3rd FORTHEM international conference: Democratic & Responsible Bio Innovation

Report of Contributions

Contribution ID: **2** Type: **not specified**

Artificial Intelligence and Civil Liability: Governing Risk and Accountability in Biosciences

Wednesday, 11 March 2026 10:15 (20 minutes)

The growing integration of artificial intelligence into biosciences and healthcare is reshaping innovation processes while simultaneously amplifying risks related to safety, accountability, and trust. As AI systems increasingly influence decisions with significant biological and health impacts, questions of responsibility can no longer be addressed solely at the technical level.

This presentation examines civil liability as a policy instrument for governing AI-driven innovation in bioscientific contexts. Moving beyond compensation for harm, liability frameworks are explored as mechanisms capable of steering responsible design, risk prevention, and ethical deployment of AI technologies. Drawing on current European regulatory developments and selected application scenarios, the analysis highlights how liability rules can align technological innovation with public interests, sustainability, and societal values. The contribution argues that integrating liability considerations into AI governance is essential for fostering trustworthy and socially resilient bioscience ecosystems.

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Session Classification: AI Driven Biosciences & Ethical Autonomy

Track Classification: General sessions: AI Driven Biosciences & Ethical Autonomy

Contribution ID: **4** Type: **not specified**

Enzymatic Coagulation of Chickpea-Based Plant Beverage Using Artichoke-Derived Enzyme

Thursday, 12 March 2026 15:20 (10 minutes)

This study aims to evaluate the potential of enzymatic extract derived from artichoke to induce coagulation in a plant-based beverage formulated from chickpeas. The goal is to explore plant-based alternatives to traditional animal rennet for the development of clean-label dairy-free products.
To obtain the enzymatic extract, dried artichoke flowers were homogenized in 50 mL of 50 mM sodium citrate buffer at pH 5.0. The homogenate was then centrifuged at 8500 rpm for 30 minutes. The resulting supernatant, containing crude enzymatic extract, was collected and used directly for the coagulation trials. The enzymatic extract was subsequently characterized for its proteolytic activity, milk-clotting activity, and bioactive compound content (Total polyphenols and flavonoids).
The chickpea-based beverage was prepared by soaking, grinding, cooking and filtering chickpeas to obtain a smooth plant beverage.
The chickpea-based plant beverage was prepared by soaking, grinding, and filtering chickpeas. Enzymatic coagulation trials were conducted using a Central Composite Design (CCD) as part of a Response Surface Methodology (RSM) approach. Three independent variables were studied: enzyme concentration, coagulation time, and temperature. The effects of these parameters on coagulation efficiency were evaluated through pH monitoring, Texture, Electrical conductivity and Turbidity.
The enzymatic extract obtained showed high proteolytic and coagulant activities (1290.32 U/mg and 81.63 RU/mL respectively) , confirming its potential as a natural coagulant. In addition, the extract was found to be rich in antioxidant compounds, notably total phenolics (296.21 mg EAG/g) and flavonoids (265.13 g ER/g), which contribute to its functional value.
The statistical analysis of the response surface model allowed the determination of an optimal combination of the three factors, leading to favorable coagulation conditions, which are 2571.82 U/mg of enzyme, during 3 minutes at 60° C.
Under these optimal conditions, the coagulated beverage exhibited low final pH, increased turbidity, high gel firmness (texture), and significant reduction in conductivity, indicating effective protein network formation and aggregation.
The final coagulated product was characterized by a high protein content (8.82%), notable retention of bioactive compounds such as total polyphenols (339.51 mg EAG/ g) and flavonoids (294.9 mg ER/ g), and a good yield of curd formation (38.13%). These results highlight the technological and nutritional potential of chickpea-based plant beverages coagulated with a natural, plant-derived enzyme.

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Session Classification: Sustainable Bioeconomy & Nature Based Solutions

Track Classification: General sessions: Sustainable Bioeconomy & Nature Based Solutions

Contribution ID: **5** Type: **not specified**

Red Wood Ants in Romania - distribution, monitoring and conservation issues

Thursday, 12 March 2026 14:10 (20 minutes)

Red Wood ants (the Formica rufa group) are a complex of ant species native to the coniferous, deciduous and mixed forests of Europe. Widely recognized as ecosystem engineers, they construct large, dome-shaped mounds from spruce needles, twigs, and grass, which function as sophisticated solar collectors and climate-controlled nurseries. These ants play a critical keystone role in forest ecology through their aggressive predation of invertebrates, their mutualistic tending of aphids for honeydew, and their role in nutrient cycling and seed dispersal. In Europe, there are seven known red wood ant species: *Formica rufa, Formica polyctena, Formica lugubris, Formica aquilonia, Formica pratensis, Formica paralugubris* and *Formica truncorum.* In Romania, four of these species occur and their distribution is discussed. Aspects regarding the conservation and monitoring protocol are also highlighted.

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Session Classification: Coastal & Environmental Security in a Warming Europe

Track Classification: General sessions: Coastal & Environmental Security in a Warming Europe

Contribution ID: **6** Type: **not specified**

"A tsunami of cancer"and mental health: the impact of negative emotions on illness acceptance in cancer patients

Friday, 13 March 2026 11:50 (20 minutes)

Cancer, as highlighted by numerous researchers (Caldiroli et al., 2025; Hsiao & Lee, 2026; Karademas et al., 2025), represents a life-threatening medical condition in which psychological factors, particularly emotion-related processes, play a substantial role in patients'adaptation and overall functioning. For the individual, a cancer diagnosis constitutes a highly stressful and potentially traumatic life event that evokes a broad spectrum of cognitive, emotional, and behavioral responses across different stages of diagnosis, treatment, and survivorship. It profoundly disrupts personal goals and future-oriented plans, necessitates significant lifestyle adjustments, restricts the fulfillment of social and professional roles, and may alter interpersonal relationships. The aim of this presentation is to examine—based on the authors'empirical research (Krok et al., 2025; Krok et al., 2026)—the role of emotional processes in psychological adaptation to cancer. Central to this line of research are negative emotions, e.g. fear of recurrence and generalized anxiety, which play a pivotal role in the psychosocial functioning of cancer patients. This perspective enables an exploration of how negative emotions operate within the stress transaction process among individuals diagnosed with cancer, as well as the identification of potential mediating mechanisms through which patients experience emotional outcomes and adjustment.

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Session Classification: Bioconvergence & Resilient Innovation Ecosystems

Track Classification: General sessions: Bioconvergence & Resilient Innovation Ecosystems

Contribution ID: **7** Type: **not specified**

Understanding Burnout in the Primary Healthcare Workforce: Prevalence and Risk Factors

Friday, 13 March 2026 13:30 (10 minutes)

Background:
Burnout syndrome is a major global challenge in healthcare, affecting physicians'well-being, job performance, and patient safety. Primary healthcare physicians are particularly vulnerable due to high cognitive, emotional, and organizational demands.

Aim:
To determine the prevalence of burnout and identify associated risk factors among physicians working in Family Medicine Centers (FMCs) in Saudi Arabia.

Methods:
A cross-sectional study was conducted among physicians in a Family Medicine Center in Jubail, Saudi Arabia, between February and June 2024. Data were collected via an online questionnaire including sociodemographic variables and the Maslach Burnout Inventory (MBI), assessing emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA).

Results:
A total of 160 physicians participated (response rate 65%). High levels of burnout were observed: 48.1% reported high EE, 28.5% high DP, and 14.7% low PA. Overall, 30.4% met criteria for high burnout across all three dimensions. Burnout was significantly associated with gender, marital status, having children, specialty, years of experience, and additional administrative workload.

Conclusion:
Burnout among primary healthcare physicians is highly prevalent, particularly emotional exhaustion. Targeted organizational and psychosocial interventions are urgently needed to support physician well-being and maintain high-quality patient care.

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Session Classification: Bioconvergence & Resilient Innovation Ecosystems

Track Classification: General sessions: Bioconvergence & Resilient Innovation Ecosystems

Contribution ID: **8** Type: **not specified**

Laboratory for Community Development: An Innovation for Resilient Innovation Systems in Central Romania

Friday, 13 March 2026 11:10 (20 minutes)

Digitalization and technology are reshaping contemporary realities at an unprecedented pace and are generating new opportunities for innovation at the intersection of multiple fields. The algorithmic logic of these innovations produces novel social phenomena and nurtures a range of anxieties, fears, and retreat of particular categories of population into conservative values for obtaining the needed psychological comfort. In this context of social change, we propose an integrated approach from the perspective of the social sciences to understand how communities can be made part of these processes so that change is comprehended and social solidarity reinforced. Therefore, this presentation outlines the working logic of the Community Development Laboratory piloted in Romania and examines how new forms of digital governance can contribute to the development of a resilient innovation system. On the one hand, the core themes addressed relate to the potential of innovation systems to support democratization and to foster the participation of younger generations in social processes that previously held little interest for them, as well as multi-actor frameworks required for this process. On the other hand, the response to these new trends within society is documented in the case of Romania's younger generation and interpreted through an analysis of their uncertainties regarding the society of the future. This perspective enables us to introduce the community dimension into systems dominated by digital and global patterns of technological transformation. In this framework, the Community Development Laboratory operates within emerging innovation ecosystems shaped by technological convergence and digitally mediated governance. Its role is to strengthen inclusive participation and institutional resilience in contexts marked by rapid socio-technological transformation.

