers, vine bark, insects, grape berries) and winery environments (equipment surfaces, walls). Molecular identification was performed through sequencing of the D1/D2 domain of the 26S ribosomal DNA gene. The analysis identified 263 isolates, belonging to 44 species distributed across 25 distinct genera. Subsequently, a subset of these yeasts has undergone characterization in co-fermentations with *S. cerevisiae* reported in another work. Characterization studies, including micro-fermentations alongside chemical and sensory analyses, will be extended to additional species.



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sciforum-136789: Innovative Potential of New *Lachancea thermotolerans* Strains in Winemaking

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The yeast *Lachancea thermotolerans* is significant in winemaking due to its ability to produce L (D)-lactic acid, aiding in biological acidification and pH reduction. New strains were isolated from naturally fermenting fruits and assessed with regard to winemaking. Their physiological and fermentative characteristics were examined in various environments. Fermentation trials with synthetic must, synthetic base wine, and grape must showed that fermentation capacity, lactic acid production, and survival depended on the yeast strain and environmental conditions. Adding different concentrations of tartaric and sulphurous acids affected yeast viability and acidification ability. Treatment with 1 g/L tartaric acid and 50 mg/L metabisulfite resulted in the highest yeast imposition. Higher concentrations were toxic, causing yeast disappearance by the seventh day. Wines made with *L. thermotolerans* contained 1% less alcohol but had worse organoleptic characteristics and less aromatic complexity than the control wines. They also displayed an imbalance due to high acidity and low pH. The new strains show potential for winemaking, especially for biological acidification, but further research is needed to improve their organoleptic and aromatic qualities. Additionally, optimizing fermentation conditions and mixing with wines made with *S. cerevisiae* could enhance the overall quality and acceptance of wines produced with *L. thermotolerans* strains.



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sciforum-142895: Laboratory-Scale Design of a Submerged Fermentation Process Using Agroindustrial Waste for Producing *Metarhizium robertsii* Mt008 Metabolites and Resistance Structures to Control *Anastrepha obliqua*

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Fruit flies are a major constraint in mango production in Colombia. To address this, the entomopathogenic fungus *Metarhizium robertsii* Mt008 was selected for biocontrol development due to being shown to be effective against *Anastrepha obliqua*. This study evaluated the use of agroindustrial waste as a carbon and a complex nitrogen source to optimize both fungal biomass and destruxin production. A central composite design with 11 treatments was used to assess their effects on biomass, destruxin A and B production, and insecticidal activity against both preimaginal and adult stages of *A. obliqua*. Fermentations were conducted at 28 °C and 300 rpm. Optimal production was achieved using 6 g/L of the carbon source and 10 g/L of the nitrogen source, resulting in 2×10^5 conidia/mL, 1.7×10^5 blastospores/mL, 160 pellets/mL, and destruxin concentrations of 4 ppm (dxt A) and 15 ppm (dxt B). After 18 days of fermentation, the fungal biomass caused 78% mortality in the preimaginal stages, while the metabolites in the extracts achieved 30% adult mortality. These results suggest that submerged fermentation using agroindustrial residues is a promising strategy for the cost-effective production of fungal biocontrol agents targeting *A. obliqua*, with potential application in sustainable mango pest management programs in Colombia.



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sciforum-136615: Microbial Communities in Wild and Cultivated Vineyards: Insights into the Native Microbiota Relevant to Fermentation Processes

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The microbial diversity associated with grapevines plays a crucial role in shaping fermentation outcomes and wine characteristics. In this study, we explored the microbiota of three contrasting vineyard types: a wild *Vitis vinifera* subsp. *sylvestris* population and two cultivated *V. vinifera* subsp. *vinifera* vineyards under organic and conventional management. Microbial isolates were obtained using culture-dependent methods, followed by DNA extraction and taxonomic identification through PCR amplification of 16S rDNA and ITS regions. The distribution of bacterial and fungal phyla varied notably across vineyard types, reflecting the influence of both anthropogenic practices and the natural environment. Wild vines exhibited distinct microbial profiles, often absent or underrepresented in cultivated systems. These results underscore the value of native microbiota as reservoirs of microbial diversity with potential relevance for spontaneous fermentation processes. By characterizing cultivable microbial communities in diverse viticultural settings, this study contributes to a better understanding of the ecological and oenological roles of vineyard-associated microorganisms, aligning with the goals of the 1st International Online Conference on Fermentation.



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sciforum-136796: MODERN TECHNOLOGIES FOR THE PRODUCTION OF GLUCOAMYLASE ENZYME PRODUCTS

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In modern biotechnological practice, there is a growing trend toward the use of thermostable enzymes due to their efficiency in intensive industrial processes. Among the diversity of microbial producers of thermostable glucoamylases, special attention is paid to bacteria of the *Bacillus* genus (*B. licheniformis*, *B. subtilis*, and *B. amyloliquefaciens*). The aim of this study was to analyze the technological aspects of the process of obtaining the enzyme preparation of glucoamylase. In the present study, strains 1-5 of *Bacillus subtilis* were selected for the evaluation of amylolytic activity. Quantitative determination of amylolytic activity was performed using a modified iodometric method. The concentration of total protein was determined using the Bradford spectrophotometric method with bovine serum albumin as a standard to construct a calibration curve. The results of this study showed that strains 1, 5, and 3 were characterized by the highest glucoamylase activity. At the same time, bacterial strains 2 and 4 showed a significantly lower level of amylolytic activity. The results of preliminary studies indicate the prospects of using brewer's grains and molasses as cost-effective and nutritious components of the nutrient medium for the cultivation of glucoamylase producers, which provides a complete and balanced substrate for the biosynthesis of enzyme products.



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sciforum-136520: Novel Strategies for Enhancing *Torulaspora delbrueckii* Performance in Wine Fermentation

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Torulaspora delbrueckii (*Td*) improves wine organoleptic quality but struggles with fermentation efficiency and sensitivity to SO₂, ethanol, and CO₂ compared to *Saccharomyces cerevisiae* (*Sc*). To boost its industrial application, we explored several improvement strategies.

Firstly, genetic improvement involved isolating spore clones free of growth-retarding alleles from wine *Td* strains. Mutants resistant to SO₂, ethanol, and high CO₂ pressure were then obtained. These showed enhanced base wine fermentation, some approaching *Sc*'s capability, with good genetic stability.

Secondly, we investigated yeast mixture for eventual hybridization between *Td* and *Sc*. The resulting mixed clones (*Sc*-mixed *Td*) exhibited intermediate phenotypes for critical biotechnological properties, including resistance to SO₂, ethanol, and high CO₂ pressure. Several mixed clones improved base wine fermentation and sparkling wine organoleptic quality, coinciding with increased acetate and ethyl esters. Their genetic stability supports commercial use.

Finally, we explored increasing *Td* inocula ploidy. Unlike *Sc*, *Td* transitions to diploid or polyploid states under stressful conditions. This increased ploidy enhances *Td*'s viability and metabolic activity. Consequently, *Td* inocula with increased ploidy exhibited enhanced fermentation efficiency. These combined strategies offer promising avenues for optimizing *Td*'s performance in industrial wine production.



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sciforum-143864: Nutritional Requirements in Anaerobic Digesters: A PRISMA-Based Review on Mineral and Vitamin Supplementation

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Anaerobic digestion is an essential process for converting organic waste into renewable fuels such as biogas, offering an efficient alternative for the energy transition while also promoting the sustainable management of materials such as animal manure, industrial effluents, and agricultural waste. Optimal performance of anaerobic digestion requires strict control of operational parameters, including pH, temperature, and the availability of minerals and vitamins. Understanding the nutritional requirements of the involved microorganisms, as well as the micro- and macronutrient profiles of the substrates used, is fundamental to ensuring process efficiency. In this context, the present study conducted a literature review aimed at identifying the mineral and vitamin supplementation needs in biodigesters, based on the substrates applied. The PRISMA methodology (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) was used to identify the most relevant experimental studies that reported either efficiency gains or inhibitory effects. The results showed that nutritional requirements vary not only according to the type of substrate but also with the operational time of the reactor, the composition of the microbial consortium, and other operational factors. Therefore, it is not possible to establish a generalized recommendation for mineral and vitamin supplementation in commercial biodigesters based solely on the substrate type.



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sciforum-136667: Obtaining a functional food ingredient based on oat bran and fermented by *Lactcaseibacillus casei*

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Using agro-industrial by-products as a substrate for the growth of probiotic strains is an alternative for increasing their added value. This study aimed to design and optimize the production of a functional ingredient (FI) with *Lactcaseibacillus casei* (ATCC 393) immobilized in oat bran (OB). A Box–Behnken experimental design was applied to study the effect of hydration level (HL), whey supplementation, and initial inoculum concentration (IC) on the probiotic growing. According to design, systems containing 1 g of OB, supplemented with 0 to 0.4 g whey/g OB, and HL from 5 to 20 mL of water/g OB were sterilized and inoculated with an IC in the range 5.61 and 7.61 log (CFU/g OB). After incubation at 37°C for 24 h with orbital shaking, the systems were washed, centrifuged, and vacuum-dried. Independent variables were optimized to maximize cell count and growth and minimize cell decay due to drying. The optimal conditions found were for HL: 15 mL of water/g OB; for whey: 0.3 g/g OB, and for the IC: 5.79 log(CFU/g OB), which were recorded within the studied range. This result demonstrates the feasibility of optimizing the production of a dried FI based on OB as a substrate for *L. casei*.



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sciforum-136891: Optimisation of a Bacterial Co-culture for Sustainable Bioinoculant Development to Mitigate Drought Effects in Colombian Grasslands

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Climate change has intensified desertification and droughts, directly impacting agriculture and livestock. To promote sustainability in Colombian grasslands, AGROSAVIA developed a bioinoculant comprising a synthetic bacterial consortium of three rhizobacteria (*Herbaspirillum* sp. AP21, *Azospirillum brasilense* D7, and *Rhizobium leguminosarum* T88) with plant growth-promoting properties and drought resilience. This study evaluated the co-culture fermentation of these strains in M10 medium, testing different carbon source (SC) concentrations relative to the baseline (T0): T0, T1 (-30%), T2 (-10%), T3 (+10%), and T4 (30%). Fermentations were conducted at 150 rpm and 30°C. Co-culture was initiated with strain T88, followed 24 h later by the addition of strains D7 and AP21. To monitor growth dynamics, the cell viability (CFU/mL) of each strain and the mixed culture was quantified after 24 h and 48 h on LMA agar (30 °C, 72 h incubation). Once the optimal carbon concentration was identified, the co-culture was scaled up in an 8 L stirred-tank bioreactor (STR). The bioreactor results showed enhanced growth, with cell counts exceeding 10⁹ CFU/mL, confirming the feasibility of co-culture fermentation for the development of a sustainable bioinoculant to mitigate drought impacts.



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sciforum-136522: Optimizing Wine Yeast Biomass Production: Effect of Culture Medium Composition in *Saccharomyces cerevisiae* for Scaling-Up Bioreactor Systems

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Large-scale biomass production of *Saccharomyces cerevisiae* is essential for oenological and industrial applications. The efficiency and cost-effectiveness of biomass cultivation depend significantly on the composition of the culture medium. In this study the potential of different nitrogen sources for yeast growth was evaluated in different medium cultures, evaluating the growth of four different commercial *S. cerevisiae*. The different nitrogen sources used for the culture medium were easily available in the cellar as brewer's yeast, diammonium phosphate and two commercial products with nitrogen composition, Actimax Vit and Actimax Plus; all of them were tested in different concentrations. Fermentations with different culture mediums were performed on a 96-well plate at 24°C with no oxygenation or extra feeding. Cell growth was evaluated at initial and final stages by solid culture and monitored by OD₆₀₀ by microplate reader Varioskan lux. The medium containing Actimax Plus did not support satisfactory yeast growth, despite having a composition similar to the commercial medium. Additionally, brewer's yeast-based media were discarded due to their complex handling under cellar conditions. The medium with sucrose and Actimax Vit and diammonium phosphate maintained yeast growth yields and represented a more cost-efficient and promising alternative for biomass production compared to the commercial medium evaluated.



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sciforum-136556: Screening and optimization of Chinese herbal matrix for liquid fermentation by *Pleurotus ostreatus* HXS-M1

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This study aimed to screen and optimize the liquid fermentation medium for a compound Chinese herbal matrix (comprising *Astragalus membranaceus*, *Atractylodes macrocephala*, *Taraxacum mongolicum*, and *Glycyrrhiza uralensis*) using *Pleurotus ostreatus* strain HXS-M1, with the ultimate goal of enhancing the bioavailability and efficacy of herbal active compounds through microbial fermentation. Carboxymethyl cellulase (CMCase) activity was used as the response indicator. A single-factor test was conducted to preliminarily screen suitable medium components, followed by a Box–Behnken design-based response surface methodology to establish a mathematical model for optimization. The results identified the optimal medium composition as follows: 43.0% compound Chinese herbal extract (as carbon source), 1.0% mung bean powder (as nitrogen source), and 0.1% calcium carbonate (as inorganic salt). Under these conditions, the maximum CMCase activity reached 39.92 U/mL. This optimized fermentation process not only improves enzyme yield but also promotes the degradation of herbal cell walls, facilitating the release of bioactive compounds, thereby enhancing pharmacological efficacy and supporting the development of antibiotic-free feed additives. The findings provide a technical foundation for further scaling up the fermentation process of Chinese herbs using *P. ostreatus* HXS-M1.



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sciforum-136865: Selection of *Saccharomyces cerevisiae* strains for application in the fermentation and production of Arbutus-berry brandy

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Arbutus-berry brandy is a traditional Portuguese distillate that plays a significant role in the regional economy. At present, the fermentation of arbutus-berry must occurs spontaneously, resulting in inconsistency in the quality of the final product. The objective of this study was to characterize *Saccharomyces cerevisiae* strains isolated from naturally fermented arbutus-berry must, with a view to selecting strains with the potential for controlled and consistent fermentations. A total of 65 strains were evaluated using high-throughput methods, based on 24 phenotypic tests, allowing the selection of 10 strains with distinct profiles. These were then subjected to a series of fermentation tests in synthetic must. Additionally, the same 10 strains were inoculated into arbutus-berry must to conduct fermentation. Subsequent monitoring of the inoculated samples was undertaken over a period of 30 days, during which the weight loss was evaluated. The majority of the strains were distinguished by their accelerated sugar consumption and effective fermentation performance in arbutus must, indicating their potential for industrial application in controlled fermentations for the production of arbutus-berry brandy.



