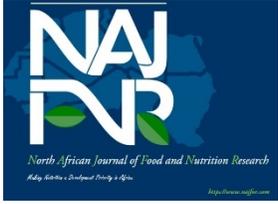




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Making Nutrition a Development Priority in Africa



المؤتمر الدولي لسلامة الأغذية المستدامة

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CONGRES INTERNATIONAL SÉCURITÉ ALIMENTAIRE DURABLE

INTERNATIONAL SUSTAINABLE FOOD SAFETY CONFERENCE

Book of Abstracts



Bejaia, November 10, 11, and 12, 2025

<https://www.bejaia-sfs25.com>



جامعة بجاية
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Université de Béjaïa



فريكات
Fruicade



**CO-PRODUCT
VALORIZATION**

FOOD INNOVATIONS

**ENVIRONMENT AND
FOOD SECURITY**

**ARTIFICIAL
INTELLIGENCE (AI)
FOR FOOD
TECHNOLOGY**



**PROCEEDING
BOOK**



بجاية
ΕΞΟΣΤ

BEJAIA



Welcoming Message

It is with great honor and enthusiasm that we welcome you to the 1st International Conference on Sustainable Food Security: Innovation and Challenges, on November 10, 11, and 12, 2025, organized by the Biomathematics, Biophysics, Biochemistry, and Scientometrics Laboratory of the University of Bejaia (Algeria). This event marks an important milestone in our collective commitment to advancing research and improving the management of food challenges.

The topics covered and the discussions we will have during these days reflect the richness and diversity of the work being conducted in the field of food science.

We warmly thank you for your presence and your commitment. Together, let's make these first days a time of sharing, inspiration, and progress.

Welcome everyone, and have a wonderful time with us.

Objectives of the Conference

The International Congress “Sustainable Food Security: Innovation and Challenges” serves as a strategic crossroads for scientific knowledge and sustainable innovation. Celebrating the spirit of research and knowledge, this ambitious academic event aims to promote a transformative vision of food security, where scientific excellence meets environmental responsibility. By bringing together researchers, experts, and professionals, the congress aims to boost green biotechnologies, explore circular economy models, stimulate nutritional innovations, and enhance the value of natural resources, while forging interdisciplinary collaborations. It is a space for reflection and creativity where science becomes a powerful lever for addressing contemporary food challenges, placing eco-responsibility and scientific progress at the heart of a holistic approach that offers hope for a more sustainable and equitable food future. The application of Artificial Intelligence in the modernization of food systems enables the prediction of eating behaviors, optimization of the supply chain, quality and safety control, agriculture precision and personalized nutrition.

Conference Topics

TOPIC 1: CO-PRODUCT VALORIZATION

TOPIC 2: FOOD INNOVATIONS

TOPIC 3: ENVIRONMENT & FOOD INDUSTRY

TOPIC 4: ARTIFICIAL INTELLIGENCE (AI) FOR FOOD TECHNOLOGY

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Rym SALHI

Nabila DJERRADA

Amira OUFIGHOU

Imad AGOUNE

Abdelkarim KABIR

L'Agriculture Algérienne entre Sécurité et Autosuffisance Alimentaire

Khodir MADANI

RÉSUMÉ

Entre sécurité alimentaire, souveraineté alimentaire et autosuffisance alimentaire, l'Algérie demeure fortement dépendante des importations de produits agroalimentaires, tant pour la consommation humaine que pour l'alimentation animale. Cette dépendance structurelle, amplifiée par les fluctuations des marchés internationaux et les contraintes climatiques internes, interroge la durabilité du modèle alimentaire national. Cette communication vise à dresser un état des lieux précis des équilibres et déséquilibres du système alimentaire algérien, à travers l'analyse des principales filières importées et produites localement. Seront présentées la structure des importations, la production nationale et la consommation par grandes familles d'aliments (céréales, sucre, huiles, fruits, légumes, œufs, viandes blanches et rouges, etc.). Une attention particulière sera accordée à la différenciation des habitudes alimentaires entre milieux rural et urbain, ainsi qu'à l'origine des apports en macronutriments (protéines, glucides et lipides), selon qu'ils proviennent de sources animales ou végétales. L'objectif est d'identifier les tendances dominantes et les leviers stratégiques permettant de renforcer la résilience et la souveraineté alimentaire de l'Algérie, dans un contexte global marqué par l'instabilité économique et le changement climatique.

Valorisation des Biodéchets au Service de la Sécurité Alimentaire : Synthèse des Travaux Réalisés et Perspectives sur les Coproduits de l'Olivier

Lila BOULEKBACHE-MAKHLOUF

RÉSUMÉ

Une synthèse bibliographique est présentée sur la valorisation des biodéchets et des coproduits de l'olivier. Le travail souligne l'ampleur mondiale de la production de déchets, estimée à plus de 13 milliards de tonnes par an, dont moins de 20 % sont valorisés. Le gaspillage alimentaire atteint plus d'un milliard de tonnes, tandis que des centaines de millions de personnes souffrent de la faim. L'économie circulaire apparaît ainsi comme un cadre stratégique essentiel pour transformer les rebuts en ressources utiles, réduire l'impact environnemental et créer de nouvelles opportunités économiques. Une analyse de 327 manuscrits publiés entre 2014 et 2024 a répertorié les procédés de valorisation étudiés dans les secteurs agricole, industriel, alimentaire et municipal, avec un intérêt particulier pour la digestion anaérobie, la fermentation et l'extraction de molécules bioactives. Cette analyse met en évidence aussi les avancées technologiques ainsi que les limites persistantes, notamment la variabilité des matières premières, la gestion des sous-produits, les coûts élevés et la viabilité économique souvent insuffisante pour une mise à l'échelle. Ce travail présente ensuite les projets de recherche réalisés, incluant des collaborations Algériennes, Tunisiennes et Espagnoles portant sur la valorisation des déchets végétaux, l'optimisation de l'extraction de caroténoïdes, de sucres et de pectines, ainsi que les applications alimentaires, pharmaceutiques et cosmétiques. Enfin, un volet spécifique est consacré aux co-produits de l'olivier, ressource majeure en Algérie, dont la valorisation peut passer par l'extraction de composés bioactifs, la

production d'énergie, la formulation d'ingrédients fonctionnels et la fabrication d'emballages innovants.

Mots clés: Biodéchets ; Procédés de Valorisation ; Coproduits de l'Olivier ; Bioéconomie ; Sécurité Alimentaire ; Nouveaux Produits.

From Waste to Worth: Rethinking Food Waste in the Global Valorization Chain

Inmaculada MATEOS-APARICIO CEDIEL

ABSTRACT

The transition toward a more sustainable and efficient agri-food system requires innovative approaches to reduce food losses, minimize waste, and fully valorise by-products generated throughout the production chain. Currently, approximately one third of global food production is lost or wasted, highlighting the urgent need for circular strategies aligned with the United Nations Sustainable Development Goals, particularly SDG 12 on responsible consumption and production. A clear distinction must be made between food losses, which occur during harvesting, processing, and distribution, and food waste, which is mainly generated at the consumer level. Residues produced at early stages, especially during harvesting and processing, offer the greatest potential for reintroduction into the food chain and should be considered valuable by-products rather than waste. The successful reintegration of these by-products requires the implementation of a structured and comprehensive strategy, conceptualized as a valorisation chain. This framework guides their transformation into value-added ingredients through five main stages: by-product selection, treatment, evaluation, quality assessment, and bioactivity studies. Appropriate selection should account for production volume, by-product yield, and the preservation of bioactive compounds. Treatment should prioritize sustainable and innovative technologies, such as extractions assisted by ultrasound, microwaves, and high hydrostatic pressure, to enhance efficiency and reduce environmental impact. Subsequent evaluation using chromatographic and structural analyses ensures accurate identification and effective extraction of target compounds. Quality assessment addresses hygienic, nutritional, technological, and sensory criteria to guarantee product safety and functionality. Finally, in vitro, cell-based, and in vivo studies confirm the potential health benefits, including antioxidant and prebiotic effects. Therefore, integrating sustainable processing technologies within a structured valorisation chain enables the conversion of agri-food by-products into high-value ingredients, contributing to a more resilient, efficient, and circular food system.

Smart Packaging: An Innovative and Pragmatic Tool for Sustainable Food Waste Reduction

Slim SMAOUI

ABSTRACT

Food loss/waste are complex, and multifaceted issues that occur across all stages of the food supply chain, could generate significant consequences for food security, environment, and global, regional, and national economies. A clear understanding of the distinctions between food loss/waste is essential for effectively monitoring, analyzing, and mitigating their impacts, as well as for developing sustainable and efficient management strategies. To achieve a sustainable food system,

future strategies should prioritize the simultaneous reduction and prevention of both food loss and food waste throughout the entire supply chain. Packaging plays a crucial and inclusive role in addressing these challenges, positioning it as a potential key strategy to mitigate food loss and food waste. Among emerging solutions, smart packaging materials represent an innovative technology equipped with advanced functionalities that enable real-time monitoring of product conditions, provide valuable information, and extend the shelf life of food products. Beyond preservation, smart packaging enhances consumer engagement by improving product transparency, offering traceability, and fostering informed purchasing decisions. Given the growing global concern over food waste and food loss, this communication highlights the implementation, applications, limitations, and overall importance of smart packaging in minimizing these issues along the food supply chain. Furthermore, it critically examines the myths and realities of current packaging systems and discusses the sustainability dimensions of smart packaging technologies from economic, social, and environmental perspectives.

Keywords: Food Loss; Food Waste; Smart Packaging; Food Security; Sustainability.

Plant Phenols as Food Colorants and Antioxidants

Olivier DANGLES

ABSTRACT

Phenolic compounds are one of the main classes of plants' secondary metabolites. As such, they are abundant in plant food and in the by-products of the food industry. Thus, phenolic compounds are widely consumed through diets rich in fruit, vegetables and cereals, which are known to be protective against degenerative diseases (e.g., cardiovascular disease, aging-related disorders, and some cancers). In this presentation, the importance of plant phenols in food and in human health will be outlined through the following examples: Plant phenols as food colorants: anthocyanins, an important class of phenolic pigments, express a wide palette of bright red, purple and blue colors in nature. However, once extracted from their natural medium, they readily turn colorless through reversible and irreversible mechanisms. For development of anthocyanins as natural food colorants, the issue of color stabilization and variation must be addressed, in particular by considering the interactions anthocyanins can develop with metal ions and other (colorless) plant phenols (called copigments). A special focus will be given to anthocyanins from dark vegetables (e.g., red cabbage, purple sweet potato), whose sugar moieties are acylated by hydroxycinnamic acids. Plant phenols as antioxidants: the current knowledge on the bioavailability of plant phenols in humans strongly suggests that the digestive tract is the major site for their antioxidant activity. Indeed, the consumption of oxidizable fat (polyunsaturated lipids) and heme iron (from meat and meat products), as well as the specific characteristics of the gastric compartment (acidic, aerobic, strongly stirred during food digestion), altogether create favorable conditions for dietary lipid oxidation, with concomitant loss of essential lipids and accumulation of potentially toxic lipid oxidation products (hydroperoxides, epoxides, aldehydes). Simple models for investigating this postprandial oxidative stress and its mitigation by plant phenols will be presented.

Keywords: Phenol; Anthocyanin; Color; Pigment; Copigment; Antioxidant; Lipid Oxidation; Heme Iron; Stomach.

Ultrasonic Processing: A Green Technology for Aromatized Vegetable Oil Production

Sabiha ACHAT

ABSTRACT

In this 21st century, much interest has been focused on the applications of ultrasound in food processing and technology. Applications of ultrasound generally involve processes that can enhance rates, improve quality and/or safety, reduce processing time, and play a key role in implementing sustainable "green" technology. Ultrasound is applied in order to accelerate diffusion of volatile (aromas) and nonvolatile (antioxidants, colors) compounds into the edible oils mainly olive oil. The processing time is reduced from hours or days to few minutes when comparing traditional maceration and ultrasound-assisted aromatization. This work presents an overview of ultrasound-assisted aromatization and enrichment of vegetable oils with various bioactive compounds from natural resources, as well as the relationship between dissolving power of nonpolar and polar bioactive components with the function of fatty acids and/or lipid classes in vegetable oils, and other minor components.

Keywords: Ultrasound; Vegetable Oils; Enrichment; Bioactive compounds.

Eradication of CORONA and Other Respiratory Viruses in Indoor Environments Using Safe Fumigation

Mahmoud Fahmy ELSEBAI

ABSTRACT

Essential oils exhibit strong antiviral activities and can disrupt viral envelopes due to their lipophilic nature. This study introduces a safe fumigation formula composed of volatile essential oils for eradicating SARS-CoV-2 and other respiratory viruses in indoor environments. The formulation prevents viral attachment and entry, inhibits ACE2 receptors, and provides additional anti-inflammatory and bronchodilatory benefits when inhaled. Its components are pharmaceutically approved, possess high vapor pressure, and achieve localized pulmonary action with minimal systemic effects. The non-thermal vaporization process (using vaporiser) ensures enhanced antimicrobial efficacy. This approach offers a rapid, safe, and practical method for disinfecting enclosed spaces such as hospitals, schools, offices, transport systems, etc. The innovation represents a novel application of natural volatiles for respiratory virus control, and the results have been submitted for patent protection.

Keywords: Essential Oils; SARS-CoV-2; Fumigation; Antiviral; ACE2 Inhibition; Respiratory Infections.

Proteomic Approaches to Discover Biomarkers of Meat Quality in Goats and Camels: Implications for Algerian Food Security

Mohammed GAGAOUA

ABSTRACT

The decision to purchase meat by consumers is guided by a combination of interacting factors from which the main drivers are

safety, nutrition, sustainability and perception of healthiness along with a variety of sensory properties. These aspects constitute the complexity of meat quality, known to be influenced, by both intrinsic and extrinsic factors that are related or not to the animal. In the last years, the quality of meat has become a more relevant topic and its control is very important for both the consumers and stakeholders. Therefore, several management strategies were proposed at the research and industry levels with the aim of better control and improvement of fresh meat quality traits. In this talk and among the tools developed in the field of camel and goat meat research, the potential of foodomics approaches with a focus on proteomics for the discovery of biomarkers, will be discussed. Both examples are in line with the 2030 Agenda for Sustainable Development Goals and the Algerian Food Security agenda. The several methods developed or burgeoning aimed to advance further the research in the field of camel and goat meat research and deliver sustainable meat products that meet consumers' expectations and support the urgent needs of Algerian food security.

Keywords: Quality of Fresh Camel and Goat Meat; High-throughput Tools; Tenderization; Muscle Proteome; Meat Quality Defects; Biomarkers; Meat Quality Evaluation.

Camel Meat: Production, Quality and Processing Potential

Djamel DJENANE

ABSTRACT

The camel (*Camelus dromedarius*) could play a central role in the future. Firstly, it could bring benefits to human health and nutrition. Camel meat could be a sustainable source of animal protein for regional or even global supply. Traditionally, knowledge about camels was limited to the specific geographical areas in which they are raised, particularly the Middle East, Asia and Africa. However, camel products (milk and meat) have recently become well known worldwide. From an economic standpoint, camel meat is more competitive than other meats due to its low production costs. Produced naturally and locally, camel meat could occupy a significant place in the global market. Although scientific research results are modest, they open new avenues for developing the sector and improving the productive performance of dromedaries in desert and arid regions. Future research on camels should focus on realising their meat potential in the same way as with milk, through interdisciplinary research into efficient production systems, improved meat processing technology and commercialisation. Appropriate refrigeration and innovative packaging technologies are needed to enhance product safety. This conference will summarise the current knowledge on camel meat production and its potential to contribute to achieving sustainable development goals.

Keywords: *Camelus dromedarius*; Fresh Meat and Meat Products; Alternative Animal Proteins; Perspectives; Resilience.

AI for Food Industry

Mohamed Ali HADHRI

ABSTRACT

The presentation "AI for Food Industry" offers a comprehensive overview of how Artificial Intelligence is driving innovation across the

food sector. It explores AI's definitions, evolution, key technologies, main applications, benefits, and the major challenges facing the industry. The presentation explains the functionalities and practical uses of AI technologies such as Machine Learning, Deep Learning, Generative AI, and autonomous agents. Comparative tables are used to illustrate their strengths and limitations AI applications are spanning the entire food value chain "from farm to fork" including precision agriculture, predictive maintenance, automated quality control, supply chain optimization, and new product development. These applications are explained by use cases, such as blockchain-based product traceability, quality assurance systems, logistics optimization, and waste reduction initiatives. The presentation concludes by exploring future perspectives for AI in food industry, forecasting the emergence of hyper-personalized nutrition, fully autonomous food systems, and advancements in sustainable ingredient innovation. It also addresses persistent challenges, including data diversity, legacy system integration, and the growing need for specialized digital skills.

From Algorithm to Plate: Artificial Intelligence for Precision Nutrition and Public Health in Algeria

Meghit Boumediene KHALED

ABSTRACT

The growing disease burden of NCDs in Algeria, driven by nutrition transition towards processed food and rising rates of obesity and diabetes, necessitates a shift in public health strategy. This presentation will explore the revolutionary potential of Artificial Intelligence (AI) in revolutionizing nutrition and public health in Algeria, leading the journey «From Algorithm to Plate.» We propose a multi-dimension AI-based framework to bridge the gap between population-level health data and personalized dietary advice. This paradigm leverages machine learning models to handle diverse sets of data including demographic information, biomedical markers, dietary patterns, and socio-cultural characteristics unique to Algeria in order to develop tailored nutritional recommendations. Further, we discuss the application of AI in predictive risk modeling for NCDs, enhancing public health policy, and food supply chain management for enhanced nutritional security. There is, however, significant challenge in the implementation of such technologies, whereby issues of data privacy, an adequate digital infrastructure, and the compatibility of AI with Algeria's existing healthcare system form significant obstacles. This argues that there is strategic use of AI in precision nutrition with the ability to alleviate the NCD crisis, enhance preventative care, and induce sustainable well-being. With a roadmap outlining future research, pilot projects, and the intersectoral collaboration required to utilize AI ethically and effectively, spanning the entire process from algorithmic design to citizen consumption.

Keywords: Artificial Intelligence (AI); Precision Nutrition; Non-Communicable Diseases (NCDs); Public Health Policy; Algeria.

Artificial Intelligence in Agri-Food Science: Foundations and Applications

Amir AIEB

ABSTRACT

Artificial Intelligence (AI) and geospatial data science are revolutionising precision agri culture by enabling data-driven modelling

and mapping for improved decision-making in complex environments. However, large-scale systems face challenges in multisensor data integration, where information from satellites, drones, and ground sensors must be harmonised despite differences in formats, resolutions, and calibrations. To address these issues, AI detects patterns in sparse data and optimises sensor placement, though uncertainty and scale alignment remain complex tasks. These capabilities further support crop yield prediction, water resource management, and optimised planting strategies, helping agriculture adapt to climate variability and geophysical changes. Moreover, physical explainability is critical, as models must be interpretable and aligned with ecological principles, requiring integration of domain knowledge to reflect interactions among soil, crops, and weather. In addition to agriculture, AI-driven computer vision in food science enhances quality control through automated defect detection and consistency monitoring. Nevertheless, challenges such as background masking, where lighting or texture obscures objects, demand advanced image processing and deep learning solutions. To overcome these limitations, transfer learning improves domain adaptation, enabling models trained on one dataset to generalise across diverse production conditions, thereby boosting robustness and accuracy. Furthermore, AI plays a key role in cost optimisation for food production by streamlining schedules, ingredient mixes, and energy use. Finally, Explainable AI (XAI) ensures transparency in these processes, which is vital for regulatory compliance and trust. By clarifying decision-making, XAI enables manufacturers to act confidently, reducing waste, lowering costs, and improving efficiency.

Keywords: Data-driven; Computer Vision; Explainable AI (XAI); Precision Agriculture; Quality Control in Food Science; Multisensor Data Integration; Large-scale Modelling; Domain Adaptation.

Biocontrol of Plant Diseases by Extracts from Plants of the Asteraceae Family

Nadjette ACHOURA, Samira MALKI, Samir GRAMA BORHANE, and Imane GHOUL DJOWEIDA

ABSTRACT

The growing demand for sustainable and environmentally friendly agricultural practices has intensified interest in biological alternatives to synthetic pesticides. This study explores the potential of extracts from *Scolymus hispanicus*, a member of the Asteraceae family, a large and diverse family known for its bioactive secondary metabolites, in plant disease management. The use of Asteraceae extracts is a viable strategy for integrated pest management, reducing chemical inputs and improving crop health. The effects of methanolic extracts of *S. hispanicus* on fungal growth were studied *in vitro*. Different concentrations of *S. hispanicus* extract in PDA inhibited 65% of the mycelial growth of *Aspergillus sp.* This study highlights recent findings on the effectiveness of *S. hispanicus* extract in biological control of plant diseases, with the aim of contributing to more sustainable and resilient agricultural systems.

Keywords: *Scolymus hispanicus*; Phytopathogenic Fungi; Biocontrol; *Aspergillus sp.*

Comparative Evaluation of Decontamination Methods for Isolation of *Mycobacterium spp.* from Various Animal Species

Dassine BELLIL, Alima GHROUT-SAÏT, Farhet DJOUDI, Zahra BELLIL, Ouided MENDIL, Lyticia MANSEUR, and Sonia ADDALOU

ABSTRACT

Nontuberculous mycobacteria (NTM) are environmental organisms that can infect both humans and animals, often detected through fecal screening. This study aimed to evaluate the effectiveness of different decontamination methods for isolating *Mycobacterium spp.* from fecal samples collected from various animal species. A set of fecal samples was subjected to three decontamination protocols: 5% oxalic acid, modified Petroff's method (using NaOH), and the sulfuric acid method. After treatment, samples were inoculated onto Löwenstein-Jensen (LJ) medium and monitored for contamination and mycobacterial growth. The overall contamination rate was low, highlighting the general suitability of the protocols. However, the modified Petroff method resulted in a high percentage of contaminated cultures, indicating poor efficacy in fecal sample decontamination. In contrast, both the 5% oxalic acid and sulfuric acid methods significantly reduced contamination, allowing for better recovery of *Mycobacterium* species. These findings suggest that acid-based decontamination protocols, particularly oxalic and sulfuric acid methods, are more effective for processing fecal samples in mycobacterial surveillance. This study provides useful guidance for optimizing fecal sample processing to enhance the detection of NTM and reduce culture contamination in wildlife and domestic animal studies.

Keywords: *Mycobacterium*; Fecal Samples, LJ, Algeria.