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Session Classification: Bioconvergence & Resilient Innovation Ecosystems

Track Classification: General sessions: Bioconvergence & Resilient Innovation Ecosystems

Contribution ID: **9** Type: **not specified**

Examples of waste raw materials: representatives of the genus Rosa as sources of biologically active substances for the development and creation of medicines and dietary supplements

Friday, 13 March 2026 13:10 (10 minutes)

Introduction. Nowadays, humanity is facing many problems in the field of ecology, the purity of air, soil and water is deteriorating. Due to the overuse of natural resources, many plant species are becoming endangered and are eventually lost forever. The key role in solving such problems can be played by the popularization of waste recycling.
This work is devoted to the recycling of waste from the production of plants of the genus *Rosa*: *Rosa canina* L. and *Rosa × damascena* Mill. grown in Ukraine.
From the fruits of *R. canina*, using a special apparatus with a directed air stream, the nut fruits are separated for further production of fatty oil. Waste in the form of trichomes, pericarp and other parts are usually not used in production in Ukraine.
Petals of *R. × damascena* are usually used to obtain essential oil and hydrolate. Waste in the form of moistened raw materials (after hydrodistillation, steam distillation) remain unused.
The use of waste from fruits and petals of plants of the genus Rosa will allow to offer their waste-free processing.
Aim. The aim of our work was to study the phytochemical properties of *R. canina* fruit waste and *R. × damascena* petals.
Materials and methods. *R. canina* raw material was obtained from the manufacturer LLC "Shans Vik". For *R. canina* fruit waste, which consisted mainly of pericarp (24.8%) and trichomes (75.2%), the quantitative content of the sum of polyphenolic compounds was determined by the Folin-Ciocalteu method (calculated in terms of gallic acid, mgEGA/g), the quantitative content of carotenoids (μg/g) and procyanidins (calculated in terms of cyanidin chloride, %) by spectrophotometry.
R. × damascena petals were collected during flowering in Perechyn, Mukachevo district, Transcarpathian region, Ukraine (48.74335◦N, 22.47417 E). For the petals of *R. × damascena*, which remained after obtaining the ether, the quantitative content of water-soluble polysaccharides and pectin substances was determined by the method of precipitation in ethanol (in terms of dry raw material, %).
Results. The obtained results indicate that the content of polyphenolic compounds in the waste of *R. canina* fruits was 110.01±2.10 mgEGC/g; the content of carotenoids was 2547.10 μg/g; the content of procyanidins was 0.05 ± 0.01%.
For the petals of *R. × damascena*, the quantitative content of water-soluble polysaccharides was 8.04±0.15% and of pectin substances was 6.25±0.12%.
Conclusions. Products of processing raw materials of plants of the genus *Rosa*, collected in Ukraine, are rich in various groups of biologically active substances and can be a promising source for the development and creation of medicines and dietary supplements.

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Session Classification: Bioconvergence & Resilient Innovation Ecosystems

Track Classification: General sessions: Bioconvergence & Resilient Innovation Ecosystems

Contribution ID: **10** Type: **not specified**

Measuring export competitiveness of wood products: Latvia vs other European countries

Friday, 13 March 2026 10:50 (20 minutes)

Wood is an important natural resource in several Northern and Central European countries. This study aims to assess the export competitiveness of wood products in the European Union (EU), with a particular focus on Latvia.

Methodology and data. This research is based on data from the Atlas of Economic Complexity. Wood product groups are defined according to the HS92 product classification at the 4-digit level of disaggregation. For each wood product group, we calculate the revealed comparative advantage (RCA) index and compute the average export complexity of wood products for each EU country. In addition, we analyse the share of wood products in total exports and examine developments in global market shares.

Empirical results. Latvia ranks first among EU countries in terms of export competitiveness in wood products. The volume of Latvia's wood product exports even exceeds the level that would be expected given the country's forest area. However, despite notable improvements, the average complexity of Latvian wood product exports remains relatively low. This suggests that wood resources could be utilised more efficiently to enhance national welfare. Latvia demonstrates strong export capacity in primary wood processing products (e.g., fuel wood, packing boxes, particle board), but comparatively weaker performance in secondary processing industries (e.g., pulp, paper, furniture, musical instruments). Further expansion limited to primary wood processing is unlikely to raise the complexity of Latvia's wood exports to the level observed in Scandinavian countries. The development of secondary wood processing industries is therefore crucial for increasing the export complexity of wood products in Latvia.

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Session Classification: Bioconvergence & Resilient Innovation Ecosystems

Track Classification: General sessions: Bioconvergence & Resilient Innovation Ecosystems

Contribution ID: **11** Type: **not specified**

PLANT BY-PRODUCTS AS POTENTIAL SOURCES OF VALUABLE BIOLOGICALLY ACTIVE COMPOUNDS

Friday, 13 March 2026 12:10 (20 minutes)

Keywords: plant by-products, polysaccharides, biologically active substances.

Background: The annual accumulation of significant amounts of plant residues in the agricultural and pharmaceutical sectors creates a significant environmental burden, but in the context of the global transition to a closed-loop economy, these by-products should be considered as promising natural raw materials. Plant polysaccharides are particularly valuable, as together with phenolic compounds and organic acids, they form the basis for obtaining products with high added value and can serve as a basis for creating innovative biopolymers and dietary supplements.
Aim: The aim of the study is to investigate the quantitative content of polysaccharides in alternative plant sources.
Methods: The quantitative determination of polysaccharides in leaves, herbs, fruits, seeds, and pericarps of various species was established by the gravimetric method to the monograph State Pharmacopoeia of Ukraine (SPhU) 2.1 "Plantaginis majoris foliumN"[1].
Results: Plant samples were selected for the study, the raw materials of which are not a direct source of polysaccharides, but are used as a raw material base for the extraction of essential oils, anthocyanins, saponins, and glycosides. The concept of the study was to use raw materials after extracting the main biological substances from them: instead of disposal, further extraction was envisaged. The results of the study are presented in Table 1.
Table 1. Medicinal plant raw materials that can potentially be used as an additional source of polysaccharides

The species name	Type of raw material	Polysaccharide content %
Acanthus mollis L. [2]	leaves	15,8
Artemisia absintium L.	herbs	1,3
Artemisia argyi H. Lév. & Vaniot	herbs	1,9
Cucurbita pepo var. melopepo	fruits	3,7
Elettaria cardamomum (L.) Maton. [4]	fruits	2,8
Elettaria cardamomum (L.) Maton. [4]	seeds	2,2
Elettaria cardamomum (L.) Maton. [4]	pericarps	4,7
Ocimum basilicum L.	leaves	1,8
Ocimum basilicum L.	seeds	0,67
Parthenocissus quinquefolia Planch. [3]	leaves	4,9
Tanacetum balsamita L.	leaves	1,2

During the preparation of aqueous extracts of certain types of raw materials, in particular the fruits of C. pepo var. melopepo and the seeds of O. basilicum, significant water absorption by the raw materials was observed. Therefore, our further research will be focused on analyzing this mucilage, in particular, determining the swelling index in these and other species, determining the swelling index in these and other species, as well as searching for additional sources of polysaccharides.
Conclusion: It has been established that plant residues of certain types of raw materials can serve as an additional source of polysaccharides and at the same time reduce the impact of plant waste on the environment.

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Session Classification: Bioconvergence & Resilient Innovation Ecosystems

Track Classification: General sessions: Sustainable Bioeconomy & Nature Based Solutions

Contribution ID: **12** Type: **not specified**

When Open Data Do Not Mean Open Knowledge: Interpreting Environmental Monitoring Results

Thursday, 12 March 2026 13:00 (30 minutes)

Public access to environmental information, strengthened in the European Union by the Aarhus Convention, has significantly expanded the availability of environmental monitoring data. Yet increased access does not automatically produce shared understanding. This presentation examines epistemic challenges associated with interpreting open environmental data, focusing on the interaction between cognitive biases, statistical literacy, and intrinsic statistical properties of environmental datasets. Particular attention is given to skewed distributions and compositional structures typical for concentration-based measurements, which may generate misleading correlations and complicate inference about environmental processes. The paper argues that open environmental data shift the central challenge from availability to interpretation, influencing trust in official communication and shaping public risk perception. This highlights the need for interpretative mediation in open environmental governance.

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Session Classification: Coastal & Environmental Security in a Warming Europe

Track Classification: General sessions: Coastal & Environmental Security in a Warming Europe

Contribution ID: **13** Type: **not specified**

Contribution to the development of a multifaceted diversity framework in the context of the Biology–Ecology–Environmental Sciences–Environmental Engineering–and–(Human) Society (BEES) System.

Friday, 13 March 2026 12:30 (10 minutes)

Structural and functional loss of biodiversity and habitat heterogeneity are among the main plagues of the age and pose an increasing threat to the future of our planet. Despite all efforts, mostly declaratory and less effective, the edge of the diversity crisis, embodied by the next, also called the sixth mass extinction, was allegedly already passed. Among the many cases of failure of decelerating extinction rates and environmental damage are the conceptual and methodological limitations. Biodiversity and its ecological counterpart have been defined and measured mostly unidimensionally or at least in a very narrow approach, including taxonomic, functional, phylogenetic, and other constitutive details, ranging from genes to human society, without any holistic attempt to combine and express the multidimensional features of life and environmental heterogeneity in a unified hyperspace. First, we stress that all ecological and societal issues must be placed in a broad context, defined as the holistic paradigm termed Biology–Ecology–Environmental Sciences–Environmental Engineering–and–(Human) Society (BEES) System. Then, within this system, the traditional metrics of diversity, namely the Taxonomic, Functional, Niche-based, and Phylogenetic Diversity as well as their constituents, have to be combined and unified into a multifaceted conceptual and methodological framework. We introduced several new indices and approaches: the Overall Diversity (OD) which combines taxonomic, functional, niche, and phylogenetic diversities into a single measure, visualized geometrically as multidimensional volumes, Lambda diversity (λ) captures the dynamic changes in community composition along gradients —reflecting species turnover, persistence, and replacement, Xi diversity (ξ) links biodiversity with environmental and spatial heterogeneity, integrating "life, environment, and space" into a common measure of ecological diversity, and the SADDI (Standardized Average Diversity Distinctness Index) synthesizes all these dimensions into one standardized value, providing a holistic picture of biodiversity complexity. SADDI is calculated as an n-th root of the determinant of a distance or dissimilarity matrix between several diversity measures. Relying on real and simulated data sets, we formally described the measures and their assessment using scripts and projects in software such as R, Mathcad, and Canoco. Our introduced measures reveal geometric structure, multidimensional relationships, and hidden dependencies that univariate indices cannot capture. They also facilitate communication between experts and the public, providing accessible means to express diversity dynamics, paralleled by an increasing reliance on biodiversity data by managers and policymakers. Rather than replacing established methods, our synthetic measures aim to complement them. Together, they can enhance monitoring, modelling, conservation, management, and cross-disciplinary dialogue, while supporting trans- and interdisciplinary research and education, strengthening communication, and may ultimately help establish more effective strategies to mitigate loss and protect the ecological and cultural values of diversity.