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sciforum-136814: Solid-State Fermentation of Corn Silk by *Aspergillus niger* Improves Phenolic Profile and Antioxidant Capacity

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Corn silk (CS), a residue of maize cultivation, represents an underutilized source of bioactive compounds, particularly phenolics. In this context, the present study investigated the effect of solid-state fermentation (SsF) using *Aspergillus niger* ATCC-6275 on increasing the phenolic profile and antioxidant activity of CS over a 10-day period. Total phenolic and flavonoid contents increased by approximately 73% and 37%, respectively. HPLC-DAD-ESI-MS analysis revealed substantial enrichment of hydroxycinnamic acids, particularly 4-caffeoylquinic (20-fold), 5-synapoylquinic (9-fold), and 4-feruloylquinic (5-fold) acids, suggesting enzymatic release of bound phenolic compounds. Enzymatic hydrolysis of flavonoid glycosides resulted in aglycone accumulation, such as methoxyluteolin and luteolin. The antioxidant activity of fermented CS significantly improved, with DPPH, ABTS, and FRAP assays indicating increases of 23%, 50%, and 44%, respectively. These biochemical transformations occurred alongside organic acid production and sugar depletion, confirming active fungal metabolism. Overall, this work supports SsF as an eco-friendly strategy for converting corn silk into a high-value functional ingredient for food, pharmaceutical, or nutraceutical applications.



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sciforum-136477: Solid-State Fungal Fermentation as a Sustainable Strategy to Increase Protein and Antioxidant Capacity in Plant-Based by-Products

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Pressure on the food industry to reduce environmental impact has positioned the revalorization of by-products as a major strategy to address this effect. One strategy that could be useful in addressing this problem is solid-state fungal fermentation (SSSF). The aim of this study is to use SSSF on by-products (remaining cakes) from the plant-based beverage industry (tiger nut, carob, and rice) to increase protein content and antioxidant capacity. For this purpose, two strains of filamentous fungi (*Aspergillus oryzae* var. *oryzae* CBS 819.72 and *Fusarium venenatum* CBS 458.93) presenting Qualified Presumption of Safety status, were used as sources to produce mycoprotein. The protein content was determined by Kjeldahl method, Total Antioxidant Capacity (TAC), by ORAC and TEAC methods, and Total Polyphenols (TP) by the Folin-Ciocalteu method. The results showed a significant increase in proteic biomass in all fermented matrices, especially in the case of rice by-product with *A. oryzae*. Likewise, an increase in TAC was observed with notable improvements in all fermented samples, except for carob by-product, which reduced values in all the methods analyzed, except in ORAC. In conclusion, this process represents an effective strategy for the valorization of agri-food by-products, promoting the circular economy and sustainability.



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sciforum-143597: Sustainable production of plant growth-promoting bacteria on agroindustrial byproduct-based media

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Plant growth-promoting bacteria (PGPB) are crucial for sustainable agriculture, offering an eco-friendly alternative to chemical fertilizers by boosting crop productivity. This research focused on developing cost-effective culture media for PGPB associated with sugarcane, utilizing agro-industrial byproducts. We evaluated 83 formulations based on sugarcane molasses, glycerin, corn steep liquor, and yeast extract for eight *Bacillus* species and six diazotrophic species. For the *Bacillus* genus, the optimal medium consisted of glycerin (2%), corn steep liquor (1.5%), and yeast extract (0.35%)—this formulation yielded a high optical density (OD_{600nm}) of 9.36 ± 0.17 within 48 hours for *Bacillus megaterium* (Bm). For the diazotrophic bacteria, the most effective medium was composed of sugarcane molasses (2%), corn steep liquor (3%), and yeast extract (0.5%), supplemented with macro- and micronutrients, and vitamins, achieving an OD_{600nm} of 8.416 ± 0.016 in 48 hours for *Herbaspirillum rubrisubalbicans* (Hr). In comparison to the standard Luria–Bertani (LB) medium, which resulted in turbidities of 4.46 ± 0.22 for Bm and 3.19 ± 0.04 for Hr, our developed media demonstrated a more than twofold increase in bacterial growth. These findings highlight a promising, sustainable approach to producing high-density PGPB inoculants for enhanced agricultural productivity.



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sciforum-136726: The Reuse of Agri-Food Waste for a Sustainable Growth of Lactic Acid Bacteria Stains: A Preliminary Study

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Annually, agri-food industries generate significant amounts of waste, particularly from plant-based and dairy sources. Although these wastes can pose environmental and economic management challenges, they are also rich in bioactive components, making them cost-effective substrates for microbial growth and a natural source of high-value compounds. In this context, eleven by-products derived from fruit, vegetable, and dairy processing were selected, along with ten different strains of lactic acid bacteria (LAB), to assess their potential as alternative substrates for microbial growth and biomass production. All matrices were subjected to various physical pretreatments in order to evaluate their influence on LAB proliferation. Later, the strains were incubated at a controlled temperature, and the bacterial growth was monitored for 24 hours using spectrophotometry.

Matrix–strain combinations analysis have highlighted the most efficient pairings for supporting microbial growth. These preliminary findings provide valuable insights for the development of innovative, cost-effective, and eco-friendly growth media, promoting the adoption of circular economy practices, and contributing to waste reduction.



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sciforum-143057: Thermostable Hemicellulolytic Enzymes Secreted by a Microbiome Isolated from a Local Anaerobic Digester

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Lignocellulose biomasses (LCB) are abundant and sustainable reservoirs of fermentable sugars that can be exploited to produce bio-based fuels and chemicals. In the emerging context of a circular economy, the implementation of thermophilic microbes and enzymes can represent a greener tool for lignocellulose deconstruction. We described the biochemical characterization of enzymes secreted by a microbiome (named CMC-70), which was obtained after an enrichment at 70°C using spent mushroom substrate (SMS) and subsequently selected on carboxymethylcellulose (CMC) as a pure carbon source. The proliferation of the microbiome on SMS revealed the secretion in the supernatant of thermostable xylanases. These enzymes were mainly active from pH 5 to pH 10, with an optimum at pH 7. Xylanase activity was highest at 80°C, and the secretome retained more than 50% of its initial activity over two months when stored at 4 °C. Enzymes' hydrolytic potential was tested on pure and complex biomasses, highlighting the presence of a wide spectrum of glycoside hydrolase (GH) activities. These insights provide a framework for future formulations of more effective enzymatic cocktails for biotechnological applications. The research was granted by Next Generation EU in the context of the National Biodiversity Future Center (NBFC).



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sciforum-136450: Traditional vs Bioprotection: Comparative Evaluation of Four *Metschnikowia pulcherrima* Strains in fermentation

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Growing market pressure and consumer concerns over food additives have driven the demand for low-sulfur or sulfur-free wines. Due to the limitations of alternative preservation methods (high cost and efficacy constraints), biological protection has recently emerged as a promising approach. This study compared the protective efficacy of four *Metschnikowia pulcherrima* strains (Mp346, Mp29, Mp54, Mp57) and *Saccharomyces cerevisiae* with glutathione (20 g/hL) and *S. cerevisiae* with sulfur dioxide (50 mg/L) for wine preservation. For each treatment group, three independent fermentation replicates (n=3) were carried out using 200 mL of grape juice in 250 mL wide-mouth ISO bottles, with daily monitoring of dissolved oxygen and redox potential (mV).

Through controlled fermentations with continuous monitoring, the *M. pulcherrima* strains demonstrated superior oxygen management, maintaining must under consistently lower oxidative stress throughout fermentation compared to chemical alternatives, and the sensory analysis revealed that *M. pulcherrima* conferred pronounced floral characteristics. These results demonstrate that non-*Saccharomycetes* yeasts with bioprotective traits like *M. pulcherrima* outperform traditional methods in both oxidative stability and sensory profile, offering a viable strategy for sustainable winemaking.



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sciforum-143756: Turning Stress Into Color: Enhancing Pyocyanin Yield via Solvent-Induced Responses in *Pseudomonas aeruginosa*

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Bacterial pigments are emerging as sustainable alternatives to synthetic dyes, with potential applications in textiles. Pyocyanin, a vivid blue pigment produced by *Pseudomonas aeruginosa*, is biodegradable and easily extractable and exhibits strong antimicrobial activity against *Staphylococcus aureus*, *Escherichia coli*, *Fusarium graminearum*, and *Candida albicans*, making it a promising biodye.

This study investigated the use of stress-inducing agents (toluene, acetone, ethanol, and their mixtures) to enhance pyocyanin production. *Pseudomonas aeruginosa* NCTC 12903 was cultured in nutrient broth for seven days. Organic solvents were added 24 h after inoculation to trigger a defensive metabolic response. Visible pigment accumulation after one week confirmed successful induction. Among the tested conditions, 0.1% (v/v) ethanol yielded the highest pigment levels. The extracted pyocyanin was applied to multifiber fabric, demonstrating its effectiveness as a sustainable, functional textile dye.

Ethanol, being relatively biodegradable and less toxic than conventional dye precursors, requires only small amounts to stimulate pigment production. Recovery strategies, including rotary evaporation, further support the environmental viability of this process.



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sciforum-135375: Yeast diversity during spontaneous fermentation of Tostado wine

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Tostado wine is a prestigious sweet wine produced in Galicia (NW Spain) from air-dried grapes of traditional grape varieties grown in this region. The peculiar characteristics of the must, mainly its high sugar concentration, make its fermentation particularly difficult. The aim of this study was to characterize the dynamics of the yeast populations involved in Tostado fermentation. White and red Tostado musts, supplied by local winegrowers, were allowed to ferment spontaneously. Yeasts were isolated at different stages of the process using conventional methodology. The isolated yeasts were then identified to the species level by PCR amplification of the 5.8S rRNA gene and the two internal spacers ITS1 and ITS2. *Saccharomyces cerevisiae* isolates were characterized at the strain level by mtDNA-RFLP. The results showed the diversity of the yeast population during fermentations. Non-*Saccharomyces* yeasts, including *Hanseniaspora uvarum*, *Metschnikowia* spp., *Starmerella bacillaris*, and *Candida* spp., predominated in the early stages of fermentation; as fermentation progressed, codominance between different *S. cerevisiae* strains was observed. However, one trial fermented only with non-*Saccharomyces* species, mainly *Lachancea thermotolerans* and *Starmerella bacillaris*. The oenological properties of the isolated non-*Saccharomyces* species and *S. cerevisiae* strains will be analyzed to select suitable starter cultures for Tostado production.



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Session 2. Fermentation and Sensory Profiles/Impact

sciforum-136855: *Vitis*-associated microbial communities shape the volatile profiles of fermented grape juices without altering grape varietal identity

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Introduction:

Vitis-specific microbial communities contribute to the volatile profile of Malbec (*V. vinifera* L.) early grape juice fermentations. We extended our studies to characterize the impact of alternative microbial consortia on the volatile profiles of fermenting Isabella (*V. labrusca* L.) grape juice.

Methods:

Homologous (Isabella) or heterologous (Malbec) microbial communities were used to inoculate sterile Isabella grape juice. Volatile compounds were characterized and analyzed, at early fermentation stages, using GC-MS. Cultivable yeast species were identified using 5.8-ITS rDNA sequences.

Results:

PCA analyses revealed that *Vitis*-specific microbial starters significantly affected the volatile profiles of fermenting Isabella grape juices. *H. uvarum*, *H. opuntiae*, and *S. bacillaris* were the predominant yeast species in these fermentations. PCA and HCA, based on data reported herein and in previous studies on Malbec, revealed that despite the pronounced impact of alternative microbial communities on aromatic profiles, the fermented products of Malbec and Isabella grapes retained their varietal aromatic identity.

Conclusions:

Our innovative experimental approach allowed us to highlight the impact of the native grape microbiota on the volatile profile of fermented grape juices, and the dominance of grape varietal identity on these profiles. Our studies underscore the potential value of wine yeasts isolated from exotic *Vitis* ecosystems.



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sciforum-143734: *Lactococcus lactis*: an original producer of volatile compounds during the fermentation of mashed cucumber

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Fermented cucumber is popular around the world, especially in Southeast Asia. In this study, we fermented mashed cucumber with several strains harvested from fermented vegetables collected in various markets in Phnom Penh. Strains belonging to different families of Lactic Acid Bacteria were selected for fermentation: the homolactic *Lactococcus lactis* and *Pediococcus pentosaceus*, the heterolactic *Limosilactobacillus fermentum*, and the facultative heterolactic *Lactiplantibacillus plantarum* and *Lactiplantibacillus pentosus*. The fermentation of mashed cucumber was conducted for one day. Volatile compounds were analyzed using the HS-SPME-GCMS method. One strain behaved differently from the others. Indeed, *L. lactis* grew more slowly than the others (reaching 10⁷ CFU/g compared to other strains, which reached 10⁸ CFU/g after one day of fermentation). The results showed that the number of various volatile compounds of *L. lactis* strain was significantly higher than fermentation with the other strains. The main difference was the number of esters, especially acetate and ethyl ester. However, despite the higher diversity of compounds, the global concentration of volatile compounds was comparable to the concentration obtained with other strains. Thus, this finding provides valuable information about the activity of the *L. lactis* strain, which exhibits esterification in green vegetables, producing more diverse ester compounds.



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sciforum-143752: The Effect of Different Cryoprotectants on the Survival Rate of Freeze-dried Lactic Acid bacteria (LAB) Powder for Cucumber Fermentation

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Lyophilization, or freeze-drying, is a new methodology for cucumber fermentation that operates at low temperatures to preserve nutritional value and taste and delays the product's deterioration. The aim of this study was to determine the effectiveness of different cryoprotectants on the survival rate for fermenting cucumbers using freeze-dried lactic acid bacteria (LAB) powder.