Effect of Sun-Drying on the Phenolic Contents and Antioxidant Capacity of Two Grape Varieties from North Algeria

Lilia BOUSSOUF, Saliha DJABALI, Hanane BOUTENNOUN, and Nassima BALLI

ABSTRACT

Grapes *Vitis vinifera* L. is an excellent source of nutrients. The nutritional content of grapes includes proteins, lipids including unsaturated fatty acids, fibers, carbohydrates, minerals, and vitamins. Moreover, this fruit is considered a rich source of polyphenolic compounds. However, due to its perishable and seasonal nature, part of the production is allocated to drying. This study aimed to investigate the effect of sun-drying on the contents of phenolic compounds and *in vitro* antioxidant activity of two *Vitis vinifera* varieties from Jijel region (North Algeria). The total phenolic and flavonoid contents were measured using the colorimetric method. Antioxidant activity was determined by DPPH free radical scavenging, ferric reducing power, and H₂O₂ scavenging assays. The phytochemical investigation showed that sun-drying processes led to positive effect in the levels of total phenolic compounds, which reached a value of 234.76 ± 0.49 mg AGE/100 g for Muscat dried variety. The results also showed that dried grapes exhibit significantly higher antioxidant activity than fresh grapes, an effect dependent on their phenolic content.

Keywords: *Vitis vinifera*; Sun-Drying; Phenolic Content; Antioxidant activity.

Physicochemical, Microbiological, and Sensory Impact of *Pistacia lentiscus* Essential Oil in Lben

Fatima DJENAD, Sabiha ACHAT, Narimen HADJI, Sabrina IDIR, Yasmine ACHAT, and Tassadit SAHKI

ABSTRACT

Lben, a traditional fermented milk widely consumed in North Africa, is appreciated for its refreshing taste, probiotic benefits, and cultural importance. In the search for functional dairy innovations, natural plant extracts such as essential oils can be incorporated to enhance both nutritional and health-promoting properties. *Pistacia lentiscus* essential oil (PLEO), recognized for its antimicrobial and antioxidant activities, represents a promising bioactive ingredient for improving fermented milk quality. The objective of this study was to evaluate the impact of adding PLEO at different concentrations (0%, 0.01%, 0.05%, and 0.1%) on the physicochemical, microbiological, and sensory characteristics of Lben during 28 days of refrigerated storage. Lben was prepared with *Streptococcus thermophilus*, *Lactobacillus delbrueckii* subsp. *bulgaricus*, and *Bifidobacterium* sp., and parameters including pH, acidity, syneresis, total solids, fat, protein, microbial viability, and sensory attributes were monitored. The results showed that PLEO incorporation did not significantly affect the main physicochemical parameters ($p > 0.05$). The pH decreased slightly during storage, while acidity increased progressively. Fat content declined gradually, whereas protein content was influenced by EO concentration, with 0.1% PLEO showing the highest retention at the end of storage. Syneresis increased over the storage period. The viability of lactic acid bacteria and *Bifidobacterium* was maintained, and no spoilage or pathogenic microorganisms were detected. Sensory evaluation indicated that low concentrations of PLEO (0.01 – 0.05%) enhanced consumer acceptability, while 0.1% was perceived as too strong. This study highlights the potential of *Pistacia lentiscus* essential oil as a natural functional ingredient for improving the quality and sensory appeal of traditional fermented milk.

Keywords: Essential Oil; *Pistacia lentiscus*; Lben; Probiotics; Lactic Acid Bacteria; Sensory Evaluation.

Ultrasound-Assisted Modulation of *Escherichia coli* Persistence and Growth Dynamics in Carrot Juice During Refrigerated Storage

Ourdia dite Nouara KERNOU, Zahra AZZOUZ, Khadidja ADEL, Akila AMIR, Ghania KANIN, Fatima IGUELOUADA, and Ahlam MECHEROUH

ABSTRACT

Microbial contamination of fruit juices, especially by *Escherichia coli*, poses a major public health concern. Due to its richness in nutrients and antioxidants, carrot juice is particularly vulnerable to microbial spoilage, given its high water content, slightly acidic pH, and nutritional properties. Traditional thermal methods, like pasteurization, ensure product safety but may adversely affect flavor and nutrient profiles, which has prompted interest in non-thermal alternatives such as ultrasound technology. In this study, carrot juice was inoculated with a high concentration of *E. coli* ATCC 25922, then subjected to ultrasonic treatments at varying amplitudes (60 to 90%) and durations (1 to 7 minutes). Results indicated that ultrasound could achieve immediate bacterial reduction up to $-8 \log$ at 90% amplitude for 7

minutes, meeting FDA safety standards. However, a rebound effect was observed after several days of storage, suggesting the impact is mainly bacteriostatic: weakened bacteria can resume growth if conditions become favorable. Regarding quality parameters, ultrasound did not alter the pH or titratable acidity, and vitamin C content remained stable even after 7 days of storage. °Brix showed only a slight decrease at higher amplitudes, indicating the nutritional and sensory qualities of the juice were largely preserved. Overall, ultrasound processing shows promise for reducing microbial load in carrot juice without compromising its quality; however, it should be combined with other approaches to ensure sustained microbiological safety. This work paves the way for innovative preservation methods that meet consumer and industry expectations.

Keywords: Ultrasound; *Escherichia coli* ATCC25922; Carrot Juice.

Formulation Innovante de Glaces Végétales Locales: Propriétés Physico Chimiques et Acceptabilité Sensorielle

Khadidja ADEL, Nouara KERNOU, Yasmine AIT ABBAS, and Amina ABOU

RÉSUMÉ

Les desserts glacés traditionnels sont souvent critiqués pour leur teneur élevée en sucres, en graisses et en additifs. Dans ce contexte, ce travail a porté sur la conception de desserts glacés innovants, formulés à partir de laits végétaux et d'ingrédients naturels, sans recours aux additifs artificiels. L'originalité de l'étude repose sur l'utilisation du lait des graines de pin d'Alep, une ressource locale riche en nutriments et encore peu valorisée. Quatre formulations (A, B, C et D) ont été élaborées et soumises à des analyses physico-chimiques et sensorielles. Les desserts glacés ont montré des différences significatives : l'acidité, la matière sèche, le °Brix et la viscosité sont maximales pour les formulations riches en miel et citron (notamment D et C), tandis que A a le foisonnement le plus élevé et B fond le plus vite. Les résultats ont souligné que la densité réelle augmente avec les sucres et minéraux ; la densité apparente est inversement liée à l'air incorporé et influence la texture et la résistance à la fonte. Les résultats de l'analyse sensorielle ont noté une bonne appréciation par le panel de dégustateurs pour l'échantillon B (100%), A et C (33 % chacun), cependant, l'échantillon D n'a pas reçu d'appréciations positives (0%). Ce travail démontre la faisabilité de proposer des desserts glacés végétaux alliant sécurité, valeur nutritionnelle et attrait sensoriel, tout en ouvrant de nouvelles perspectives pour la valorisation des ressources naturelles locales.

Mots clés : Dessert Glacé ; Laits Végétaux ; Ingrédients Naturels ; Lait de Graine de Pin d'Alep ; Analyse Physico-chimique.

Phenolic Composition and Antioxidant Potential of Methanolic and Aqueous Extracts of *Piper cubeba* Seeds

Abdenassar HARRAR, Abdelmoumen BENMERZOUG, Sofiane BECHAMI, Omar AOUN, Bouchra CHICHI, and Nisrin CHERGUI

ABSTRACT

Spices and herbs are important natural sources of antioxidants that can mitigate oxidative stress and related disorders. *Piper cubeba* seeds,

traditionally used for their medicinal properties, were investigated for their phenolic composition and antioxidant potential. Methanolic and aqueous extracts were obtained by maceration and decoction, respectively. Total phenolics were quantified by the Folin–Ciocalteu method, while flavonoids and flavonols were measured using aluminum trichloride. Antioxidant activity was evaluated by DPPH radical scavenging and ferric reducing antioxidant power (FRAP) assays. The extraction yields were 18.5% (aqueous, EAQ) and 6.4% (methanolic, EMet). EMet contained higher phenolics ($235.9 \pm 13.3 \mu\text{g GAE/mg}$ extract) compared with EAQ ($185.3 \pm 3.7 \mu\text{g GAE/mg}$). Flavonoid contents were $47.3 \pm 0.8 \mu\text{g QE/mg}$ (EAQ) and $35.4 \pm 1.3 \mu\text{g QE/mg}$ (EMet). In the FRAP assay, IC_{50} values were $89.3 \pm 8.8 \text{ mg/mL}$ (EAQ) and $63.6 \pm 1.5 \text{ mg/mL}$ (EMet), versus $21.4 \pm 0.3 \text{ mg/mL}$ for BHT. DPPH scavenging confirmed higher activity for EMet ($148.6 \pm 0.9 \text{ mg/mL}$) than EAQ ($155.9 \pm 2.1 \text{ mg/mL}$), although both were less active than ascorbic acid ($70.8 \pm 3.7 \text{ mg/mL}$). These findings highlight *Piper cubeba* seeds as a promising source of phenolic compounds with measurable antioxidant activity, supporting their potential applications in food and health-related formulations.

Keywords: *Piper cubeba*; phenolics; flavonoids; antioxidant activity; DPPH; FRAP

Valorization of Date (*Phoenix dactylifera*) by-Products, Recovery of Phenolic Compounds and Assessment of Antioxidant Potential

Ali MANSOURI, Kamel DEROUICHE, and Hichem KHEMMAR

ABSTRACT

Background: Dates are a significant fruit crop in Algeria, positioning the country as the third-largest producer worldwide, with an annual yield surpassing 1.3 million tons (FAO 2023). However, approximately 30% of the harvested dates are discarded due to poor quality, and the seeds, which constitute 10 – 20% of the fresh fruit weight, are mostly considered waste despite being rich in phenolic compounds. This study aimed to add value to these underutilised by-products by extracting phenolics from both the seeds and flesh and evaluating their bioactive potential. **Methodology:** The study examined 19 different date varieties, with all findings reported as average values. Phenolics from the seeds were extracted using ultrasound-assisted extraction with a hydroethanolic solvent, while those from the flesh were obtained using an Ultra-Turrax homogeniser with a hydromethanolic solvent. **Results:** The seed extracts demonstrated notably higher concentrations of bioactive compounds and antioxidant activity than the flesh. Specifically, the seeds contained 22.839 g GAE/100 g of total phenolic compounds (TPC), 2.837 g CE/100 g of condensed tannins (CT), 0.761 g QE/100 g of flavonoids (FLV), and an IC_{50} of $34 \mu\text{g/mL}$ for antioxidant activity as measured by the DPPH^o assay. Conversely, the flesh extracts had lower measurements, with 0.69 g GAE/100 g TPC, 0.027 g CE/100 g CT, 0.167 mg QE/100 g FLV, and an IC_{50} of $827 \mu\text{g/mL}$. **Conclusion:** These results emphasise the significant antioxidant potential of date seeds, particularly their free phenolic fraction, and highlight their value as sustainable sources of bioactive compounds. The valorization of date by-products not only addresses issues in agro-industrial waste management but also opens up new possibilities for their use in the food, cosmetic, and nutraceutical

industries, aligning with the goals of sustainable agriculture and resource-efficient innovations.

Keywords: Dates; Seeds; Flesh; Byproducts; Phenolic Compounds; Valorization.

Extraction of Bacterial Proteins from *Pinus halepensis* Seeds and their Industrial Applications

Taous BACHIRI, Chafiaa MEDBOUA, Naila MAIZI, Nada AITABBAS and Nabil KADRI

ABSTRACT

In the context of a shift toward natural and sustainable alternatives, this study investigates the biotechnological potential of endophytic microorganisms associated with *Pinus halepensis* seeds. After isolating and identifying bacterial strains (*Staphylococcus*, *Bacillus*, *Pseudomonas*, *Klebsiella*, *Enterobacter*), intra- and extracellular protein extracts were obtained. These extracts were biochemically characterized (proteins, polyphenols, sugars) and tested for biological activities: anti-inflammatory, anti-diabetic, enzymatic, and antibacterial. The results show high concentrations of proteins and bioactive compounds especially in intracellular fractions with significant inhibition of γ -amylase and protein denaturation. However, no enzymatic or antibacterial activity was observed. These findings highlight the promising potential of bacterial proteins for industrial applications in pharmaceutical, food, and cosmetic sectors.

Keywords: *Pinus halepensis*; Endophytic Bacteria, Bioactive Proteins, Biological Activities, Industrial Valorization.

Stratégie d'Intégration et Valorisation des Produits Laitiers : Cas de la Laiterie "Al Enfel" (COOPSEL) de la Wilaya de Sétif

Houria HADJLOUNE, Ahcène KACI, et Meriem BENSAAIDI

RÉSUMÉ

L'industrie laitière en Algérie occupe une place stratégique, avec une production importante mais générant des co-produits encore sous-valorisés, souvent gaspillés et insuffisamment exploités. Leur valorisation représente une opportunité majeure pour l'économie circulaire, la durabilité environnementale et la sécurité alimentaire. Les coopératives laitières constituent à ce titre des acteurs clés dans l'intégration de ces pratiques. Cette recherche a été menée au sein de la COOPSEL, une coopérative agricole de services spécialisés en élevage. L'objectif de cette étude est d'examiner la stratégie d'intégration de la laiterie Al Enfel (Sétif) à travers l'approche de la chaîne de valeur de Porter, en vue d'un diagnostic fonctionnel et de l'évaluation de ses ressources, compétences et perspectives de développement. L'analyse a porté sur trois volets : une enquête auprès de 21 éleveurs adhérents, l'évaluation des conditions de production et des performances technico-économiques, ainsi que l'analyse de la rentabilité des élevages selon l'approche ACP. Les résultats mettent en évidence la réussite de la stratégie d'intégration de la transformation industrielle menée par la coopérative, rendue possible grâce à son bon fonctionnement organisationnel et aux services apportés à ses adhérents au niveau local. La capacité de production a connu une progression notable, passant de 2 000 L/h en 2002 à 60 000 L/j en 2018. Par ailleurs, la laiterie assure

la prise en charge de l'alimentation du bétail à travers la fabrication d'un aliment MASH, tout en renforçant son attractivité auprès de nouveaux producteurs, avec un taux moyen d'adhésion de 64 % depuis 2010. Bien que cette recherche comporte certaines limites en matière de généralisation, elle apporte néanmoins des éléments pertinents susceptibles d'orienter la conception et la mise en œuvre de projets de valorisation et de promotion de la production laitière à l'échelle locale.

Mots clés : Filière Lait ; Coopérative Al Enfel ; Stratégie d'Intégration; Performances ; Sétif.

Food Waste Management and Recovery: An Integrated Approach to Food Security and the Circular Economy

Bilal MADAGH, Noureddine TOUATI, and Soraya HIHAT

ABSTRACT

The aim of this literature review is to emphasize strategies for reducing and recovering the post-harvest losses and food waste. The main causes of these losses fall into two categories: in developing countries, which is primarily due to infrastructure problems; and in developed countries, which is attributed to consumer waste. Based on this data, a transition to a circular economy is necessary, considering these losses as a valuable resource. The main thrusts of this circular economy, according to the literature review, can be gathered in three key points. First, recovery through biotechnology, which involves the extraction of high-value-added molecules from these co-products using various extraction techniques. Secondly, the technological innovations which is represented by the use of the Internet of Things (IoT), artificial intelligence (AI), blockchain, and the development of active packaging that extends the shelf life of products. The third area of the circular economy is the optimization of the supply chain through better flow management and reduction of losses, intending to minimize inefficiencies in the processing industries. As conclusion, the fight against post-harvest losses and food waste requires concerted action and an integrated approach. It is crucial to combine prevention strategies at the source, through the optimization of supply chains, with technological innovations and efficient recovery channels. Transforming the problem of post-harvest losses and food waste into an economic and environmental opportunity is not only possible but essential to ensuring global food security and building a sustainable future.

Keywords: Food Waste; Food Security; Circular Economy; Waste Recovery; Supply Chain; Technological Innovation.

Development and Characterization of Gelatin-Based Biodegradable Films for Sustainable Packaging

Nawal MAKHLOUFI, Farouk REZGUI, Cylia AREZKI and Leticia ARICHE

ABSTRACT

In the recent years, the research and development of biodegradable packaging films have received more attention, because petroleum-based plastic packaging is a major source of pollution and is harmful to the ecology; as a result, several adverse effects on human health. Moreover, there are several advantages of biopolymers over synthetic polymers due to their recharnewability, low cost, high availability, non-toxicity and

biodegradability. The main polymer used for the formation of bio-packaging films are based on polysaccharides, proteins, lipids and blends mainly obtained from plants or animals. This work focused on the development and characterization of bio-based Sustainable films based on gelatin (Ge) and glycerol (Gly) (used Ge at 4% and Gly at 40% as plasticizer chosen after preliminary tests) by casting method, with the aim of developing an alternative to plastics derived from non-renewable resources (petroleum) to reduce waste from plastic packaging. The resulting films were analyzed using a range of techniques to assess their physicochemical, structural, rheological, and optical properties, including FTIR (Fourier Transform Infrared Spectroscopy), XRD (X-ray Diffraction), DMA (Dynamic Mechanical Analysis), UV-Visible spectroscopy, opacity measurements, solubility tests, and biodegradability assessments. XRD analysis revealed an amorphous structure, while optical tests confirmed high transparency and effective UV-blocking capabilities. DMA analysis demonstrated pronounced deformation and a viscoelastic profile marked by significant creep. Furthermore, biodegradability tests conducted through soil burial showed complete degradation within 30 days. These findings highlight the potential of gelatin-based films for eco-friendly applications, particularly in sustainable packaging.

Keywords: Bioplastic; Gelatin; Glycerol; Biodegradable Films; DMA; Transparency; UV Protection; Packaging.

Date Seeds (*Phoenix dactylifera* L.): A Promising Source of Bioactive Compounds for Functional Applications

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ABSTRACT

Dates (*Phoenix dactylifera* L.) are a strategic agro-food resource in arid and semi-arid regions, but their processing generates large amounts of seeds considered as by-products. This study highlights the valorization potential of date seeds from four cultivars (Ourous (C1), Tazarzeit (C2), Tazoughart (C3) and Tamezwert n'telet (C4)) provided from M'zab oasis in Ghardaia region of Algeria, through the assessment of their phytochemical composition, phenolic profile, and biological activities. The total phenolic (TPC) and flavonoid (TFC) contents were analyzed using spectrophotometric methods. Individual phenolic compounds were identified and quantified by ultra-high-performance liquid chromatography (UHPLC). Antioxidant activities were assessed using DPPH, ABTS and ORAC assays, while the enzyme inhibition potential of the extracts was tested against tyrosinase (TYR), α -glucosidase (α -GLU), α -amylase, acetylcholinesterase (AChE) and butyrylcholinesterase (BChE). The seed extracts showed a remarkable richness in TPC (298 - 400 mg GAE/g) and TFC (13-16 mg QE/g). UHPLC analysis identified a total of seven phenolic acids and nine flavonoids, with a predominance of protocatechuic acid and catechin and procyanidin. Regarding bioactivity, the extracts exhibited strong antioxidant capacity, as evidenced by different assays (DPPH, ABTS, ORAC). Additionally, the different extracts demonstrated significant inhibitory effects against key enzymes involved in chronic diseases α -GLU (97%) and α -amylase (66%) (antidiabetic potential), AChE (43%) and BChE (62%) (neuroprotective action), as well as TYR (40%) (antimelanogenic activity). These findings confirm that date seeds, long considered as waste, represent a promising source of

bioactive compounds with potential applications in the development of functional ingredients or nutraceuticals.

Keywords: Date seed; Phenolic Profile; Phytochemical; Antioxidant Activity; Enzymes Inhibitory Potential; By-Product Valorization.

Food Waste Valorization by Fermentation as Innovative Green and Sustainable Tool for Enzyme Production

Rima AYAD, and Radia AYAD

ABSTRACT

The significant increase of household waste in recent decades is mostly due to the previous century's rapid urbanization. This means that waste management is at the intersection of economic development and the need to protect people's living environments. Kitchen waste is the most common sort of organic waste generated by humans, and it encompasses a wide range of discarded food scraps. Fruit and vegetable peelings from household kitchens generate a considerable amount of waste. Much study has been made on the fermentation treatment of food waste using various microorganisms, including *Bacillus* species, which are well-known for their application in waste valorization. The use of this low-cost waste to produce value-added products is a step forward in terms of sustainability. The current study is conducted in this context, with the primary goal of synthesizing extracellular amylase from *Bacillus flexus* on a production medium derived from kitchen waste.

Keywords: Valorization; Kitchen Waste; Fermentation; *Bacillus flexus*; Extracellular Amylase.

Caractérisation Chimiques des Composés Bioactifs de la Poudre de Feuilles de *Moringa oleifera*

Saida MEZIANI, Meriem MEZIANI, Fatah KHOUCHANE, and Yacine MAHOUI

RÉSUMÉ

Moringa oleifera, appelé «aliment naturel des tropiques», est largement valorisé pour ses propriétés nutritionnelles et médicinales. La poudre de ses feuilles, riche en protéines, acides aminés essentiels, vitamines (A, C, E et B) et minéraux (calcium, fer, potassium et magnésium), constitue un complément de choix pour améliorer la qualité des régimes alimentaires et prévenir les carences ainsi que la malnutrition. Au-delà de son intérêt nutritionnel, elle possède des vertus thérapeutiques reconnues, notamment contre l'hyperglycémie, la dyslipidémie, l'inflammation, les douleurs, les spasmes et les ulcères. Elle présente également des effets hépato-protecteurs, antimicrobiens et anticancéreux, et est utilisée dans le traitement de l'anémie hémolytique. Ces bienfaits sont attribués à sa richesse en composés phytochimiques, tels que les flavonoïdes, phénols, tanins, saponines, stéroïdes et alcaloïdes. La présente étude visait à évaluer la composition chimique des extraits de feuilles de *M. oleifera* et à caractériser les composés présents à l'aide de la spectroscopie infrarouge à transformée de Fourier (FTIR). L'analyse phytochimique de l'extrait éthanol/eau a révélé une teneur élevée en polyphénols (215,09 EAG/g), et en flavonoïdes (18,45 EQ/g), ainsi qu'une teneur plus faible en tanins. Les spectres FTIR de l'extrait et de la poudre de feuilles ont permis de

mettre en évidence plusieurs groupements fonctionnels : hydroxyles ($\sim 3393\text{ cm}^{-1}$), doubles liaisons aromatiques C=C ($\sim 1600\text{--}1500\text{ cm}^{-1}$), liaisons C–O ($\sim 1034\text{ cm}^{-1}$), carbonyles ($\sim 1626\text{ cm}^{-1}$), et chaînes aliphatiques ($\sim 2912\text{ cm}^{-1}$). Le spectre de la poudre de feuille révèle en outre la présence de polysaccharides tels que la cellulose et les pectines, non extraits par le solvant utilisé. Ces résultats confirment que *M. oleifera* constitue une source naturelle et prometteuse de biomolécules actives, susceptibles de contribuer au développement de traitements alternatifs aux médicaments synthétiques, dans une perspective de santé durable et intégrative.