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Session Classification: Bioconvergence & Resilient Innovation Ecosystems

Track Classification: General sessions: Bioconvergence & Resilient Innovation Ecosystems

Contribution ID: **14** Type: **not specified**

Re-purposing invasive plants as bioeconomic solutions [Prof. Simona Oancea; Dr. Maria Denisa COCÎRLEA]

Friday, 13 March 2026 11:30 (20 minutes)

Invasive plants, despite being viewed with skepticism due to their negative effects mainly on environmental biodiversity, proved to be valuable resources, from a medical or an industrial perspective. Some of these plants are characterized by relevant biological properties, relatively low cytotoxicity, coloring properties, being also used in environmental remediation, as biopesticides or in biorefinery processes. The present study aimed to investigate two invasive species well represented in Romania, *Ailanthus altissima* and *Rhus typhina*, often mistaken for each other due to the similarity of their leaves' appearance, but differentiated by chemical composition. Ethanol extracts of dried powder of autumnal *A. altissima* leaves presented a significant antioxidant activity, supported by the polyphenol content such as gallic acid, catechin and quercetin. The extract showed inhibition diameters of 10 mm against several strains of pathogenic bacteria, in particular against *Staphylococcus aureus* and *Enterococcus faecalis*. Fruits of *R. typhina* proved to be a valuable source of phenolic compounds, such as myricetin, *p*-coumaric and ferulic acids, the ethanolic extract showing antibacterial activity against *Streptococcus pyogenes* and *Salmonella enterica*, with inhibition diameters >10 mm. From a practical viewpoint, the high tannin content in *A. altissima* leaves and the presence of anthocyanins in *R. typhina* fruits suggest that these species could serve as relevant raw materials for the textile ecodyeing, tannins being well known for their ability to bind strongly to textile fibers, improving dye fixation and color fastness, while anthocyanins provide a wide range of natural red to purple hues.
Considering our results regarding good bioactivities of the investigated species and the successful cotton dyeing with *R. typhina* fruit extracts, these species may find application for pharmaceutical and industrial purposes. Transforming these species into useful products can contribute to reducing environmental pollution, improving human well-being and supporting the gradual development of a sustainable economy.

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Session Classification: Bioconvergence & Resilient Innovation Ecosystems

Track Classification: General sessions: Bioconvergence & Resilient Innovation Ecosystems

Contribution ID: **16** Type: **not specified**

Law and Artificial Intelligence in Biosciences: Algorithmic Transparency and Liability for Medical Error

Wednesday, 11 March 2026 10:35 (20 minutes)

The rapid integration of artificial intelligence into biosciences and clinical diagnostics has transformed contemporary healthcare, offering improved accuracy, efficiency, and predictive capacity. At the same time, the growing reliance on machine learning systems,particularly opaque "black box"models raises significant legal concerns regarding transparency, accountability, and patient protection. The use of AI-assisted diagnostic tools challenges traditional legal doctrines built around human decision-making and individual professional responsibility.
This paper examines whether the current European regulatory framework, including the Artificial Intelligence Act, the Medical Devices Regulation and the modernised Product Liability regime, provides adequate safeguards in cases of medical error involving AI systems. It addresses two central questions: first, whether existing transparency and documentation requirements sufficiently mitigate the epistemic opacity of algorithmic systems in high-risk medical contexts; and second, how liability should be allocated within hybrid human–machine decision-making environments.
The analysis argues that while recent EU legislation strengthens ex ante compliance obligations and risk-based oversight, significant doctrinal and practical uncertainties remain in attributing responsibility when harm results from AI-supported clinical decisions. Traditional fault-based and product liability models do not fully capture the distributed and adaptive nature of contemporary AI systems. Ensuring democratic legitimacy in bioinnovation therefore requires clearer standards of explainability, traceability, and accountability that reconcile technological complexity with the fundamental rights of patients.

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Session Classification: AI Driven Biosciences & Ethical Autonomy

Track Classification: General sessions: AI Driven Biosciences & Ethical Autonomy

Contribution ID: **17** Type: **not specified**

UNRAVELING BEAUVERICIN TOXICITY: CELL DEATH AND OXIDATIVE STRESS IN SH-SY5Y CELLS

Friday, 13 March 2026 13:00 (10 minutes)

Background: Mycotoxins are secondary metabolites produced by several fungal genera, particularly Aspergillus, Penicillium, and Fusarium (1). Beauvericin (BEA) is an emerging mycotoxin that currently has limited regulatory control (2). **Aim:** The purpose of this study was to evaluate the association between oxidative stress and cell death mechanisms induced by BEA exposure. **Methods:** Cytotoxicity was assessed using the (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) (MTT) assay after 24 and 48 h of exposure, while intracellular reactive oxygen species (ROS) production was measured with the fluorescent probe dichlorofluorescein (H2-DCFDA) for 120 minutes and after 24 h of exposure with a specific measurement. Lipid peroxidation (LPO) was evaluated by the TBARS assay with measurement of malondialdehyde (MDA) production after 24 and 48h of exposure. Human SH-SY5Y neuroblastoma cells were treated with BEA at concentrations ranging from 0.12 to 30 μM. **Results:** BEA demonstrated a biphasic effect on cell viability, enhancing cell proliferation at 0.94 μM and inducing significant cytotoxicity at higher doses, particularly after 48 h of exposure. ROS levels increased at 12 μM across all time points, ranging from 13.9% to 33%, while lower doses elevated ROS production during the initial 45 minutes. Additionally, BEA at 12 μM significantly increased malondialdehyde (MDA) formation after 24h, although no significant effect was observed after 48 h. **Conclusion:** These findings indicate that BEA acts as a cytotoxic compound at elevated concentrations and exhibits a concentration-dependent effect on ROS generation, likely triggering long-term cellular antioxidant responses. The widespread presence of mycotoxins in food systems emphasizes the importance of studying their toxicity. **Acknowledgements:** This work has been funded by the Ministry of Science and Innovation and the CIAICO/2022/199 project of the Generalitat Valenciana. CML thanks the Generalitat Valenciana and the Ministry of Education, Universities and Employment for the contract associated with the CIAICO/2022/199 project.

Keywords: cytotoxicity, oxidative stress, in vitro, SH-SY5Y.

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Session Classification: Bioconvergence & Resilient Innovation Ecosystems

Track Classification: General sessions: Bioconvergence & Resilient Innovation Ecosystems

Contribution ID: **18** Type: **not specified**

Protective Factors and Resources for Burnout Prevention and Intervention

Wednesday, 11 March 2026 15:00 (10 minutes)

Abstract

This study investigates the relationship between difficulties in emotional regulation, perceived organizational support, and occupational burnout among employees. The objective of the study was to identify significant psychological, organizational, and contextual factors that can serve as protective resources against professional burnout. Research hypotheses were formulated to examine direct relationships between variables and the role of organizational support as a moderator.
The study had a correlational, cross-sectional, non-experimental design. The sample included 135 participants from various occupational fields. Three instruments were used: the Difficulties in Emotion Regulation Scale (DERS, Gratz & Roemer, 2004), Multidimensional Scale of Perceived Social Support (MSPSS, Zimet, Dahlem, Zimet & Farley, 1988, Zimet, 2016, 2021), and the Maslach Burnout Inventory –General Survey (MBI-GS, Schaufeli, Leiter & Kalimo, 1995). Statistical analyses included correlations, linear regressions, and moderation analysis.
The results confirmed the existence of significant relationships between emotional regulation difficulties and burnout levels, as well as between perceived organizational support and burnout. Organizational support also moderated the relationship between emotional regulation and burnout, amplifying the protective effect of self-regulation on professional exhaustion. Methodological and practical implications of the study are discussed, and prevention/intervention strategies to stimulate protective resources are proposed, highlighting the importance of an integrated approach to individual and organizational factors in preventing burnout.

Keywords: burnout, emotional regulation, perceived organizational support, protective factors, prevention and intervention strategies.

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Session Classification: Green, Safe & Digital Laboratories

Track Classification: General sessions: Green, Safe & Digital Laboratories

Contribution ID: **19** Type: **not specified**

Coastal Circular Bioeconomy Models: Valorization of Algal Biomass for Democratic and Responsible Bio-innovation

Thursday, 12 March 2026 15:30 (10 minutes)

Ecological transition requires innovation models that integrate environmental sustainability, social ethics, and economic feasibility. This study proposes a circular economy model based on the valorization of algal biomass, including invasive species, transforming organic waste into high-value resources through biorefinery processes. Aqueous and alcoholic extracts from *Ulva ohnoi* and *Asparagopsis taxiformis* were analyzed for the development of agricultural biostimulants and eco-compatible antifouling coatings. Experimental results indicate that priming *Lactuca sativa* and *Spinacia oleracea* seeds with Liquid Seaweed Fertilizers (LSF) at the optimal concentration of 2 mL L^{-1} increases the germination rate by 20% and seedling dry biomass by up to 35% compared to the control. Simultaneously, the application of extracts on marine substrates demonstrated a substantial reduction in biofouling colonization, offering viable alternatives to toxic synthetic biocides. The adopted transdisciplinary approach goes beyond technical assessment, highlighting how the local management of algal resources can support "democratic bio-innovation". This model promotes the technological sovereignty of coastal communities, reduces the carbon footprint, and fosters inclusive governance in line with the European sustainability goals promoted by the FORTHEM Alliance.

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Session Classification: Sustainable Bioeconomy & Nature Based Solutions

Track Classification: General sessions: Sustainable Bioeconomy & Nature Based Solutions

Contribution ID: **20** Type: **not specified**

Educational Engagement in the Digital Transition: Evidence from Romanian Students During COVID-19

Wednesday, 11 March 2026 14:00 (20 minutes)

The COVID-19 pandemic produced major disruptions in educational systems worldwide, with significant implications for students'learning experiences and psychological well-being. The rapid shift toward digital forms of instruction raised important concerns regarding the extent to which students remained academically engaged during extended periods of remote learning. This study explores students'levels of engagement in the context of repeated school closures and home-based education.

The research involved 1,276 pupils (mean age = 15.5 years) enrolled in different educational programs in public schools located in central Romania. To assess students'engagement in the specific context of learning from home, an adapted version of the Utrecht Work Engagement Scale for Students (UWES-9S) (Schaufeli et al., 2002) was employed. Psychometric evaluation of the instrument revealed a two-factor structure emerging as the principal dimensions of engagement. Furthermore, the study analyzed varying levels of academic involvement according to predefined identification criteria. Beyond the quantitative results, qualitative data derived from students'narratives offered additional insights into their personal experiences with online learning. These reflections highlight how pupils interpreted their educational circumstances through emotional reactions, decreased motivation, digital fatigue, and fluctuating patterns of engagement and disengagement, which may either foster or undermine resilience. The discussion emphasizes the importance of recognizing and addressing both visible and subtle disruptions affecting the learning process during periods of large-scale educational transformation.