Mixtures of freeze-dried LAB powder with cryoprotectants (skim milk, sucrose, maltodextrin, lactose, glucose, and a mix of skim milk and sucrose) were prepared using two different ratios, namely, 1:2 and 1:10. The freeze-drying process started with freezing at -80°C for 3 to 5 hours, primary drying at -50°C for 24 hours, and secondary drying at -45°C for 2 hours. Then, the survival rate was determined in terms of physicochemical quality and sensory evaluation.

The moisture content of the freeze-dried powder ranged from 2.21% to 5.43% and 2.28% to 5.6% and water activity was between 0.153-0.283 and 0.163-0.268 for the 1:10 and 1:2 ratios, respectively. There was no significant difference in pH, total acidity, reducing sugar, total soluble solids, and salt content and the sensory evaluation was acceptable. Skim milk proved to be the most effective cryoprotectant, yielding a survival rate of approximately 70% (70.07% for the 1:10 ratio and 70.01% for the 1:2 ratio) after 24 hours of storage at 4°C.



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sciforum-140254: The influence of citrate on aroma development during pea protein fermentation

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Yoghurt is a popular fermented milk product produced by lactic acid bacteria. Plant-based milk alternatives can also be processed into yoghurt alternatives using similar fermentation approaches. Fermentation affects both the texture as well as the flavor of the final product. Vegetable proteins, especially those from peas, are often associated with an unpleasant grassy off-flavors, mainly due to aldehydes such as hexanal. These can be degraded during fermentation, while desirable, aroma-active compounds are formed simultaneously. Diacetyl, which has a characteristic buttery aroma and is formed via the citrate metabolism, plays a central role here. This study aimed to enhance the flavor of a pea-based yoghurt alternative by influencing citrate metabolism.

A substrate based on pea protein was fermented with a starter culture comprising *Streptococcus thermophilus* and *Lactobacillus rhamnosus*, and citrate--metal complexes were added. The impact on the formation of aroma-active volatile organic compounds was analyzed using headspace gas chromatography--mass spectrometry.

However, no significant increase in the concentration of diacetyl could be achieved, so far. Further experiments are therefore necessary to investigate additional influencing factors that could affect the aroma profile.



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sciforum-142475: Comparative Sensory Evaluation of Three Carbonated Kombucha Beverages Available in the Paraguayan Market

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Kombucha is a fermented beverage made from black tea, sugar, and a symbiotic culture of bacteria and yeast known as SCOBY. This traditional drink is recognized as a functional beverage, attracting consumers worldwide due to its distinctive combination of phytochemicals, bioactive metabolites, and beneficial microorganisms. These components contribute to its potential health-promoting properties, such as improved digestion, antioxidant effects, and immune support. In Paraguay, kombucha is gaining increasing popularity and is available in the market as a naturally carbonated beverage produced through both industrial and artisanal methods. Given the growing consumer interest, this study focused on evaluating the sensory acceptance of three kombucha brands: two industrially produced and one artisanal. A consumer panel was invited to participate in a blind tasting, where samples were coded to avoid bias. Participants rated their preference on a scale ranging from 1 (liked very much) to 5 (disliked very much). The sensory analysis revealed that the artisanal kombucha, marketed under the brand Scooby Shot, achieved the highest acceptance among consumers, indicating a preference for its unique flavor profile and artisanal quality. These findings highlight the potential market advantage of handcrafted kombucha in Paraguay.



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sciforum-143754: Comparison of Physicochemical Characteristics of Soy Sauces Made from Germinated Soybeans with Different Salt Concentrations

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Soy sauce, a dark brown fermented liquid, is a staple condiment in Asian cuisine, including Cambodia. A good quality soy sauce is made from soybeans, which serve as the primary raw material and potentially yield health benefits when soybeans are germinated. The purpose of this study is to produce a soy sauce from germinated soybeans with different salt concentrations. Initially, soybeans were germinated for 48 and 72 hours, then homogenized with roasted wheat, and 0.1% of *A. oryzae* was added. The koji mash after fermentation was homogenized with salt at 18% and 22% to make moromi. In addition, the physicochemical characteristics were determined, and a sensory evaluation was conducted to assess the quality during moromi fermentation. Moreover, 5×10^7 CFU/ml of *Z. rouxii* was used in moromi. The optimized results for enzyme activity, total phenolic content, and sensory evaluation of germinated soybean with a salt content of 18% were higher than those of non-germinated soybean, which were 118.02 U/g, 7.40 g/100 mg GAE/ml, and 7.36, respectively. The soy sauce made from germinated soybeans over 48 hours resulted in the best conditions in this study, including TA, amino acid nitrogen, RS, enzyme activity, sensory evaluation, and bioactive compounds at optimal levels.



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sciforum-136798: Effect of the harvest time on the population and diversity of wine yeasts

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The timing of grape harvest is critical in winemaking, as grape maturity directly influences composition, sensory attributes, and overall quality of the final wine. The aim of this study was to test the effect of the grape maturation stage on the yeast microbiome, which plays a key role in spontaneous fermentation and wine typicity.

Grapes from different varieties and regions were harvested in three different maturation stages. The must mixtures were fermented spontaneously, and the microbial population was assessed during fermentation. Yeast and mould diversity were assessed at the species level via an RFLP PCR of the 5.8S-ITS region. The fermentation potential of the different *S. cerevisiae* strains and non-*Saccharomyces* species was determined. The results showed that the proportion of microorganisms in the grape varied significantly during the different maturation stages: while in the first stages, mould predominated in the grape population, during the optimum and late stages, fermentative yeasts were present at a higher proportion. Generally, in the middle of the fermentation process, non-*Saccharomyces* yeasts, such as *Torulaspora delbrueckii* and *Hanseniaspora* spp., predominated at around 50%; at the end of the fermentation process, strains of *S. cerevisiae* predominated (around 100%). This study allows us to conclude whether the maturity stage of the grape impacts the yeast population and diversity.



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sciforum-134288: Fermentation-Induced Modulation of Color and Taste: Linking Microbial Activity to Sensory Profiles

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The sensory quality of fermented foods and beverages is profoundly influenced by microbial metabolism, which generates a broad spectrum of bioactive compounds responsible for color, taste, and aroma. This study explores the dynamic relationship between microbial activity and sensory outcomes, with a particular focus on fermentation-induced modulation of color and taste attributes. Using selected strains of lactic acid bacteria, yeasts, and filamentous fungi, we investigated their role in pigment biotransformation, organic acid production, and the generation of volatile flavor compounds during the fermentation of plant-based substrates. Advanced analytical techniques, including HPLC, GC-MS, and sensory panel evaluations, revealed that specific microbial consortia enhanced desirable color intensities through increased pigment stability and biosynthesis of anthocyanin derivatives. Simultaneously, microbial metabolism significantly influenced taste profiles by altering acidification rates, sugar consumption patterns, and the production of esters, aldehydes, and other flavor-active molecules. Our findings establish clear microbial–sensory linkages, demonstrating that targeted selection and optimization of microbial communities can fine-tune the color vibrancy and taste complexity of fermented products. This research highlights the potential for precision fermentation to develop innovative foods with tailored sensory properties, aligning consumer preferences with scientific advancements in fermentation biotechnology.



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sciforum-136885: Formulation and comparative analysis of plant-based walnut milk yoghurt

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Plant-based yogurt is being considered as a healthy alternative due to its lactose-free and cholesterol-free benefits compared to dairy yogurt. The global plant-based food market is valued at USD 14,225.3 million in 2025 and is expected to grow in the future. This study aims to develop a plant-based walnut milk yoghurt (WMY) as an alternative to dairy yogurt. WMY preparation was carried out by following the procedures of walnut milk pasteurization, cooling, culture inoculation, and the addition of sugar, pectin, emulsifier, and vanilla. Walnut milk was incubated at 38°C for 12 h. The phenolic profile of WMY attested to a total polyphenol content of 257 mg GA/100g and a total flavonoid content of 93 mg QE/100g. WMY increased the in vitro DPPH and ABTS antioxidant activity by 76.89% and 89.93% compared with commercially available animal yogurt. WMY recorded the lowest L* index and the highest a* and b* indexes, at 47.34, 13.47, and 0.19, respectively. The reference sample exhibited the highest L* index and the lowest a* and b* indexes, measuring 67.23, 11.98, and 0.05, respectively. WMY had high scores for all sensory attributes (≥ 8.78) compared with those for animal yogurt. This study highlights the benefits of plant-based yoghurt and provides a scientific basis for further optimizing the formula and production process of WMY.



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sciforum-136735: Impact of *Saccharomyces ludwigii* yeast derivatives on the chemical, physical, and sensory characteristics of Garnacha Blanca and Tempranillo Blanco wines

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Developing biotechnological tools to ensure wine quality is a key issue. Among potential biotechnological tools, yeast derivatives (YDs) are attracting considerable interest. Currently, YDs available on the market are mainly those obtained from yeasts belonging to the *Saccharomyces cerevisiae* genus. In contrast, there is limited information on YDs obtained from non-*Saccharomyces* yeasts. Significant differences have been shown among derivatives of thermally inactivated non-*Saccharomyces* yeasts in terms of protein, polysaccharides, lipids, and oxygen consumption. This study focused on YDs obtained from a *Saccharomyces ludwigii* (SL) strain, whose cell wall is rich in polysaccharides, particularly mannoproteins. The effect of three different SL derivatives (SL-YDs) was evaluated in two Spanish white wines: Garnacha Blanca and Tempranillo Blanco. After the addition of the SL-YDs, analyses were carried out after 2 and 15 days of contact with the wine.

Treating both wines with SL-YDs resulted in a significant increase in polysaccharide concentration. However, the aromatic profile of the variety may have influenced the sensory analysis of the wines. Garnacha Blanca, which is less aromatic than Tempranillo Blanco, showed more pronounced sensory differences between treatments.

Further analyses are needed to evaluate the long-term effects of SL-YD polysaccharides on the overall quality of wines.



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sciforum-136725: Impact of commercial cream yeast on acidity and sulphur dioxide combination in high-quality wines

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The loss of acidity and pH increase in grapes and wines by accelerated ripening due to climate change represent key challenges for winemakers, especially in warm regions. Rapid sugar accumulation and sharp malic acid degradation result in wines with lower freshness, reduced microbiological stability, and diminished aging potential. While viticultural strategies likely require long-term implementation, oenological solutions such as bioacidification offer immediate impact on wine acidity. This study focuses on the use of specific *Saccharomyces* and non-*Saccharomyces* yeast strains in cream format that naturally impact increasing wine acidity while allowing to reduce the combination rate of sulphur dioxide. Studied cream yeasts developed by Bioenologia 2.0 showed the ability to increase total acidity between 0.8 to 1.4 g/L in reds with a consequent pH reduction around 0.36 units via activation of a proton pump mechanism from yeast. Cream yeasts also release significant amounts of glutathione, improving antioxidant capacity and contributing to lower sulphur dioxide combination, and increase the fresher aromatic profiles of wines. Obtained wines were basically and sensory characterized by accredited laboratory and sensory panels, respectively. Results confirm commercial cream yeasts are an effective biotechnological tool to overcome the effects of climate-driven grape ripening and to support the production of high-quality wines.



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sciforum-143790: Inoculated sourdoughs and associated bread aroma profiles

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The use of novel yeast strains in mixed starters containing lactic acid bacteria (LAB) could contribute to the creation of innovative breads with unique aromatic characteristics. Two yeast strains isolated from natural sourdoughs and one LAB strain were used as inocula to prepare Type III wheat flour sourdoughs and were maintained through back-slopping. The fermentation dynamics and microbial diversity of these sourdoughs were studied. The volatile organic compounds (VOCs) in the sourdoughs and the breads made with them were identified using GC-MS analysis.

Saccharomyces cerevisiae was predominant in the inoculated sourdoughs, whereas the yeast *Wickerhamomyces anomalus* dominated in the spontaneous sourdough. *Levilactobacillus brevis* and *Lactiplantibacillus plantarum* were consistently found across all sourdoughs, with abundance ranging from 12% to 55%. A significant positive correlation was found between the presence of *S. cerevisiae*, *L. brevis*, and *L. plantarum* and the production of certain ethyl esters and alcohols, which accounted for 60% of the total VOCs. The *Weissella cibaria* strain BAL3C5B2 included in the inoculum was not the dominant LAB during successive refreshments (20% of the LAB population). Overall, the results highlight the strong fermentation performance of the newly developed mixed starter, along with its distinctive VOCs, underscoring the innovative potential of Type III sourdoughs.



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sciforum-136941: Integrated Characterization of Lactic Acid Bacteria from Subappennino Dauno Sheep Milk (Gentile di Puglia) for Pecorino Cheese Production and Cereal-Based Fermented Beverage Development: a Case Study from Italian Marginal Areas

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Safeguarding Apulian agro-biodiversity is of interest in driving bio-based innovation within the food systems of regional marginal territories. The 'Gentile di Puglia' sheep breed, a long-standing local variety from Southern Italy and especially the Foggia province, is closely linked to traditional dairy practices and local transhumance phenomena. In this study, we focused on the Subappennino Dauno region in northern Apulia, where we isolated lactic acid bacteria (LAB) from the milk of this indigenous breed. A comprehensive, polyphasic approach was employed to characterize these LAB strains in order to formulate multifunctional starter cultures suitable for Pecorino cheese manufacturing and for fermenting a cereal-based beverage using the 'Senatore Cappelli' durum wheat variety. The investigation covered technological features, antimicrobial efficacy, sensory profiles, and the production of volatile organic compounds. Fermentation and fermented products represent interesting elements to ensure the transition of food systems toward marginal areas sustainability. MF, HC, GS and VC are supported by the funding of the European Union Next-Generation EU [PNRR—Mission 4 Component 2, Investment 1.4—D.D. 1032 17/06/2022, CN00000022] within the AgriTech National Research Centre for Agricultural Technologies. FB and MP, under the same scheme, Investment 1.3 - PE00000003, title: "ON Foods-Research and innovation network on food and nutrition Sustainability, Safety and Security—Working ON Foods".