Mots clés : *Moringa oleifera* ; Composition Chimique ; FTIR ; Antioxydants.

Valorisation des Extraits de Feuilles et l'Huile de *Moringa oleifera* par leur Incorporation dans une Margarine de Table

Sara OUAHRANI, Tassadit BENHAMMOUCHE Ahlem AKHRIB, Rachida AZRI, and Farid ZAIDI

RÉSUMÉ

Moringa oleifera est un arbre miracle aux multiples vertus médicinales, nutritionnelles et industrielles. L'objectif principal assigné à ce travail consiste à explorer l'impact de la conservation de la margarine avec l'extrait de feuille (EFMO) et l'huile de *Moringa oleifera* (HMO) cultivé en Algérie à différentes doses (100, 400, 600 et 800 ppm). Les margarines enrichies par EFMO et HMO se conservent plus au cours du stockage que les témoins (margarine sans incorporation et margarine avec Vitamine E) tout en gardant les mêmes propriétés physicochimiques, microbiologiques et sensorielles. Néanmoins la teneur en Polyphénols augmente pour les margarines enrichies par EFMO et HMO à 600 ppm avec un facteur d'augmentation de 2216 % et 240.01% respectivement. Pour les caroténoïdes le facteur d'augmentation est de 39,25% pour les margarines enrichies avec l'EFMO à 600 ppm et 11.60% pour celle enrichies avec l'huile à 600 ppm, Les données expérimentales démontrent une amélioration importante dans l'activité antiradicalaire DPPH des margarines enrichies en EFMO à 600 ppm avec un facteur de 1792,64 %, cette amélioration est moins importante dans les margarines enrichies avec HMO à 800 ppm (226,77 %). Le pouvoir réducteur accuse une augmentation uniquement dans les margarines enrichies avec l'EFMO à 400, 600 et 800 ppm (2.8, 4.5 et 5.1 mgEAA/100 g d'échantillon).

Mots clés: *Moringa oleifera* ; Margarine ; Antioxydant Naturel ; Extrait de Feuilles de Moringa ; Huile de Moringa ; Oxydation.

Valorization of Screw-Pressed Vegetable Oil from *Pinus halepensis* Mill. Seeds: HPLC-DAD Analysis, Anti-Inflammatory Activity, and RT-qPCR Analysis of Inflammatory Mediators in Skin Wound Healing

Sihem AIT ATMANE, Karim TIGHILET, Nassim BELKACEM, and Bachra KHETTAL

ABSTRACT

The seeds of *Pinus halepensis* Mill. (Pinaceae), commonly known as «Zgougou» are widely consumed in the Mediterranean region and have been traditionally used in folk medicine. to treat various diseases such as bronchitis, rheumatism, infections, and inflammation. This study

aimed to characterize the phytochemical profile and evaluate the anti-inflammatory and wound healing properties of cold-pressed oil extracted from *Pinus halepensis* seeds. The fixed oil was obtained via a cold pressing process, and its chemical composition was analyzed using HPLC DAD and GC. The *in vivo* anti-inflammatory activity was assessed using carrageenan- and formalin-induced paw and ear edema models, while the wound healing potential was investigated through an experimental skin wound model. In addition, the expression levels of key inflammatory mediators were quantified by RT-qPCR during the wound healing process. Phytochemical analysis revealed that the oil contains a variety of bioactive compounds, including tocopherols, phyosterols, polyphenols, and linoleic acid. *In vivo* results demonstrated significant anti-inflammatory activity, with inhibition rates of 62.25% and 70.00% for ear and paw edema, respectively. Moreover, the oil markedly promoted wound contraction, reaching a rate of 89.23%, and significantly reduced the expression of key inflammatory markers such as TNF- α and NF- κ B. These findings highlight the potential of cold pressed *Pinus halepensis* seed oil as a promising multifunctional natural vegetable oil for applications in food, cosmetics, and pharmaceutical industries.

Keywords: *Pinus halepensis* Mill.; Screw-Pressing; Vegetable Oil; Bioactive Compounds; Anti-Inflammatory; Wound Healing.

Extraction et Caractérisation de l'Huile de Graines d'*Opuntia ficus-indica* et Valorisation du Résidu par Fractionnement Anti-solvant Supercritique des Antioxydants

Souad KHALED, Mohamed HAMIMECHE, Kahina HAMENNI, Samiya BOUKHANOUF, Meriem ABIDER-AMRANE et Khodir MADANI

RÉSUMÉ

La valorisation des principes actifs issus des déchets végétaux constitue un domaine de recherche prometteur dans le cadre du développement d'une économie durable. C'est dans cette optique que notre travail de recherche s'est focalisé sur la valorisation des graines d'*Opuntia ficus-indica* (OFI). Une étude comparative a été menée sur l'extraction et la caractérisation de l'huile extraite de ces graines à l'aide de différentes méthodes : pression à froid, extraction Soxhlet au n-hexane, et extraction au CO₂ supercritique. Les résultats ont montré que le rendement le plus élevé en huile a été obtenu avec la méthode Soxhlet au n-hexane (8,55 %), suivi de l'extraction au CO₂ supercritique (8,41 %). Le rendement le plus faible a été enregistré avec l'extraction par pression à froid (5 %). L'huile obtenue par les trois procédés présente une composition similaire en acides gras, dominée par l'acide linoléique, suivi de l'acide oléique et de l'acide palmitique. Toutefois, l'huile extraite par CO₂ supercritique a révélé la présence de composés minoritaires supplémentaires, tels que (C20:2 et C22) (conditions : T = 40°C, P = 250 bar, débit de CO₂ = 100 %, durée = 2 h). Les huiles extraites étaient fortement insaturées, avec un rapport UFA/SFA compris entre 4.92 et 5.26. La seconde partie de l'étude a porté sur la valorisation du tourteau, un déchet solide issu du pressage des graines d'*Opuntia ficus-indica* pour l'extraction d'huile. L'objectif principal était d'évaluer le potentiel de ce résidu pour la production de concentrés d'antioxydants. À cet effet, le Fractionnement Supercritique Anti-solvant (SAF) a été utilisé, une technologie permettant de concentrer sous forme sèche les principes actifs d'intérêt pour une

application directe. Deux paramètres ont été examinés : la pression (P) et le débit de CO₂ (Q-CO₂), et optimisés à l'aide de la méthode de surface de réponse (RSM). L'identification et la quantification des antioxydants présents dans les différents extraits ont été réalisées par chromatographie liquide à haute performance (HPLC). Le modèle mathématique a permis de déterminer les conditions optimales du SAF : une pression de 15 MPa et un débit de CO₂ de 30 g·min⁻¹ pour une récupération maximale de masse d'extrait (77,96 %), et une pression de 13,6 MPa avec un débit de CO₂ de 10 g·min⁻¹ pour un rendement optimal en épicatechine (3,81 %). Nos recherches ont montré que les graines d'OFI sont une excellente source de nutriments et de substances bénéfiques pour la santé. De plus, cela contribuerait à réduire la quantité de déchets générés au cours du processus de production.

Keywords: *Opuntia ficus-indica*; Graines; Valorisation; CO₂ Supercritique; Huile; Antioxydants.

Exploring the Antibacterial Efficacy of Wild Olive (*Olea europaea* subsp. *sylvestris*) Leaf Extracts Obtained by Different Extraction Methods

Souad LAHCENE, Nassima SADOON, Manel AIT AHMED MEHALLA, and Karim HOUALI

ABSTRACT

The wild olive (*Olea europaea* subsp. *sylvestris*) is a resilient Mediterranean species, which adapts perfectly to difficult environmental conditions. Its leaves are used have always been used in traditional medicine for their nutritional and medicinal properties. In the current context of increasing resistance to antibiotics, the study of its natural bioactive compounds is of major interest. This study evaluates the antibacterial activity of Oleaster leaf extracts obtained by different extraction methods. The leaves of *Olea sylvestris*, dried and ground, were subjected to three different extraction methods, namely: ethanolic extraction, microwave-assisted extraction and ultrasound-assisted extraction. The obtained extracts were analyzed for their total polyphenol content. Their antibacterial activity was tested by the agar diffusion method against two Gram+ bacterial species (*Staphylococcus aureus* and *Bacillus cereus*) and two Gram- bacterial species (*Escherichia coli* and *Pseudomonas aeruginosa*). We have also determined the minimum inhibitory concentrations (MIC). Microwave-assisted extraction showed the highest yield (16.7%), followed by ethanolic extraction, and then ultrasound-assisted extraction. The ethanolic extract showed a significant total polyphenol content (21.2 mg GAE/g). *E. coli* and *P. aeruginosa* proved resistant to all extracts, whereas *S. aureus* and *B. cereus* were sensitive to them. The ethanolic extract proved the most effective against the latter, with average inhibition zones of 21.57 mm for *S. aureus* and 8±1,73 mm for *B. cereus*, as well as a minimum inhibitory concentration (MIC) of 15.63 mg/mL for *S. aureus*. This study highlights the selective antibacterial activity of Oleaster leaf extracts, particularly against Gram-positive bacteria, and underlines the importance of the extraction method in the optimization of their effectiveness. These results confirm the potential of the Oleaster as a Mediterranean plant resource to be valorized, falling within an agroecological and sustainable approach to the management and use of local plants.

Keywords: *Olea sylvestris*; Polyphenols; Extraction; Antibacterial Activity.

Chicken Feather Co-Product Valorization for Keratinase Biosynthesis by Wastewater-Derived *Streptomyces albidoflavus* S19 Isolated in Bejaia Region

Samiha SOUAGUI, Hafid BOUDRIES, Firdousse LAINCER, Badria KERAMANE, Ibtissem DJINNI, Warda DJOUDI, Hanane BELABBAS, Wissam RETI, and Mouloud KECHA

ABSTRACT

Background: Keratinous residues from poultry processing are difficult to manage but represent an abundant co-product suitable for circular valorization. **Objective:** We assessed the ability of wastewater-derived *Streptomyces albidoflavus* S19 to produce keratinases using chicken feathers as the sole carbon and nitrogen source. **Methods:** Strain S19 was isolated from *Souk El-Tnine* wastewater treatment plant (Béjaïa, Algeria) and identified by morphology, chemotaxonomy, and 16S rRNA gene sequencing. Broad hydrolytic potential (proteases, cellulase, amylase, lipase, tyrosinase) was screened on solid media containing the corresponding substrates. Proteolysis was evidenced on skim-milk nutrient agar at 28 °C for 9 days by casein hydrolysis halos (halo/colony diameter ratio = 2). Keratinolysis was first screened on feather-meal agar (FBMS) prepared with chicken feather meal and incubated at 28 °C for 9 days, then quantified in feather-meal liquid medium (FBML). Culture supernatant was reacted with feather-derived keratin (1:1, 50 °C, 10 min) and keratinase activity was measured at 280 nm and expressed as U mL⁻¹. **Results:** *S. albidoflavus* S19 reached 75.1 U mL⁻¹ keratinase activity under these conditions and grew on both solid and liquid feather-meal media, confirming secretion of extracellular keratinases. **Conclusions:** These results demonstrate efficient conversion of feather co-products into value-added enzymes by *S. albidoflavus* S19, supporting scalable, low-cost bioprocessing aligned with circular bioeconomy principles.

Keywords: Keratinase; *Streptomyces albidoflavus* S19; Chicken Feather Valorization; Wastewater Isolate; Co-product Upcycling; Circular Bioeconomy.

Anti-Inflammatory and Anti-Diabetic Properties of Corchorus Polysaccharides used to Supplement Yoghurt

Souheila LAGGOUNE, Assia ZEGHIB, and Habiba MOKADDEM-DAROUI

ABSTRACT

Corchorus species, particularly *C. olitorius*, contain high levels of polysaccharides, fibres, antioxidants, and other phytochemicals, making them promising candidates for use in functional foods. This study investigated the anti-inflammatory and antidiabetic effects of polysaccharide extracts from Corchorus using an in vitro model. The polysaccharides were extracted using the hot water and ethanol precipitation method and characterised in terms of their sugar composition, molecular weight, and in vitro antioxidant capacity. The antidiabetic potential was assessed via α -amylase inhibition, while the anti-inflammatory activity was evaluated using bovine serum albumin (BSA) denaturation. The results showed that Corchorus polysaccharides significantly inhibited both α -amylase activity and the denaturation bovine serum albumin (BSA) denaturation, with IC??

values of 648.2 \pm 0.02 μ g/mL and 375.2 \pm 0.02 μ g/mL, respectively. Anti-denaturation activity was similar to that of the reference drug, acetylsalicylic acid (IC₅₀ = 341.12 \pm 0.08 μ g/mL). These characteristics can be attributed to the abundant phenolic constituents found in the leaves, such as caffeic acid, chlorogenic acid, and isorhamnetin. The polysaccharide extract inhibited both α -amylase activity and heat-induced BSA denaturation in a concentration-dependent manner. These findings suggest that Corchorus polysaccharide supplementation has the potential to be an effective natural dietary intervention for mitigating inflammation and improving glycemic control in people with diabetes.

Keywords: *C. olitorius*; Polysaccharides; Anti-Inflammatory Activity, Anti-Diabetic Activity.

Valorization of Orange Peel Co-Products: A Natural Anti-Inflammatory Agent

Tinhinane REKEB, Samia BEDOUHENE, Nassima SENANI, and Sahra-Amel BELAMBRI

ABSTRACT

In light of the nearly 190 million tons of fruit and vegetable by-products generated annually worldwide, sustainable strategies for their valorization have become an urgent need. Among these, citrus peels represent a valuable source of bioactive compounds with potential applications in food, pharmaceutical, and medical industries. Orange peel is particularly rich in dietary fiber, vitamins, minerals, carotenoids, phenolic acids, and flavonoids such as hesperidin, which are known for their health-promoting properties. This study aimed to evaluate the in vivo anti-inflammatory activity of orange peel aqueous extract (OPE) and its major flavonoid, hesperidin (HSP), using the β -carrageenan-induced paw edema model in male Wistar albino rats. Oral pretreatment with OPE at dose of 500 mg/kg significantly ($p < 0.001$) attenuated paw edema in a time-dependent manner, with a maximal inhibition rate of 75.26 \pm 8.51 % where paw thickness decreased from 3.3 \pm 0.43 mm to 0.85 \pm 0.25 mm. Hesperidin at 400 mg/kg also exerted a significant ($p < 0.001$) anti-edematous effect. Paw thickness in the HSP-treated group decreased to 1.57 \pm 0.35 mm, with an inhibition rate of 61.33 \pm 12.02%. These effects were comparable to aspirin (400 mg/kg), a standard non-steroidal anti-inflammatory drug. These findings highlight the therapeutic potential of citrus by-products as natural modulators of inflammation. The efficacy of OPE and HSP supports their further development as nutraceutical agents or adjuncts to conventional anti-inflammatory therapies, contributing to sustainable waste valorization and human health promotion.

Keywords: Orange Peel Extract; Hesperidin; By-Product Valorization; Anti-Inflammatory Activity; Paw Edema; Carrageenan.

Nutritional Composition and Evaluation of the Antioxidant Activity of Some Species of Sea from the Algerian Coast

Khadidja CHIKHECHIOUKH, Meriem MOKHTAR, and Soumia KEDDARI

ABSTRACT

The aim of the present work is to compare the nutritional composition and evaluate the antioxidant activity of Polyphenols, Carotenoids, and

Spinochrome of some species of sea urchin (*Paracentrus lividus* and *Arbacia lixula*) from the Algerian coast. The moisture and ash content of the gonads of sea urchins was determined using standard methods, the protein content was estimated by the Kjeldahl method, the total lipids were analyzed according to the method of Bligh and Dyer and the carbohydrates were measured with colorimetric assays. The concentrations of Polyphenols, carotenoids, and spinochrome were measured through colorimetric tests. The antioxidant properties of the extracts were evaluated using two methods: the DPPH assay and the ABTS^{•+} radical scavenging. The obtained results have shown that the gonad of *P. lividus* and *A. lixula* from the east of the Algerian coast contained the highest amount of moisture 83.33%, 80.85%, respectively, compared to the gonad of center and east of Algerian coast, which contain (80.4%, 78.84%), (78.4%, 76,2%) respectively, on the other hand ,the ash content of the gonad of *P. lividus* and *A. lixula* (1.27%,1.98 %) is higher than those reported by gonad of the center and the east (1.46%, 1.5%), (1.12%, 1.4%), respectively. The main constituent of gonad is protein, a high levels content was observed in *P. lividus* in all the regions 9.8 %, 8.9% and 8.6%, respectively, compared to the gonad of *A. lixula*, which contain 4.6%, 3.7% and 5.4%, respectively. We noticed that the percentage of the total lipid was close in all regions in a average of 2.3%. The gonad of *A. lixula* have the highest amount of carbohydrate in all of the regions 10.4%, 12.1% and 11.5%, respectively, compared to the gonad of *P. lividus* which contain 7.07%, 9.2% and 8.3% respectively. The results revealed that gonad of *Paracentrus lividus* from the region of El Taref had the highest concentrations of polyphenols (17.8 mg GAE/100g DM) and carotenoids (16.76 mg QE/100g DM). Regarding the antioxidant capacity, spinochrome from the gonad of *Paracentrus lividus* displayed the most potential activity in both the DPPH (IC₅₀ = 328 ± 0.15 µg/ml) and the ABTS^{•+} radical scavenging (IC₅₀ = 614 ± 0.15 µg/mL).

Keywords: Sea urchin; *Paracentrus lividus*; *Arbacia lixula*; Algerian Coast; Nutritional Composition; Antioxidant activity.

Valorization of Rhizospheric and Nodule Bacteria from Legumes as Potential Biofertilizers for Sustainable Food Security

Dahbia LOURABI, Karima ZENATI, Djellali BELHADI, and Raouya MOSTEFAOUI

ABSTRACT

Ensuring sustainable agricultural productivity while minimizing environmental impact has become a major global challenge. Excessive use of chemical fertilizers has led to soil degradation, nutrient imbalance, and contamination of ecosystems. Consequently, the search for ecological and sustainable alternatives to chemical inputs has intensified in recent years. Among these alternatives, plant growth-promoting rhizobacteria (PGPR) have emerged as promising bioinoculants due to their ability to improve nutrient availability, stimulate plant growth, and enhance soil fertility through various biochemical mechanisms. In this study, seventy-five bacterial strains were isolated from nodules and rhizosphere soils of lentil (*Lens culinaris*) and pea (*Pisum sativum*) cultivated in the Bouira region (Algeria). The bacteria were isolated using selective media, including YMA, KB, ASHBY, and MAC, to ensure the recovery of diverse functional groups. The isolates were screened for three key plant

growth-promoting traits related to nutrient availability: • Phosphate solubilization on Pikovskaya medium, assessed by the formation of clear halos around colonies after seven days of incubation; • Potassium solubilization on Aleksandrov medium, identified by halo formation after seven days; • Siderophore production on Chrome Azurol S (CAS) medium, indicated by a distinct color change from blue to orange. The results revealed that 26 strains exhibited phosphate solubilization ability, 15 solubilized potassium, and 13 produced siderophores. These functional traits indicate the potential of the isolated bacteria as effective biofertilizer candidates capable of improving soil fertility and supporting sustainable crop production. Overall, this study emphasizes the functional diversity and biotechnological value of indigenous rhizospheric bacteria associated with legumes, offering a promising approach for nutrient recycling and environmentally friendly agriculture.

Keywords: PGPR; Phosphate Solubilization; Siderophore Production; Biofertilizers; Sustainable Agri culture.

Formulation of a New Culture Medium Based on Whey and Eggshell Powder for Biosurfactant Production

Drifa YALAOUI-GUELAL, Adidi CHOUDANI, Samia LEULMI, and Lila HADIDI

ABSTRACT

This study investigates the use of whey enriched with eggshell powder, a readily available agricultural waste, as a sustainable raw material for biosurfactant production. Whey and eggshells are rich in nutrients and provide an excellent medium for microbial fermentation. Recovery techniques, including pretreatment, were used to enhance nutrient availability. Biosurfactants were produced using two strains of hydrocarbonoclastic bacteria (Str1, and Str2). The production of biosurfactants in this media was estimated by hemolytic activity, oil displacement test, emulsification activity (E24%), surface tension. The biosurfactants were extracted using acid precipitation, and determined the biosurfactant yield, and then characterized by FTIR spectroscopy. The results showed, neither of the two strains exhibits hemolytic activity with a maximum emulsification index of 52,44% and 50.59 ± 2.279% for Str1 and Str2 respectively. The oil displacement results show high surface activity with zone diameters of 6.25 ± 2.4 cm for Str1, and 2.4 ± 0.141 cm for Str2. The surface tension was reduced to 23 mN/m and to 27 mN/m by the biosurfactants produced in the supernatant of Str2 and Str1, respectively. After extraction by acid precipitation, strain 1 produced the highest biosurfactants yield, 5.94 mg/ml. Infrared absorption spectra show the simultaneous presence of aliphatics chain and peptide groups in the biosurfactants produced confirming the lipopeptide nature of biosurfactant. The results showed high biosurfactants yield with excellent surface activity and emulsification index, indicating their environmental application. This work demonstrates the converting feasibility of whey and eggshell waste into environmentally friendly biosurfactants, in line with the objectives of the circular bioeconomy.

Keywords: Whey; Eggshell Powder; Biosurfactants; Emulsification Index (E24); Surface tension.

Fungal Biodegradation of some Agro-industrial Wastes for Efficient Cellulase Production: A Circular Economy Approach

Zahir AMGHAR, Zahra AZZOUZ, Narimane ALLAOUA, and Azzeddine BETTACHE

ABSTRACT

The valorization of agro-industrial residues is crucial for promoting the principles of a circular economy, focusing on waste reduction, resource optimization, and the production of value-added products. This study investigates the biodegradation potential of 5 fungal strains (S1, S2, S3, S4, and S5) for cellulase production, by using 5 agro-industrial wastes as substrates: olive pomace (OP), orange peel (ORP), wheat straw (WS), date palm leaves (DPL), and cardboard waste (CW). Behind that, some of these residues were considered as cause of environmental concern, they are rich in lignocellulosic materials and represent potential substrates for sustainable biotechnological processes. The study was conducted by using solid-state fermentation (SSF), an economical and environmentally friendly method. The results revealed significant differences in cellulase potential between the fungal strains and substrates. DPL and WS were the most promising substrates, with S5 producing up to 201.8 U/mL of cellulase activity on DPL. OP and ORP demonstrated moderate enzymatic production, while CW demonstrated the lowest cellulase activity, reflecting its lower biodegradability. This study underlines the importance of selecting the best-performing native fungal strains and locally abundant substrates for efficient waste valorization for cellulase production. The use of fungal strains to break down locally available agro-industrial waste and promote cellulase production supports the principle goal of the circular economy and sustainable biotechnology. This approach helps to manage waste, reduce dependence on raw materials, and find new uses of agro-industrial wastes for industrial applications, including enzyme production, making biofuel, and sustainable waste management strategies.