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Session Classification: Green, Safe & Digital Laboratories

Track Classification: General sessions: Green, Safe & Digital Laboratories

Contribution ID: **21** Type: **not specified**

Safeguarding insect mass-rearing: molecular approaches to pathogen identification and surveillance

Thursday, 12 March 2026 10:00 (20 minutes)

Insect mass-rearing is a rapidly growing field with applications ranging from sustainable protein production to biocontrol. While most research has focused on improving production efficiency, the health of reared insects has received comparatively less attention, despite its critical impact on industry sustainability.
Our work aims to bridge this gap by applying advanced scientific methods to detect and monitor pathogens threatening insect rearing operations. By combining high-throughput sequencing and bioinformatics, we identify novel pathogens associated with impaired production in mass-reared insects such as the Black Soldier Fly, the mealworm, and biocontrol agents of the Nesidiocoris genus. In parallel, we apply targeted molecular techniques to deliver cost-effective and tailored approaches for the detection and quantification of known insect pathogens.
Overall, these case studies highlight the importance of integrating pathogen discovery and health monitoring into standard rearing practices to ensure the resilience and safety of this emerging industry.

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Session Classification: Microbiome & Multi Omics in Health, Food

Track Classification: General sessions: Microbiome & Multi Omics in Health, Food & Environment

Contribution ID: **22** Type: **not specified**

Multi-Omics Insights into the Anti-Mycotoxigenic Activity of Citrus aurantium Extract Against Aspergillus niger in Stored Cereals

Thursday, 12 March 2026 10:40 (20 minutes)

Mycotoxin contamination of cereals represents a major challenge for food safety and public health. Ochratoxin A (OTA), produced by toxigenic fungi such as Aspergillus niger, is a nephrotoxic and carcinogenic compound frequently detected in stored grains. Understanding how natural bioactive compounds influence fungal metabolism and the cereal-associated microbiome is essential for developing sustainable mitigation strategies.

This study investigates the anti-mycotoxigenic potential of hydroethanolic extract from Citrus aurantium (bitter orange) and explores its molecular mechanisms using a multi-omics framework integrating metabolite profiling and gene expression analysis.

Phytochemical composition of the citrus extract was characterized using UPLC-PDA metabolomic profiling. Antifungal and anti-mycotoxigenic effects were evaluated in vitro against OTA-producing A. niger, assessing fungal growth, sporulation, and OTA production. Transcriptomic responses were examined by RT-qPCR targeting otaA, the polyketide synthase gene initiating OTA biosynthesis. The protective potential of the extract was further evaluated in situ on artificially inoculated durum wheat grains during storage.

The extract displayed a distinctive metabolite profile rich in ferulic acid, luteolin glycosides, and ellagic acid. Significant dose-dependent inhibition of fungal growth and sporulation was observed, accompanied by strong suppression of OTA production. Molecular analysis revealed marked downregulation of otaA, suggesting disruption of the fungal secondary metabolism regulatory network. When applied to wheat grains, the extract significantly reduced fungal colonization and OTA accumulation without altering key grain quality parameters.

By linking metabolomic signatures with transcriptional responses in fungal toxin pathways, this study highlights how citrus-derived bioactive compounds can modulate microbial metabolism within food-associated ecosystems. The results support the valorization of citrus by-products as sustainable bio-solutions to control mycotoxin-producing fungi and improve food safety within the food–environment–health nexus.

Keywords: Multi-omics; Citrus aurantium; Ochratoxin A; Fungal metabolism; Food microbiome

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Session Classification: Microbiome & Multi Omics in Health, Food

Track Classification: General sessions: Microbiome & Multi Omics in Health, Food & Environment

Contribution ID: **23** Type: **not specified**

The importance of sericiculture in the development of the circular economy

Friday, 13 March 2026 13:20 (10 minutes)

Sericin is a natural glycoprotein, produced by the silkworm (Bombyx mori). It "coats" silk filaments, and in industrial processes, it is obtained by degumming to facilitate processing. In the textile industry, it is considered a by-product; for other industries, it can be considered the main raw material.
Sericin represents 20-30% of the weight of the silk cocoon, implying a production of up to 30,000 tons/year. Its price depends on its physical properties and purity; the silkworm's species influences these.
Even if, for the textile industry, it is a by-product, for other industries it can also represent an important raw material, being an integral part of the new industrial model (circular economy). Thus, sericin can be useful in medicine, the pharmaceutical, cosmetic, and food industries.
In the food industry, sericin can replace certain food additives (approval of the European Food Safety Authority and the European Commission is required).

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Session Classification: Bioconvergence & Resilient Innovation Ecosystems

Track Classification: General sessions: Bioconvergence & Resilient Innovation Ecosystems

Contribution ID: **24** Type: **not specified**

Waste-to-Hydrogen: Experimental Green Hydrogen Generation for Circular and Responsible Bio-Innovation

Thursday, 12 March 2026 14:30 (10 minutes)

The transition toward a climate-neutral European economy requires scalable solutions for producing low-carbon hydrogen while addressing the growing challenge of waste management. This study presents the ongoing development of an experimental modular system for green hydrogen generation integrating renewable-powered electrolysis with thermochemical conversion of waste-derived syngas obtained through pyrolysis and gasification processes.

The research explores the potential conversion of hydrocarbon-rich waste streams, including used tires and other residual materials, into hydrogen as a clean energy carrier. The proposed system architecture combines waste-to-syngas conversion, catalytic reforming, hydrogen separation, and digital monitoring of key operational parameters such as temperature, pressure, gas composition, and energy efficiency. At this early stage of development, the study focuses on system design, technological integration, and the identification of key performance indicators for future experimental testing.

Beyond technological development, the project situates hydrogen production within the broader framework of circular bioeconomy and responsible innovation. The research also promotes the involvement of early-stage researchers and interdisciplinary collaboration between energy engineering, environmental sustainability, and circular economy studies.

Developed at Lucian Blaga University of Sibiu in collaboration with the National Research and Development Institute for Cryogenic and Isotopic Technologies –ICSI Râmnicu Vâlcea, this initiative aims to contribute to emerging European innovation ecosystems supporting sustainable hydrogen and circular energy systems.

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Session Classification: Sustainable Bioeconomy & Nature Based Solutions

Track Classification: General sessions: Sustainable Bioeconomy & Nature Based Solutions

Contribution ID: **25** Type: **not specified**

Microbial response and process stability under sodium reduction in Castelvetrano table olives

Thursday, 12 March 2026 11:00 (10 minutes)

Table olives are widely consumed throughout the Mediterranean basin. The main processing styles (Greek, Seville, Californian, and Castelvetrano) rely heavily on sodium-based agents (NaOH/NaCl), with public health implications, given the world health organization (WHO) recommendations to reduce sodium intake, and for the management of saline effluents. In the framework of responsible, sustainable, and socially inclusive innovation co-developed by industry and academia, this study examines the technical and microbiological feasibility of partially or fully replacing sodium with potassium (KOH/KCl) in the Castelvetrano process, which typically results in higher sodium levels than the Greek or Sevillian methods. Three treatments were prepared in triplicate: a sodium-based control (CS), total replacement with potassium (CP), and a 1:1 sodium-potassium substitution (CSP). Over 180 days, microbiological [absence/presence of spoilage and pathogenic microorganisms; dynamics of lactic acid bacteria (LAB) and yeasts] and physicochemical parameters (pH and salinity) were monitored. Sodium reduction, whether total or partial, proved technologically feasible. Microbiological stability was observed, with no detection of spoilage or pathogenic microorganisms. LAB and yeast populations followed trends comparable to the control, indicating that beneficial microbes adapt effectively to KCl/KOH environments. The pH and salinity profiles closely matched the control, consistent with findings reported for other non-Castelvetrano styles. These results support the feasibility of reformulating table olives for improved health profiles while preserving the technological and traditional characteristics of the Castelvetrano method. Benefits may extend to salt-sensitive populations (e.g. individuals with hypertension) and to environmental management through reduced saline wastewater loads. The co-creation approach between industry and the SAAF Department, demonstrate high transferability of the method, fostering transparency, traceability, and constructive engagement with stakeholders (consumers, operators, and regulatory bodies), in alignment with the principles of Responsible Research and Innovation. Future work will address sensory performance, regulatory assessments, and life cycle environmental and economic impacts to support large-scale industrial adoption.

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Session Classification: Microbiome & Multi Omics in Health, Food

Track Classification: General sessions: Microbiome & Multi Omics in Health, Food & Environment

Contribution ID: **26** Type: **not specified**

Circular microbial biotechnology for improving colour and aroma in rosé wines produced in warm climates

Thursday, 12 March 2026 14:50 (10 minutes)

Abstract

Global rosé wine production is on the increase, but high temperatures in warm climates influence colour intensity and aromatic freshness, ultimately affecting sensory quality [1,2]. Applying non-*Saccharomyces* yeasts and lactic acid bacteria in combination with *Saccharomyces cerevisiae* in sequential inoculations offers a promising strategy to enhance colour expression and aromatic complexity during fermentation [3]. In this study, six pilot-scale fermentations (500 L each) were carried out using Nero d'Avola grape must, with co-inoculations of either *Starmerella lactis-condensi* MN412 or *Candida oleophila* YS209, with or without *Lactiplantibacillus plantarum* MLPKH45™, followed by sequential inoculation with *S. cerevisiae* NF213. Fermentation kinetics, microbial dynamics, CIELab colour parameters, and sensory profiles were monitored. Sequential inoculation accelerated fermentation compared to the control with *S. cerevisiae*, showing positive microbial interactions. All mixed fermentation trials showed significantly higher L*values (up to 67.20*vs*57.67) and lower C* values (17 *vs* 24.52), suggesting lighter hues and lower colour saturation. Total colour differences (ΔE) between treatments and the control reached up to 12.2, well above the visual perception threshold (ΔE > 2.7) [4]. Sensory analysis showed that sequential inoculations enhanced floral (up to 6.7) and red fruit notes (up to 6.5). The combination of *C. oleophila* YS209 + *L. plantarum* MLPKH45™, followed by *S. cerevisiae*, provided the best balance between colour intensity and sensory quality, achieving the highest overall score (7.5 *vs* 6.5 for the control). Overall, the results demonstrate that co-inoculation of *non-Saccharomyces* yeasts and lactic acid bacteria, coupled with sequential inoculation of *S. cerevisiae*, is an effective tool for modulating colour and aroma in rosé wines produced in warm climates. This approach supports more sustainable winemaking practices with reduced reliance on chemical additives.

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Track Classification: General sessions: Sustainable Bioeconomy & Nature Based Solutions

Contribution ID: **27** Type: **not specified**

Promoting Sustainable Development of Local Fishery Products Through Responsible Bio-Innovation and Technological Advancement

Thursday, 12 March 2026 15:10 (10 minutes)

In recent years, the modern fishing and aquaculture sectors have focused on sustainable technological innovation to improve the quality, safety and shelf life of fish products. These innovative systems include using alternative ingredients in feed, such as insect or algae proteins, to improve production efficiency and product quality. Furthermore, several studies have demonstrated that innovative processing technologies, could contribute both to preserve the sensory qualities of fish products, significantly extending their shelf life and to increase competitiveness of European productions.