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sciforum-136776: Kefir-enriched alginate coating for fresh-cut apples: a natural biopreservation strategy to enhance microbial stability and produce quality

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The growing demand for fresh-cut chemical-free fruits has driven the search for natural preservation strategies. This study explores the use of alginate-based edible coating enriched with kefir culture to maintain the quality and safety of fresh-cut apples. Pink Lady® apple slices were subjected to these dipping treatments: water as a control (CTRL), 2% sodium alginate (ALG), or 2% alginate supplemented with a commercial kefir culture (ALG+KEFIR). Samples were stored at 4 °C for 7 days. Quality was assessed through microbiological analysis (mesophilic bacteria, yeasts and molds, and lactic acid bacteria), respiration rate, and visual appearance. Initially, all treatments exhibited similar respiration rates. However, by day 3, ALG showed a sharp increase (10.7 mL CO₂ kg⁻¹·h⁻¹), whereas ALG+KEFIR moderated this rise. By day 7, CTRL had the highest respiration, while ALG+KEFIR remained significantly lower. ALG+KEFIR also maintained the lowest mesophilic (3.24 log CFU g⁻¹) and fungal loads (3.3 log CFU g⁻¹), while supporting the highest LAB counts (3.1 log CFU g⁻¹). Visual quality was best preserved in ALG+KEFIR samples, with reduced browning. Incorporating kefir into alginate coatings enhances microbial stability and preserves visual quality. This natural, clean-label approach aligns with consumer preferences and offers a promising alternative to synthetic preservatives in fresh-cut fruit processing.



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sciforum-138595: Optimizing Fermentation Time and pH in Primary Souring of Beer Through Co-Fermentation with *Saccharomyces cerevisiae* and *Lachancea thermotolerans*

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This study investigates mixed fermentations of *Lachancea thermotolerans* and *Saccharomyces cerevisiae* as a strategy to reduce fermentation time in sour beer production while preserving the acidification benefits of *L. thermotolerans* (~3.5 pH). Fermentations were conducted at 20 °C and 25 °C using pure and mixed cultures at ratios ranging from 1:10 to 1:40 (*S. cerevisiae* to *L. thermotolerans*). Extract concentration and pH were monitored daily during the fermentation process. Alcohol content, total acidity, and FAN were also measured. A sensory evaluation was also performed for all final products.

Final pH values remained consistently low across all mixed fermentations (ranging from ~ 3.7 to 3.63), regardless of ratio or temperature. However, fermentation time was notably reduced in the presence of *S. cerevisiae*, especially at higher temperatures and higher ratios. At 25 °C, mixed fermentations completed up to 30% faster than pure *L. thermotolerans* cultures.

Sensory analysis indicated that mixed fermentations at 20 °C and higher *L. thermotolerans* ratios yielded more desirable sensory profiles, with citrus and floral notes. These findings support that the use of targeted co-inoculation strategies can effectively accelerate sour beer production while preserving the acidic and aromatic quality characteristics of *L. thermotolerans* fermentations.



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sciforum-136948: Real-Time Volatile Profiling by Direct-Injection Mass Spectrometry: A Sustainable Strategy to Accelerate R&D in Fermentation Studies

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Fermented foods represent a wide array of products with substantial cultural, ecological, and economic importance. Advancing research and innovation in this domain requires analytical techniques that are efficient, eco-friendly, and cost-effective. Volatile organic compounds (VOCs), which are generated as a result of microbial metabolism during fermentation, serve as indicators of bioprocess dynamics and are closely linked to sensory attributes. Monitoring these volatiles in real-time can reveal critical information regarding fermentation progress, product safety, and aromatic profiles. Direct-Injection Mass Spectrometry (DIMS) is a sustainable analytical method that facilitates rapid, high-sensitivity VOC detection without the need for labor-intensive preparation or separation procedures. This technique has proven effective in tracking fermentation-related microbial activities, even in microbiologically complex environments of alimentary interest. In this study, we present a series of case studies overviewing the use of DIMS in characterizing VOCs across diverse fermented matrices, including dairy (e.g., yoghurt, kefir), cereal-based items (e.g., sourdough), and fermented beverages (e.g., wine, beer, kombucha). FB and VC were supported by Investment 1.3 – Award Number: Project code PE00000003. GS and MG by Investment 1.4—D.D. 1032 17 June 2022, CN00000022] CN00000022] within the Agritech National Research Centre for Agricultural Technologies.



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sciforum-136811: Role of Yeast Derivative Products in enhancing alcoholic fermentation

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Yeast nutrient imbalances, such as deficiencies in assimilable nitrogen and accumulation of short- and medium-chain fatty acids, can inhibit *Saccharomyces cerevisiae* during alcoholic fermentation. Yeast derivative products (YDPs) could supplement nitrogen, detoxify inhibitory fatty acids, and deliver sterol-rich cell-wall fragments that integrate into active dry yeast (ADY) membranes, enhancing rehydration and membrane repair.

In this study, six YDPs of different composition and nature were added either to grape must or during ADY rehydration. In addition, an experimental design was carried out considering 3 different musts fermented at three temperatures with three YDP concentrations.

Fermentation kinetics and general chemical parameters seemed to not change depending on the YDP addition, instead the fermentation temperature seemed to have a major role. However, YDPs led to shifts in volatile organic compound profiles, affecting the concentration of esters, higher alcohols, and fatty acids. Differences of sensory characteristics were also found. These effects depended on the timing of YDP addition, dosage, and fermentation temperature.

In conclusion, while YDPs under adequate assimilable nitrogen conditions seemed to not alter fermentation performance in the experimental conditions adopted, they modulated wine aroma and sensory complexity, underscoring the need for the optimization of YDP application in enological practice.



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sciforum-143731: Technological quality and volatile profile of breads with sourdoughs prepared from sprouted and unsprouted whole-wheat flour

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There is a growing interest in applying natural and sustainable methods to improve functional, nutritional, and technological properties of foods. Sprouting and sourdough are promising technological solutions in the bakery industry. This study evaluated the effect of incorporating sourdough (SD) made from unsprouted (USWF) and sprouted whole-wheat flour (SWF) on the technological quality and volatile profile of bread. Sourdoughs were prepared from USWF or SWF, obtained under controlled conditions (20 °C for 24 h), and propagated at 30 °C for 7 days. Breads were formulated by substituting 20% of USWF with ripe sourdoughs—SB(USWF) and SB(SWF), respectively—and compared with a control bread (CB) made exclusively with USWF. Bread quality and volatile organic compounds (VOCs) were assessed. Sourdough-substituted breads exhibited improved specific volume (30–40%) and softer crumb texture (20–60% less firmness), both post-baking and following storage. Additionally, SB(SWF) led to higher crust browning and distinct VOCs, such as ethyl-heptanoate, heptanol, and geranyl-acetone, which were absent in SB(USWF) and CB. The compounds are associated with pleasant aromas, which may represent a potential advantage of using SD made from SWF. Overall, combining sprouting with sourdough improves whole-wheat bread's texture and aroma, providing a promising strategy to improve sensory attributes and consumer acceptability.



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Session 3. Fermentation Foods, Drinks, and Food Safety

sciforum-136790: Biological tools for microbial control: *Leuconostoc mesenteroides* and *Lactiplantibacillus plantarum* strains isolated from Apulian honeys as promising antifungal agents

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Lactic acid bacteria (LAB) are emerging as valuable agents for microbial biocontrol, due to their ability to produce broad-spectrum antagonistic compounds, including organic acids, bacteriocins, bioactive peptides, short-chain fatty acids, and volatile organic compounds (VOCs). We assessed the antifungal potential of 10 LAB strains belonging to the species *Leuconostoc* (*Leuc.*) *mesenteroides* and *Lactiplantibacillus plantarum*, isolated from five varieties of Apulian honey: *i*) honeydew honey, *ii*) French honeysuckle honey, *iii*) wildflower honey, *iv*) coriander honey, and *v*) *eucalyptus* honey. Antifungal activity was investigated through a sequential assay combining the agar overlay method and the 'Plate-on-Plate' technique, tested against *Aspergillus* (*A.*) *niger*, *Penicillium* (*P.*) *crustosum*, *P. roqueforti*, *Aureobasidium* (*Au.*) *pullulans* and *Geotrichum* spp. In both cases, all strains exhibited moderate-to-high inhibitory activity against *Au. pullulans* and *P. roqueforti*. Complete inhibition of *A. niger* mycelial growth was observed exclusively for *Leuc. mesenteroides* MME-4 in the 'Plate-on-Plate' assay, suggesting the involvement of bioactive VOCs within the shared headspace. The results support the application of LAB from non-conventional matrices as bioprotective agents in food and packaging systems, promoting the development of 'green' solutions in line with the principles of sustainability and the circular bioeconomy.



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sciforum-136830: Microbiological stability of dealcoholised wines using SO₂ and sorbic acid

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Introduction:

Dealcoholised wines are rapidly gaining popularity. The removal of ethanol and the substantial residual sugar content (about 35–50 g/L) make these products vulnerable to microbiological threats. Therefore, the questions related to dealcoholized wines stability have become relevant for producers, in particular, if dimethyl dicarbonate (DMDC) is not added these wines.

Methods:

A dealcoholised Riesling wine was used for the experiments, which involved the wine being bottled with various doses of SO₂ and the addition of potassium sorbate; and bottle opening for wine consumption and their subsequent storage. The following analyses were performed: FTIR analysis, CO₂ pressure measurement inside the bottles, membrane filtration, and sensory analysis.

Results:

About 1 mg/L of molecular SO₂ demonstrated a good level of antimicrobial activity when the dealcoholised Riesling wine was sterile bottled. After bottle opening and simulated consumption, the same wine remained microbiologically stable in the bottle for at least one week.

Conclusions:

This study is among the first to determine which molecular SO₂ levels can provide adequate protection to dealcoholised wines and the effect of sorbic acid.



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sciforum-126308: Mixed beverage involving acetic fermentation of cashews with apple juice and grape juice: assessing antioxidant activity.

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Acetic fermentates from fruits and grains are widely consumed but have low commercial value. Combining them with natural juices can enhance flavor and health benefits. This study evaluated the antioxidant activity of beverages made by mixing acetic fermented cashews (rich in vitamin C and phenolics) with apple and grape juices, both known for their antioxidants. Cashew fermentate (15 mL/100 mL), standardised to 4% acidity, was mixed at a ratio of 15:85 (v/v) with commercial apple juice for the formulation of the BMA drink and, similarly, at a ratio of 15:85 (v/v) with commercial grape juice for the formulation of the BMG drink. Stored under refrigeration, the mixtures were analyzed for total phenolic content and antioxidant activity using DPPH and ABTS methods. BMA showed 102.24 ± 0.46 mg L⁻¹ of phenolics and antioxidant values of 1270.92 ± 0.48 μM (DPPH) and 2077.00 ± 0.41 μM (ABTS). BMG had 92.13 ± 0.61 mg L⁻¹ phenolics, with antioxidant values of 1260.92 ± 0.39 μM (DPPH) and 2279.22 ± 0.46 μM (ABTS). Both drinks demonstrated significant antioxidant activity, with variations depending on the analytical method, suggesting their potential as functional beverages and opportunities for regional development through the valorization of cashew pseudofruit.



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sciforum-136614: Natural Biocontrol Strategies Against *Brettanomyces* for Sulphite-Free Wine Preservation

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Microbial contamination remains a major challenge for the wine industry, particularly due to *Brettanomyces*/Dekkerayea, which produce volatile phenols that negatively affect the flavor and aroma of wine. Traditionally, sulphur dioxide (SO₂) is used to control these microorganisms; however, growing health concerns have led to increased demand for low-sulphite or “clean label” wines. This study aimed to explore natural biocontrol strategies to reduce or eliminate the use of SO₂. A total of 87 microbial isolates—58 bacteria and 29 yeasts—were obtained from spoiled wine samples and other food sources. Phenotypic characterization and partial rDNA sequencing identified eight lactic acid bacteria belonging to *Pediococcus parvulus*, *Lentilactobacillus hilgardii*, and *Sporolactobacillus inulinus* species and 50 strains of *Bacillus* spp. Among the yeasts, 20 were identified as *Brettanomyces bruxellensis* and 9 as *Saccharomyces cerevisiae*. Antimicrobial assays revealed that *Bacillus subtilis*, *Bacillus velezensis*, *Bacillus* sp., and *Lysinibacillus sphaericus* exhibited promising inhibitory activity. Although the extraction of inhibitory compounds and potential synergistic interactions among strains remain to be explored, the current results highlight the potential of natural biocontrol agents as a sustainable alternative to SO₂. Such strategies offer the dual benefit of preserving wine quality while meeting consumer demand for safer and more natural products.



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sciforum-136856: Assessing the Microbiological Quality of Innovative Sustainable Low- and No-Alcohol Wine Production

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The wine industry faces growing demand for low- and no-alcohol wines (LNAWs), driven by changing consumer preferences and climate change. The project “INNOWINE”—Cascading Grant Spoke 3 - Project OnFoods—applied an optimised production cycle to limit alcohol formation during fermentation, offering an innovative alternative to conventional post-fermentation dealcoholization. Among the strategies tested, we investigated X-ray irradiation, a non-thermal method proposed to replace sulfur dioxide and improve wine microbial stability. Microbiological quality was assessed in experimental low-alcohol wines (EW) and grape-must permeate (P) versus conventional wine (CW). Total mesophilic prokaryotes and yeasts were quantified using PCA and WLN, respectively. Putative lactic acid bacteria (LAB), acetic acid bacteria (AAB), and *Brettanomyces* were enumerated on differential media (i.e. MRS, GYC, mWLN), all supplemented with cycloheximide to suppress undesired yeasts and improve selectivity. Samples were analysed with and without X-ray treatment at 0.5, 1.0, and 2.0 kGy. Preliminary findings show higher microbial counts in EW and P than CW without irradiation. Irradiation progressively reduced microbial loads from partial reductions (i.e. 0.5 kGy) to microorganism elimination across all media (i.e. 2.0 kGy). X-ray technology appears promising for stabilising LNAW while preserving quality, offering a potential substitute for sulfur dioxide.