Keywords: Circular Economy; Fungal Biodegradation; Agro-industrial Wastes; Cellulase; Waste Valorization; Sustainable Biotechnology.

Proximate Composition of Biscuit Enriched with Pomegranate Peel By-Product

Sarra LEHAÇANI, and Meriem AMMIMOUR

ABSTRACT

Pomegranate peel powder is used as a functional ingredient in the development of nutritional biscuit. Pomegranate (*Punica granatum*) is well known fruit belongs to punicaceae family having multiple health benefits, not only limited to its edible parts but also in its non-edible parts mostly the peel. Fruit wastes are rich source of nutrients and can be used for the development of functional food products. Among the confectionary products, biscuits are liked by individuals of different age groups. Hence, nutritional properties of biscuits can be enhanced by using pomegranate peel powder. This study evaluated the effects of varying PPP proportions on the nutritional quality, antioxidant properties, and Sensory acceptability of biscuits. Four formulations were prepared: a control (100% whole wheat flour, T0) and Three blends with PPP at 1% (T1), 5% (T2), and 7% (T3). Proximate composition (moisture, ash, fat, protein, carbohydrate, fiber, and minerals), pH, titrable acidity, phytochemical properties (total

phenolics, flavonoids, condensed tannins, antioxidant assays), and sensory attributes were analyzed. Incorporation of PPP enhanced the nutritional profile, particularly increasing dietary fiber, minerals, and antioxidant activity, while causing slight reductions in protein and fat. Among the tested formulations, biscuits containing 5% PPP (T2) were most preferred by the sensory panel, combining high acceptability with improved functional properties. These findings highlight the potential of pomegranate peel powder as a sustainable by-product ingredient for the development of functional bakery products that contribute to consumer health and well-being.

Keywords: Biscuits Formulation; Pomegranate Peel Powder; Whole Wheat Flour; Functional Ingredient; By-Product Valorization.

Olive By-Products Valorization from Extraction to Food Enrichment: Case Study of Cheese Fortified with Olive Leaves

Fatiha BRAHMI, Hayate GUEMGHAR-HADDADI, Kahina DJAOUD, Tinhinane HADDAD, Hadjer LAMRI, and Lila BOULEKBACHE-MAKHLOUF

ABSTRACT

Owing in significant measure to the rise in olive oil consumption worldwide, the land area covered by olive plantations has expanded recently. The manufacturing of seasonable olive oil generates a lot of waste that needs to be discarded as soon as feasible. Researchers have been interested in studying olive leaves given that they are a good source of phenolic compounds, which are potent antioxidants. The aim of this research is to develop an eco-friendly method for extracting phenolics from Chemlal variety olive tree (*Olea europaea* L.) leaves by using natural deep eutectic solvent (NADES). These by-products were also incorporated into fresh cheese. At first, a eutectic solvent was employed to optimize the extraction conditions for total phenolics (TPP). Then, using the optimized extract, we assessed the extract levels of TPP, flavonoids, tannins, and antioxidant activity. Additionally, a number of physicochemical and sensory tests were performed on the enriched cheese. The greatest TPC value of 96306.20 mg equivalent acid gallic/100 g dry matter was attained by studied olive leaves with an extraction duration of 90 minutes, a ratio of 1/90 g/mL, and a stirring speed of 500 rpm. The optimized extract contains 52.18 quercetin equivalent/100 g dry matter of flavonoids and 664.28 catechin equivalent/100 g dry matter of tannins. The IC₅₀ for the DPPH assay, which gauges antioxidant activity, was 1357 µg/mL. Physical-chemical analyses showed that the cheese manufactured with olive leaves met the standards set. According to sensory analyses, experts highly appreciated fresh cheeses supplemented with powdered olive leaves at low proportion. Thus, improving food with olive leaves may be an environmentally friendly practice.

Keywords: Olive Leaves; Extraction Optimization; Phenolic Compounds; Antioxidant Activity; Fresh Cheese.

Optimization of Antioxidant Activity from *Crataegus monogyna* Leaves Extracts Using Response Surface Methodology

Nacim NABET, Yasmine Lina SIMOUD, Tifina AIT AHMED, and Faouzi MAOUCHE

ABSTRACT

The aim of this study was to optimize the extraction conditions of phenolic compounds from *Crataegus monogyna* leaves using ultrasound-assisted extraction (UAE) method combined with response surface methodology (RSM). Three independent variables were tested: extraction time (5 – 55 min), ethanol concentration (0-100%), and temperature (45 – 55 °C). A Box-Behnken experimental design with 15 runs, with three central points was used. The total phenolic content (TPC) response was measured using Folin-Ciocalteu reagent. TPC from *C. monogyna* UAE extracts ranged from 6.67 ± 0.41 to 116.93 ± 7.03 mg gallic acid equivalent (GAE)/g of dry matter (DM). Optimization of TPC surface response yielded the following optimal extraction conditions: 54°C, 55 minutes and 62% ethanol. Under these conditions, the model proposed a maximal value of 121.28 mg GAE/g DM for TPC response with coefficient correlation (R^2) value of 99.40%.

Keywords: Box Behnken Design; *Crataegus monogyna*, Optimization; Response Surface Methodology (RSM); Total Polyphenol Content (TPC) and Ultrasound-Assisted Extraction (UAE).

Anti-Inflammatory Potential of Functional Beverages Based on Citrus Peels

Roukia BOUIZAR, Nabila BRAHMI, Rania AGABI, and Rim SALHI

ABSTRACT

The citrus processing industry is responsible for the generation of large volumes of waste side streams, represented principally by fruit peels. These tissues are exceptionally rich in bioactive compounds, and there has been a great industrial interest for their valorization. These compounds have antimicrobial, anticancer, antidiabetic, and anti-inflammatory activities. This study investigated the feasibility of enriching a commercial milk juice with powders derived from citrus peels, leveraging their potential as natural colorants and sources of beneficial phytochemicals. Citrus peels were carefully dried and ground into powders, which were then incorporated into the milk juice formulation. The enriched beverage also exhibited improved antioxidant capacity, as evidenced by its enhanced free radical scavenging and reducing power - factors that are closely linked to its anti-inflammatory properties. Importantly, the incorporation of the citrus peel powders did not negatively impact the sensory acceptability of the final product, suggesting a high potential for consumer adoption of this functional beverage. These findings underscore the considerable promise of citrus peel valorization in developing value-added, health-promoting products with targeted anti-inflammatory benefits, which would be of great interest for the seminar audience. These results underline the considerable potential of citrus peel upgrading to improve the nutritional and functional profiles of commercial beverages. This work offers a promising avenue for the development of value-added products that contribute to more sustainable and health-conscious consumption patterns.

Keywords: Valorization; Citrus Peel Powders; Functional Milk Juice; Anti-Inflammatory Activity; Bioactive Compounds.

Evaluation of the Antifungal Potential of Acetonic Extracts from Two Pomegranate Varieties Against *Candida albicans*

Rania AGABI, Hafida BOUNCER-MERZOUK, Nabil KADRI, Rim SALHI, Roukia BOUIZAR, and Abel ZENATI

ABSTRACT

This study aims to investigate the antifungal and antioxidant properties of acetonetic peel extracts from two local pomegranate varieties (*Punica granatum* L.): Quares and Lahlou. The extract from the Quares variety showed the highest levels of total polyphenols (697.20 ± 24.09 mg GAE/g extract), hydrolyzable tannins (63.6 ± 4.10 mg TAE/g extract), and condensed tannins (173.43 ± 9.03 mg/g extract). Conversely, the Lahlou variety exhibited a higher flavonoid content (143.12 ± 0.27 mg QE/g extract). Antioxidant assays revealed that the Quares extract demonstrated stronger hydrogen peroxide scavenging activity and reducing power. Additionally, it showed notable antifungal effects against *Candida albicans* strains, with the following order of sensitivity: CAM1 > CAM3 > CAM2. The minimum inhibitory concentrations (MICs) ranged from 0.97 to 1.95 mg/mL, and the minimum fungicidal concentration (MFC) was 15.62 mg/mL. The same strain order was observed for inhibition of *C. albicans* biofilm attachment

Keywords: Pomegranate Extracts; Antifungal Activity; *Candida albicans*; Phenolic Compounds; *Punica granatum* L..

Valorization of Carob Seed and Orange Peel By-Products: Extraction and Application of Functional Hydrocolloids in Dairy product

Yasmine AIT ABBAS-OUARI, Aida MEKHOUKHE, Khadidja ADEL, Celia OURARI, and Farida KHYAR

ABSTRACT

In the field of food safety, the valorization of by-products represents an innovative and strategic approach to addressing growing challenges related to sustainability, waste reduction, and resource conservation. The agri-food industry generates large quantities of by-products that are often discarded, despite their richness in bioactive compounds, fibers, proteins, and antioxidants. Among these by-products, carob seeds and orange peels, long considered waste, have significant technological and nutritional potential. Locust bean gum (LBG), extracted from carob seeds, is a natural hydrocolloid with thickening and stabilizing properties widely used in the food industry. Similarly, pectin, extracted from orange peels, plays a key role in texture, gelling, and preservation of processed foods. Valorizing these natural compounds helps reduce food waste while developing functional ingredients that meet strict safety and quality standards. In this context, a study was conducted in which both hydrocolloids were extracted, purified, and incorporated into a dairy beverage to evaluate their technological performance and safety. Antioxidant activity and physicochemical analysis and were conducted, where parameters studied included: yield, moisture, ash content, pH, Brix, total sugar content, protein, and lipid content. Three samples of milk beverage were formulated and analyzed for physicochemical (pH, Brix degree, density, and viscosity) and sensory properties (odor, texture, consistency, and taste). Physicochemical and antioxidant analyses

showed that the optimized pectin had a notable content of lipids, proteins, and polyphenols, along with a higher antioxidant potential than LBG, which, in contrast, had the highest sugar content. The incorporation of these hydrocolloids influenced the physicochemical properties of the dairy beverage, notably improving its viscosity. Sensory evaluations revealed a clear preference for the pectin-enriched beverage, while the one containing LBG received a lower satisfaction rating.

Keywords: By-Product; Locust Bean Gum; Pectin; Orange Peel; Hydrocolloid.

Impact of Raw and Microwaved Turnip Enrichment on the Physicochemical Characteristics of White Cheese

Amina AZI, Naima GUENDOOUZ, and Nadia BOUAOUDIA

ABSTRACT

The aim of this study was to compare the physicochemical properties of white cheese, cheese enriched with raw turnip, and cheese enriched with microwaved turnip. The results showed significant differences among the samples. Unenriched cheese had the lowest total polyphenol content (0.38 ± 0.01 mg gallic acid equivalent/g fresh matter (FM)), while enrichment with raw turnips increased TPC to 1.15 ± 0.03 mg GAE/g FM and enrichment with microwaved turnips produced the highest TPC (1.66 ± 0.03 mg GAE/g FM). Titratable acidity was lowest in plain cheese (27.0 ± 0.0 °D) and higher—but similar—in cheeses enriched with raw and microwaved turnips (36.0 ± 0.0 °D each). Total sugars nearly doubled with raw turnips (14.08 ± 0.04 mg glucose equivalent/g FM compared to 7.01 ± 0.08 mg glucose equivalent/g FM for the control), while microwaved turnips also increased sugars (13.13 ± 0.03 mg glucose equivalent/g FM). Moisture content remained relatively stable across treatments, ranging from $52.17 \pm 0.05\%$ (microwaved) to $52.94 \pm 0.03\%$ (raw). Finally, ash content rose from $0.82 \pm 0.15\%$ in plain cheese to $1.21 \pm 0.01\%$ with raw turnip enrichment and to $1.84 \pm 0.05\%$ with microwaved turnip enrichment. These findings suggest that raw turnip enrichment increases sugars (and moderately increases polyphenols), while microwaving turnips markedly increases total polyphenols and mineral (ash) content; titratable acidity was comparable for raw and microwaved enrichments.

Keywords: Enrichissement; Turnip; Microwaving Treatment, Polyphenol; White Cheese.

Physicochemical and Phytochemical Characterization of Carob and Its Application in Experimental Yogurt Formulations

Dihia BABOURI, Nabila BRAHMI, Asma BOUDRIA, Sabine CHABANE, Aicha KANTAOUI, and Cylia KACI

ABSTRACT

Carob (*Ceratonia siliqua* L.), a typical Mediterranean species, is well known for its pods rich in sugars, dietary fibers, and phenolic compounds. Due to its nutritional and functional value, it represents a natural ingredient of growing interest in the food industry. The aim of

this study was to evaluate the incorporation of carob powder and carob syrup (concentrated to 70 °Brix) into an experimental yogurt and to investigate their impact on its physicochemical characteristics. A preliminary physicochemical and phytochemical analysis showed that carob powder has moderate moisture, high fiber content, and significant levels of phenolic compounds, confirming its potential as a source of bioactive substances. The syrup, on the other hand, was characterized by its high concentration of soluble sugars, giving it strong sweetening power and suitable density for dairy formulations. Three yogurt formulations were prepared: a control without incorporation, E1 (3% powder, 9% syrup), and E2 (1% powder, 15% syrup). The results revealed that the control had an acidity of 73 ± 1 , a °Brix of 18.0 ± 0.1 , and a viscosity of 3500 ± 100 mPa·s. In comparison, formulation E1 showed an acidity of 103.5 ± 1.5 , a °Brix of 28.1 ± 0.1 , and a high viscosity ($18,800 \pm 100$ mPa·s), reflecting the combined effect of powder and syrup on texture and density. Formulation E2 presented intermediate values with an acidity of 98 ± 1 , a °Brix of 21.5 ± 0.5 , and a viscosity of $16,720 \pm 120$ mPa·s. These findings demonstrate that carob incorporation significantly improves yogurt characteristics by increasing its nutritional value, sugar density, and textural stability. The powder/syrup combination thus appears as a promising approach for the development of innovative dairy products that are both healthy and aligned with consumer expectations.

Keywords: Carob Powder (*Ceratonia siliqua*); Carob Syrup; Yogurt; Physicochemical Analysis; Phytochemical Analysis, Nutritional Quality.

Functional Enhancement of Biscuits through Sloe Powder Integration: A Novel Approach to Local Fruit Valorization

Asmaa BERKATI, Nadir BEN HAMICHE, and Kamilia BOUSSAID

ABSTRACT

As part of local fruit valorization efforts, this study aims to enrich dry biscuits with sloe powder at different concentrations and evaluate the impact of this incorporation. Control and enriched biscuits were prepared following a standard formulation (flour, sugar, baking powder, margarine, salt, water) where flour was partially substituted with sloe powder at rates of 3%, 5.5%, and 8%. Biweekly extractions were performed from day 0 to day 45 to measure total phenolic compounds (TPC) and monitor the temporal evolution of enrichment, accompanied by comprehensive physicochemical analyses. Sensory evaluation involved an expert panel of 15 tasters analyzing color, texture, friability, taste, aroma, and overall acceptability. Results demonstrate a significant increase in bioactive compounds proportional to the incorporation rate, ranging from 1185.55 mg GAE/100g DW for the control to 1480.04 mg GAE/100g DW for the 8% enriched biscuit. Linear regression analysis ($R^2 = 0.851$, $p < 0.0001$) reveals significant degradation during storage. Sensory analysis shows optimal acceptability for biscuits enriched at 5.5%, confirming the technical feasibility of this innovation. This research opens promising perspectives for developing food industry products with added nutritional value, effectively contributing to the valorization of local fruit resources.

Keywords: Sloe; Bioactive compounds; Sensory Evaluation; Valorization; Biscuits.

Cherry Stem By-Product Valorization on Medicinal Applications for Treating Obesity and Bacterial Infections

Yasmina BOUREBABA, Sonia KOUBACHE, Zahoua-Sara BERRAKI, Rabah BRAHMI, Amina MAHDI, and Saida MEZIANI

ABSTRACT

Obesity and infectious diseases are becoming increasingly common and represent major public health challenges, necessitating the development of effective therapeutic alternatives. Cherry stems, a byproduct of the agri-food industry, have attracted considerable attention due to their potential health benefits. This study investigated the effects of an ethanolic extract of cherry stems on inflammation and oxidative stress related to obesity, as well as its antibacterial properties. Additionally, acute oral toxicity was evaluated in female BALB-c mice, and the levels of bioactive compounds were quantified. Phytochemical analysis was performed, followed by *in vitro* and *in vivo* assessments of biological activities linked to obesity reduction. The extract's effects on various pathogens and its synergistic potential with antibiotics were also examined. *In vitro* results revealed significant concentrations of vitamin C and phenolic compounds (3.93 mg ASE/g and 215.52 ± 2.46 mg GAE/g extract, respectively). At a concentration of 0.1 mg/ml, the extract exhibited marked anti-inflammatory (67.11%), antioxidant (60.17% and 64.23%), and anti-obesity (28.29% and 76.66%) effects. No evident toxicity was observed even at high doses during acute oral toxicity testing of the crude ethanolic extract. The data demonstrate that Prunus extracts possess notable antimicrobial activity, with growth inhibition rates ranging from 10 to 98.5%, mainly due to their bioactive content. When combined with antibiotics, the extract enhanced bacterial growth inhibition, indicating a promising synergistic effect. Furthermore, the extract showed bactericidal activity (66.66% to 77.77%) against various pathogenic bacterial strains. These findings suggest that cherry stems could serve as a natural alternative to combat bacterial infections, obesity, and associated disorders.

Keywords: Cherry Stem; Obesity; Infectious Diseases; Oxidative Stress; Antibiotic Susceptibility.

Entre Nutrition et Médecine : Valorisation du Potentiel Bioactif de la Caroube

Sabrina DJEBARI, Magdalena WRONA, Cristina NERIN, Ouarda DJAOUDENE, et Sara GUÉMOUNI

RÉSUMÉ

La flore algérienne est très riche en plantes médicinales aux bienfaits reconnus pour la santé humaine. Dans cette étude, nous avons tenté d'explorer le potentiel d'une plante locale, *Ceratonia siliqua* L., en exploitant les propriétés intéressantes des extraits phénoliques de la pulpe et de la gomme de cette plante. Soixante-seize composés différents ont été détectés chez *Ceratonia siliqua* L. dans les deux extraits (44 composés ont été identifiés dans l'extrait de pulpe de caroube et 57 composés dans l'extrait de gomme de caroube). Les flavonoïdes et les acides phénoliques constituent le principal groupe de composés phénoliques présents dans les extraits analysés. L'évaluation de l'activité antibactérienne a démontré le pouvoir inhibiteur des extraits de pulpe et de gomme contre diverses bactéries pathogènes. De plus, la sensibilité des souches bactériennes testées dépend de la dose

d'extraits analysés. De plus, les deux extraits possèdent une activité piégeuse contre les radicaux libres DPPH, ce qui en fait de bons candidats pour la prévention des maladies induites par le stress oxydatif. Les extraits de pulpe et de gomme de caroube ont montré un bon potentiel antioxydant et antibactérien et constituent une source intéressante de TPC qui mérite d'être appliquée dans les industries pharmaceutiques et médicales.

Mots clés: *Ceratonia siliqua* L. ; UPLC-ESI-Q-TOF-MSE ; Composés Phénoliques ; Activité antioxydante ; Activité Antibactérienne.

Teneur en Chlorophylle et Caroténoïdes des Ecorces de Concombre, Melon, Patate et Pastèque et leurs Mélange Eco-séchées par Micro-ondes à Haute Puissance (1000W).

Oualid DJOUDER et Sabiha ACHAT

RÉSUMÉ

Les sous-produits agricoles sont très riches en phytomicronutriments qui peuvent être utilisés pour formuler et/ou renforcer la valeur nutritionnelle, sanitaire et technologique des nouveaux produits agroalimentaires, cosmétiques et pharmaceutiques. Dans l'objectif de la valorisation de ces sous-produits avec des éco-procédés, le but de cette étude était mesuré la teneur en pigments (les chlorophylles (a, b et totaux) et les caroténoïdes totaux) des écorces de quelques fruits et légumes : concombre (CP), melon (MP), patate (PP) et pastèque (WP) et leurs mélanges, qui ayant des couleurs variés entre le jaune et le vert. Nos sous-produits ont été traités par des éco-procédés par l'utilisation de micro-onde, où un éco-séchage à haute puissance (1000W) suivis par une éco-extraction à faible puissance (400W) ont été réalisés. D'après les résultats, on a trouvé que les écorces de concombre sont les plus riches soit en chlorophylles soit en caroténoïdes par rapport aux autres écorces, ainsi, nous avons remarqué que dans les CP, MP et WP, la teneur en chlorophylles totaux est plus importante qu'en caroténoïdes totaux contrairement au PP, malgré que MP présentes une couleur jaune.

Mots clés : Sous-produits ; Eco-procédé ; Ecoséchage ; Ecorces ; Chlorophylles ; Caroténoïdes.

Etude de la Composition Phénolique et des Propriétés Antioxydantes d'Extraits des Feuilles d'Orge (*Hordeum vulgare* L.)

Samira FELLA et Nadjat BENNACER

RÉSUMÉ

Le travail réalisé a pour objectif le dosage des composés phénoliques et l'étude de l'activité oxydante de deux extraits éthanolique (80%) de l'herbe d'orge (*Hordeum vulgare* L.) à deux stades de maturation (herbes d'orge de stade 10 cm et 20 cm). A la lumière de nos résultats, le taux d'extraction trouvé est presque pareil dans les deux extraits ($15,5 \pm 0,29$ % et $16,7 \pm 0,18$ %). De même, pour la teneur en chlorophylle (0,7056 \pm 0,0006 et 0,694 \pm 0,016 mg/g). En revanche, pour le dosage de la vitamine C, la valeur la plus élevée à été trouvée pour l'extrait d'herbe d'orge de 10 cm, avec une valeur de 548,98 \pm 19 mg équivalent d'acide ascorbique/100g de poudre. Les valeurs du dosage des composés phénoliques montrent que la valeur la plus élevée a été trouvée pour l'extrait de 10 cm (4640 \pm 37mg d'équivalent d'acide gallique/100

g de poudre) en polyphénols totaux, et pour l'extrait de 20 cm (22960 mg d' équivalent de quercitrine /100g de poudre) en flavonoïdes. L'évaluation de l'activité antioxydante pour le teste DPPH et ABTS, révèle que les deux extraits 10 et 20 cm, possèdent une activité antiradicalaire similaire, avec un IC_{50} pour le DPPH de $153,72 \pm 6,80$ et $140,15 \pm 5,31 \mu\text{g}/100\text{g}$ respectivement, et avec un IC_{50} pour le test ABTS de $0,2197 \pm 0,0175$ et $0,2307 \pm 0,0103 \text{ mg/mL}$ respectivement.