However, bio-innovation and technological advancement do not automatically translate into long-term territorial benefits or sustainable socio-ecological transitions. Their ultimate impact depends on how these technical solutions are integrated within complex local production systems, evolving regulatory frameworks, and diverse collaborative networks. Similarly, technological innovations in fish production must interact dynamically with local infrastructure, specialised technical skills, institutional regulations and stakeholder relationships in order to evolve into "integrated innovations".

To promote sustainable and responsible development of local fishery industries and products, we propose a transdisciplinary analytical model that connects technological upgrading with three interrelated enabling conditions: first, the strengthening of local strategic competencies, including advanced technical expertise, modern processing facilities, and enhanced regulatory awareness. The second is the fostering of stable, multi-helix collaboration among producers, researchers, public actors, and civil society through structured spaces for co-working and co-design, such as living labs. The third is the facilitation of cross-sectoral coordination to align decentralized innovation efforts with shared sustainability and regional development goals. In conclusion, the adoption of this transdisciplinary analytical framework to advance technological innovation in the fisheries sector, by strengthening local strategic capabilities, fostering multi-helix collaboration, and facilitating cross-sectoral coordination, could act as a powerful catalyst for enhancing market performance and promoting more resilient, territorially based bio-innovation pathways.

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Session Classification: Sustainable Bioeconomy & Nature Based Solutions

Track Classification: General sessions: Bioconvergence & Resilient Innovation Ecosystems

Contribution ID: **28** Type: **not specified**

From circular economy to social innovation: ecosystem governance and marine by-products valorisation in Sicily

Thursday, 12 March 2026 15:00 (10 minutes)

In the Sicilian context, blue circular economy and social innovation are developing within the same territory, but their integration is still partial and not yet fully consolidated. Within the broader framework of EU strategies on the circular economy, the European Green Deal and zero-waste objectives, marine biomass valorisation has emerged as a regional pathway toward resource efficiency. The activation of traceability protocols for onboard and onshore biomass, the creation of shared aggregation hubs to stabilise fragmented and seasonal flows, and the experimentation with small-scale pilots partnerships require new coordination mechanisms among fishers' cooperatives, processing firms, universities, local authorities and emerging bio-based enterprises. These arrangements reshape material flows as well as decision-making routines, data governance structures and risk-sharing mechanisms.

This study examines how business innovation in marine by-product valorisation may scale into social innovation within the Sicilian blue bioeconomy ecosystem. An integrated case-based approach combines stakeholder interviews, structured questionnaires across processing hubs, institutional document analysis, and material flow evidence supported by life cycle assessment insights. Data from facilities processing anchovy, tuna, swordfish, and shrimp show substantial interspecies variability and a systematic lack of quantification of biomass generated during at-sea processing, weakening traceability and limiting economic planning.

Findings indicate that informational and coordination gaps—more than technological barriers—constrain circular transition. While business innovation generates spillovers, systemic transformation occurs only when governance routines are stabilised and collaboration becomes institutionally embedded.

The Sicilian case demonstrates that durable circular transitions require the institutionalisation of ecosystem-level coordination, ensuring that collaborative structures persist independently of individual leadership and actor turnover.

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Session Classification: Sustainable Bioeconomy & Nature Based Solutions

Track Classification: General sessions: Sustainable Bioeconomy & Nature Based Solutions

Contribution ID: **29** Type: **not specified**

Empowering the Transition to Green and Digital Laboratories: The Role of the GREENVERSITY Project in Sustainable Higher Education

Wednesday, 11 March 2026 13:00 (20 minutes)

The transition towards "Green, Safe & Digital Laboratories" requires more than just technological advancements in lab infrastructures and automation; it demands a profound shift in the skills, mindset, and ethical responsibility of the professionals designing and managing these environments. As the complexity of digital transitions and risk management increases, there is an urgent need for professionals equipped with comprehensive sustainability competencies. This presentation explores how the European Erasmus+ GREENVERSITY project addresses this critical gap by systematically integrating the European Green Competence Framework (GreenComp) into higher education curricula.

The GREENVERSITY project aims to empower universities, educators, and future graduates with the essential knowledge, skills, and attitudes required to lead sustainable transformations. By developing the GREENVERSITY CORE framework, the project translates the high-level GreenComp competencies—such as systems thinking, problem framing, adaptability, and exploratory thinking—into clear, measurable learning outcomes tailored for university students. These specific competencies are highly relevant to the conference theme, as they provide the cognitive tools necessary for understanding complex interconnected systems, managing risks in digital automated environments, and ensuring that technological transitions do not exceed planetary boundaries.

Furthermore, the presentation will highlight the GREENVERSITY PATHWAY, a structured model for standardizing assessment and accreditation. By embedding these sustainability competencies across diverse academic disciplines, including engineering and natural sciences, the project ensures that future lab managers, researchers, and engineers are not only technically proficient but also socially and environmentally conscious. Ultimately, the GREENVERSITY model demonstrates how higher education can act as a catalyst, equipping the workforce with the transversal green skills needed to design and operate the safe, resilient, and sustainable laboratory infrastructures of the future.

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Session Classification: Green, Safe & Digital Laboratories

Track Classification: General sessions: Green, Safe & Digital Laboratories

Contribution ID: **30** Type: **not specified**

Sequential inoculation strategies in malolactic fermentation: impact on fermentation kinetics and volatile compounds in Catarratto wines

Thursday, 12 March 2026 14:20 (10 minutes)

Malolactic fermentation is a key biological deacidification process in winemaking, in which L-malic acid, naturally present in grapes, is converted into L-lactic acid and carbon dioxide, resulting in a reduction of wine acidity. Lactic acid bacteria can be introduced at various stages of production, before alcoholic fermentation, during co-inoculation, or through sequential inoculation with yeasts (after 24, 48, or 72 hours). Previous studies have shown that early bacterial inoculation improves acclimatisation to stress factors such as ethanol and sulphur dioxide, bacterial resilience and accelerating fermentation. This study comparative six fermentation protocols and their respective controls to assess the impact of the non-*Saccharomyces* yeast *Starmerella lactis-condensi* MN412, sequentially inoculation with *Saccharomyces cerevisiae* QA23 and the lactic acid bacteria *Oenococcus oeni* and *Lactiplantibacillus plantarum*, on fermentation kinetics and the volatile organic compounds (VOC) profile of Catarratto wines. The fastest fermentation kinetics were observed in the sequential inoculation involving *St. lactis-condensi*, *L. plantarum*, and *S. cerevisiae*. In this protocol, malic acid showed the greatest decline between days 3 and 4, decreasing from 1.30 to 0.41 g/L and reaching a final concentration of 0.12 g/L. Concurrently, lactic acid increased to approximately 0.73 g/L. The resulting volatile profile displayed elevated alcohol levels and the highest total concentration of carboxylic acids (32.68 ppm), including 23.41 ppm of acetic acid, together with esters and fruity compounds. The protocol combining *St. lactis-condensi*, *O. oeni* and *S. cerevisiae* showed a more gradual conversion of malic acid, with a reduction of 0.11 g/L between days 3 and 4, and final lactic acid values comparable to the other treatments (approximately 0.73 g/L). VOCs in this treatment were dominated by esters (20.2 ppm), including 3-methylbutyl acetate, ethyl lactate, and multiple fatty acid esters. The treatment with *St. lactis-condensi* alone produced one of the highest total alcohol concentrations (192.49 ppm). In the protocol in which *S. cerevisiae* was inoculated prior to *O. oeni*, malic acid was degraded more slowly than in treatments involving *L. plantarum*, although medium-chain fatty acids such as hexanoic and octanoic acids, together with abundant esters, contributed positively to the aroma profile. Finally, the sequential inoculation of *S. cerevisiae* and *L. plantarum* achieved rapid malic acid degradation and generated the highest lactic acid concentration (0.96 g/L), with medium-chain fatty acids supporting overall compositional balance. Overall, sequential inoculation strategies, particularly those involving *L. plantarum*, resulted in faster fermentation kinetics and more complex aroma profiles, while treatments with *O. oeni* favoured higher ester production.

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Session Classification: Sustainable Bioeconomy & Nature Based Solutions

Track Classification: General sessions: Sustainable Bioeconomy & Nature Based Solutions

Contribution ID: **31** Type: **not specified**

Teaching with Algorithms, Learning with Care: Reimagining AI-Enhanced Pedagogy for Student Wellbeing in Higher Education

Wednesday, 11 March 2026 12:05 (20 minutes)

The rapid integration of Artificial Intelligence (AI) into higher education is reshaping pedagogical practices, learning environments, and academic expectations. While AI-powered tools promise efficiency, personalization, and enhanced access to knowledge, their widespread adoption also raises important questions about student wellbeing, cognitive overload, and the evolving relationship between technology and human learning.

This paper explores how AI-integrated pedagogical models can be designed to support not only academic performance but also the psychological and emotional wellbeing of contemporary students. Drawing on recent developments in educational technology, responsible innovation frameworks, and wellbeing-centered pedagogy, the study examines how AI can be used as a supportive educational partner rather than a productivity-driven surveillance tool.

The research adopts a conceptual and interdisciplinary approach, bridging insights from digital pedagogy, educational psychology, and responsible AI governance. It proposes a framework for AI-enhanced wellbeing pedagogy, focusing on three interconnected dimensions: cognitive balance (reducing information overload and supporting meaningful learning), emotional resilience (promoting supportive feedback and reducing performance anxiety), and ethical agency (empowering students to critically engage with AI technologies).

By situating AI within the broader discourse of democratic and responsible bio-innovation, the paper argues that universities must rethink pedagogical strategies to ensure that technological innovation aligns with human-centered educational values. The proposed approach contributes to ongoing discussions about the role of educators in AI-mediated learning ecosystems and highlights the need for institutional strategies that place student wellbeing at the core of digital transformation in higher education.

This contribution aims to stimulate interdisciplinary dialogue on how AI can be responsibly integrated into pedagogical practices while safeguarding the wellbeing, autonomy, and intellectual development of the next generation of students.

Keywords: Artificial Intelligence in education, digital pedagogy, student wellbeing, responsible innovation, higher education transformation.