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sciforum-136821: Characterisation of sheep cheeses made from the milk of the Madrid autochthonous Colmenareña ovine breed

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Introduction:

In the Madrid Region (MR), two autochthonous ovine breeds are in danger of extinction: Rubia del Molar and Colmenareña. Currently, there are no dairy products made from their milk. The aim of this study was to evaluate the characteristics of different type of cheeses created with sheep milk from the Colmenareña breed to study their quality and in this way aid in the preservation of the breed.

Methods:

Milk from the Colmenareña breed was collected from a livestock farm located in the MR. Three batches of cheeses were created at two independent times: 1) fresh cheese (FC) and 2) pressed paste cheese matured for 30 days (SC), both made with pasteurised milk, and 3) pressed paste cheese matured for 60 days and made with raw milk (n=9). Nutritional, fatty acid profile, physico-chemical, microbiological, and sensory analyses (trained judges, n=12) were carried out.

Results:

Colmenareña cheeses differed in their fat, protein, salt, pH, moisture, and colour. The majority of the fatty acids detected were palmitic, oleic, and stearic acid. In terms of the global impression (hedonic scale, 1-9), good overall acceptance scores were achieved (6.24-7.34).

Conclusion:

Colmenareña cheeses demonstrated good physico-chemical properties, and judges considered them acceptable in their overall acceptance. The production of this type of cheese could contribute to the preservation of this native sheep breed.



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sciforum-136877: Cross-Tolerance to Sulfite (SO_3H^-) and Selenite (SeO_3^{2-}) in *Saccharomyces cerevisiae* Strains Carrying SSU1-Associated Chromosomal Rearrangements

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Introduction:

Exposure of *Saccharomyces cerevisiae* to sulfite (SO_3H^-) in winemaking environments has driven the selection of tolerant strains, often carrying chromosomal rearrangements (CRs) that enhance the expression of a sulfite efflux pump encoded by the gene SSU1. Recent studies suggest that protein ssu1p may also contribute to selenite (SeO_3^{2-}) tolerance.

Methods:

We identified *S. cerevisiae* strains carrying SSU1-associated CR VIII-t-XVI and XV-t-XVI. Additional sulfite-tolerant strains were isolated following adaptive laboratory evolution (ALE) experiments. Strains were used to investigate the potential connection between tolerance to sulfite and selenite.

Results:

Our results show that *S. cerevisiae* CR strains, which tolerate sulfite levels up to ~150 mg/L, also grow in media supplemented with high concentrations of selenite (i.e., 1.5 mM), suggesting a shared underlying mechanism of tolerance. Isolated strains obtained after 100 generations of adaptive laboratory evolution (ALE) under sulfite pressure were able to grow in a YPD agar supplemented with either sulfite or selenite. Interestingly, these isolates failed to regrow under these selective conditions if previously grown in a YPD agar without selective pressure.

Conclusion:

Our findings support the existence of a common mechanism of toxicity for sulfite and selenite and indicate that sulfite/selenite tolerance acquired through ALE may represent a transient adaptive trait.



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sciforum-143781: Eco-friendly production of biosurfactants by *Penicillium rubens* applied to sustainable onion cultivation

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Microbial biosurfactants have emerged as sustainable alternatives to promote plant growth and control phytopathogens in an eco-friendly manner. Their multifunctionality and low toxicity make them promising allies for modern agriculture. This study investigated the production of a biosurfactant by *Penicillium rubens* UCP 1213 using post-frying soybean oil (PFSO) and corn steep liquor (CSL) as low-cost substrates. A 2² full-factorial design was used to evaluate the effects of substrate concentration on biosurfactant production, assessed by the reduction in surface tension. The best result was achieved in a medium containing 3% PFSO and 4% CSL, resulting in a surface tension of 26.8 mN/m. A reduction in the interfacial tension against n-hexadecane was also verified (1.8 mN/m). The biosurfactant was isolated with ethanol at 70% (2,40 g/L) and exhibited a critical micelle concentration (CMC) of 500 mg/L, indicating its effectiveness. In vitro assays demonstrated that the biosurfactant significantly enhanced the germination and vigor of onion seeds (*Allium cepa* L.) and inhibited the growth of phytopathogenic fungi *Curvularia lunata* and *Fusarium oxysporum*. These findings reinforce this biosurfactant's potential as a biostimulant and biocontrol agent. Therefore, the production of biosurfactants from agro-industrial waste represents a promising strategy for more sustainable agricultural practices in onion cultivation.



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sciforum-136437: Effect of *Lactococcus lactis* on the survival of *Listeria monocytogenes* and *Staphylococcus aureus* in yoghurt

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This study evaluated *Lactococcus lactis* strains for their acidifying and antibacterial properties, with particular focus on their effect on artificially inoculated foodborne pathogens in milk and yoghurt matrices. Antibacterial activity was first assessed using agar spot and overlay methods against *Listeria monocytogenes* ATCC 7644 and *Staphylococcus aureus* ATCC 25923. Acidifying ability was monitored based on pH reduction at 6 and 24 hours. Strain LL16 demonstrated optimal fermentation activity, reaching a pH drop of 2.26 ± 0.01 with desirable aroma and gel-like consistency after 24 hours. LL29 showed the strongest inhibition against *S. aureus* (2.35 ± 0.19 cm zone), while LL16, LL29, and LL14C inhibited *L. monocytogenes* (2.15 ± 0.09 cm zones). For the challenge test, UAT cow's milk was used to prepare yoghurt with a commercial starter and 1% LL29 and then artificially contaminated with 5 μ l of *L. monocytogenes* and *S. aureus*. Samples were stored at 4 °C, and counts were monitored on days 1, 7, 14, and 21. This experiment showed complete inhibition of both pathogens throughout 21-day storage at 4°C. These findings support the application of LL16 and LL29 strains for safe dairy fermentation processes.



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sciforum-135660: Effect of Pathogenic Bacteria on Volatile and Sensory Characteristics of Table Olive Brines

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The safety and quality of fermented table olives depend on microbial dynamics during fermentation. Although spontaneous fermentation typically inhibits pathogens, their possible survival remains a concern. This study evaluated the survival of five pathogenic bacterial species (*Bacillus subtilis*; *Bacillus cereus*; *Staphylococcus aureus*; *Escherichia coli*; *Enterobacter cloacae*) in olive brine, and their impact on the chemical and sensory properties of the fermentation. Pathogenic strains were inoculated into sterilized olive brines and incubated under fermentation-like conditions. Their survival was monitored for 3 days by plate counts. Volatile compounds were analyzed by GC-MS. Sensory evaluation was assessed by an eight-member expert panel, assessing odor intensity and attributes on a 0-10 scale. Results showed species-dependent pathogen survival over 30 days, with viability ranging from 25% to 80%. GC-MS revealed distinct differences in the volatile profiles of inoculated brines compared to controls, particularly in phenolic-derived compounds, alcohols, or aldehydes. Sensory analysis confirmed perceptible differences in aroma and overall perception. In conclusion, certain pathogenic bacteria can persist in olive brines at significant levels and alter their chemical and sensory characteristics. These findings underscore the importance of controlled fermentation and highlight the need to consider both safety and quality in table olive production.



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sciforum-143034: Enhancing the Nutritional Quality of Fermented Milk Set Yogurt with Date Syrup as a Conservative and a Natural Substitute for White Sugar

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In many countries, fresh fermented dairy products are consumed in large quantities. The food sector is constantly creating new items due to current food market trends. The addition of certain fruits or extracts, either fully or partially, to some foods, like yogurt, improves their nutritional content and composition. This area has attracted the attention of dieticians, nutritionists, and customers alike. This study develops a fermented milk by combining date syrup and examines its impact on nutritional and microbial properties. The control batch included only milk, while the two experimental groups incorporated 30% and 60% of date syrup, respectively. Key fatty acid levels were identified as $\Sigma n-6$ to $\Sigma n-3$ fatty acids ($p0.001$), as well as a higher ratio of PUFA/SFA ($p0.05$). The vitamin E analysis showed significant differences among the samples and predominant amounts for yogurt made with 60% date syrup (6.38 mg/100g, $p0.001$). Additionally, they exhibited superior sensory attributes such as darker color, grainy and softer texture, and a more pronounced odor. These findings show that date syrup is rich in carbohydrates (68%), fat (3.25%), minerals (5.68%), and polyphenols (674 mg of gallic acid equivalent per 100 g), exhibiting enhanced antioxidant properties (7985 $\mu\text{mol TE}/100\text{ g}$) and antimicrobial capacity, which suggests promising potential applications in the food industry.



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sciforum-136260: Exploring the Probiotic Potential of *Enterococcus faecium* Strains Through Skimmed Milk Fermentation

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This study aimed to evaluate the fermentation potential and probiotic behavior of selected *E. faecium* strains (n= 6) in skimmed milk for a four-week period. A 4% (w/v) skimmed milk solution was prepared, autoclaved, and inoculated with 2% (v/v) of an overnight culture of each strain. The samples were incubated at 37°C for 24 hours to initiate fermentation, followed by storage at 4°C for four weeks to assess post-fermentation stability. The experiment was conducted in two independent replicates, and the fermentation progress was monitored weekly by measuring changes in the pH. After 24 hours of incubation, a drop in pH from 7.0 to 4.0–5.0 was observed, indicating acid production and fermentation. During storage, no significant change in pH was recorded in the first week. However, from week two onward, a gradual decline in pH to 3.0–4.0 was observed, which remained stable for the remaining period. No further acidification occurred beyond the third week. These results demonstrate that the selected strains possess fermentation potential, effectively acidifying the skimmed milk substrate and maintaining their activity during storage. This fermentation profile supports their potential application in the development of functional fermented dairy products and related industries.



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sciforum-136286: Fermentation-Driven Improvement of Antioxidant Properties in Minimally Processed Fermented Plant-Based Beverages

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The plant-based beverage (PBB) market is among the fastest-growing segments of the food industry, driven by demand for ethical, environmental, and health-conscious dairy alternatives. However, commercial PBBs often rely on additives to mimic milk's sensory and functional properties, raising concerns about ultra-processed formulations. This study aimed to develop and characterize eight minimally processed PBBs representing different categories (carob, tiger nut, cashew, sesame, rice, lucuma, beetroot, and tomato), with bovine milk as a reference, to explore fermentation as a strategy to enhance antioxidant properties without additives. The beverages were prepared by mixing water with a single food matrix, which was heat-treated (95 °C, 10 min) and fermented with either *Lactiplantibacillus plantarum* WCFS1 (10⁶ CFU/mL) or commercial kefir grains (5 g/L). Fermentation was carried out at 30 °C for 24 h, followed by storage at 4 °C for two weeks, during which the progress of fermentation was monitored and total polyphenols, TEAC, and ORAC were analyzed to assess antioxidant capacity. All fermented beverages exhibited microbial growth and pH reduction, indicating successful fermentation, with a variable impact on antioxidant potential. For future *in vitro* studies, tomato has been selected for its antioxidant properties, leading to different modulations of the three indicators (polyphenols, TEAC, and ORAC) when comparing different microbiological starter cultures.



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sciforum-136871: Functional food ingredient based on rice bran containing *Lactibacillus acidophilus*

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Rice bran (RB) was used as a substrate and carrier for *Lactobacillus acidophilus*. Systems were prepared with RB, cheese whey (CW) and water. They were inoculated according to the experimental design. The system that maximized cell growth and yield consisted of 1 g RB, 0.4 g CW, and 7.5 mL water. After sterilization, the system was inoculated, reaching 7×10^6 CFU/g, incubated, centrifuged, and vacuum-dried. The obtained powder was packaged in plastic bags and stored at 25°C. Cell counts were measured on MRS agar for 102 days, and gastric and intestinal digestion were simulated in vitro. The proposed process achieved a yield of ~0.75 g/g RB, with a count at the beginning of storage of 9.40 log CFU/g. Cell death was recorded during storage and presented a rate $k \approx 0.064$ day⁻¹. Nevertheless, viability was >7 log CFU/g over the 102 days of storage. When comparing Log count after in vitro digestion, values ranged from 63 to 78%, and 64 to 93% for gastric and intestinal conditions, respectively. Meanwhile free cells from fresh MRS broth presented 88.7% and 90.1%, gastric and intestinal resistance, respectively. It is concluded that RB is a suitable substrate and support for storing *L. acidophilus* at 25°C.



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sciforum-124109: Impact of Probiotic Fermentation with Indigenous *Lactococcus lactis* LL16 on the Safety of Lithuanian Dried Chanterelles.

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The study evaluated the impact of *Lactococcus lactis* LL16 fermentation on the safety parameters of Lithuanian dried chanterelle mushrooms. The chanterelles were handpicked, dried, homogenized, and sterilized before use. For solid-state fermentation, the chanterelle powder was mixed with sterilized water (ratio 1:2 w/w), inoculated with a $9.0 \log_{10} \text{CFU/mL}$ bacterial concentration of revitalized *L. lactis* LL16 (previously isolated from locally sourced raw bovine milk, GenBank: JARHUB000000000). Non-fermented chanterelle mushroom powder served as the control. LAB counts were determined by plating and counting, and were significantly increased in the fermented samples ($7.42 \pm 0.00 \log \text{CFU/g}$) in contrast to being undetectable in the non-fermented control. These results correlated with a significant pH decrease in the fermented sample (from 6.03 ± 0.02 to 5.64 ± 0.20). Antimicrobial activity was assessed by agar diffusion against 8 common foodborne pathogens. The zones of inhibition were scaled from – to +++. *Brochothrix thermosphacta*, *Pseudomonas aeruginosa*, and *Pseudomonas fibrescens* showed strong inhibition (+++), while *Listeria monocytogenes* showed mild inhibition (+), *Staphylococcus aureus* and *Bacillus cereus* showed very weak inhibition (+/-), and no visible inhibition occurred against *E. coli*, and *Salmonella typhimurium*. These findings demonstrate that fermentation with *L. lactis* LL16, compared to the non-fermented control, effectively improves the microbial safety of dried chanterelles.



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sciforum-142696: Optimization of the Fermentation Process of the Ancestral Beverage “Chirrincho” Using Aspen Plus Simulation and Sensory-Physicochemical Validation in Indigenous Communities of Cauca, Colombia.