Mots clés : Herbe d'Orge ; *Hordeum vulgare* L. ; Activité Antioxydante; DPPH ; ABTS.

Antimicrobial and Anti-Biofilm Potential of Juglans regia Husk Extracts: A Promising Co-Product for Oral Health Applications

Kahina HARDOU-BELHOCINE, Fatiha BRAHMI, Lila BOULEKBACHE-MAKHLOUF, and Khokha MOUHOUBI-ALOU

ABSTRACT

Dental caries and periodontal diseases are among the most prevalent oral health problems worldwide and are primarily associated with the activity of pathogenic microorganisms organized within biofilms. The increasing resistance of these pathogens to conventional antimicrobial agents highlights the need for natural and sustainable alternatives. In this context, the present study investigates the antimicrobial and anti-biofilm potential of polar extracts obtained from the husk of *Juglans regia* (walnut), an underutilized plant co-product with significant bioactive potential. The study aimed to assess the inhibitory effects of *Juglans regia* husk extracts against key oral pathogens, including *Streptococcus mutans*, *Streptococcus sobrinus*, *Aggregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis*, *Fusobacterium nucleatum*, and *Candida albicans*. Antimicrobial activity was evaluated through determination of the minimum inhibitory concentration (MIC) and minimum bactericidal/fungicidal concentration (MBC/MFC), while the anti-biofilm and anti-adhesive effects were assessed using biofilm inhibition assays and adhesion tests on hydroxyapatite surfaces, which mimic the tooth enamel environment. Results revealed that the polar extracts of *Juglans regia* husk exhibited strong antimicrobial activity, particularly against anaerobic bacteria. The most notable effects were observed for *Fusobacterium nucleatum* (MIC = 0.012%) and *Porphyromonas gingivalis* (MIC = 0.025%). Concerning cariogenic bacteria, *S. mutans* and *S. sobrinus* were inhibited at MIC values of 0.06% and 0.5%, respectively. Furthermore, the extracts demonstrated significant antifungal activity against *Candida albicans*. The anti-biofilm assays showed a substantial reduction in biofilm formation across all tested species, indicating that the extracts not only inhibit bacterial growth but also interfere with microbial adhesion and biofilm development. The adhesion of *S. mutans* and *S. sobrinus* to hydroxyapatite surfaces was significantly reduced at low extract concentrations (0.12% and 0.5%, respectively). These results suggest that the polar extracts of *Juglans regia* husk can effectively disrupt early stages of biofilm formation and prevent bacterial colonization on dental surfaces. The findings highlight the remarkable potential of *Juglans regia* husk as a source of natural antimicrobial and anti-biofilm compounds. Beyond its biological efficacy, this work contributes to the valorization of an agricultural co-product, promoting the circular use of plant materials with medicinal value. Such an approach aligns with current global

efforts toward sustainable bioproduct development and improved oral health management. In conclusion, *Juglans regia* husk represents a promising and eco-friendly co-product that could be further explored for incorporation into pharmaceutical or oral hygiene formulations aimed at preventing dental caries and biofilm-related infections. Its dual antimicrobial and anti-biofilm properties make it a valuable candidate for natural, safe, and effective alternatives in oral healthcare.

Keywords: *Juglans regia*; Co-Product Valorization; Antimicrobial Activity; Anti-Biofilm; Oral Pathogens; Natural Compounds.

Caractérisation Physicochimique et Phytochimique des Différentes Parties du Melon (*Cucumis melo* L.)

Cilya KACI, Lynda DJERMOUNE, Sabine CHAABANE, Aicha KANTAOUI, Dihia BABOURI, and Farida BENMEZIANE

RÉSUMÉ

Le melon (*Cucumis melo* L.), espèce de la famille des Cucurbitacées, est un fruit apprécié pour ses qualités nutritionnelles et ses bienfaits pour la santé. Cette étude vise à caractériser les principales parties du fruit (pulpe, graines et pelure) à travers une analyse physicochimique et phytochimique, dans l'objectif d'évaluer leur potentiel de valorisation. Les résultats ont révélé des variations notables entre les différentes parties en ce qui concerne leur composition nutritionnelle ainsi que leur richesse en composés bioactifs. La pulpe s'est distinguée par sa teneur en nutriments essentiels, tandis que les graines et surtout la pelure ont montré une concentration élevée en substances antioxydantes, généralement sous-exploitées dans les filières de transformation. Cette étude met en évidence l'intérêt d'une valorisation intégrale du melon, incluant ses sous-produits, dans une perspective de lutte contre le gaspillage agroalimentaire, de gestion durable des ressources et de développement d'ingrédients naturels à haute valeur ajoutée.

Mots clés : Melon (*Cucumis melo* L.) ; Caractérisation Physicochimique ; Composés Bioactifs ; Propriétés Antioxydantes ; Graines ; Pelure ; Pulpe.

Nutraceutical and Food Applications of Algerian Carob Derivatives

Aida MEKHOUKHE, Leila DEFLAOU-ABDELFFETTAH, Yasmine AIT ABBAS, Celia OURARI, Sonia MEDOUNI-ADRAR, Lamia MEDOUNI-HAROUNE, Ouahiba SOUFI-MADDI, Khodir MADANI, and Lila BOULEKBACHE-MAKHLOUF

ABSTRACT

This work is part of a study on the functional and nutritional properties of Algerian carob, with particular emphasis on its gum (used as a thickening and stabilizing agent), pulp (rich in sugars and polyphenols), and by-products (cakes rich in fibers and proteins). The aim is to valorize these local resources through innovative food applications, such as chocolate production, while promoting sustainable by-product management within a circular economy framework. A chemical characterization and evaluation of certain biological activities of the carob fruit and its derivatives were carried

out. Physicochemical analyses (moisture content, lipid, protein, total sugar, fiber, ash, pH, acidity, and °Brix values) were performed to determine the composition of the fruit and its by-products. In addition, antioxidant capacity and antidiabetic activity were assessed. The effect of carob powder proportion on the chemical and sensory characteristics of the elaborated chocolate was determined and the antioxidant capacity was assessed. The results demonstrated that carob pulp presented high levels of carbohydrates (55.85%), fiber (11.68%), and a low level of fat (0.34%). Its aqueous–acetone extract exhibited a notable content of phenolic compounds, significant antioxidant activity, and strong inhibitory potential against α -glucosidase. This study demonstrated that the carob pod powder could be a promising replacement of cocoa powder with a level of 80% and hence has potential effect for industrial, nutritional, and health applications.

Keywords: Carob; Polyphenols; Pulp; α -Glucosidase; Sensory Analysis.

In vitro Effects of Peach Phenolic Compounds on Beta-Amyloid and Alpha-Synuclein Aggregation and Neuroprotection

Abderrahmane MOKRANI and Tristan RICHARD

ABSTRACT

Background: Peaches (*Prunus persica* L.) are a popular summer fruit and there has been an increasing interest in their nutritional value. Phenolic compounds represent the main antioxidants present in peaches. Phenolic compounds have recently received particular attention because of their possible preventive role in neurological disorders. Because β -amyloid (β A) and α -synuclein (α S) are the primary components of amyloid plaques and Lewy bodies, respectively, the aggregation of these proteins is considered to be a critical step during neurodegenerative processes associated with Alzheimer's disease (AD) and Parkinson's disease (PD), respectively. **Aim:** The aim of this study was to study the inhibitory activity of fruit extracts of seven peach varieties cultivated in Algeria against β A and α S aggregation and their neuroprotective effect. **Material and Methods:** Several peach fruit extracts were investigated in order to assess their inhibitory activity against β A and α S fibril formation and to evaluate their neuroprotective capacity against β A-induced cytotoxicity on PC12 cells. The effect of each peach fruit extract on the β A25-35 aggregation was monitored by using an in vitro assay based on UV-visible measurements; curcumin was used as positive control. The inhibitory property of peach fruit extract on the α S aggregation was studied by using thioflavin T binding assay. Finally the neuroprotective capacity against β A-induced cytotoxicity on PC12 cells was monitored by determination of cell viability by the MTT assay and the intracellular ROS production measurement evaluated by the DCFH-DA assay. **Results.** Results showed that all peach phenolic extracts inhibit β A and α S aggregation (fibril formation) and protect PC12 cells against β A-induced cytotoxicity. Concerning β A fibril formation, among the seven peach varieties studied, Red Top and Cardinal extracts had the strongest inhibition percentage comparing to the other cultivars. Peach extracts are more effective on α S aggregation. These data suggested that the constituents of each cultivar might have some influences on the inhibitory process. Incubation of PC12 cells with 100 and 200 μ g/mL of peach extracts of all cultivars significantly prevented the cytotoxic effect of β A25-35. The extracts increased the cell viability in dose

dependent manner. Finally, for ROS production, treating cells with the different peach fruit extracts permitted to reduce ROS generation induced by the β A. **Conclusion.** In conclusion, these results suggest that peach fruit could serve as a good source of natural antioxidant compounds and might contribute for nutritional prevention of certain chronic diseases linked to oxidative stress such as neurological disorders (Alzheimer and Parkinson diseases).

Keywords: Peach; Phenolic Compounds; β -Amyloid; α -Synuclein; Aggregation, Neuroprotection.

Potentiel Nutraceutique et Antioxydant des Ecorces de Quelques Cucurbitacées

Nadjiba OUALI

RÉSUMÉ

Introduction : *Citrullus lanatus* 'Crimson Sweet', *Cucumis melo* subsp. *melo* et *Cucurbita pepo*, originaires de la localité de Béjaïa ont fait l'objet de la présente étude. Les proportions relatives des différentes parties de ces fruits (jus, pulpe, écorce et pépins) ainsi que leurs valeurs nutritionnelles ont été déterminées. L'extraction enzymatique des substances bioactives à partir des écorces a été optimisée. **Matériels et Méthodes :** Les glucides, les protéines, les lipides, les fibres et Les polyphénols totaux ont été quantifiés respectivement par les méthodes d anthrone , de Bradford, de Folch , gravimétrique et de Folin-Ciocalteu. L'activité antiradicalaire au DPPH et l'activité antioxydante à l'ABTS ont été évaluées pour déterminer l'activité antioxydante des différents extraits. **Résultats :** Les résultats obtenus montrent que les trois espèces de Cucurbitacées (*Cucumis melo*, *Cucumis lanatus* et *Cucumis pepo*) ont des profils nutritionnels presque similaires. *Cucumis lanatus* se distingue par sa teneur élevée en glucides (7,2%) et sa faible teneur en lipides (0,22%), tandis que *Cucumis pepo* est riche en protéines (0,8%) et pauvre en lipides (0,09%). *Cucumis melo* a une teneur en fibres légèrement plus élevée (0,53%) que les deux autres espèces. L'extraction enzymatique donne des rendements plus élevés en polyphénols totaux pour les écorces des trois fruits étudiés par rapport à l'extraction conventionnelle. **Conclusion :** Cette étude montre que les Cucurbitacées ont un potentiel nutraceutique et antioxydant prometteur, avec des profils nutritionnels intéressants riches en glucides, fibres et protéines, et pauvres en lipides. Ces caractéristiques font d'elles une excellente addition à une alimentation équilibrée et pourraient être utilisées pour développer des produits alimentaires fonctionnels et des suppléments nutritionnels pour promouvoir la santé humaine.

Mots clés : Cucurbitacées ; Valorisation ; Antioxydants ; Coproduits ; Extraction.

Pistacia Lentiscus Oil Byproduct: A Great Potential for Valorization as a Source of Bioactive Phenolic Compounds

Toufik OUATMANI, Hayate HADDADI-GUEMGHAR, Lila BOULEKBACHE-MAKHLOUF, and Khodir MADANI

ABSTRACT

In Mediterranean regions, oil is obtained from the berries of the *Pistacia lentiscus* L. (mastic tree) by cold pressing and mainly used in

traditional medicine. However, this process yields a byproduct consisting in the oil cake (LOC). Unfortunately, despite being rich in bioactive compounds, the LOC is undervalued. The objective of this study was to optimize the green, ultrasound-assisted extraction of phenolic compounds from lentisk oil cake. A Box-Behnken design was used to evaluate the effects of an ethanol/water mixture, temperature, and extraction time on the total polyphenol yield of LOC. High-performance liquid chromatography (HPLC) coupled with a diode array detector (DAD) was then used to determine the phenolic profile of the optimized extract. The extract's antioxidant and antidiabetic activities were also evaluated. The predicted extraction conditions (50% ethanol, 60 °C, and 86 minutes) were confirmed experimentally. Under these conditions, the optimized extract exhibited an IC_{50} of 61.79 ± 0.40 $\mu\text{g/mL}$ against the ABTS' free radical, compared to a positive control of Trolox with an IC_{50} of 50.67 ± 0.32 $\mu\text{g/mL}$. Additionally, the optimized extract demonstrated promising anti- α -amylase activity with an IC_{50} of 99.82 ± 2.03 $\mu\text{g/mL}$. This bioactivity is likely due to the phenolic composition of the TL extract. Twelve phenolic compounds, including six flavonoids and five phenolic acids, were identified and quantified in the optimized extract.

Keywords: *Pistacia Lentiscus* L.; Cake; Ultrasound-Assisted Extraction; Box Behnken Design; Phenolic Compounds; HPLC-DAD, *In vitro* Biological Activities.

Effect of Locust Bean Gum on Texture, Viscosity, and Stability of Food Sauces

Celia OURARI, Aida MEKHOUKHE, Yasmine AIT ABBAS, and Lila BOULEKBACHE- MAKHLOUF

ABSTRACT

The purpose of this study was to valorize carob by-products by incorporating locust bean gum (LBG) into mayonnaise. LBG was extracted with water, purified, and characterized, showing a high sugar content, minimal pH-dependent solubility changes, and no cytotoxicity. Mayonnaise samples containing LBG, alone or combined with modified starch, were evaluated for physicochemical and rheological properties. Results indicated that formulations with LBG exhibited acceptable texture, stability, and overall quality. The study concludes that LBG is a promising natural ingredient for improving the functional properties of mayonnaise.

Keywords: Carob; Cleansing; Locust Bean Gum; Mayonnaise; Solubility.

Activité Antibactérienne du Miel Algérien et son Potentiel pour la Sécurité Alimentaire Durable

Abel ZENATI, Zina TAFININE-MOUHOUBI, Rim SALHI, Younes ARROUL, Nawel GUENAOU, Roukia BOUIZAR, Rania AGABI et Nadia AMESSIS-OUCHEMOUKH

RÉSUMÉ

Le miel, produit naturel issu de la ruche, possède une réputation millénaire pour ses propriétés thérapeutiques, notamment son pouvoir antimicrobien. Dans un contexte mondial marqué par la résistance croissante des micro-organismes pathogènes aux antibiotiques, la recherche de nouvelles substances naturelles à potentiels

antimicrobiens constitue un enjeu majeur pour la sécurité de denrées alimentaire et la santé publique. Le présent travail vise à évaluer l'activité antimicrobienne du miel algérien vis-à-vis de plusieurs souches bactériennes et fongiques d'intérêt alimentaire et clinique. Des échantillons de miel ont été collectés à partir de différentes zones de production algériennes, représentatives de la diversité florale nationale. L'évaluation de l'activité antimicrobienne a été réalisée selon la méthode de diffusion sur gélose Muller Hinton (méthode des puits), en testant les extraits de miel à l'égard de 3 bactéries à Gram positif *Staphylococcus aureus*, *Enterococcus faecalis*, *Staphylococcus aureus* résistant à la méthicilline (SARM), et 3 bactéries à Gram négatif : *Escherichia coli*, *Salmonella enterica*, et *Acinetobacter baumannii*. Les diamètres des zones d'inhibition ont été mesurés après incubation à l'aide d'un pied à coulisse et comparés à un échantillon témoin non enrichi. Les résultats obtenus ont mis en évidence une activité antibactérienne variable selon les souches. Tous les échantillons de miel testés ont montré une action inhibitrice significative vis à vis *Enterococcus faecalis*, avec des zones d'inhibition comprises entre 21 et 24 mm, ce qui explique une sensibilité élevée de cette souche aux composés bioactifs du miel. En revanche, les autres souches bactériennes, notamment *E. coli*, *S. aureus*, *SARM*, *Salmonella enterica* et *A. baumannii*, se sont qualifiées résistantes à l'ensemble des échantillons testés, suggérant que le potentiel antibactérien du miel dépend étroitement de la bactérie cible et du profil biochimique du miel considéré. L'activité observée à l'égard *E. faecalis* pourrait être attribuée à la synergie entre plusieurs facteurs du miel : sa forte osmolarité, son pH acide, la présence de peroxyde d'hydrogène, ainsi que la richesse en composés phénoliques et flavonoïdes, connus pour leurs propriétés antibactériennes. Cette spécificité d'action confère au miel un intérêt particulier dans le développement de solutions naturelles pour la préservation et la sécurité des denrées alimentaires, comme alternative des conservateurs synthétiques. En conclusion, le miel algérien se distingue par son potentiel antimicrobien ciblé, particulièrement efficace vis à vis *Enterococcus faecalis*. Ces résultats renforcent la position du miel comme produit de la ruche à haute valeur ajoutée, pouvant contribuer à la valorisation du patrimoine apicole national et à la promotion d'une sécurité alimentaire durable fondée sur les ressources locales.

Mots clés: Miel Algérien ; Activité Antibactérienne ; *Enterococcus faecalis* ; Sécurité Alimentaire ; Valorisation ; Produits de la Ruche.

Development of Peach Fruit Extracts with Anticancer Activity against Human Glioblastoma U87 Cells

Abderrahmane MOKRANI, Annie-claire BALANDRE, Arnaud MONVOISIN, and Marc MESNIL

ABSTRACT

Peaches (*Prunus persica* L.) are a popular summer fruit and there has been an increasing interest in their nutritional value. Phenolic compounds represent the main antioxidants present in peaches. Phenolic compounds have recently received particular attention because of their possible preventive role in neurological disorders. Background. Because β -amyloid (βA) and α -synuclein (αS) are the primary components of amyloid plaques and Lewy bodies, respectively, the aggregation of these proteins is considered to be a critical step during neurodegenerative processes associated with Alzheimer's disease (AD) and Parkinson's disease (PD), respectively. Aim. The aim of this study is to study the inhibitory activity of fruit extracts of seven peach

varieties cultivated in Algeria against β A and α S aggregation and their neuroprotective effect. Material and methods. Several peach fruit extracts were investigated in order to assess their inhibitory activity against β A and α S fibril formation and to evaluate their neuroprotective capacity against α A-induced cytotoxicity on PC12 cells. The effect of each peach fruit extract on the β A25-35 aggregation was monitored by using an in vitro assay based on UV-visible measurements; curcumin was used as positive control. The inhibitory property of peach fruit extract on the α S aggregation was studied by using thioflavin T binding assay. Finally the neuroprotective capacity against β A-induced cytotoxicity on PC12 cells was monitored by determination of cell viability by the MTT assay and the intracellular ROS production measurement evaluated by the DCFH-DA assay. Results. Results showed that all peach phenolic extracts inhibit β A and α S aggregation (fibril formation) and protect PC12 cells against β A-induced cytotoxicity. Concerning β A fibril formation, among the seven peach varieties studied, Red Top and Cardinal extracts had the strongest inhibition percentage comparing to the other cultivars. Peach extracts are more effective on α S aggregation. These data suggested that the constituents of each cultivar might have some influences on the inhibitory process. Incubation of PC12 cells with 100 and 200 μ g/mL of peach extracts of all cultivars significantly prevented the cytotoxic effect of β A25-35. The extracts increased the cell viability in dose dependent manner. Finally, for ROS production, treating cells with the different peach fruit extracts permitted to reduce ROS generation induced by the β A. Conclusion. In conclusion, these results suggest that peach fruit could serve as a good source of natural antioxidant compounds and might contribute for nutritional prevention of certain chronic diseases linked to oxidative stress such as neurological disorders (Alzheimer and Parkinson diseases).

Keywords: Peach; Phenolic Compounds; β -Amyloid; α -Synuclein; Aggregation; Neuroprotection.

Water Treatment: Effect of *Opuntia ficus-indica* Mucilage on Chemical Oxygen Demand (COD) Removal

Naima DJERROUD-MOHELLEBI, Nawel ADJEROU-ABDELLATIF, Zahra AZZOUZ, Belkacem MERZOUK, Mehmet KOBYA, and Khodir MADANI

ABSTRACT

The electrocoagulation (EC) treatment process was aided by the cladode mucilage of *Opuntia ficus-indica* (OFI) to improve chemical oxygen demand (COD) removal efficiency (%) of wastewater from a plant producing flavoring and food additives. The studied variables included initial pH, current density, types of electrodes (Fe and Al), mucilage concentration, and charge loading. The EC treatment using Al electrodes, assisted by an optimum concentration of 200 mg L⁻¹ OFI mucilage, a current density of 60 A/m², and an initial pH equal to 3, improved the COD removal efficiency (69.77%) at an EC treatment time of 40 min. The EC operating costs, energy, and electrode consumptions values were equal to 3.809 US \$/m³, 0.810 kWh/kg COD removed, and 0.7898 kg/m³, respectively. However, no improvement was noted when Fe electrodes were used with or without adding OFI mucilage (under conditions of pH 6, current density of 50 A/m², and EC time of 120 min), and COD removal efficiency (%) was equal to 41.5%. The operational costs, energy and electrode

consumptions were equal to 4.2201 US \$/m³, 2.8 kWh/kg COD removal and 3.0964 kg/m³, respectively. The OFI mucilage could be used as a promising bio-coagulant with EC treatment using Al electrodes, to treat the plant producing flavoring and food additives wastewater.

Keywords: Electrocoagulation Process; Food Production; COD; *Opuntia ficus indica*; Mucilage.