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Session Classification: AI Driven Biosciences & Ethical Autonomy

Track Classification: General sessions: AI Driven Biosciences & Ethical Autonomy

Contribution ID: **32** Type: **not specified**

Data-Driven Conservation Modeling for Fish Species in Protected Areas

Friday, 13 March 2026 10:30 (20 minutes)

Effective conservation planning in protected aquatic ecosystems requires analytical tools capable of identifying complex relationships among ecological indicators and management actions. This study proposes a data-driven conservation modeling approach to support sustainable management of fish species within protected areas. Using ecological and management data collected over seven years from Natura 2000 sites in Romania, we analyze conservation requirements for thirteen fish species of ecological and economic importance. Management measures were encoded as transactional data and analyzed using association rule mining with the FP-Growth algorithm implemented in RapidMiner. The analysis generated 573 association rules that satisfied predefined thresholds of minimum support (61%) and confidence (95%), from which 44 highly relevant rules were selected for interpretation. The results reveal strong co-occurrence patterns among conservation actions, highlighting interdependencies between habitat protection, pollution control, anti-poaching enforcement, and ecological monitoring. Several rules exhibited confidence values of 100%, indicating deterministic relationships between sets of management measures. These findings demonstrate that conservation actions often function synergistically rather than independently, suggesting that integrated management strategies are essential for maintaining favorable conservation status of fish populations. The proposed framework illustrates the potential of data mining techniques to extract actionable ecological knowledge from complex datasets and to support evidence-based decision-making in biodiversity conservation and protected area management.

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Session Classification: Bioconvergence & Resilient Innovation Ecosystems

Track Classification: General sessions: Bioconvergence & Resilient Innovation Ecosystems

Contribution ID: **33** Type: **not specified**

A STRATEGIC FRAMEWORK FOR SUSTAINABLE DIGITAL TRANSFORMATION IN THE ROMANIAN BANKING SECTOR

Wednesday, 11 March 2026 13:20 (20 minutes)

The digital transformation of financial services has become a key driver of efficiency, competitiveness, and sustainability in modern banking systems. Within the broader European context marked by the objectives of the European Green Deal and the Digital Decade strategy, the Romanian banking sector is undergoing a significant transition toward the adoption of digital technologies. Despite notable progress, structural disparities persist in terms of digital financial inclusion, technological adoption, and the integration of sustainable banking practices. In response to these challenges, this study proposes an integrated strategic framework aimed at supporting the sustainable digital transformation of the Romanian banking sector over the medium term horizon. The research identifies several priority directions designed to address current challenges and enhance the resilience of the banking ecosystem. These include the comprehensive digitalization of banking processes across institutions, the development of an expanded portfolio of sustainable financial products, the strengthening of cooperation between the banking sector and public institutions, and the promotion of digital financial education initiatives, particularly in rural areas. Thus, the findings suggest that the integration of advanced digital technologies, combined with coordinated institutional collaboration and inclusive financial policies, can significantly improve accessibility, operational efficiency, and environmental responsibility within the banking sector. Ultimately, the proposed strategic approach contributes to redefining the role of banks as active promoters of sustainable economic development and digital financial inclusion in Romania.

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Session Classification: Green, Safe & Digital Laboratories

Track Classification: General sessions: Green, Safe & Digital Laboratories

Contribution ID: **34** Type: **not specified**

Bat guano as a non-invasive indicator of environmental pollution with heavy metals

Thursday, 12 March 2026 13:30 (20 minutes)

Heavy metals are persistent, bioaccumulating pollutants, and their spatial heterogeneity is central to environmental quality assessment. We evaluated fresh bat guano as a practical, non-invasive matrix for monitoring multi-element heavy-metal "fingerprints"across roost locations. Fresh guano was collected from eight sites (five replicates per site). Concentrations of Mn, Fe, Ni, Cu, Zn, Cd and Pb were quantified by Atomic Absorption Spectroscopy (AAS), and Hg by an AMA-254 mercury analyser. Analyses were conducted on the log10 scale. We computed descriptive statistics and a Metal Pollution Index (*MPI*; geometric mean, reported as log10(*MPI*)) to rank site-level overall metal burden. Within-species spatial differences were tested using Welch ANOVA. Mixture patterns were summarised using hierarchical clustering ("fingerprints"), Spearman correlations and Principal Component Analysis (PCA).
Log10(*MPI*) showed pronounced spatial heterogeneity (0.995–1.47; ≈ threefold range between least and most affected sites). In *Rhinolophus hipposideros*, site effects were significant for Mn, Fe, Cd, Pb, Hg and Ni, while in *Myotis myotis* the location effect persisted across all metals. The strongest positive correlations were Cu-Zn (ρ=0.958) and Mn-Ni (ρ=0.786). PCA separated a Zn-Cu-Cd-Pb axis from Fe-Mn-Ni variance relative to Hg, supporting site-specific pollution signatures from guano.

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Session Classification: Coastal & Environmental Security in a Warming Europe

Track Classification: General sessions: Coastal & Environmental Security in a Warming Europe

Contribution ID: **35** Type: **not specified**

Neural Operators Approximations for Fluid-Structure Interaction in Aortic Aneurysm Modeling

Wednesday, 11 March 2026 12:25 (20 minutes)

Aortic aneurysms pose a significant clinical risk due to the potential for rupture, a life-threatening event whose likelihood depends on the hemodynamic forces acting on the arterial wall. Quantities such as wall shear stress, intraluminal pressure, and wall displacement are critical indicators of rupture risk, yet their accurate computation requires solving coupled partial differential equation systems that model both blood flow and vessel wall mechanics.

The hemodynamics are governed by the incompressible Navier-Stokes equations, while the arterial wall is modeled as a nonlinear hyperelastic material using constitutive laws such as the Holzapfel-Gasser-Ogden model. The two-way coupling between these domains – fluid-structure interaction (FSI) – introduces additional complexity through kinematic, dynamic, and geometric interface conditions. High-fidelity numerical simulations of this coupled system require meshes with millions of elements and thousands of time steps per cardiac cycle, resulting in computational times on the order of hours to days on high-performance computing systems.

This work investigates neural operator methods as a means to approximate the FSI solution operator directly, learning mappings between function spaces from simulation data. We present two complementary architectures: the Fourier Neural Operator, which leverages spectral convolutions for global information propagation, and graph-based neural operators, which naturally accommodate the irregular mesh topology of patient-specific vascular geometries. The presentation covers the mathematical foundations, the data generation pipeline, training and evaluation methodology, and ethical considerations for clinical deployment. Central research questions address approximation capacity, generalization to unseen geometries, preservation of physical constraints such as incompressibility, and operator stability. Preliminary analysis suggests that trained neural operators can achieve speedups of three to five orders of magnitude over classical solvers, opening pathways toward real-time cardiovascular risk assessment.

Keywords: Neural operators, Fluid-structure interaction, Aortic aneurysm, Fourier Neural Operator, Graph neural networks, Cardiovascular modeling

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Session Classification: AI Driven Biosciences & Ethical Autonomy

Track Classification: General sessions: AI Driven Biosciences & Ethical Autonomy

Contribution ID: **36** Type: **not specified**

Comparative Deep Learning Models for Aortic Aneurysm Segmentation in CT Imaging

Wednesday, 11 March 2026 11:45 (20 minutes)

This research investigates deep learning approaches for the automated detection and segmentation of aortic aneurysms from CT imaging. The project initially focuses on the development of a custom deep learning pipeline designed for medical image preprocessing, training, and evaluation. The baseline model used in this pipeline is the widely adopted U-Net, which has become a standard architecture for biomedical image segmentation due to its encoder–decoder structure and ability to capture spatial features in volumetric data.

Building on this initial implementation, the study explores architectural improvements and alternative segmentation approaches. Variants such as Attention U-Net and automated configuration frameworks such as nnU-Net are evaluated to determine how architectural modifications and automated hyperparameter optimization influence segmentation performance in vascular CT datasets.

In addition to convolutional models, the research also investigates transformer-based segmentation architectures such as Swin-UNETR, which incorporate attention mechanisms capable of modeling long-range dependencies within medical images. These models have shown promising results in complex anatomical segmentation tasks.

To further extend the experimentation framework, the study proposes integrating GPU-accelerated medical imaging tools from the NVIDIA Clara Train and MONAI ecosystems. These platforms provide optimized pipelines for large-scale medical imaging workflows and facilitate the implementation, training, and benchmarking of multiple architectures on high-performance hardware.

The performance of the evaluated models is compared using common segmentation metrics such as the Dice coefficient and Intersection over Union. Through this comparative analysis, the study aims to identify architectures and frameworks that offer improved segmentation accuracy and computational efficiency.

Ultimately, this work highlights the importance of combining custom research pipelines with modern AI frameworks in order to develop scalable and reliable tools for automated medical image analysis, supporting clinicians in the early detection and monitoring of aortic aneurysms.

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Session Classification: AI Driven Biosciences & Ethical Autonomy

Track Classification: General sessions: AI Driven Biosciences & Ethical Autonomy

Contribution ID: **37** Type: **not specified**

Different Perspectives and Different Systems: Responsible and Ethical Mental Health Technology Development

Wednesday, 11 March 2026 11:25 (20 minutes)

Background. In psychiatry, there currently are attempts to develop predictive models identifying risk for severe mental illness before any clinical symptoms appear, thus enabling early intervention and reduction of long-term burden of mental illness. Since these processes need to be responsible and include target group perspective (people with the experience of mental health issues), challenges arise when ensuring the development of ethical medical technology in different healthcare systems.
Research question. How do individuals with different lived experiences of mental illness and their support persons imagine ethical and responsible use of novelty, AI based medical technologies in different healthcare systems?
Methods. Thirty semi-structured interviews with individuals with lived experience of mental illness and their support persons from 9 European countries conducted during 2024.
Results. Using the framework of social construction of technology (Pinch and Bijker, 1984) we explore how the complicated experience of mental illness is lived through in different social and healthcare systems. People with experience of mental health issues are not a homogenous group, and even people with the same diagnosis can have significantly different experiences. It also applies to their knowledge and understanding of medical technologies and AI, creating challenges in the development process of these technologies. People with the experience of mental health issues are equally difficult and important to include into the development process of new technologies so that future risk prediction tools function in a way that is necessary and useful for this vulnerable population. Research participants worried about the use of predictive models becoming mandatory to access healthcare and reproducing further inequalities.
Research participants imagine future trajectories of the potential predictive model as rooted in their past experiences (difficulties accessing support, prejudiced attitudes from professionals, etc). If the existing experience with the healthcare system is seen as responsive for needs, people are more likely to see the benefit of the predictive model since it allows timely prevention of the illness or its consequences. Meanwhile those who experienced healthcare systems as unsupportive, see the tool bringing more of a risk of inequality.
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Session Classification: AI Driven Biosciences & Ethical Autonomy

Track Classification: General sessions: AI Driven Biosciences & Ethical Autonomy

Contribution ID: **38** Type: **not specified**

CHOROLOGY OF THE SPECIES CRAMBE TATARIA IN NATURE RESERVE DEALUL ZACKEL, SIBIU COUNTY, ROMANIA

Thursday, 12 March 2026 13:50 (20 minutes)

The aim of this paper is to provide a better understanding of the ecological and conservation importance of the species Crambe tataria Sebeók, family Brassicaceae, within the Dealul Zackel nature reserve, the Natura 2000 site ROSCI0093 Insulele Stepice de la Slimnic, Sibiu County, Romania, by studying environmental and anthropogenic factors, local distribution, and by offering new chorological data. Crambe tataria has LC IUCN status and is a steppe species, its geographical distribution is limited to central and eastern Europe, to 42 Natura 2000 sites and in Romania it is being present only in areas where edaphic and climatic conditions are suitable, such as Dealul Zackel, which serves as a true refuge for this species, providing it with specific habitat conditions. The analyses and data provided by this study may be correlated with climate changes and can be used for the development of conservation measures and the updating of the management plan.