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Chirrincho is a traditional sugarcane-based fermented spirit emblematic of the Nasa Indigenous culture in southwestern Colombia. Despite its symbolic and economic significance, its artisanal production suffers from lack of standardization, leading to quality variability and challenges in meeting safety regulations. This research proposes an integral optimization of the fermentation process by combining Aspen Plus simulation with empirical data analysis and community-based sensory evaluation.

A structured dataset of raw material entries—including °Bx, volume, date, and supplier—was collected to establish quality patterns of the sugarcane juice. A reception protocol was developed and validated through field tests to ensure compliance with physicochemical standards. Additionally, a participatory sensory survey was conducted with elders and producers from the ACIN community, capturing traditional perceptions of chirrincho regarding color, aroma, flavor, body, and perceived effect.

Simulation outcomes enabled the identification of optimal fermentation conditions, achieving a 15–20% increase in ethanol yield and ~30% reduction in fermentation time, while maintaining cultural and sensory integrity. The model was validated through ANOVA, confirming statistical robustness against experimental data. This work bridges chemical engineering and ancestral knowledge, providing a replicable model for the sustainable industrialization of traditional fermented beverages with cultural identity.



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sciforum-136478: Pulque Microbiota Core: Stability and Functional Role Across the Fermentation Process.

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Introduction.

Pulque is a traditional Mexican beverage made from *Agave* sap, involving complex microbial communities. This study used omics-based approaches to identify a core microbiota present throughout the production process from agave tissue to the final beverage and assessed its temporal stability over one year in Huitzilac, Morelos.

Methodology.

A total of 90 biological samples were analyzed, including triplicates of agave tissue, aguamiel (sap), and commercial pulque at three fermentation stages (T0, T3, T6). Sequencing of the 16S rRNA (V3–V4) and ITS1 regions was performed via Illumina NovaSeq. Taxonomic assignment and diversity metrics were conducted using QIIME with SILVA and UNITE databases. Metabolites were profiled using HPLC and UPLC.

Results

A microbial core of eight bacterial and five fungal genera was identified. *Zymomonas* (~58%) and *Saccharomyces* (~70%) were the most abundant. Core stability over the year was ~70%. Conserved genera were associated with sugar hydrolysis, metabolite production, and aroma biosynthesis. Sucrose (52 g/L), fructose (12 g/L), and glucose (17 g/L) were detected as carbon sources. Ethanol (30 g/L), and organic acids (average 4.0 g/L) increased in later stages (pulque T6), while early stages (aguamiel) were richer in carbohydrates.

Conclusion.

A stable and functionally relevant microbial core persists throughout pulque fermentation.



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sciforum-136561: Safety enhancement of soybean straw silage via co-fermentation with lactic acid bacteria and cellulase: Microbial community dynamics and pH control

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Introduction:

Soybean straw is an abundant but underutilized fibrous residue. This study tested the hypothesis that simultaneous inoculation of lactic acid bacteria (LAB) and cellulase would accelerate acidification and suppress undesirable microbes during micro-silage.

Materials and Methods:

Eight treatments (triplicated) were established: (1) straw+water (control); (2) straw+RS26 LAB; (3) straw+RS33 LAB; (4) straw+RS26+RS33; (5) straw+cellulase; (6) straw+RS26+cellulase; (7) straw+RS33+cellulase; (8) straw+RS26+RS33+cellulase. Chopped straw (60–65% moisture) was vacuum-sealed and stored at 20°C for 0, 8, 16, 32 and 64 d. pH was measured electrometrically; LAB, total bacteria, molds and yeasts were enumerated on MRS, NA and PDA plates.

Results:

Control pH remained 6.2 at 64 d. The pH of group 8 declined fastest, reaching 4.3 by 32 d and stabilising. LAB counts in group 8 rose from 10⁵ to 10⁹ CFU/g FM, while total bacteria fell from 10⁵ to 10³ CFU/g FM. No molds or yeasts were detected in any treated bags. Cellulase-supplied groups showed higher LAB proliferation and lower pH than cellulase-free groups.

Conclusion:

Co-inoculation of dual LAB strains plus cellulase rapidly acidified soybean straw silage, enriched LAB and eliminated spoilage fungi and yeasts, offering a safe, low-cost biopreservation strategy for on-farm feed use.



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sciforum-135460: Sustainable Production of Antimicrobial Peptides from Fruit Waste Using Genetically Modified Yeast for Pathogen Control

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Fruit waste represents over 40% of global food loss and contributes significantly to methane emissions. This project aimed to develop a sustainable method for producing antimicrobial peptides (AMPs) from fruit peel residues using genetically modified *Saccharomyces cerevisiae* Ethanol Red TDH1 (ER TDH1) and evaluate their potential against microbial pathogens.

Peels of mango, pineapple, banana, and apple were processed into must. The musts underwent acid hydrolysis, followed by alcoholic fermentation with *S. cerevisiae* ER TDH1. After fermentation, the peptides 10 kDa were extracted via ultrafiltration from the cell-free supernatant and tested against microbial pathogens, *E. coli*, *P. aeruginosa*, *S. aureus*, and *C. albicans*. Glucose, fructose, and ethanol levels were monitored throughout. For peptide production comparison, alcoholic fermentation in a synthetic must was performed, yielding higher ethanol (≈ 14 g/L) than fruit must (≈ 3 g/L). The 10 kDa peptide fraction from fruit must showed strong inhibition of *S. aureus* and *C. albicans* (MIC = 1.47 mg/mL), while synthetic must peptides performed better against *E. coli* and *P. aeruginosa* (MIC = 1.47 mg/mL). AMPs derived from fruit waste via fermentation show promising antimicrobial activity, particularly against Gram-positive bacteria and yeast, highlighting their potential as sustainable, natural preservatives for pharmaceutical or food product applications.



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sciforum-136245: The influence of the type and geographic origin of the SCOBY starter culture on the microbiological and physicochemical quality of tea, milk, and rice types of Kombucha beverages

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Kombucha is a fermented tea beverage produced by a symbiotic culture of bacteria and yeast (SCOBY). The quality of the Kombucha beverage depends not only on the fermentation parameters, but also on the type of raw materials used, as well as the SCOBY starter culture. The aim of this study was to evaluate various types of Kombucha beverages in terms of their microbiological quality, including antibacterial properties and physicochemical characteristics. Two different SCOBYs—Italian and Polish—and three variants for each starter (tea-based, milk-based, and rice-based Kombucha) were used for fermentation. Microbial counts (CFU/mL), antibacterial activity, and chemical analyses were performed over three days. The results showed stable fermentation across all substrates, with microbial counts increasing from ~0–2 log CFU/mL at Day 0 to ~3–12 log CFU/mL at Day 3, depending on the matrix. A pH reduction of ~1.1–1.3 fold confirmed active microbial metabolism. Antibacterial activity was highest in tea-based Kombucha, with inhibition zones of up to 17 mm against *Staphylococcus aureus* and *Escherichia coli*, particularly in beverages fermented with the Italian SCOBY. These findings demonstrate the adaptability of Kombucha fermentation to different substrates and contribute to expanding knowledge on the potential production of functional beverages using alternative raw materials.



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sciforum-136124: Unlocking the Potential of Agro-Waste: Cucurbita pepo Peel as a Superior Fermentation Medium for Yeast Production

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The valorization of agro-industrial byproducts is a key strategy for developing sustainable industries. This study explored the potential of Cucurbita pepo peel, a common waste, as a low-cost fermentation medium for producing *Saccharomyces cerevisiae* biomass, comparing its performance against the valuable pulp juice. Fermentations were conducted to optimize the initial sugar concentration and evaluate the effect of various nitrogenous sources, including yeast extract, casein hydrolysate, and economical ammonium sulfate mixtures. Results showed an optimal sugar concentration of 10%, where the peel extract produced 2.1-fold more yeast biomass than the pulp juice. While supplementing pulp juice with yeast extract or casein hydrolysate yielded the highest biomass (up to 28.53 g/l), a more economical 1:3 mixture of $(\text{NH}_4)_2\text{SO}_4$ /yeast extract still achieved a significant 20.24 g/l. Similarly, supplementing the peel extract with yeast extract resulted in a high biomass concentration of 20.83 g/l and a productivity of 0.42 g/l.h. These findings demonstrate that Cucurbita pepo peel is a highly effective and viable substrate, representing a sustainable and cost-efficient alternative to the edible pulp for the industrial-scale production of *S. cerevisiae* biomass.



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sciforum-142634: Utilization of sugarcane (Saccharum officinarum L.) byproducts for functional food development: A novel process optimization study

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In recent decades, novel vinegar types have been developed from various fruits to meet consumer demand. However, limited research has been focused on crop-based vinegar. Therefore, this study aimed to produce vinegar from sugarcane and optimize its acidification process. Vinegar was prepared using a two-step method: yeast (*Saccharomyces cerevisiae*) converted carbohydrates into ethanol, followed by acetic acid bacteria (*Acetobacter aceti*) oxidizing ethanol to acetic acid. Physicochemical parameters, including pH, titratable acidity, total soluble solids (TSS), and alcohol content, were analyzed at 4-day intervals over 40 days under four environmental conditions (T0 Room temperature, T1 Dehydrator, T2 Incubator, and T3 Open sun). Our results showed that pH decreased in all treatments, highest in T1 Dehydrator (38.05%) and lowest in T2 Incubator (11.28%). TSS decreased most in T1 Dehydrator (80.47%) and least in T2 Incubator (66.66%). Titratable acidity increased in all treatments, with the highest increase in T1 Dehydrator (93.13%) and the lowest in T2 Incubator (85.02%). Alcohol content decreased most in T1 Dehydrator (87.5%) and least in T2 Incubator (10%). Overall, the highest changes were recorded in T1 Dehydrator, making it the most effective and rapid method for acetic acid fermentation. This study highlights a novel approach for utilizing sugarcane byproducts in value-added production.



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sciforum-135521: Valorization of Orange Peel By-Products in Kefir Cream Cheese and Its Impact on Their Physicochemical, Microbiological, and Functional Properties

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The valorization of fruit by-products offers a sustainable route for developing functional foods. This study explores the incorporation of orange peel—which is rich in phenolics and abundant in the juice industry—into kefir-based cream cheese made from cow's milk and yogurt. The peel was added directly into the cheese matrix at 1% and 5% (w/w), in non-fermented and fermented forms (in saline solution 2%, w/w), after drying at 60°C and grinding. Its impact on physicochemical (pH, acidity, texture, color), microbiological, and functional properties was evaluated. Orange peel addition enhanced firmness, cohesiveness, and color (providing a yellow-orange hue). It slightly reduced the pH (3.2–3.5) and increased titrable acidity (3.6–4.9 g lactic acid/100 g), suggesting better acidification and water retention. Microbiological analysis showed higher lactic acid bacteria counts, indicating a possible prebiotic effect. Functional parameters were notably improved, with the total phenolic content reaching 50–300 mg GAE/100 g dw and antioxidant activity ranging from 40 to 140 µmol TE/g dw. These findings demonstrate the potential of orange peel as a value-added ingredient in fermented dairy products. Enriching kefir cream cheese with citrus by-products not only boosts its nutritional value but also supports circular economy practices in the dairy sector.



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Session 4. Fermentation and Health (Nutraceutical Impact)

sciforum-136342: Enhanced Carotenoid Production by *Rhodotorula mucilaginosa* Cultivated Under LED Illumination in a Photobioreactor

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The effect of LED light on carotenoid production by new isolated *R. mucilaginosa* was evaluated, aiming to develop a more efficient cultivation system. Inoculum preparation involved culturing the strain in a defined medium containing glucose, yeast extract, and salts, incubated for 48 h at 28 °C. A central composite design was employed to optimize glucose and yeast extract concentrations for carotenoid and biomass production. Fermentation was carried out at 25 °C and 180 rpm for 96 h. The effects of different LED light sources (red, green, and blue) were evaluated, along with a dark control and white LED light, under optimized conditions. In addition, a 5 L stirred-tank photobioreactor was used for scale-up under blue LED illumination. The optimized medium composition—10 g/L glucose and 1 g/L yeast extract—favored carotenoid production, albeit with reduced biomass yield. Regarding light treatments, blue LED exposure resulted in the highest carotenoid production (12.3 Abs/g biomass), followed by white light (11.2 Abs/g), darkness (10.7 Abs/g), green light (10.3 Abs/g), and red light (10.2 Abs/g). In the 5 L bioreactor, carotenoid production reached 15.35 Abs/g under blue LED light, compared to 12.7 Abs/g in the dark control. Spectrophotometric analysis revealed the presence of β -carotene (451 nm), torulene (485 nm), and torularhodin (498 nm).



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sciforum-135950: Effect of Certain Food Additives on *Lactococcus lactis* Strains Intended to be Used for Dairy Food Fermentation

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The aim of this study was to evaluate the resistance of five *Lactococcus lactis* strains (LL19, LL21, LL30A, LL57A, and LL77) isolated from cow's milk to food additives commonly used in the food industry: sodium benzoate, lysozyme, and nisin. The resistance of *L. lactis* strains to sodium benzoate (concentrations (0.075–1%)) was determined by viable cell count and spectrophotometric examination; to lysozyme—by viable cell counts after different time intervals; and to nisin—using the well diffusion method on MRS agar with seven different nisin concentrations (2 - 150 µg/mL).

The sodium benzoate experiment showed that strain LL57A exhibited the highest resistance—at all concentrations, growth activity remained above 63%, reaching up to 80% at the 0.075% concentration. The lowest resistance was observed in strain LL77—growth decreased to 47% at the 1% concentration.

The lysozyme experiment showed that LL21 and LL19 strains maintained high viability even after 24 hours (8.90 and 7.85 log CFU/ml, respectively).

The nisin experiment showed that strain LL77 exhibited the highest resistance, while LL19 was the most sensitive.

Strains LL57A and LL21 demonstrated the highest resistance to most of the tested additives and have potential for use in fermented dairy products containing preservatives.