Application of Pumpkin Powder in Pasta Fortification: Impacts on Nutritional, Technological, and Organoleptic Properties

Abdallah BOUASLA and Warda SAHRAOUI

ABSTRACT

The aim of the study was to evaluate nutritional, technological, and organoleptic properties of durum wheat pasta fortified with pumpkin powder (PP). Two levels of PP (5, and 10%) were incorporated for the development of fortified wheat pasta and their impact on nutritional properties (ash content, phenolic content and β -carotene content), cooking quality (optimum cooking time and cooking loss), color profile, and overall sensory acceptability was assessed. 100% wheat pasta was considered as control sample. The results showed that the amount of ash content, phenolic compounds and β -carotene content increased significantly in the fortified pasta with the increase of the fortification level. Furthermore, the addition of PP in pasta significantly reduced optimum cooking time. In contrast, the incorporation of PP in pasta significantly increased cooking loss without exceeding the acceptable limit. Similar tendency was observed for yellowness. As regard organoleptic evaluation, fortified pasta received acceptable scores in overall acceptability. PP can successfully be used (up to 10%) in nutritionally valuable pasta formulations.

Keywords: Pumpkin Powder; Whole Wheat; Pasta, Nutritional Value; Technological Quality; Organoleptic Properties.

Caractérisation Microbienne et Potentiel Fonctionnel d'un Levain Naturel Elaboré à Partir de Blé Complet Algérien (MAWNA)

Amel CHAIBAI, Amel KOUIDRI et Djamilia DEFFAIRI

RÉSUMÉ

La fermentation au levain naturel constitue une pratique ancestrale, récemment réhabilitée en raison de ses nombreux avantages technologiques, nutritionnels et sensoriels. Dans ce contexte, la présente étude a été consacrée au développement d'un levain naturel à partir de farine de blé complet, avec pour objectif principal l'analyse de son profil microbien et l'évaluation de son potentiel fonctionnel. Le choix de la farine complète repose sur sa richesse en nutriments (fibres, minéraux, vitamines) et sur la présence de micro-organismes indigènes qui participent activement au processus fermentaire. Les analyses physico-chimiques réalisées sur le blé complet ont permis de mieux comprendre les conditions du milieu et leur influence sur le développement microbien pendant la fermentation de blé. Les résultats obtenus montrent des valeurs conformes aux standards de qualité alimentaire : humidité = 9,21 %, cendres totales = 2,49 %, acidité titrable = 0,033 %, protéines = 13,75 %, fibres totales = 2,03 %. Ces

paramètres traduisent une bonne stabilité du levain et confirment son aptitude à assurer une fermentation efficace, favorable à l'amélioration des qualités organoleptiques et nutritionnelles du pain. Sur le plan microbiologique, les résultats révèlent une grande diversité de micro-Lactobacillus, leuconstoc. Les levures isolées sont représentées essentiellement par les genres *Saccharomyces* et *Candida*. Cette flore variée témoigne de la complexité des interactions microbiennes au sein du levain naturel et souligne son rôle dans la production d'acides organiques, de composés aromatiques et de métabolites d'intérêt technologiques. Ainsi, le levain étudié présente non seulement une activité fermentaire significative mais également un potentiel de conservation intéressant, pouvant contribuer à la prolongation de la durée de vie du pain. L'utilisation de ce type de levain naturel apparaît comme une alternative durable et valorisante par rapport aux levures commerciales, permettant la production de pains aux propriétés sensorielles améliorées, enrichis en nutriments et plus digestes. En conclusion, cette étude met en évidence la richesse microbienne et la valeur technologique d'un levain naturel élaboré à partir de blé complet algérien. Elle ouvre des perspectives prometteuses pour la sélection de souches autochtones de bactéries lactiques et de levures susceptibles d'être utilisées comme starters dans la panification artisanale et industrielle

Mots clés : Levain Naturel ; Bactéries Lactiques ; Levures ; Blé Tendre ; Fermentation Spontanée.

Étude Comparative Physico-Chimique et Sensorielle de Deux Huiles d'Olive, Aharon et Chemlal, Aromatisées par *Origanum floribundum* et *Rosmarinus officinalis*

Farida DJELILI-MAMOU et Zina MOUHOUBI-TAFININE

RÉSUMÉ

L'huile d'olive représente une source typique de lipide de régime méditerranéen. Elle est l'une et la seule huile végétale qui peut être consommée sous sa forme brute sans traitement préalable. Dans la présente étude nous nous sommes intéressés à évaluer les propriétés physicochimique et sensorielle de deux variétés d'huiles d'olive ; Aharon et Chemlal issues de la région de Tazmalt de Bejaïa et qui sont aromatisées par deux plantes médicinales ; *Origanum floribundum* et *Rosmarinus officinalis*. Les résultats pour la détermination des indices de qualité (taux d'acidité, indice de peroxyde et les absorbances spécifiques dans l'ultraviolet K232 et K270) sont inférieurs aux limites établies par le COI (2019). Après l'addition de plantes aromatiques, une diminution de taux d'acidité a été observée, contrairement à l'indice de peroxyde qui augmente pour atteindre son maximum, puis diminue avec l'état d'oxydation avancé. Pour les coefficients d'extinctions spécifiques (K232 et K270) ont enregistré une faible augmentation qui est peut-être expliquée par la dégradation des hydroperoxydes. Les résultats de l'évaluation sensorielle ont montré que les huiles d'olives aromatisées sont les plus estimées par les expert et les consommateurs naïfs par rapport à celles non aromatisées. Cela est démontré par les meilleurs scores accordés aux attributs positifs (fruité, amer et piquant) caractéristiques d'une huile d'olive de bonne qualité. Il est à noter que l'analyse physico-chimique d'une huile d'olive ne peut être le seul critère à prendre en compte pour évaluer la qualité de celle-ci, néanmoins, l'évaluation sensorielle, par un jury compétent,

permet d'apprécier d'autres propriétés intéressantes pour ces huiles, notamment leur saveur caractéristique.

Mots clés: Huile d'Olive ; Aromatisée ; Qualité ; Sensorielle ; Plantes Médicinales.

Essai de Fabrication d'une Crème Végétale à Base d'Huile de Palmiste Alternative à la Crème Fraîche Laitière

Chafiaa MEDBOUA, Taous BACHIRI, Khalil MEGUELLATI, Djihad ABOU et Rabah ACHIR

RÉSUMÉ

La rareté du lait et de ses dérivés, ainsi que le développement du secteur des crèmes laitières reconstituées, ont conduit à l'émergence des crèmes analogues, produits similaires aux crèmes laitières dans lesquels la matière grasse animale est remplacée par une matière grasse d'origine végétale. Le présent travail, réalisé au sein de l'entreprise ABIA FOOD, a pour objectif la mise au point d'une crème végétale à base d'huile de palmiste, destinée à constituer une alternative à la crème fraîche laitière. Il vise également à étudier l'influence des paramètres de formulation et de procédé sur les propriétés physico-chimiques de la crème obtenue, en la comparant à une crème fraîche laitière commercialisée sur le marché algérien. Après plusieurs essais, une formulation optimale a été établie. Celle-ci est composée d'une matière grasse végétale à 70 % (huile de palmiste), de poudre de lait (?20 %), d'émulsifiants (E471), de tensioactifs dont le choix dépend du type d'émulsion, ainsi que d'agents conservateurs antimicrobiens et antioxydants, d'aromatisants, d'améliorants et de sel. Les résultats ont montré que le choix des ingrédients, les conditions d'émulsification et la température de traitement influencent significativement les propriétés finales de la crème végétale obtenue. Celle-ci présente une acidité de 0,768 %, une viscosité de 21 330 cP, un pH de 4,8, et une homogénéité très proche de celle de la crème fraîche laitière. En conclusion, il ressort que la matière grasse des crèmes fraîches laitières peut être efficacement remplacée par l'huile de palmiste. Les propriétés nutritives, physico-chimiques et rhéologiques de cette dernière confirment son potentiel en tant qu'alternative prometteuse à la crème fraîche d'origine animale.

Mots clés : Huile de Palmiste ; Crème Fraîche ; Crème Végétale.

Innovative Development of a Sustainable Functional Food Based on *Opuntia ficus-indica* Cladodes and Acorn Flour

Malha OUDIR, Youssa AIT AHMED LAMARA, and Meriem BENMOUHOUB

ABSTRACT

Opuntia ficus-indica is recognized for its remarkable resilience to drought, low water footprint, minimal agricultural inputs, and valuable nutritional properties, making it a promising resource to enhance food security in arid and semi-arid regions. This study aimed to develop an innovative and sustainable functional food by combining cactus cladode semolina with acorn flour. A total of 46 kg of cladodes were harvested between February and April in central Algeria. After spine removal, washing, drying, milling, and sieving, a semolina of medium granulometry was obtained. Physicochemical analyses revealed that cactus semolina exhibits an interesting nutritional profile, being rich in

proteins and essential minerals (iron, phosphorus, and potassium), with moderate calcium content and low sugar levels. The functional food formulated with cactus semolina and acorn flour demonstrated acceptable sensory quality and enhanced nutritional value, being rich in proteins, soluble fibers, antioxidants, essential minerals, and low in sugars. The combined results highlight the potential of cactus semolina as a sustainable raw material for the development of gluten-free, functional food products with high nutritional benefits. This approach provides innovative opportunities for the local valorization of underutilized bio-resources and contributes to sustainable strategies for food security.

Keywords: *Opuntia ficus-indica*; Functional Foods; Acorn Flour; Sustainability; Food Security.

The Evaluation of Antioxidant and Anti-Inflammatory Properties of *Urtica urens*: A Homemade Tisane

Meriem BELAOUNI

ABSTRACT

The exploitation of medicinal plants that are well distributed all over the world has taken a large interest of the majority of scientific research. Here in Algeria, besides many other plant species, Algerians use the small nettle (*Urtica urens*) to help with various health problems, mainly those related to the skin, commonly used to treat rashes, itching, and even joint pain. The leaves and stems of *Urtica urens* are packed with natural compounds that can help reduce inflammation and relieve allergy symptoms. Citizens, however, have many recipes aiming to use this sort of plant at home. Between January and March of 2025, this study was conducted in the educational labs of the University of Mascara Mustapha Stambouli Faculty of Natural and Life Sciences. The gathered plant material (From Sidi Kada Street Tighennif located in Mascara) was sorted and used in their fresh state without going through a drying process. The plant was identified by one of the botanists from University Mustapha Stambouli-Faculty of Natural and Life Sciences, Mascara. The evaluation of biological properties of the small nettle (*Urtica urens*) aimed to investigate through qualitative and quantitative phytochemical analyses, as well as in vitro biological tests. This study was conducted in two parts; in the first part we investigated, using a questionnaire, the familiarity of some citizens with the relevant plant, how they use it and for what, this part helped us in the selecting of the two most used methods for tisane preparation at home (water infusion and decoction). In the second part we conducted a qualitative analysis through phytochemical screening revealed the presence of various secondary metabolites in the aqueous extracts (infused and decocted) of *Urtica urens*. The evaluation of the antioxidant property was conducted through DPPH test using ascorbic acid as a reference, and thiobarbituric acid reactive substances (TBARS test). The anti-inflammatory property was conducted in vitro through inhibition of the protein denaturation, their haemolytic activity and anti-haemolytic activity. The pharmacological properties of *Urtica urens*, highlighted in this study, justify its use in various therapeutic, nutraceutical, and cosmetic fields. Its richness in phenolic compounds (polyphenols, flavonoids, and tannins) provides it promising antioxidant and anti-inflammatory effects. Thus, the exploitation of this plant as a source of bioactive molecules could be beneficial for health, particularly in the prevention of diseases related to oxidative stress and chronic inflammation.

Keywords: *Urtica urens*; Antioxidant Activity; *In Vitro* Anti-Inflammatory Activity; Polyphenols.

Elaboration d'un Nouveau Produit «un Fromage Probiotique à *Lactiplantibacillus plantarum* Enrichi aux *Thymus capitatus*» à l'Echelle Pilote

Samia HAMMA-FARADJI, Sylia TERKI, Ghania ZIDI, Lylia OUARABI, Wissam HAFIR, Amel AIT MEDDOUR, Liza OUARABI et Rachid LADJOUZI

RÉSUMÉ

L'objectif de cette étude est la mise au point d'un nouveau produit semi-industriel à l'échelle pilote à la fromagerie FAFI à Tizi-Ouzou «un fromage blanc probiotique (*Lactobacillus plantarum*) enrichi au *Thymus capitatus* ou à son huile essentielle. Les résultats des analyses physico-chimiques du lait cru sont conformes aux normes établies. Concernant les résultats de l'analyse microbiologiques du lait après pasteurisation, une charge de 4.102 UFC/mL de FTAM est obtenue, avec l'absence total de la flore de contamination et pathogène ce qui est conforme aux normes de JORA. Une analyse sensorielle effectuée sur un panel de 30 dégustateurs a été réalisée au sein de la fromagerie dans le but de déterminer et sélectionner le pourcentage de la poudre de feuilles de thym à incorporer et de son HE. Les résultats ont montré que le fromage enrichi avec 2% de Thym et 0,2% d'HE est le plus apprécié par les dégustateurs. Les résultats du suivi de la qualité physico-chimique du produit fini durant les 20 et 30 jours de conservation à 6°C ont montré des valeurs similaires de matière grasse et du ESD par rapport au fromage enrichi. Le suivi de la qualité microbiologique a montré que l'incorporation de la plante ou de son huile essentielle n'a pas eu d'impact significatif sur la présence et la croissance du probiotique (*Lactobacillus plantarum*). Néanmoins, une différence significative entre les taux de flores d'altérations (levures et coliformes) est observée au cours de la conservation par rapport aux fromages témoins (non enrichi) avec une présence de moisissures à partir du 20^{ème} jour dans le fromage témoin. Néanmoins, une meilleure qualité hygiénique est notée pour le Fromage probiotique en présence de la poudre de feuilles de *Thymus capitatus* que celui avec l'huile essentielle. Cependant, la croissance de *L. plantarum* est meilleure en présence de la plante ou de son HE. Ces résultats indiquent un effet prébiotique de la poudre de thym et de son HE. Pour évaluer les caractéristiques sensorielles de ces derniers, une analyse sensorielle a été réalisée sur un panel non expert constitué de 100 sujets (tous sexes et âges confondus) avec une validation d'un plan d'expérience généré par le logiciel Excel. Les résultats ont montré que les fromages où la poudre de feuille de *Thymus capitatus* avec le probiotique sont les plus appréciés avec une qualité organoleptique meilleur. L'association de plantes médicinales ou d'huiles essentielles aux bactéries lactiques probiotiques pourrait non seulement être considérée comme une alternative au contrôle de la prolifération et à l'inhibition des souches bactériennes pathogènes et d'altérations devenues résistantes aux traitements usuels mais les quelles exercent aussi des actions spécifiques et bénéfiques sur la flore intestinale, régulent le transit et peuvent renforcer les défenses immunitaires.

Mots clés: Fromages ; Echelle Pilote, *Thymus capitatus*, *Lactobacillus plantarum*.

Palm Wine as a Source of Innovative Probiotic Lactic Acid Bacteria

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ABSTRACT

Traditional fermented foods are an invaluable source of microbial diversity with potential applications in the development of functional foods. Palm wine, a naturally fermented beverage widely consumed in Africa, represents a promising yet underexplored niche for the isolation of lactic acid bacteria (LAB) with probiotic potential. In this study, LAB strains were isolated from palm wine and characterized for their functional and technological properties relevant to food innovation. Key traits such as auto-aggregation, cell surface hydrophobicity, biofilm formation, and antibiotic susceptibility were assessed. Their antagonistic activity against *Candida albicans*, a common opportunistic pathogen, was evaluated through spot assays, well diffusion, co-aggregation, and adhesion inhibition tests. Several isolates displayed strong probiotic attributes, including auto-aggregation up to 62 %, hydrophobicity above 55 %, co-aggregation with *C. albicans* reaching 68 %, and adhesion inhibition exceeding 60 %. These results demonstrate that palm wine is a valuable reservoir of probiotic LAB with potential applications in the design of innovative functional foods. By bridging traditional fermentation practices with modern food biotechnology, this work highlights how microbial resources from local beverages can contribute to the development of next-generation probiotic foods, promoting both human health and sustainable food systems.

Keywords: Palm Wine; Lactic Acid Bacteria; Probiotics; Food Innovation; Functional Foods

Effect of a Natural Bioactive Additive on the Microbiological Profile and Oxidative Stability of a Dairy Matrix

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ABSTRACT

Food innovation strategies are increasingly focusing on enhancing existing products by incorporating natural bioactive ingredients with functional properties. In this context, the present study investigated the use of propolis as a natural additive to improve the quality and shelf life of yoghurt, a widely consumed fermented dairy product. Yoghurts were produced from whole UHT milk and inoculated with 3% lyophilized starter cultures consisting of *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus*. The formulations were supplemented with propolis at different concentrations, along with a control without propolis. Physicochemical, microbiological, oxidative stability, and sensory attributes (evaluated by a 10-member panel) were monitored during refrigerated storage. The results showed that the addition of propolis enhanced yoghurt quality by reducing whey separation, maintaining the viability of starter cultures, and inhibiting the growth of contaminating flora. Oxidative stability was significantly improved in the enriched samples, particularly at the higher concentration, supporting the antioxidant role of propolis. Sensory

evaluation indicated that lower concentrations were well accepted and rated superior in taste compared to the control, whereas the higher concentration negatively affected flavor.

Keywords: Yoghurt; Propolis; Food Innovation; Antioxidant Activity; Microbiological Stability; Sensory quality.

Agro-Industrial Betalain Pigments as Bioactive Coatings for Antioxidant Probiotics

Elias BENRAMDANE, Fabiane O. FARIAS, Abderezak TAMENDJARI and Cassamo U. MUSSAGY

ABSTRACT

Agro-industrial residues represent a valuable yet underexploited source of bioactive compounds for sustainable food innovation. In this work, residues from beetroot (*Beta vulgaris*) and prickly pear (*Opuntia ficus-indica*) were valorized as natural sources of betalain pigments—betacyanins (Btc) and betaxanthins (Btx), respectively. Using a water-based extraction method guided by COSMO-SAC modeling, pigment recovery reached 30.5 mg/100 g fresh weight of betacyanins in beetroot and 3.1 mg/100 g FW of betaxanthins in prickly pear. The extracted pigments were employed as bioactive surface coatings for *Lactobacillus bulgaricus* and *Lactococcus lactis*. Antioxidant performance was strongly enhanced: while uncoated strains displayed only 10–20% radical scavenging activity, Btc-coated strains reached 80–85% inhibition in both ABTS and DPPH assays. In terms of IC₅₀ values, Btc-coated *L. bulgaricus* achieved ~102 µg/mL (ABTS) and 151 µg/mL (DPPH), whereas Btx-coated cultures required > 300 µg/mL, confirming that betacyanins were approximately three times more effective than betaxanthins. Bacterial viability was also preserved or improved after coating, with Btx promoting growth in *L. bulgaricus* and Btc supporting higher resilience in *L. lactis*. When applied to yogurt formulations, coated strains retained their enhanced redox activity, with antioxidant inhibition increasing from ~45% in control yogurt to 63% at the highest probiotic concentration (3 × 10⁹ CFU/mL). Moreover, the addition of Btc-coated strains imparted a desirable red hue, with the a* redness value rising from 0.87 (control) to 2.66 (fortified yogurt). Overall, this study demonstrates that betalain-rich extracts from food residues can be effectively used as natural probiotic coatings, delivering dual functionality: (i) reinforcing probiotic antioxidant stability and viability, and (ii) enhancing the nutritional and sensory quality of dairy products. These findings provide a sustainable pathway for circular bioeconomy applications in the functional food sector.

Keywords: Betanin; Betaxanthin; Agro-waste; Redox state; Lactic acid bacteria.

Jus de Carotte comme Colorant Naturel dans le Yaourt Fonctionnel : Evaluation des Propriétés Physico-Chimiques, Microbiologiques Sensorielles et Bioactives au Cours du Stockage

Lynda ARKOUB-DJERMOUNE, Lahna BENSALIA, Lina HADDAR, Cilya KACI, Farida BENMEZIANE et Lila BOULEKBACHE-MAKHLOUF

RÉSUMÉ

La carotte (*Daucus carota* L.) est largement cultivée à travers le monde, notamment dans les zones méditerranéennes, et constitue une excellente source de substance bioactives. L'objectif du présent travail est l'évaluation des propriétés physico-chimiques et antioxydantes du jus de carotte (*Daucus carota* L.) d'une part et l'élaboration d'un yaourt brassé enrichi en ce jus, à différentes concentrations (10 % (YE1), 20% (YE2), 30% (YE3) et 40% (YE4)), afin d'évaluer son impact sur la qualité globale du produit au cours de 21 jours de stockage comparativement à un yaourt témoin (YT) d'autre part. Les analyses effectuées ont montré que le jus de carotte est une source importante de composés bioactifs : polyphénols ($52,11 \pm 0,18$ mg EAG/100mL), vitamine C ($3,63 \pm 0,10$ mg EAA/100 mL), caroténoïdes ($19,89 \pm 0,08$ µg/mL) et lycopène ($10,29 \pm 0,09$ µg/mL). Il a présenté également une bonne activité antiradicalaire DPPH de l'ordre de $98,01 \pm 0,52$ mg ET/100 mL. En outre, les résultats obtenus ont montré également que toutes les formulations de yaourts (YE1 à YE4) présentent une stabilité conforme aux normes de point de vue physico-chimique et microbiologique après 21 jours de stockage à 4°C. De plus, L'ajout de jus de carotte a permis d'enrichir les yaourts en substances bioactives et d'augmenter leur activité antioxydante, notamment pour YE4 (40 %), qui a présenté la meilleure activité antiradicalaire DPPH de l'ordre de 92,56 me ET/100 g d'Ech, un meilleur pouvoir réducteur de 40,09 mg EAA/100 g d'Ech et une bonne activité antioxydante totale de 65,65 mg EAA/100 g d'Ech, par rapport au yaourt témoin. L'analyse sensorielle a mis en évidence une forte acceptabilité des yaourts enrichis, avec une préférence marquée pour YE1 (75,69 %) et YE2 (73,61 %), en raison de leur goût doux, leur couleur attrayante et leur bonne texture. En conclusion, l'élaboration d'un yaourt brassé enrichi en jus de carotte est non seulement faisable, mais offre aussi une véritable opportunité de valorisation d'un ingrédient végétal local à fort potentiel nutritionnel et fonctionnel. Son développement à l'échelle industrielle pourrait répondre aux attentes actuelles des consommateurs en matière de santé, de naturalité et de diversité des produits laitiers.

Mots clés: *Daucus carota* L. ; Jus de Carotte ; Yaourt Brassé ; Qualité ; Stockage ; Activité Antioxydante.