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Session Classification: Coastal & Environmental Security in a Warming Europe

Track Classification: General sessions: Coastal & Environmental Security in a Warming Europe

Contribution ID: **39** Type: **not specified**

Bioactive Potential and Phytochemical Profile of Phoenix dactylifera L. Seeds Extracted Using Hydrophilic and Hydrophobic NADES

Friday, 13 March 2026 12:50 (10 minutes)

Introduction
Date palm consumption produces large amounts of seed by-products rich in polyphenols, carotenoids, tocopherols and other bioactive components.1 These compounds contribute to structural, signaling and immune functions. Natural Deep Eutectic Solvents (NADES) offer a sustainable alternative to conventional solvents, efficiently extracting these valuable biocompounds through a greener process.2 This study evaluates the physicochemical properties and biological activities of date seed extracts produced using both hydrophilic and hydrophobic NADES.

Materials and Methods
Date seed extracts were obtained after heating-stirring (HS) - NADES extraction with a 1:9 (w/v) solid-to-liquid ratio for 45 minutes at 45 °C. Two hydrophilic (Betaine:Urea, Bet:U (1:2) and Betaine:Glycerol:Glucose, Bet:Gly:Glu (4:20:1)) and two hydrophobic NADES (Octanoic acid: Dodecanoic acid, C8:C12 (3:1) and Octanoic acid: L-Proline, C8:Pro (4:1)) with its respective controls (ethanol–water mixture, 50% (v/v), and hexane), were used in this study to evaluate the bioactive potential and profile of date seed, using SDS-PAGE, Bradford assay, activity of the pepsin, trypsin and chymotrypsin determination and MTT assay with differentiated Caco-2.3,4

Results
SDS-PAGE analysis revealed that all hydrophilic NADES extracts exhibited distinct protein bands, with a predominant band consistently observed between 60 and 67 kDa. Among them, the Bet:U extract displayed the highest number and intensity of protein bands. In contrast, only one hydrophobic solvent, C8:Pro, produced visible protein bands, showing a faint band at approximately 66.2 kDa.
According to the Bradford assay, Bet:Gly:Glu was the hydrophilic extract with the highest quantified protein content (7.6 mg protein/g extract). Among hydrophobic extracts, C8:Pro was the only sample in which total protein content could be quantified (0.3 mg protein/g extract).
Based on its superior total polyphenol content compared with the other NADES extracts, Bet:U was selected for the evaluation of pepsin, trypsin, and chymotrypsin activities, as well as for the MTT assay. This extract enhanced the activity of all three enzymes and preserved Caco 2 cell viability up to 20 µL/mL, demonstrating its potential to confer protection against cellular damage.

Conclusions
Hydrophilic NADES demonstrated a superior capacity for protein extraction compared with hydrophobic solvents, as evidenced by the presence of well-defined protein bands in SDS-PAGE, particularly the predominant 60–67 kDa band common across all hydrophilic formulations. Among these, Bet:U showed the highest capacity of protein extraction. In protein extraction, Bet:Gly:Glu and Bet:U yielding the highest protein content without statistical differences, while only one hydrophobic solvent (C8:Pro) enabled measurable protein recovery.
Bet:U, selected due to its elevated polyphenol concentration, enhanced pepsin, trypsin and chymotrypsin activities and maintained Caco-2 cell viability. These findings highlight Bet:U as a promising extraction medium capable of preserving bioactive compounds activity and conferring protective effects against cellular stressors, including oxidative agents and indomethacin. Overall, NADES—especially hydrophilic formulations—emerge as effective and biologically compatible solvents for recovering functional biomolecules.

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Session Classification: Bioconvergence & Resilient Innovation Ecosystems

Track Classification: General sessions: Sustainable Bioeconomy & Nature Based Solutions

Contribution ID: **40** Type: **not specified**

Discrete and Integral Sampling Operators in Medical Image Processing

Wednesday, 11 March 2026 13:40 (20 minutes)

I investigate discrete and integral sampling operators as positive linear maps on spaces of continuous function.
Through B-splines functions and neural network operators with sigmoidal activations, I investigate their convergence, approximation capabilities, and shape-preserving properties.
These mathematical tools provide a framework for enhancing tasks in medical image processing, such as reconstruction, denoising, and feature preservation.

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Session Classification: Green, Safe & Digital Laboratories

Track Classification: General sessions: Green, Safe & Digital Laboratories

Contribution ID: **41** Type: **not specified**

Use of Lachancea thermotolerans strains for modulation of acidity and aroma in Sicilian Syrah wines

Thursday, 12 March 2026 14:40 (10 minutes)

The compositional changes in grapes caused by global warming are compromising the quality of wines in Mediterranean regions. Recent studies have shown that hot vintages and severe water stress lead to an increase in pH and a decrease in the acidity of grapes. These phenomena are one of the main causes of changes in the acidity and sensory profiles of wines. To date, the production sector has already intervened by adding exogenous additives to mitigate these effects.
However, these practices are corrective measures associated with a significant environmental impact and possible negative effects on the sensory profile of wine. The aim of this work is to identify more sustainable solutions through the use of *Lachancea thermotolerans* strains.
In this context, *L. thermotolerans* represents a promising biotechnological strategy for adaptive fermentation management in warm and arid regions.
This study applied an integrated experimental approach to evaluate the acidifying and aromatic contribution of four *L. thermotolerans* strains (codes LT-A, LT-B, LT-C and LT-D), inoculated in microbial consortia with *Saccharomyces cerevisiae* and *Lactiplantibacillus plantarum*.
The influence of inoculation timing on technological, aromatic and sensory parameters of Sicilian Syrah wines was also assessed.
All strains showed bioacidification capacity, with LT-D achieving a maximum pH reduction of 0.68 units, exceeding chemical acidification and producing 5.96–12.10 g/L of L-lactic acid.
LT-B significantly improved the biosynthesis of fruity ethyl esters, including ethyl hexanoate, ethyl octanoate and ethyl decanoate.
The timing of inoculation had a greater impact on the aromatic composition than on technological parameters, as confirmed by sensory analysis.
Wines produced with the LT-A strain, with sequential inoculation at 48 hours (LT1 trial), achieved higher aromatic intensity and overall appreciation than those inoculated after 72 hours (LT5 trial).
Overall, these results demonstrate that strain selection combined with optimized inoculation timing enables precision modulation of acidity and aroma, supporting the use of non-*Saccharomyces* yeasts as sustainable climate-adaptive tools for Mediterranean winemaking.

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Session Classification: Sustainable Bioeconomy & Nature Based Solutions

Track Classification: General sessions: Sustainable Bioeconomy & Nature Based Solutions

Contribution ID: **42** Type: **not specified**

From emissions to feed: Quantifying the GHG emission avoidance potential of microbial protein production with hybrid living materials.

Friday, 13 March 2026 12:40 (10 minutes)

Keywords: Microbial Protein, Single Cell Protein, Carbon Capture and Utilization (CCU), GHG emission avoidance, Hybrid Living Materials (HLM), Methane Mitigation, Carbon Footprint, Alternative Animal Feed

Global food systems account for one-third of total greenhouse gas (GHG) emissions and are simultaneously challenged by future food insecurity and significant plastic pollution. In the European Union (EU), 66% of protein-rich animal feed is imported, resulting in vulnerable supply chains, plastic recycling rates remain low at 16%, and agriculture contributes to 11% of EU GHG emissions, with methane (CH4) identified as a major and high-impact pollutant.

The REPLACER project addresses these challenges by developing a GHG capture approach for biomass production using Hybrid Living Materials (HLMs). This system, inspired by nature, integrates biofilm-based methanotrophic and phototrophic microbial consortia cultivation on porous scaffolds made from recycled PET or viscose, directly sequestering CH4 and CO2 to produce microbial protein suitable for animal feed. Preliminary Life Cycle Assessment (LCA) confirms the sustainability potential of HLMs, notably outperforming conventional fishmeal and soymeal feeds in land and water use efficiency. However, while LCA effectively maps relative environmental impacts and hotspots, it does not answer a critical policy question: **what is the absolute volume of GHG emissions avoided?**

This study aims to quantify the absolute and relative GHG emission avoidance for HLM-based microbial protein production following the EU Innovation Fund (InnovFund v5.1) methodology for energy intensive industries. The assessment adopts a modified cradle-to-gate system boundary with an end-of-life phase over a 10 year operational cycle (upstream feedstock, production, excluding capital goods) and aligns with ISO 14067 and IPCC AR5 GWP 100 guidelines. To model long-term impacts, the methodology assumes 1) a decarbonized 2050 electricity grid factor (0.00 tCO2eq/MWh), 2) biogenic input compliance with the Renewable Energy Directive II (RED II, Directive 2018/2001/EU) sustainability criteria and 3) benchmarks the Project Scenario against a proposed reference scenario for carbon-intensive conventional feeds.

At technology readiness level (TRL) 3, this assessment relies on lab-scale data, and proactively aims to estimate GHG emission mitigation potential before physical scale-up. The obtained results will be compared against broader-scale GHG mitigation targets to estimate the platform's actual capacity to drive the transition toward carbon neutrality, or even carbon negativity, within the EU agriculture system.