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sciforum-136784: Antioxidant Potential in Kombucha. Application of Penalized Models

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This project evaluated the antioxidant potential of kombucha using a three-factor design: extracts from Guayusa (*Ilex guayusa*) and Moringa (*Moringa oleifera*) leaves; at variable concentrations (1% and 2%); and with or without pH adjustment to 3.5 using 0.1 N citric acid; across four fermentation times over 14 days. The experiment was conducted at ambient temperature between 19 and 21 °C with 6% honey as a carbohydrate source due to its hypoglycemic potential. Antioxidant activity was quantified in Trolox equivalents (mg/100 mL) measured by DPPH assay. Additionally, physicochemical properties were evaluated: °Brix, acetic acid percentage, and pH, using refractometry (AOAC 934.14), titration (INEN 1091:1984), and potentiometry, respectively. For statistical analysis, penalized regression models were employed with performance metrics RMSE and R^2 , respectively, Lasso (0.0917, 0.9867), Ridge (0.2884, 0.8932), and Elastic Net (0.0925, 0.9866), showing better goodness-of-fit indicators than classical regression models. R Studio was used with the dplyr, MASS, and glmnet packages, evaluating an 80/20 train–test data split. The conclusions highlight the robustness of Elastic Net in predicting antioxidant capacity, offering a reliable statistical tool for future fermentation systems, where the considered factors enable estimation of antioxidant potential.



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sciforum-132097: Bioactivity of Green Tea Kombucha: Polyphenol-Rich Ferment for Oxidative and Inflammatory Stress Modulation

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Kombucha is a fermented tea beverage increasingly recognized for its health-promoting properties due to its richness in polyphenols, organic acids, and microbial metabolites. This study evaluated the antioxidant, anti-inflammatory, and antibacterial activities of green tea-based kombucha fermented for 14 days.

Biochemical assays revealed high levels of total polyphenols (4.97 mg GAE/mL), flavonoids (258.48 mg QE/mL), tannins (172.82 mg EC/mL), and flavonols (33.4 mg QE/mL). Antioxidant capacity was assessed using DPPH, ABTS, FRAP, and TAC assays. The extract showed strong radical scavenging activity, particularly in the ABTS and TAC assays, with IC₅₀ values of 3.44% and 0.52%, respectively.

Anti-inflammatory activity was evaluated through bovine serum albumin (BSA) denaturation inhibition. Interestingly, the highest inhibition was observed at the lowest concentration tested (0.18%), suggesting potential prooxidant effects at higher doses.

Antibacterial effects were tested against *E. coli*, *P. aeruginosa*, *B. subtilis*, and *S. aureus* using the agar diffusion method. Moderate inhibition was observed for *P. aeruginosa* and *B. subtilis*, with increased activity after longer fermentation.

These findings support green tea kombucha as a promising natural product with antioxidant, anti-inflammatory, and antibacterial properties, encouraging further exploration for therapeutic or functional food applications.



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sciforum-136560: Effect of *Pleurotus ostreatus* HXS-M1 Fermented Compound Traditional Chinese Medicine on Main Active Components and Antibacterial Activities

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This experiment was conducted to investigate the effect of fermentation of a self-made compound traditional Chinese medicine (TCM) by *Pleurotus ostreatus* HXS-M1 on its main active components and antibacterial activities. *Pleurotus ostreatus* HXS-M1, a food-medicine homologous fungus, was used to ferment the compound TCM. The contents of active components of the compound TCM and the diameters of inhibition zones before and after fermentation were determined using ultraviolet–visible spectrophotometry and the Oxford cup method, respectively. The results showed that the contents of total polysaccharides, total alkaloids, total flavonoids, and total saponins in the compound TCM before and after fermentation had extremely significant differences ($P<0.01$). After fermentation, the contents of total polysaccharides and total alkaloids increased by 350.63% and 95.65%, respectively, while the contents of total flavonoids and total saponins decreased by 79.63% and 84.08%, respectively, compared with those in the non-fermented compound TCM. The diameters of the inhibition zones against *Escherichia coli*, *Salmonella*, and *Staphylococcus aureus* increased by 4.54 mm, 4.08 mm, and 5.33 mm, respectively, compared with those for the non-fermented compound TCM, and these differences were extremely significant ($P<0.01$). In conclusion, compound TCM fermented by *Pleurotus ostreatus* HXS-M1 can promote the release and biotransformation of active components, improve antibacterial activities, enhance the application effect, and provide a scientific basis for the development of high-efficiency TCM feed additives.



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sciforum-136374: Effect of pulque-derived microbiota with probiotic potential on metabolism and gut microbiota composition in a murine model.

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Pulque is a traditional Mexican fermented beverage that harbors a diverse microbial community with potential probiotic properties. However, its functional impact in animal models remains underexplored. This study aimed to evaluate the effects of pulque-derived microbiota on host metabolism and gut microbial composition in a high-fat diet (HFD) mouse model. C57BL/6 mice were divided into groups fed either a normal diet or an HFD, with or without pulque microbiota supplementation for 8 weeks. Metabolic parameters such as glucose tolerance, insulin resistance, and body weight were assessed, along with gut microbiota diversity and composition through 16S rRNA gene sequencing. Results indicated that pulque microbiota exerted a protective effect by promoting the persistence of beneficial families such as *Lactobacillaceae* and *Akkermansiaceae*, while moderating shifts in *Lachnospiraceae*, a family associated with inflammation. Moreover, it attenuated HFD-induced metabolic impairments. In conclusion, pulque-derived microbiota demonstrated a potential probiotic effect by improving metabolic outcomes, limiting the expansion of dysbiosis-associated taxa, and enhancing the presence of beneficial microbial groups. These findings support its potential use in dietary strategies aimed at preventing metabolic disorders related to high-calorie diets.



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sciforum-136592: Effects of *Pleurotus ostreatus* HXS-M1-Fermented Liquorice on Biotransformation of Active Components and Antioxidant Properties

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This study evaluated the biotransformation of active compounds and antioxidant activity in liquorice root following solid-state fermentation with the food- and medicine-homologous white-rot fungus *Pleurotus ostreatus* HXS-M1. Dried slices of *Glycyrrhiza uralensis* were moistened to 65 % moisture, autoclaved, cooled, and inoculated with 4 % (v/w) seed mash that had been pre-cultivated in potato-dextrose broth for seven days at 28 °C. Fermentation proceeded under static conditions at 28 °C for 25 days, after which the substrate was dried at 40 °C, ground to 40 mesh, and extracted with 70 % ethanol. HPLC-DAD analysis showed that the process completely removed liquiritin (100 % decrease, $P = 0.01$) and lowered glycyrrhizic acid by 59.41 % ($P = 0.01$), whereas the pharmacologically active aglycones liquiritigenin and glycyrrhetinic acid increased by 270.29 % and 390.23 %, respectively ($P = 0.01$). Concomitantly, ABTS⁺ radical scavenging improved from 64.19 % to 129.78 % and DPPH[·] scavenging from 72.48 % to 228.53 %, corresponding to 102.18 % and 215.30 % enhancements ($P = 0.01$). These results demonstrate that *P. ostreatus* HXS-M1 efficiently hydrolyses oleanane-type saponins and flavonoid glycosides into their more lipophilic and antioxidant aglycones, offering a green, low-cost bioprocess for upgrading liquorice for nutraceutical, pharmaceutical and feed applications.



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sciforum-135984: Evaluation of LAB-Fermented Rice and Maize Sourdoughs as a Biotechnological Approach to Gluten-Free Bread Improvement

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Growing demand for gluten-free (GF) products promotes developing biotechnological strategies to enhance bread quality. Sourdough fermentation with lactic acid bacteria (LAB) offers potential to improve safety, functionality, and sensory properties of GF baked goods. This study evaluated *Fructilactobacillus sanfranciscensis* isolated from traditional sourdough for fermenting GF flours (rice and maize) and application in bread production. pH, total titratable acidity, LAB counts, and enzymatic activities were assessed. Sourdough with the highest phytase activity was selected for GF bread formulation. Fermentation caused more pronounced acidification in rice sourdough than maize. The highest L(+)- and D(–)-lactic acid levels were detected in maize sourdough. Rice sourdough showed highest amylase (0.43 U/g), phytase (46.57 U/g), and xylanase (41.52 U/g) activities; maize sourdough had the highest protease activity (0.093 U/g) and LAB count (8.68 log₁₀ CFU/g). Different amounts of LAB-fermented sourdough were used in bread production. Increasing sourdough reduced dough and crumb pH and increased TTA without significantly affecting crumb porosity. Sensory evaluation showed sourdough improved sensory characteristics and acceptability of GF bread, depending on the sourdough amount. These results demonstrate LAB-fermented sourdough's potential to improve gluten-free bread quality.



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sciforum-128827: Friendly Fermenters or Toxic Triggers? Metabolic mapping and phylogenetic analysis of biogenic amine-producing and degrading lactic acid bacteria

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The excessive generation and accumulation of biogenic amines (BAs) in protein-rich diets have been highlighted as a major health concern due to their potential toxicity. As a result, the tendency has shifted toward using lactic acid bacteria as a safe starting culture in foods that can degrade or transform BA into a nontoxic product. However, it has been found that certain LAB strains use their own decarboxylase enzymes to convert the amino acid precursor into BA. The diversity of LAB strains with decarboxylase activity, a critical factor in the conversion of amino acids into BA, has been investigated. Furthermore, the diversity of LAB strains that break down BA into nontoxic compounds using diverse enzymes has been thoroughly investigated. The mapping of enzymes specific to the genus and species levels of the LAB strains engaged in the entire BA metabolism, from amino acid synthesis to breakdown, is also revealed. The enzymes involved in the generation and degradation of BAs from different LAB strains are closely examined in terms of evolutionary relatedness. This study has important practical implications for managing BA levels in food items by carefully selecting and employing single or mixed cultures of LAB strains as starter cultures.



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sciforum-136995: Functional Properties of Camel Milk Fermented by Their Probiotic Lactic Acid Bacteria

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Many chronic diseases are related to population diet. The growing incidence of these diseases has encouraged consumers to turn to healthy and functional foods. Camel milk and probioticfermented foods, historically recognized for their health benefits, continue to attract increasing attention within the food industry. In this context, our study aimed to select probiotic starter cultures capable of improving the antioxidant and antimicrobial capacities of fermented camel milk as an alternative to bovine milk. The collected samples were fermented with five *Pediococcus* seven , and with spontaneous fermentation. It was found that the functional capacities were higher in controlled fermentation. The LAB strains reduced the pH of both camel and cow milk by 1.37 and 1.11 units, respectively, after just 6 hours of fermentation. In addition, they improved milk DPPH radical scavenging capacity (96.38% and 89.02%, respectively) while inhibiting the growth of *Bacillus subtilis* and *Escherichia coli*. Multivariate analysis of the results revealed that strains Pd24, Pd30, Ef2, Ef12, and Ed11 were particularly promising for the production of functional fermented camel milk, whereas strains Ef12, Ef2, and Ed11 were most suitable for cow milk fermentation.



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sciforum-135750: Hacking gut–immune axis with non-Saccharomyces yeasts: effects of *Candida intermedia* supplementation in SARS-CoV-2-vaccinated animals

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Non-Saccharomyces yeasts are promising new probiotics, with effects comparable to the reference probiotic yeast, *Saccharomyces boulardii*. *Candida intermedia*, a non-*albicans* species not considered a common human pathogen, previously demonstrated probiotic potential. This study aimed to evaluate the immunomodulatory effects of *C. intermedia* in mice vaccinated with inactivated SARS-CoV-2, seeking additional evidence of its probiotic activity. Murine macrophages were stimulated with *C. intermedia*, followed by mRNA transcription analysis via qPCR. Mice were supplemented with *C. intermedia* prior to SARS-CoV-2 vaccination. Antibody production was assessed by ELISA, and fecal microbiomes were analyzed using next-generation sequencing. *C. intermedia* significantly increased *Il4* and *Il13* expression while decreasing *Stat3* in macrophages. Splenocytes from supplemented mice exhibited elevated transcription levels of *Tnf*, *Ifng*, *Il4*, *Bcl6*, and *Stat3* after exposure to stimulatory molecules. These mice showed increased levels of anti-SARS-CoV-2 IgG and sIgA isotypes, along with higher abundances of *Bacteroides* spp. and *Clostridium* spp. in their gut microbiome. In conclusion, *C. intermedia* supplementation modulated the expression of key immune-related genes and enhanced humoral responses in mice. Furthermore, its influence on gastrointestinal microbiota suggests a synergistic effect on vaccine immunogenicity. These findings support the potential of *C. intermedia* as a novel probiotic candidate with immunomodulatory properties.



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sciforum-137013: Lactic acid bacteria from Nigerian traditional fermented foods screened for the production of selected B-vitamins in beverages

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The reduction of B-vitamins during food processing necessitates the need for an adequate supply through natural sources. This study aimed to characterise LAB that produce B-vitamins and employ them as starter cultures in milk. LAB were isolated from Nigerian fermented foods and screened for the production of B-vitamins (particularly B2 and B12). Riboflavin overproducers were obtained by selection of natural mutants with roseoflavin. LAB were identified using 16S rRNA gene sequencing and also screened for probiotic and technological characteristics. The best cobalamin and riboflavin producers with probiotic characteristics were used as starters (singly and in a co-culture) to ferment cow milk. The cobalamin and riboflavin content of the milk increased from 2.0 to 7.9 mg/L and from 1.7 to 4.4 mg/L, respectively, using *W. cibaria* TA94, while *L. plantarum* KC62 increased the cobalamin and riboflavin levels from 2.0 to 6.9 and 1.7 to 4.4 mg/L, respectively. As combined starter cultures, the cobalamin and riboflavin levels in the cow milk increased from 2.0 to 42.2 mg/L and from 1.7 to 23.8 mg/L, respectively. *Lactiplantibacillus plantarum* KC62 and *Weissella cibaria* TA94 are good candidates for designing starter cultures to be used for modulating B-vitamins in specific food applications.