Effect of Margarine Enrichment with *P. lentiscus* Fixed Oil and Honey on its Preservability and Biological Properties

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ABSTRACT

This study focused on the use of lentisk oil and honey as natural sources to formulate margarine with ameliorated quality and oxidative stability. For this, five margarines were formulated with honey and different concentrations of lentisk oil. Analyses were performed on oil and honey used, and then physicochemical characterization and several oxidative stability tests were applied to assess margarine quality. The results showed a significant richness of lentisk oil and honey in total phenolics and total flavonoids and expressed good antioxidant activities. As well as the evaluation of oxidative stability of enriched margarines during 3 months of storage demonstrated that margarine added with 2% lentisk

oil (M1) had the best resistance properties and longer Rancimat induction time (22.26 h), better than the control and margarines added with 5%(M2), 10%(M3), and 15%(M4) lentisk oil. Globally, margarines prepared with high concentrations of lentisk oil (M2–M4) were not different from the control, whereas only M1 was permitted to ameliorate the stability of margarine with a slight influence on physicochemical parameters. The elaboration of margarine supplemented with 2% lentisk oil improves the properties of the product, which could then be applied to margarine manufacturing.

Keywords: Formulation; Lentisk Oil; Honey; Margarine; Antioxidant Activities; Oxidative Stability.

Myrtle Fruit (*Myrtus communis* L.) Powder: A Natural Resource for Food Innovation and Functional Product Development

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ABSTRACT

Food innovation increasingly relies on the exploration of natural resources that combine health benefits with technological functionalities. Myrtle fruits (*Myrtus communis* L.), emblematic of the Mediterranean flora, are rich in bioactive compounds with recognized antioxidant, antimicrobial, and anti-inflammatory properties. In this study, freeze-dried myrtle fruit powder was investigated through physicochemical characterization, phytochemical profiling, and identification of its phenolic compounds. The results obtained showed that the powder exhibited high concentrations of phenolics and flavonoids, together with strong antioxidant activity. Biological evaluations further demonstrated its effectiveness against oxidative stress, pathogenic microorganisms, and key metabolic disorders, reinforcing its value as a natural health-promoting agent. Moreover, the incorporation of myrtle powder into food formulations enhanced both nutritional quality and safety, while offering opportunities for the development of novel, value-added functional products. These findings position myrtle fruit as a versatile ingredient that can inspire sustainable food innovations, reduce dependence on synthetic additives, and contribute to healthier, more resilient food systems.

Keywords: *Myrtus communis*; Food Innovation; Phenolic Compounds; Biological Properties; Functional Foods.

Optimisation de la Formulation d'un Burger Végétarien à Base de Lentilles, Pois et Haricots Noirs par Plan de Mélange D-Optimal

Sonia OUKHMANOU-BENSIDHOUM, Hafida MERZOUK, Fatiha BRAHMI, Rachida AMOKRANE, Nadia BOUAOUDIA, Sabine CHABANE, Sofiane DAIRI

RÉSUMÉ

La demande croissante en substituts de viande à base végétale reflète une évolution mondiale vers des pratiques alimentaires plus durables, éthiques et favorables à la santé. Les légumineuses, grâce à leur richesse en protéines et en fibres, constituent des ingrédients de choix pour la

formulation de tels produits. Cette étude s'est concentrée sur le développement d'un burger végétarien à base de lentilles, de pois et de haricots noirs, en mettant l'accent sur l'optimisation des proportions afin d'obtenir un équilibre entre propriétés nutritionnelles, technologiques et sensorielles. Pour cela, un plan de mélange D-optimal à trois composants a été appliqué. Cette approche a permis d'identifier la combinaison optimale des légumineuses dans la fraction de 60 g de la matrice de 100 g de burger, avec des proportions respectives de 6 g (10 %) de lentilles, 43,2 g (72 %) de pois et 10,8 g (18 %) de haricots noirs. En conclusion, l'utilisation du plan de mélange D-optimal a permis d'optimiser efficacement la formulation du burger végétarien, confirmant le potentiel des légumineuses comme ingrédients fonctionnels pour le développement de substituts de viande équilibrés et durables.

Mots clés: Burger végétarien ; Légumineuses ; Optimisation ; Plan de Mélange D-Optimal ; Formulation.

Racines et Tubercules: Nutrition, Santé et Innovation

Wassim BOUFADENE, Asma BOUDRIA-LARACHI et Nawel ADJEROUD-ABDELLATIF

RÉSUMÉ

Les racines et tubercules, notamment le manioc (*Manihot esculenta*), l'igname (*Dioscorea alata*) et la patate douce (*Ipomoea batatas*), sont des cultures alimentaires essentielles qui contribuent significativement à la sécurité alimentaire dans les régions tropicales et en développement. Ils constituent une source majeure de glucides après les céréales et sont reconnus pour leur richesse en nutriments essentiels et en composés bioactifs, tels que les polyphénols et les antioxydants, qui participent à la prévention des maladies et à la promotion de la santé. Cette étude vise à évaluer la composition nutritionnelle, le profil phytochimique et le potentiel antioxydant de ces cultures sous-exploitées afin d'explorer leur utilisation dans le développement d'aliments fonctionnels. La composition proximale (protéines, fibres, lipides, cendres et humidité) a été déterminée selon les méthodes standards AOAC. Les extraits ont été préparés par macération à froid avec un mélange méthanol/eau (80:20 v/v). Les teneurs totales en composés phénoliques et flavonoïdes ont été mesurées respectivement par les méthodes de Folin-Ciocalteu et au chlorure d'aluminium, et l'activité antioxydante a été évaluée par le test de piégeage du radical DPPH. Les résultats ont montré que *I. batatas* présentait la teneur la plus élevée en fibres alimentaires ($6,36 \pm 0,5$ g/100 g poids sec), tandis que *M. esculenta* présentait la teneur la plus élevée en glucides (86,32 %). La teneur en protéines variait de 1,2 à 6,2 g/100 g selon les espèces. Sur le plan phytochimique, *D. alata* présentait la concentration la plus élevée en composés phénoliques totaux ($11,07 \pm 0,26$ mg EAG/g d'extrait), suivie de *I. batatas* et *M. esculenta*. Les teneurs en flavonoïdes et tanins ne différaient pas significativement ($p > 0,05$), mais l'activité antioxydante variait significativement ($p < 0,05$), avec l'igname montrant le potentiel de piégeage radicalaire le plus élevé ($8,37 \pm 0,19$ μmol EAG/g). Ces résultats soulignent la richesse nutritionnelle et fonctionnelle des racines et tubercules, confirmant leur intérêt en tant qu'ingrédients pour la formulation d'aliments fonctionnels et nutraceutiques visant à améliorer la santé et prévenir les maladies chroniques.

Mots clés: Aliments Fonctionnels ; Racines et Tubercules ; Composés Phénoliques ; Activité Antioxydante ; Innovation Alimentaire.

Optimisation de l'Extraction Assistée par Ultrasons des Composés Phénoliques du Raisin et Etude de l'Activité Antioxydante

Razika BOUHEROUR, Abderrahmane MOKRANI et Tristan RICHARD

ABSTRACT

Le raisin (*Vitis vinifera* L.) est une source riche de composés bioactifs tel que les composés phénoliques qui sont des métabolites secondaires trouvés dans la peau, les graines et la chair. L'extraction assistée par ultrasons (EAU) est l'une des techniques d'extraction qui attire de plus en plus l'attention des chercheurs en raison de son efficacité par rapport aux méthodes conventionnelles. L'objectif de ce travail est l'optimisation des conditions d'extraction par ultrason (EAU) des composés phénoliques et de l'activité antioxydante à partir de la poudre de pellicule de raisin (variété Red Globe) par l'application de la méthodologie de surface de réponse en utilisant le plan d'expérience Box-Behnken (BBD). Une étude préliminaire a été effectuée pour évaluer l'effet de différents paramètres à savoir le choix du solvant (acétone, méthanol, éthanol, et eau), la concentration en solvant (acétone 10, 30, 50, 70 et 90%), la température d'extraction (25, 30, 35, 40, 45 et 50°C), le temps d'extraction (5, 10, 15, 20, 30, et 40 min) ainsi que le ratio solide/ liquide (25/15, 50/15, 100/15, 150/15, et 200/15 mg/ml) sur le rendement en composés phénoliques et l'activité antioxydante avec un degré de signification des données ($p < 0,05$). Les conditions optimales trouvées étaient l'extraction avec l'acétone 50% à 35°C pendant 20 min avec un ratio de 50/15 (mg/ml). Ensuite, la méthodologie des surfaces de réponses (MSR), en appliquant le modèle Box-Behnken, a été utilisée pour étudier les effets de quatre variables indépendantes : la concentration en acétone (30 à 70%), le temps (10 à 30 min), la température (30 à 50°C) et le ratio solide/liquide (25 à 100 mg/15 ml) sur deux réponses (PT et piégeage du radical DPPH). Les résultats montrent une bonne adéquation avec le modèle proposé ($R^2 = 0,97$). La valeur de la probabilité pour le manque d'ajustement était insignifiante, ce qui a confirmé la validité des modèles. L'analyse des surfaces de réponses a montré que les paramètres d'extraction optimaux permettant d'optimiser l'extraction des composés phénoliques et de l'activité antioxydante étaient 50,86% d'acétone, 19,80 min, 37,37°C, et 53,33 mg/15 mL. Dans des conditions optimales, les valeurs expérimentales correspondantes pour les PT et piégeage du radical DPPH étaient de 66,334 mg EAG/g de MS et de 61,994 mg ET/g MS respectivement. Les résultats expérimentaux correspondent à ceux prédits, ce qui témoigne de la pertinence du modèle et de la réussite de la MSR dans l'optimisation des conditions d'extraction des composés phénoliques et l'activité antioxydante à partir des pellicules de raisin et selon les résultats obtenus, il nous a permis de conclure que la pellicule de raisin rouge (variété Red Globe) est une bonne source de composés phénoliques et possède une bonne activité antioxydante. Ainsi, il est suggéré que la pellicule de cette variété de raisin rouge pourrait être utilisée comme source d'antioxydants naturels dans le domaine agroalimentaire et/pharmaceutique.

Mots clés: Pellicule de Raisin ; Extraction ; Optimisation ; Composés Phénoliques ; Activité Antioxydante ; Méthodologie de Surfaces de Réponses ; Modèle Box-Benken.

Spirulina-Enriched Loukoum: A Functional Approach to Nutritional Innovation

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ABSTRACT

This study investigated the potential of *Spirulina platensis* as a functional ingredient and its effect when incorporated into loukoum, a traditional confectionery. The work began by characterizing spirulina's biological activities through a methanolic extract. Antioxidant capacity, evaluated using the DPPH radical scavenging assay, revealed a strong ability to neutralize free radicals, confirming the presence of bioactive compounds such as phycoyanins, carotenoids, and phenolic constituents. Antibacterial activity was tested against *Escherichia coli* (Gram-negative) and *Staphylococcus aureus* (Gram-positive). Results showed a stronger inhibitory effect on *E. coli*, suggesting a mechanism involving bacterial membrane disruption and highlighting spirulina's potential for natural food preservation. Following this characterization, spirulina was incorporated at varying levels into standard loukoum formulations. Physicochemical properties (texture, color, moisture) were analyzed to ensure product quality, and sensory evaluation was conducted by a trained panel. Results indicated that Spirulina enrichment did not compromise consumer acceptability; instead, it enhanced visual appeal with a natural green hue and slightly improved flavor, which was considered pleasant and innovative. The study demonstrates that spirulina can be successfully integrated into traditional confectionery without negatively affecting its technological or sensory characteristics, while significantly enhancing nutritional and functional value. Spirulina-enriched loukoum provides additional antioxidants, antibacterial compounds, and high-quality proteins, making it an attractive functional food. Such innovation supports the diversification of plant-based protein sources and aligns with consumer demand for natural, health-promoting foods, contributing to better public health outcomes.

Keywords: *Spirulina platensis*; Functional Food; Antioxidant Activity; Antibacterial Activity; Loukoum Enrichment; Sensory Evaluation.

Biscuits Enriched with Lentisk Oil: Pathways to Functional and Nutritional Food Innovations

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ABSTRACT

This study investigates the incorporation of lentisk oil into biscuit formulations, highlighting its organoleptic qualities and potential health benefits. Lentisk oil, derived from the fruits of the *Pistacia lentiscus* tree native to the Béjaïa region, possesses a distinctive resinous and herbaceous aroma that can enhance the sensory profile of baked goods. The oil's physicochemical properties were first characterized, revealing an acidity of 5.54%, a peroxide value of 3.8 meq/kg, and a refractive index of 1.468. Antioxidant activity was assessed through total polyphenol content (137.78 µg/g) and the DPPH radical scavenging assay, which yielded an IC₅₀ value of 702.76 ± 0.567 mg/mL, indicating notable antiradical potential. Oxidative stability was confirmed using the Rancimat method, with an induction time of

11.87 hours at a 2% oil concentration. Gas chromatography identified a high content of essential fatty acids, including lauric acid (C12:0), myristic acid (C14:0), palmitic acid (C16:0), stearic acid (C18:0), oleic acid (C18:1), and linoleic acid (C18:2), which are recognized for their health-promoting effects. Biscuits enriched with lentisk oil were then produced and evaluated, demonstrating improved nutritional value, enhanced oxidative stability, and better microbiological quality compared to control samples. The findings support the potential of lentisk oil as a valuable functional ingredient in the food industry, particularly in bakery applications.

Keywords: *Pistacia lentiscus*; Biochemical Analysis; Antioxidant Activity; Oxidative Stability; Biscuit Formulation.

Effect of Carrot Carotenoids on Oxidative Stability of Margarine

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ABSTRACT

Margarine is known to be sensitive to oxidation damage, due to this, synthetic antioxidants which are known by their property to mitigate oxidation phenomenon and avoid the appearance of rancid defects are added. The aim of the present work was to check possibility to substitute a synthetic additive (beta-carotene) used in fats and oils productions by natural pigments such as carotenoids extracted from carrot to color and preserve margarine from oxidation. It's well known that carotenoids are responsible for the attractive colour of many foods particularly, carrot, palm oil, paprika... Carrot (*Daucus carota* L.) is among the cheapest vegetables and most consumed in Algeria. Carotenoids are extracted from three most carrots cultivated and we chose the following cultivars: Muscade, Sanguine and Yellow-orange. Results showed that the total sugar content in carrots ranged from 3.93 to 10.52 mg/100g. Sanguine cultivar exhibited the highest value and Muscade contained most phenolic compounds. The carotenoid content varies with variety. In fact, there were differences among cultivars in carotenoid content (4.9 to 9.064 mg/100g of fresh weight). Antioxidant capacity of the carotenoids evaluated by DPPH showed effective and strong antiradical properties. Margarine formulation revealed physico-chemical characteristics (melting point, Solid fat content, moisture content, salt level, pH) in accordance with national standard and oxidative stability with attractive yellow colour. The results of the oxidative stability test (Schaal test) indicated that carrot carotenes offered clear protection against the oxidation of fatty acids in addition to their colouring power in margarine.

Keywords: Carrot Carotenoids; Margarine Oxidation; Antioxydant Activity.

In Vitro and in Silico Evaluation of Date Seed Phenolic Compounds with Antidiabetic Potential: Perspectives for Food Security and Public Health

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ABSTRACT

Background: Type 2 diabetes (T2D) is a major global health concern associated with chronic hyperglycemia due to impaired insulin

secretion or resistance. In the context of food security and public health, the exploration of natural bioactive compounds as safer therapeutic alternatives has gained increasing attention. **Objectives:** This study aimed to investigate the antidiabetic potential of *Phoenix dactylifera* L. (*Mekwiya* variety) date seed extract, an underutilized agro-industrial by-product. **Methods:** *In vitro* enzyme assays were performed to evaluate the inhibitory activity of the extract against α -amylase and α -glucosidase. Additionally, four phytochemicals identified by LC-MS were subjected to *in silico* molecular docking against 2 key proteins involved in glucose metabolism. ADME predictions were conducted to assess pharmacokinetic properties and drug-likeness. **Results:** The extract showed significant inhibitory activity against α -amylase ($IC_{50} = 14.62 \pm 0.89 \mu\text{g/mL}$) and α -glucosidase ($IC_{50} = 213.47 \pm 11.45 \mu\text{g/mL}$), suggesting a strong potential to regulate postprandial hyperglycemia. Molecular docking revealed high binding affinities (7.9 to 9.8 kcal/mol), with isoquercitrin, chrysoeriol, and resveratrol 3-glucoside displaying a multi-target profile. ADME predictions confirmed favorable pharmacokinetic characteristics. **Conclusion:** *Mekwiya* date seeds represent a sustainable source of antidiabetic bioactive molecules with potential health-promoting effects. This work highlights the importance of valorizing agro-industrial by-products and supports further development of functional food ingredients or natural therapeutics for diabetes management.

Keywords: Diabetes; *Phoenix dactylifera*; α -glucosidase; ADME; Targets; Binding Affinities.

Propriétés Fonctionnelles et Viscoélastiques de Légumineuses Locales Algériennes : Indicateurs de Performance Technologique

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ABSTRACT

Cette étude vise à évaluer les propriétés viscoélastiques et fonctionnelles de sept espèces de légumineuses locales afin d'identifier leur potentiel technologique dans la formulation de nouveaux produits alimentaires. Les mesures rhéologiques ont été réalisées à l'aide d'un rhéomètre à contrainte contrôlée, permettant la détermination du module de stockage (G'), du module de perte (G''), du facteur de perte ($\tan \delta = G''/G'$), ainsi que des paramètres de viscosité apparente et de complexité viscoélastique. Les résultats ont révélé une variabilité significative ($p < 0,05$) entre les espèces. Le pois a présenté les valeurs les plus élevées de G' (1829,35 Pa) et de G'' (220,44 Pa), traduisant une structure élastique dominante et un comportement de gel cohésif. À l'inverse, les haricots noirs et blancs ont montré des valeurs faibles, suggérant une texture plus fluide et moins structurée. Les valeurs du facteur de perte, comprises entre 0,12 et 0,29, confirment la prépondérance du caractère solide ($\tan \delta < 1$) pour la majorité des échantillons. Ces différences sont attribuées à la composition en protéines, amidon et fibres, influençant la structuration du réseau viscoélastique. Sur le plan fonctionnel, la capacité d'absorption d'eau varie de 1,15 à 2,25 g/g et celle d'huile de 0,64 à 1,53 g/g. Le haricot blanc présente la plus forte affinité hydrique, tandis que la fève montre la meilleure absorption lipidique. Les capacités moussantes et émulsifiantes maximales observées pour la fève (42,72 % et 43,75 %)

indiquent un fort potentiel stabilisant. Une analyse en composantes principales (ACP) et une matrice de corrélation (heatmap) seront exploitées pour examiner les interactions entre les paramètres fonctionnels et rhéologiques. Ces analyses multivariées permettront d'identifier les légumineuses présentant le meilleur compromis entre performance techno-fonctionnelle et comportement rhéologique, en vue de leur valorisation dans le développement de produits alimentaires à haute valeur nutritionnelle et fonctionnelle.

Mots clés: Légumineuses ; Propriétés Rhéologiques ; Propriétés Fonctionnelles ; Valorisation Alimentaire.

Stability of Anthocyanin-Rich Extracts via Alginate-Pectin Encapsulation

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ABSTRACT

Anthocyanins are widespread plant pigments responsible for red–purple–blue hues and are increasingly valued as natural alternatives to synthetic food dyes. However, their industrial application is limited by sensitivity to pH, temperature, and matrix interactions, especially under near-neutral conditions. Biopolymer-based encapsulation offers an effective strategy to stabilize these pigments by restricting their exposure to destabilizing factors. Among biopolymers, alginate and pectin are particularly promising due to their gelling capacity and potential synergy with endogenous phenolics to improve oxidative stability. In this study, anthocyanin-rich extracts from eggplant peel (EPP), pomegranate juice (PGJ), and blood orange juice (BOJ) were encapsulated into alginate–pectin hydrogel beads, providing a food-relevant semi-solid model to assess pigment stability and polymer–pigment interactions. Encapsulation was successful for all extracts, although efficiency and stability strongly depended on extract composition and gel properties. BOJ showed the lowest encapsulation efficiency but exhibited good color retention, whereas EPP and PGJ displayed higher retention, with PGJ presenting the greatest color loss. These results highlight the influence of extract botanical composition on color expression and on the competitive interactions between pigments, copigments, and polymers. At 50 °C, EPP was the most affected by pigment degradation, likely due to a higher sensitivity to autoxidation resulting from the presence of caffeoyl derivatives in the extract. Moreover, Al^3+ -anthocyanin complexation enhanced pigment stability, particularly at pH 5, where high encapsulation efficiency and improved thermal resistance were achieved, with an additional protective effect conferred by pectin. Overall, these findings support alginate–pectin encapsulation as a promising strategy to stabilize anthocyanins for functional food applications.

Keywords: Anthocyanins; Encapsulation; Eggplant Peel; Blood Orange Juice; Pomegranate Juice.

Innovation dans l'Extraction par Plans d'Expériences (JMP) : Identification d'un Extrait Phénolique Optimal de la Prêle aux Propriétés Anti Inflammatoires

Sabrina SAIT-DIB, Rima TAFUKT-MEZZAI, Alima GHAROUT-SAIT, Meriem ADOUANE et Lila BOULEKBACHE-MAKHLOUF

RÉSUMÉ

La prêle plante médicinale récoltée dans la région de Béjaïa, fait l'objet de cette étude visant à optimiser l'extraction de ses composés bioactifs. Une approche par plans d'expériences (JMP) a été employée pour maximiser simultanément la teneur en polyphénols et flavonoïdes ainsi que l'activité anti-inflammatoire des extraits. La méthodologie a consisté en une extraction par ultrasons de la partie aérienne de la plante selon un plan expérimental de 15 essais, faisant varier la température (40 – 60°C), le temps d'extraction (10 – 30 min) et le ratio solvant/matière (1/10 – 1/30 g/mL) dans l'éthanol aqueux 70%. Les extraits obtenus ont été évalués sur leur teneur en polyphénols totaux, flavonoïdes et leur activité anti-inflammatoire. Les résultats ont démontré l'influence significative des paramètres étudiés sur les réponses mesurées. L'analyse statistique a permis d'identifier des conditions optimales d'extraction à 60°C pendant 10 minutes avec un ratio solvant/matière de 1/30 g/mL. La validation expérimentale de ces paramètres a confirmé la supériorité de l'extrait optimal, présentant des teneurs élevées en composés phénoliques et une activité anti-inflammatoire prometteuse. Cette étude démontre l'efficacité de la méthodologie des plans d'expériences pour optimiser l'extraction des composés bioactifs de la prêle. L'extrait optimal obtenu représente un candidat intéressant pour des applications dans les domaines des ingrédients fonctionnels et des compléments alimentaires, ouvrant des perspectives de valorisation de cette plante médicinale.