Acknowledgements

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Session Classification: Bioconvergence & Resilient Innovation Ecosystems

Track Classification: General sessions: Sustainable Bioeconomy & Nature Based Solutions

Contribution ID: **43** Type: **not specified**

Human Milk Metabolomics Across Lactation: Bioactive Compound Dynamics and Perspectives for Maternal and Infant Health

Thursday, 12 March 2026 10:20 (20 minutes)

Women´s health during pregnancy and lactation is very important to prevent complications and support optimal foetal and baby growth. Optimal nutritional intake, as well as attention to physical and mental health are crucial steps that can reduce the risk of premature birth, low birth weight and non-communicable diseases development, which have a significant impact on the child's long-term health. Conditions such as malnutrition, anaemia, gestational diabetes, and mental health issues have been associated with adverse birth outcomes like low birth weight, preterm delivery, and developmental delays in children. These complications can lead to long-term health and developmental challenges, underscoring the need for comprehensive maternal care. Although lot of research has been done linking the maternal health and nutrition with the lactation, no attention has been paid to the study of maternal factors as diet and health complications with bioactive metabolites composition of breastmilk and their role in shaping infant´s health.

Our study aims to link mother´s health and diet with bioactive compounds dynamics of breast milk and infant health in a small longitudinal mother-infant cohort (NEMO, n=55) applying a multi-omics approach. Firstly, we wanted to understand the metabolome (the complete set of metabolites) in human milk, with particular interest in bioactive compounds of human milk, and its changes throughout the different phases of lactation (colostrum, 1 month, 6 months and 1 year). The targeted metabolomics (UHPLC-Q-TOF-MS) retrieved 330 metabolites, 58 showed significant overall variation between phases (FDR $q<0.05$). Strictly phase-specific metabolites were scarce, indicating that lactation dynamics are mainly reflected in changes in metabolite abundance throughout lactation. Curiously, colostrum showed a higher relative abundance of polyamines (spermidine and putrescine), tryptophan derivatives (kynurenine and indoles), neurotransmitters (GABA), and folates, with enrichment of pathways such as tryptophan metabolism, aminoacyl-tRNA biosynthesis, as well as arginine and proline metabolism.

This observational study describes the application of metabolomics to understand the dynamics of poorly characterized bioactive compounds, including tryptophan derivatives and neurotransmitters, which may participate in the metabolic, immune, and neuronal programming of the infant. Future analysis will explore the association among maternal nutrition and health status with relevant changes in bioactive compounds profiles during lactation and child´s health and development, with the aim of supporting mother´s health during the critical period of pregnancy and lactation.

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Presenter: SÁEZ, Andrea

Session Classification: Microbiome & Multi Omics in Health, Food

Track Classification: General sessions: Microbiome & Multi Omics in Health, Food & Environment

Contribution ID: **46** Type: **not specified**

Warm welcome by the Chair of the Research, Innovation and Transfer Mission Board

Wednesday, 11 March 2026 09:00 (5 minutes)

Session Classification: Opening ceremony

Contribution ID: **47** Type: **not specified**

Welcome words by Una Riekstiņa, professor, chairwoman of the Faculty of Medicine and Life Sciences council, University of Latvia, full member of Latvian Academy of Sciences

Wednesday, 11 March 2026 09:05 (5 minutes)

Presenter: RIEKSTINA, Una (Prof.)

Session Classification: Opening ceremony

Contribution ID: **48** Type: **not specified**

Welcome by Mr. Uldis Berķis, Acting Head of the RIS3 Unit, Department of Higher Education, Science and Innovation Ministry of Education and Science, Republic of Latvia

Wednesday, 11 March 2026 09:10 (10 minutes)

Presenter: BERĶIS, Uldis

Session Classification: Opening ceremony

Contribution ID: **49** Type: **not specified**

Scene setting presentation by asoc prof.Adrian Ranga, Faculty of Engineering Science,KU Leuven, Belgium

Wednesday, 11 March 2026 09:20 (40 minutes)

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Presenter: RANGA, Adrian

Session Classification: Opening ceremony

Contribution ID: **50** Type: **not specified**

Cancer stem cells as drivers of tumour progression and resistance to targeted therapy

Wednesday, 11 March 2026 10:55 (30 minutes)

Next-Gen Therapies & Fair Health Innovation - equity, long-term safety, and regulation of gene editing, mRNA, and cell-based therapies.

Presenter: CIASTEK, Barbara (University of Opole)

Session Classification: AI Driven Biosciences & Ethical Autonomy

Contribution ID: **51** Type: **not specified**

Meet and greet over coffee

Wednesday, 11 March 2026 08:45 (15 minutes)

Session Classification: Opening ceremony

Contribution ID: **52** Type: **not specified**

Cases studies of engineering-driven research based on circular bioeconomy

Friday, 13 March 2026 10:00 (30 minutes)

Presenter: Prof. BADIA VALIENTE, José David (University of Valencia)

Session Classification: Bioconvergence & Resilient Innovation Ecosystems

Contribution ID: **53** Type: **not specified**

Tools for the theory of change in developing green bioeconomy strategy

Wednesday, 11 March 2026 14:20 (20 minutes)

Regional Inclusive Biobased Entrepreneurship Solutions, or RIBES, is a Horizon Project that addresses the need to enhance the uptake of biobased innovations through pioneering governance and business models developed at the convergence of social entrepreneurship and rural development. It will also contribute to the shift from a linear to a circular economy in nine regions of the Eastern European countries that lag in innovation. Ribes looks beyond the ´triple helix‘ governance of public-private partnership between governments, knowledge institutions, and companies that has long been seen as the main driver of innovation in a region. Since 2024, we have succeeded in implementing a multi-actor transformative forum (MTF) composed of more than 25 organizations, such as authorities, businesses, and non-governmental organizations that may have an interest in applying bio-based solutions for accessing a potentially available biomass from agriculture. In the past two years, 5 MTF meetings have been organized to act for social transformative change in supporting the integration of bio-based solutions at the County level. We contributed to the organization of the Cluster of Bioeconomy as the first partnership between the European Union projects acting for bioeconomy on 15 September, 2025. Agriculture in Sibiu County may generate a minimum available waste biomass of approximately 1,030,932.60 $t \cdot y^{-1}$, calculated as a seven-year average for 118,498 ha of arable land. Biorefinery or green gas production are among the solutions to be further discussed to be integrated into the regional policies. Livestock farming in Sibiu County produces an estimated 1,179,102.75 $t \cdot y^{-1}$ of manure, of which at least 50% (≈600,000 $t \cdot y^{-1}$) can be sustainably allocated to bioenergy production without compromising soil fertilization practices. The need for bioeconomy educational courses was essential at the MTF level and underlined the need for increasing cooperation among all stakeholders in the region. The major constraints are related to the poor communication between all involved stakeholders. A Road Map for bioeconomy may develop a critical mass of very well-informed public that will act to facilitate green bioeconomy development. The theory of change is already applied in the modus operandi of all MTF meetings. Among the relevant tools, Escali Drows and The Theory of Change Builder were successfully used.

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Session Classification: Green, Safe & Digital Laboratories

Track Classification: General sessions: Green, Safe & Digital Laboratories

Contribution ID: **54** Type: **not specified**

Capacity building for analysis of circular economy needs for master class curriculum development

Wednesday, 11 March 2026 14:40 (20 minutes)

Developing a master class curriculum on the subject of circular economy is a must for the near future. However, it is not an easy task and implies a lot of effort, starting with understanding the definition of the terms used in the current economic context at the European Union level and at the global level as well, and continuing with the domain under which the term is defined. The subject is relatively new at the global level, and most of the masterclasses all over Europe were developed in less than 10 years. In the European Union higher education system, the existing masterclasses provide courses for at least 2 semesters and 60 ECTS, up to 4 semesters and 120 ECTS. At the same time, the society ecosystem is also occupied with different high professional masterclasses provided by professional portals that are supported by different stakeholders or projects. Some of them are accredited for 30 ECTS or higher, and some of them are only targeted at professionals. The European universities are in the top 10 at the global level for scientific publications on circular economy for more than 50 years, and the constant knowledge generation in this domain gave the catalyst for masterclasses development among the first at the global level. There is a constant interdependency requirement to be implemented among teachers/ professors from academia and the socio-economic ecosystems (i.e. business, industry). This connectivity is relevant to applying the best tools and methods for developing the required skills and competencies for graduates to further support the sustainable development of our society. Our goal in the CEBCAT project was to implement a methodology based on a hands-on approach for the automotive industry. The first question was why we need? How to find information and how to be applied at the classroom? Do we need to provide some more instructions to the teachers? We are discussing in this study the follow-up reporting on the teaching sessions. All activities were scored between 4 and 5 out of 5.

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Session Classification: Green, Safe & Digital Laboratories

Track Classification: General sessions: Green, Safe & Digital Laboratories

Contribution ID: **55** Type: **not specified**

Sustainable bioeconomy must be democratic,not just efficient

Thursday, 12 March 2026 14:00 (20 minutes)

Giovanna Ottaviani Aalmo is a researcher at NIBIO –the Norwegian Institute of Bioeconomy Research. Her work focuses on sustainable bioeconomy, systems thinking, and social innovation, with particular attention to how circular and nature-based transitions can be designed in ways that are responsible, democratic, and place-based. She works extensively on EU-funded projects at the intersection of bioeconomy, environmental sustainability, stakeholder engagement, and policy coherence across diverse territorial contexts.

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Session Classification: Sustainable Bioeconomy & Nature Based Solutions

Contribution ID: **56** Type: **not specified**

Bivariate Neural Network operators based on B-spline functions

Wednesday, 11 March 2026 12:45 (20 minutes)

I introduce and study a class of neural network operators whose activation mechanism is built from cardinal B-splines. The compact support and smoothness of B-splines lead to localized approximation processes that fit naturally into the theory of positive operators. I prove convergence results and investigate qualitative features such as shape preservation, showing that several geometric properties of the target function are inherited by the approximants. A central part of the analysis is the derivation of Voronovskaja-type asymptotic formulas, which provide a refined description of the local rate of convergence and highlight the role of the underlying spline moments. The construction is further extended to a bivariate tensor-product setting, where analogous convergence and asymptotic results are obtained together with axial shape preserving properties. Finally, I illustrate the method by numerical experiments in image processing, and I report standard similarity measures (SSIM and PSNR) to assess the quality of the reconstructed images.

Keywords: Neural network operators; positive linear operators; B-splines; shape preserving approximation; Voronovskaja-type formula; image processing.

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Session Classification: AI Driven Biosciences & Ethical Autonomy

Track Classification: General sessions: AI Driven Biosciences & Ethical Autonomy