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sciforum-136767: Metabolomic Diversity and PCA-Based Nutraceutical Insight into Fermented Bamboo Shoots from Manipur, India

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Fermented bamboo shoots (FBSs) form a nutritional and cultural staple in Manipur, India, yet their bioactive compound diversity remains largely unexplored. In this study, we present the first comparative metabolomic analysis of three traditional FBS types: new Soibum (FS1), aged Soibum (FS2), and Soidon (FS3) using LC-QTOF-MS. A total of 371 unique metabolites were identified across samples, ranging from flavonoids, alkaloids, and phenolic acids to amino acids, fatty acids, and vitamins. Notably, FS3 exhibited the highest metabolite diversity, including a wide array of bioactive compounds with reported antioxidant, anti-inflammatory, and antimicrobial properties. Principal Component Analysis (PCA) revealed distinct metabolic clustering, with FS3 forming a separate group due to its enriched content of polyphenols and alkaloids, while FS1 and FS2 showed overlapping yet distinguishable profiles, suggesting that fermentation time influences metabolite evolution. These results highlight the functional and therapeutic potential of traditional fermented bamboo shoots and their relevance in the development of nutraceuticals. This study bridges traditional food knowledge with advanced metabolomic science and supports the inclusion of indigenous fermented products in modern functional food frameworks.



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sciforum-136938: Microbial-associated Foods and the Mediterranean Diet: Implications for the Design of Microbial-depleted and Microbial-enriched Diets

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Recent scientific investigations underscore the pivotal role of food-associated desired microorganisms in promoting human health and wellness. The Mediterranean diet (MD), recognised for its comprehensive health benefits and nutrient-rich profile, has also become a key focus in this field. By synthesising findings from both literature and laboratory-based culture-dependent analyses, we categorised MD food items according to their microbial characteristics. We have also developed some case studies simulating home preparation to assess the impact of vinaigrette (olive oil, vinegar, and salt) addition on the microbial content of salad and the effect of pasta preparation with pecorino cheese on microbial load (i.e., pecorino added grated to warm pasta; pecorino added to cold cooked pasta; prepared pasta with melted pecorino; sautéed pasta). Additionally, we highlighted the negative effect of pasteurisation on dietary microbes associated with fermented foods, using fermented table olives as a model product. These analyses supported the design of low- and high-microbe intake diets.



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sciforum-136480: Microbiological tools to explore LAB–Propionibacteria synergy in view of dairy by-product valorisation

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Lactic acid bacteria (LAB) can enhance the growth rate and biomass production of Propionibacteria (PAB) (Piveteau et al., 1995). Additionally, adding lactate (1.5 g L^{-1}) to a lactose-containing medium shortens the lag phase by about 39% and increases the carrying capacity of selected PAB strains (Coronas et al., 2023). Based on this evidence, and within a project aiming to improve the fermentative performance of PAB in lactose-rich dairy by-products, this study focused on identifying LAB strains that positively interact with PAB; defining an inoculation strategy to optimise PAB growth; developing a differential medium for the selective enumeration of LAB and PAB; setting up a thermal treatment that preserves the fermentability of dairy by-products while avoiding undesired contamination. The results highlighted four LAB strains that enhanced the growth of selected PAB in sequential inoculation, while no appreciable effect was observed under co-inoculation. YELactose agar clearly differentiated LAB and PAB colonies, proving suitable for monitoring each bacterial group in mixed cultures. A 5-minute treatment at 110°C proved effective in eliminating undesired microorganisms without detrimental effects on by-product fermentability. These findings provide practical tools for designing mixed starter cultures and establish a basis for further research on LAB–PAB synergistic interactions to improve the valorisation of dairy by-products through fermentation.



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sciforum-132285: Optimization of solid-state fermentation process of Angelicae Pubescentis Radix stems and leaves by probiotics

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The purpose of this study was to optimize the solid-state fermentation process of the stems and leaves of Angelicae Pubescentis Radix (APR) by probiotics, and to improve the osthole content in the stems and leaves of APR. In this experiment, *Bacillus amyloliquefaciens* SSYB was used to ferment the stems and leaves of APR. On the basis of a single-factor test, the solid-state fermentation process was optimized by an orthogonal test design, and the osthole content in the stems and leaves of APR before and after fermentation was determined by high-performance liquid chromatography. The results showed that the optimized fermentation process of the stems and leaves of APR was a fermentation time of 72 h, a fermentation temperature of 37°C, an inoculation amount of 5%, and 65% water content. Under this condition, the osthole content in the stems and leaves was 1.81 mg/g. It was significantly increased by 45.97 % ($P<0.01$) compared with that before fermentation. The results showed that the osthole content in the stems and leaves of APR was increased by optimizing the solid-state fermentation process of *Bacillus amyloliquefaciens* SSYB.



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sciforum-143740: Programmable Morphology Shifts in Lactic Acid Bacteria: A Low-Energy Harvesting Strategy for Functional Food Fermentation

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Lactic acid bacteria (LAB) are central to the production of functional foods with proven benefits for gut microbiota balance and immune regulation. Using computational modeling and literature-derived parameters, we simulated morphology transitions from planktonic rods to chain-forming aggregates and assessed their impact on biomass recovery and energy consumption.

This meta-analysis integrates quantitative findings from **18 peer-reviewed** studies examining LAB aggregation, sedimentation-related traits, and probiotic functionality. Results demonstrated auto-aggregation ranging from **45.2% to 120.4%** and hydrophobicity between **31.0% and 83.0%**, indicating strong potential for passive biomass recovery. In some strains, auto-aggregation reached as high as **96.3 %**, suggesting near-complete cell clumping. Simulated gastrointestinal conditions revealed robust probiotic viability with survival ranging from **87.2% to 96.7%** and adhesion rates to human epithelial cells (**Caco-2/HT-29**) up to **21.7%**. Taken together, these data imply that morphology-induced aggregation could facilitate sedimentation or low-speed separation, likely reducing energy consumption by **50%** or more compared to conventional centrifugation based on theoretical sedimentation models calibrated with aggregation inputs. Crucially, probiotic integrity and function appear preserved under these conditions. This analysis underscores the feasibility of morphology programming as an eco-efficient, scalable method for harvesting LAB in functional food manufacturing. It offers scalability across both dairy and plant-based fermentation systems, aligning with the growing demand for sustainable, functional foods.



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sciforum-136268: Propionibacteria in Action: Unveiling the Hidden Value of Second Cheese Whey

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Second cheese whey (SCW), the nutrient-rich by-product of whey cheese production, presents both an environmental challenge and an opportunity for sustainable innovation in the dairy sector. While Italy generates up to one million tons of SCW annually, its potential remains largely untapped, particularly by small and medium-sized dairies that often use it for animal feed or discard it as waste. This study investigates how variability in SCW composition influences its fermentation by different strains of *Propionibacterium freudenreichii* and whether this process consistently enhances the nutritional profile of SCW. To this end, five strains selected based on physiological and functional traits were tested on different SCW samples. Untargeted metabolomics revealed that SCW composition shaped fermentation outcomes while highlighting strain-specific impacts on the metabolome. Across all fermented samples, 45 metabolites were consistently enriched, including derivatives of vitamins B9 (folate) and B12 (cobalamin), essential amino acids, and compounds with prebiotic and antioxidant functions. Pathway analysis indicated significant activation of the “one-carbon pool by folate” pathway and glycine, serine, threonine, and vitamin B6 metabolism. These results demonstrate the ability of *P. freudenreichii* to transform SCW into a nutritionally enriched product, offering a promising, zero-waste strategy for valorizing dairy by-products within a circular economy framework.



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sciforum-136785: Strawberry tree fruit fermentation using the probiotic *Saccharomyces boulardii*

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Strawberry tree (*Arbutus unedo*) fruits are traditionally used in herbal/folk medicine or in the preparation of jams and alcoholic beverages. Fermentation is a microbial process that transforms the substrate, but also it may increase the nutrient bioavailability and alter the antioxidant properties of the fermented product.

Ripe fruits from a strawberry tree were freeze-dried, reconstituted in water (1:4), pasteurized, inoculated with the probiotic strain *Saccharomyces cerevisiae boulardii*, and incubated at 20 °C for 8 days. Samples collected before and after fermentation were centrifuged for further analysis.

Yeast growth reached 6.8×10^7 cfu/mL and the carbohydrate content reduced from 17.5 to 12.5⁰ Brix after the fermentation. The antioxidant activity increased (from 83 to 86 %DA_{515nm}), but the total amount of phenolics decreased in the supernatant, while no changes were observed in the precipitate. HPLC analysis identified 32 phenolic compounds in the precipitate with no significant differences after fermentation. Color measurements (L*, a*, b*) revealed a slight change, likely due to phenolic oxidation.

The above results indicate the potential utilization of strawberry tree fruits for the growth of the probiotic strain *S. boulardii*, which ferments the fruits while preserving their antioxidant properties. This *S. boulardii*-fermented matrix offers a promising platform for crafting new functional food products.



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sciforum-143762: Suitability of Natural Gums and Their Partial Hydrolysates as Prebiotics

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Natural gums are consumer safe heteropolysaccharides with industrial applications. These soluble dietary fibres, due to their inherent structural complexity, makes them a suitable candidate for prebiotic studies. Our study evaluated the prebiotic potential of four natural gums and their partial hydrolysates on the growth of six lactic acid bacterial strains, including four *Lactobacillus* species (*Lactobacillus plantarum*, *L. brevis*, *L. rhamnosus*, and *L. bifermentans*) and two strains of *Lactococcus lactis subsp. lactis*. Guar gum (Galactomannan), Acacia gum (Arabinogalactan), tamarind gum (glucan), and flaxseed gum (xylan) were targeted for prebiotic evaluation. CFU counts, optical density, pH, and BCA assay (reducing sugar estimation) revealed that not all natural gums are equally effective. Partial depolymerisation has significantly boosted the growth of specific strains, suggesting that the complexity of the native form limits its utilisation. In silico studies indicated the link between species-specific substrate utilisation and glycosyl hydrolases production and also variations in the number of isozymes present across the species. Quantitative real-time data validated the differential expression of the targeted glycosidase when grown on partially hydrolysed substrate compared to the native gums. Our findings highlight the biochemical and molecular basis for substrate preference and provide insights into potential combinations for formulating synbiotics.



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sciforum-130061: To What Extent Do Particle Film Applications on Grapes Affect Yeast Populations During Alcoholic Fermentation?

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Particle films are widely used in viticulture to protect vines from environmental stresses, but their effects on vineyard microbial communities, especially fermentation yeasts, are not well understood. This study assessed how pre-harvest applications of kaolin (5%) and potassium silicate (Si) at 0.05% and 0.10% influence yeast dynamics during spontaneous fermentation of *Vitis vinifera* “Touriga Nacional” and “Touriga Franca” musts. Grapes were harvested from a commercial vineyard in the Douro Region, and microvinifications were conducted under controlled conditions. Fermentations occurred in custom-designed fermenters, with daily monitoring. Yeast populations were analyzed at three stages (beginning, middle, and end) using culture-dependent methods and 26S rDNA sequencing. Particle film treatments affected yeast density, diversity, and composition, particularly in early and mid-fermentation. Non-*Saccharomyces* yeasts dominated initial stages, with marked differences in *Saccharomyces cerevisiae* presence across treatments. In “Touriga Nacional”, the 0.05% Si treatment promoted early *S. cerevisiae* dominance, unlike in “Touriga Franca”, where it was absent at the same stage. Kaolin-treated musts showed the lowest yeast diversity, while 0.05% Si-treated musts showed the highest. These results indicate that particle films significantly influence yeast communities during fermentation, with effects dependent on grape variety and treatment, reinforcing the need to consider microbial impacts in vineyard management.



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sciforum-143686: Use of *Weissella cibaria* BAL3C-5 B2 to produce functional breads enriched in vitamin B₂ and fortified with dextran

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Fermentation can improve the sensory, nutritional, and safety qualities of food. Furthermore, producing functional foods that contain bioactive compounds generated *in situ* by fermentative microorganisms is more sustainable than adding chemically or biotechnologically synthesized compounds.

Using optimized protocols for quantifying riboflavin (RF) and dextran, as well as gastrointestinal (GIDM) and colonic fermentation (CFDM) dynamic models, we have analyzed the functional properties of experimental breads (B_{LAB}) made from doughs inoculated with *Weissella cibaria* BAL3C-5 B2, a RF-overproducing spontaneous mutant of the dextran-producing lactic acid bacteria (LAB) *W. cibaria* BAL3C-5, which was isolated from rye sourdough.

Doughs made with binary (50:50) flour mixtures (wheat/chickpea, wheat/quinoa, wheat/teff, rice/quinoa and buckwheat/quinoa) were fermented with or without (control) *W. cibaria* BAL3C-5 B2. Dextran (~2% w/w) was only detected in the LAB-fermented doughs, which had 2-3-fold higher vitamin B₂ content. GIDM revealed that the bioaccessible vitamin B₂ content in wheat/chickpea B_{LAB} was ~3.7-fold higher than in control breads (B_C). Using CFDM, buckwheat/quinoa B_{LAB} and B_C were shown to significantly induce SCFA production by the gut microbiota, although B_{LAB} resulted in a greater increase (*Lactobacillus* and *Bifidobacterium*) or no decrease (*Akkermansia*) of the abundance of beneficial bacteria.



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sciforum-143785: Valorization of Residual *Spirulina platensis* biomass fermented by *Aspergillus oryzae* in biorefinery solid-state process

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Nowadays, the interest in microalgae for the recovery of bioactive molecules (polyphenols, and pigments) results in the production of by-products. This can be valorized through solid-state fermentation (SSF) for bioactive molecules recovery. Thus, the objective of the study was developed a solid-state biorefinery using *S. platensis* by-products (SPBP) as a substrate to recover bioactive fractions using *A. oryzae*. The study englobed chemical evaluation (composition, pH and radial growth); and fermentation (120 h) with protein (Bradford and amino acid quantification), organic acid and reducing sugar quantification; antioxidant activity; and the FPLC-profile. The results showed a higher content of protein and carbohydrates (35.09 ± 3.25 and 22.01 g/100g). The recovered extracts showed an increment in protein, reducing sugar (0.96 gEBSA/100g and 0.5 gE Glucose E/100g), amino acid contents and antioxidant activity; also, it was detected organic acids (malic and kojic acid). Finally, the protein fraction with lower molecular weight (1-3 kDa) could be involved in the antioxidant activity. The SSF biorefinery process allowed the recovery of extracts with increased antioxidant activity and valued-added molecules. Thus, the study sets a precedent for the integration of new bioprocessing technologies in the sea- industry for the recovery of value-added molecules.



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