Mots clés: Prêle ; Plans d'Expériences ; Optimisation ; Extraction par Ultrasons ; Polyphénols ; Activité Anti-Inflammatoire.

Innovative Functional Algerian Date-Peanut Spreads: Comparative Study of Deglet Nour and Takarmoust Varieties

Samiya BOUKHANOUF, Elyes KELAI, and Souad KHALED

ABSTRACT

An inventive method of valuing regional Algerian resources like dates and peanuts is the creation of functional and clean-label spreads. The purpose of this study was to create and evaluate two spreads using peanut butter and date paste of the *Deglet Nour* (D) and *Takarmoust* (T) varieties, with an emphasis on their physicochemical, antioxidant, and sensory qualities. The AOAC standard procedures were followed in order to determine the physicochemical parameters (moisture, protein, fat, ash, carbohydrates, pH, and acidity). The DPPH radical scavenging assay was used to assess antioxidant capacity, and total phenolic content (TPC) was measured to estimate the presence of bioactive compounds. Seventy untrained panelists participated in a sensory evaluation using a nine-point hedonic scale. The findings showed that the two formulations differed significantly. The *Deglet Nour* spread had more lipids (28.17 g/100 g vs. 26.04 g/100 g), and

carbohydrates (55.71 g/100 g vs. 45.14 g/100 g), while the *Takarmoust* spread had more protein (21.21 g/100 g vs. 20.53 g/100 g), and ash (4.51 g/100 g vs. 4.22 g/100 g). Acidity (-0.77 g/100 g citric acid), pH (-5.9), and moisture (-16 g/100 g) were all comparable. The *Takarmoust* spread had better TPC (380 mg GAE/100 g vs. 305 mg GAE/100 g) and DPPH activity (78% vs. 65%), according to antioxidant analysis. The *Deglet Nour* spread received higher ratings for sweetness, texture homogeneity, and creaminess, according to the sensory evaluation; overall acceptability was 7.8/9, while the *Takarmoust* spread received 6.9/9. On the other hand, the *Takarmoust* formulation was favored due to its unique flavor and caramel-like scent. Both spreads showed great promise as wholesome, antioxidant-rich substitutes for traditional chocolate spreads. Food security and sustainable agri-food diversification are supported by the value-adding of Algerian date varieties, especially the underutilized *Takarmoust*.

Keywords: Functional Foods; Food Valorization; Bioactive Compounds; Nutritional Quality; Sensory Evaluation.

Development and Evaluation of Vegan Mozzarella Using Chickpea and Mixed-Bean Bases

Tinhinene BELLOUL, Sonia MEDOUNI-ADRAR, Lamia MEDOUNI-HAROUNE, and Sonia BENSIDHOUM

ABSTRACT

This study explores the development of a plant-based mozzarella alternative using chickpea and a blend of legumes. With rising consumer interest in vegan products—especially cheese alternatives—the research aims to replicate the texture, flavor, and functionality of traditional dairy mozzarella while promoting health and sustainability. The project was conducted through three iterative tests. Test 1 focused on chickpea-based formulations, evaluating four samples (A–D) prepared through fermentation, acidification, and cooking. Sample A, using chickpea-soaking water for fermentation, showed promising color but lacked acidity and saltiness. Sample C, made with acidified chickpea milk, had good stretchiness but was overly acidic with a strong lemon aroma. Samples B and D had undesirable textures and mouthfeel. Based on sensory evaluations, samples A and C were selected for further refinement. Another test was conducted to explore legume blends—navy beans, peas, and lentils—in various ratios, combined with a fermented chickpea base. While some samples showed good visual appeal, issues with texture, mixing consistency, and flavor balance were observed. Some combinations resulted in textures that were either excessively soft or overly salty, with few samples even disintegrating during the formation process. Throughout the study, chickpeas consistently provided better texture and stability than legume blends. Fermentation using soaking water enhanced flavor development. The research emphasizes the importance of ingredient ratios, fermentation methods, and cooking processes in achieving a viable vegan mozzarella. In conclusion, chickpea-based formulations showed the most potential, especially when fermented and balanced with lactic acid and stabilizers. Legume blends introduce interesting variations but require further optimization. This work contributes to the advancement of plant-based dairy alternatives, supporting the development of sustainable, nutritious, and appealing vegan cheese options.

Keywords: Vegan Mozzarella; Chickpea Base; Fermentation; Sensory Evaluation and Mixed-Bean Formulation.

Antioxidant Activities of *Aloysia triphylla* Leaf Infusions Obtained by Two Extraction Methods: Conventional and Microwave

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ABSTRACT

Infusions made from medicinal and aromatic plants have been valued since ancient times for their therapeutic properties. Interest in these infusions has continued to grow, reflecting consumers' appreciation for the wide range of natural and refreshing flavors they offer. In addition, infusions contribute to good hydration, which is essential for maintaining the body's water balance, and contribute to a balanced diet as they are low in calories. Thanks to their antioxidant activities, these beverages protect the body against various diseases (cancer, neurodegenerative diseases, and inflammation). The objective of this study was to evaluate the extraction yields, phenolic compound content (PCC), flavonoid content, oxygen radical absorbance capacity (ORAC), and hydroxyl radical scavenging capacity (HOSC) of infusions made from *Aloysia triphylla* leaves. The infusions were prepared using two methods: conventional (CI) and microwave (MI), adding 1.5 grams of dried leaves to 250 ml of mineral water for 2 and 3 minutes. The MI infusions were heated at 400, 600, 800, and 1000 W. The results showed that the extraction yield increased with the increase in microwave power and extraction time ($30.22 \pm 1.68\%$ and $31.55 \pm 1.02\%$ for 800W/3 min and 1000W/3 min, respectively), while IC infusions showed moderate yields ($22.99 \pm 1.02\%$ and $27.99 \pm 2.91\%$ for IC/2 min and IC/3 min, respectively). These results are consistent with previous studies that have demonstrated the positive effects of microwave power and extraction time on yield. When the water contained in the plant matrix absorbs microwave energy, the destruction of cell walls is promoted by internal overheating, which facilitates the disintegration of biomaterials and improves their recovery, unlike conventional extraction where heat is transferred by convection and conduction from the surface. Infusion at 1000 W (91.60 ± 0.55 °C) /3 min and conventional infusion (90.00 ± 1.00 °C) /3 min recorded the best TPC extraction rates (47.17 ± 1.36 mg GAE/g DE and 49.19 ± 1.68 mg GAE/g DE, respectively). The TPC content of infusions depends on time and temperature. The intensity of the microwave power controls the amount of energy supplied to the sample, which is converted into thermal energy in the dielectric material in order to increase its temperature. The 400 W/2 min and 400 W/3 min powers allowed for better flavonoid extraction (22.41 ± 0.66 mg EC/g DE and 25.44 ± 1.65 mg EC/g DE, respectively), This power accelerated the mass transfer of these metabolites while preserving them, as a combination of high power and prolonged extraction time could cause them to degrade. In terms of antioxidant activity, conventional infusion/3 min showed better ORAC activity (1234.53 ± 48.37 μM Trolox/g DE), while 1000W/3 min infusion showed better HOSC activity (700.56 ± 38.97 μmol TEAC/g DE). These results show a perfect correlation between TPC content and the antioxidant activities of the infusions, indicating that the latter could be one of the main components responsible for the antioxidant activities of these beverages.

Keywords: *Aloysia triphylla*; Infusion; Conventional Extraction; Microwave Extraction; Antioxidant activities.

La Bioconservation des Produits Alimentaires

Tassadit BENBARA

RÉSUMÉ

Le but de ce travail est d'isoler les bactéries lactiques et étudier leurs diversités, ainsi que mettre en valeur l'activité antimicrobienne des isolats lactiques. Nous avons étudié le pouvoir antagoniste de plusieurs isolats lactiques de divers produits alimentaires vis-à-vis des souches pathogènes comme : *E. coli*, *Staphylococcus aureus*, *Salmonella* et *Candida albicans*. Les résultats de cette activité montrent une bonne zone d'inhibition allant jusqu'à 32 mm contre *E. coli*, vis-à-vis de *Staphylococcus aureus* en donnant 32,6 mm, *Salmonella* avec une valeur maximale qui est de 48,5 mm et *Candida albicans* avec 36,5 mm par la méthode de spot.

Mots clés: Bactéries Lactiques ; Activité Antimicrobienne ; Produits Alimentaires.

Réduction de l'Allergénicité du Lactosérum avec une Hydrolyse sous Micro-ondes et Chauffage Conventionnel du Lactosérum ProLacta 80 - Reproduire le Chauffage Conventionnel en Dynamique (Circulation) au Lieu du Chauffage au Bain Marie

Nora ATHMANI et Kamel Eddine El MECHERFI

RÉSUMÉ

L'allaitement maternel est largement reconnu comme la meilleure source optimale de nutrition pour les nouveau-nés, fournissant des nutriments complets et une protection immunitaire essentielle. Néanmoins, certains nourrissons peuvent ne pas être exclusivement allaités au cours des premiers mois de vie, ce qui peut potentiellement compromettre leur état de santé général et augmenter l'apparition précoce de maladies allergiques. Comme traitement, tous les organismes consultatifs en nutrition recommandent l'utilisation de préparations hydrolysées hypoallergéniques pour les nourrissons non allaités ou partiellement allaités présentant un risque accru d'allergie. **Objectifs.** Le but de notre travail est de voir le taux d'allergénicité des hydrolysats de lactosérum (LS) obtenu par différents types d'enzymes commerciales sous l'action du micro-onde (MO) et le chauffage conventionnel (CC). **Matériels et méthodes :** Comme une 1^{ère} étape on a pris une variété d'enzymes (Pepsine, Protamex, Alcalase 2,4 L, Corolase 2TS, Corolase 7090, Corolase HP-H), comme une 2^{ème} étape on a réalisé une hydrolyse enzymatique du LS avec le protocole suivant ; sous l'action de la pepsine (un pH / °C = 2/65 ° avec un rapport E/S = 1% (v/v)), sous l'action de la Protamex (un pH / °C = 8 / 60°C, avec un rapport E/S = 0,5%), sous l'action de la Alcalase 2,4L (un pH / °C = 8 / 60°C avec un rapport de E/S = 0,5%), sous l'action de Corolase 7090 (un pH / °C = 8 / 60°C, avec un rapport E/S = 0,5%), sous l'action de la Corolase HP-H (un pH / °C = 8 / 60°C avec un rapport E/S = 0,5% (v/v)), pendant 10, 30 et 60 min, on a choisi un degré d'hydrolyse = 8 qui est moyen pour éviter le goût amer des hydrolysats du LS et une température de 60°C qui donne une meilleure accessibilité de l'enzyme vers le substrat. Le MO a été choisi comme source de T° pour l'hydrolyse enzymatique parce que selon les statistiques du service de pédiatrie de CHU d'Oran, les mamans des nouveaux-nés ont révélé que leurs bébés ont cessé de souffrir d'allergies

liées au lait. Le CC est la 2^{ème} méthode utilisée qui est le modèle de chauffage traditionnel (une casserole) sauf qu'elle doit répondre aux conditions expérimentales. **Résultats.** Le test OPA (λ 340 nm / CTL) a révélé que la Corolase H-pH a donné les meilleurs hydrolysats de LS après 60 min d'hydrolyse surtout avec le micro-onde par rapport au CC. Le test RP-HPLC a montré que les LS Corolase H- pH-CC60°C et LS Corolase H- pH-MO-60°C et le contrôle (le peptjunior un hydrolysat du LS présent dans le lait commercialisé) sont les meilleurs hydrolysats vis-à-vis la réduction d'allergénicité. Cependant, le même test avec les deux hydrolysats précédents avec un LS comme contrôle ont démontré que ces derniers présentent un taux de réduction d'allergénicité important par rapport au LS. **Conclusion.** La Corolase H- pH avec le micro-onde et le chauffage conventionnel (60°C) donnent des bons hydrolysats du LS.

Mots clés : Nouveau-nés ; Lactosérum ; Hydrolysats ; Enzymes ; Mico-onde, Chauffage Conventionnel.

Identification of a New Chemotype of Essential Oil of *Thymus numidicus* from Algeria with Vapour Antimicrobial Activities

Azem BELASLI, Agustín ARIÑO, Filomena SILVA, Cristina NERÍN, and Djamel DJENANE

ABSTRACT

Essential oils are complex mixtures of volatile compounds with notable biological activities, and are promoted as sustainable alternatives to synthetic chemicals. Volatile profile of essential oil (EO) obtained by hydrodistillation of the aerial parts of *Thymus numidicus* was analysed using Headspace solid-phase microextraction (HS-SPME) with gas chromatography-mass spectrometry (GC-MS). The yield of EO was 0.9% (v/m). A new linalool chemotype was identified with 51 volatile compounds. Oxygenated monoterpenes were the dominant constituents, with three belonging to the group of monoterpene alcohols accounting for around 65%: linalool ($30.252 \pm 0.336\%$), alpha-terpineol ($25.167 \pm 0.168\%$) and geraniol ($9.440 \pm 0.176\%$). Antimicrobial vapour phase assays showed the antifungal capacity of *T. numidicus* EO, against *Penicillium roqueforti*, *Aspergillus flavus*, *Aspergillus niger*, *Saccharomyces cerevisiae*, with MIC values ranging from 263 to 526 $\mu\text{L/L}$. However, no antibacterial effect in vapour phase was observed against *Escherichia coli* and *Staphylococcus aureus* (MIC > 526 $\mu\text{L/L}$). Antioxidant screening with DPPH revealed that the EO had a poor antioxidant capacity ($\text{IC}_{50} = 12.13 \pm 0.24 \text{ mg/mL}$), which can be attributed to the absence of phenolic compounds (thymol and carvacrol) known for their relatively higher antioxidant potential. The results of this study are promising for the preservation and propagation of Algerian plants as well as the development of sustainable antimicrobial chemicals.

Keywords: Essential oil; *Thymus numidicus*; Antifungal; Vapour Phase; HS-SPME GC-MS; Algeria

Plantes Médicinales : une Alternative Naturelle pour la Bio-Conservation des Denrées Alimentaires

Kahina BELBACHIR et Kamel BENDJEDDOU

RÉSUMÉ

Au cours de la dernière décennie, 34%, 37% et 60% d'épidémies sont liés à la consommation de fromages contaminés respectivement par *Salmonella*, de *Listeria* et *E. coli* entérohémorragiques (EHEC). Ces bactéries sont impliquées dans plusieurs affections tel que la gastroentérite aigue et l'insuffisance rénale (EHEC et *L. monocytogenes*). Afin de prévenir ses toxiinfections, les industries agroalimentaires ont fait recours à l'utilisation des additifs et de conservateurs synthétiques tel que : le nitrite de potassium (E249), le sorbate de sodium (E201) et la natamycine (E235) ...etc. Cependant ces additifs alimentaires ont des répercussions négatives sur la santé des consommateurs et sur l'économie du pays. Les plantes médicinales sont connues par leurs divers vertus en raison de leurs richesses en substances bioactives naturelles utilisées depuis l'antiquité. Ces plantes ou leurs dérivés sont considérés comme des solutions naturelles de rechange et sûres pour la préservation et l'amélioration de la qualité sanitaire des aliments. La présente étude consiste à évaluer l'activité biologique les huiles essentielles et des extraits hydroalcooliques de deux plantes médicinales algériennes *Artemisia herba-alba* Asso et *Artemisia campestris* L. comme agents antimicrobiens vis-à-vis des souches pathogènes susceptible de contaminer les produits alimentaires tel que: *Bacillus cereus*, *Bacillus subtilis*, *Staphylococcus aureus*, *Salmonella Enteritidis*, *Escherichia coli* ainsi que leurs activités antioxydantes. Les résultats obtenus ont montré que les huiles essentielles et les extraits de ces plantes présentent un effet antimicrobien avec des zones d'inhibition allant de 0 à 29 mm de diamètre pour les extraits hydroalcooliques et des zones d'inhibitions allant de 08 à 19mm de diamètres pour les huiles essentielles. Les diamètres des zones d'inhibition sont différents selon les solvants d'extraction et les souches cibles. En effet, l'extrait alcoolique d'*A. campestris* a donné des zones d'inhibition de : 08, 10, 11, 12, 13, 15, 20, 29 pour *Bacillus cereus*, *Bacillus subtilis*, *Staphylococcus aureus*, *Salmonella Enteritidis*, *Escherichia coli* respectivement. Cependant, l'extrait alcoolique d'*A. herba-alba*, a donné des zones d'inhibition de : 07, 09, 10, 12 et 14 respectivement contre les souches pathogènes suscitées. En ce qui concerne le pouvoir antioxydant, il est également étudié en calculant la capacité des extraits à neutraliser les radicaux libres par la méthode du DPPH en utilisant la vitamine C comme référence. Les extraits hydroalcooliques des deux plantes ont montré d'excellentes propriétés antioxydantes avec des équivalents en acide ascorbique allant jusqu'à 2,14 mg d'acide ascorbique par gramme de plante. Ces résultats sont très intéressants et présentent des applications potentielles de ou des extraits de ces plantes dans le domaine de bioconservation des aliments.

Keywords: Toxiinfection Alimentaire ; Bioconservation du Fromage ; Plantes Médicinales ; Conservateurs Synthétiques.

Seasonal Variation in the Biological Response of *Scorpaena scrofa* to Metal Pollution in the Jijel Coast

Amel CHAIBEDRAA

ABSTRACT

Heavy metal pollution is increasingly recognized as a serious environmental issue. Its persistence and high toxicity pose significant threats to aquatic ecosystems, leading to ecological imbalance and long-term degradation of the natural environment. The present study aims to assess the contamination of the Jijel coast by heavy metals and to evaluate the biological response of *Scorpaena scrofa*, selected as a representative bioindicator of the coastal ecosystem. To achieve this, the levels of metal accumulation in fish tissues were examined, and oxidative stress responses were investigated using enzymatic biomarkers (glutathione S-transferase and catalase) and non-enzymatic biomarkers (malondialdehyde and reduced glutathione) in the liver and gills. In addition, a human health risk assessment was conducted to estimate the potential risks associated with the consumption of contaminated fish. By integrating biomarker responses with health risk evaluation, this study provides valuable insight into the ecological and toxicological impacts of heavy metal pollution on marine species and highlights its implications for food safety. The results emphasize the importance of continuous monitoring in order to preserve both aquatic biodiversity and public health.

Keywords: Jijel coast; *Scorpaena scrofa*; Heavy Metals; Oxidative Stress; Human Health Risk.

Species Diversity and Prevalence of *Staphylococci* Isolated from Camel Milk in Algeria

Fetta MEHOUEL and Leila BOUAYAD

ABSTRACT

This study investigated the prevalence of staphylococcal contamination in raw camel milk collected from various farms in the M'sila region of Algeria and assessed the antimicrobial susceptibility profiles of *Staphylococcus* spp. isolates. To our knowledge, this represents the first comprehensive investigation of *Staphylococcus* contamination in camel milk within Algeria. Over a three-month period, 20 raw camel milk samples were collected and analyzed using the spread plate technique for bacterial isolation. Identification of *Staphylococcus* species was performed using conventional microbiological methods, supplemented by Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry (MALDI-TOF MS). The results revealed a 100% prevalence rate of *Staphylococcus* spp. across all samples. Among the 30 isolates obtained, *Staphylococcus epidermidis* (37%) and *Staphylococcus aureus* (17%) were the most frequently identified species. These findings highlight a significant microbial risk associated with raw camel milk consumption and emphasize the need for improved hygiene practices and microbial control strategies in camel farming systems.

Keywords: Camel Milk; *Staphylococcus*; Prevalence; Bacteria; Public Health.

Pollen Quality and Floral Fertility of some Olive Cultivars (*Olea europaea* L.) from Béjaïa (Algeria)

Mourad HAMLAT, Malika OURARI, and Linda BOULLAG

ABSTRACT

In order to improve the productivity of olive orchards in Algeria, this study was undertaken to characterize the floral biology and pollen quality of four native olive cultivars from the Béjaïa region (Bouichert, Aimel, Azaradj, and Oleaster), with the objective of assessing their reproductive potential. Conducted at the INRAA experimental station in Oued Ghir, the study combined phenological monitoring of flowering in the field with laboratory analyses of floral fertility, pollen production, and pollen viability. The results revealed significant inter-varietal variability. Oleaster exhibited the highest floral fertility (92.49%) and fruit set rate (67.96%), despite a substantial physiological fruit drop (57%). In contrast, the Aimel variety showed very low fertility (0.27%) and no fruit set, primarily due to a nearly complete pistil abortion. Azaradj and Bouichert displayed moderate fertility rates (47.95% and 39.06%, respectively) and fruit set rates of 23.72% and 49.20%. Flowering occurred between late March and mid-April, with Azaradj being the earliest blooming variety. The flowering duration ranged from 11 days (Bouichert) to 22 days (Azaradj). At the pollen level, all varieties produced spheroidal, triporate grains with similar morphology. Pollen production varied considerably, with Azaradj being the most prolific (41,134 grains). Pollen viability was generally high across all varieties, peaking at 98% in Aimel. These findings suggest that, despite its low floral fertility, Aimel could serve as a valuable pollinator due to its high pollen viability. Meanwhile, Azaradj combines early flowering, high pollen production, and good fertility, making it a strong candidate for breeding and orchard diversification programs.

Keywords: *Olea europaea* L.; Native Cultivars; Flowering; Floral Fertility; Pollen Viability; Béjaïa.

Caractérisation Palynologique de l'Orge Cultivée (*Hordeum vulgare* L.) et de son Espèce Soeur Sauvage *Hordeum bulbosum* L.

Malika OURARI, Linda DJAFRI-BOUALLAG et Mourad HAMLAT

RÉSUMÉ

Les différentes formes de plantes spontanées apparentées aux espèces cultivées sont utilisées dans les programmes d'amélioration génétique des plantes. En effet, elles sont connues pour leur adaptation aux conditions du milieu les plus difficiles et pour leur variabilité génétique qui peut potentiellement enrichir le patrimoine génétique des plantes cultivées notamment en termes de résistance. Dans la nature, il existe une espèce qui est étroitement apparentée à l'orge cultivée (*Hordeum vulgare* L.) qui est l'orge bulbeuse (*Hordeum bulbosum* L.). Dans les programmes d'amélioration génétique, cette espèce est communément utilisée pour la production de polyhaploïdes chez les Triticaceae par la 'Méthode Bulbosum'. Elle est également utilisée dans le transfert de gènes d'intérêt agronomique dans les espèces d'orge cultivée et de blé (Sears, 1956 ; Driscoll 1965 ; Ullrich Steven, 2011). Sur le plan appliqué, la palynologie peut être essentielle dans la compréhension des mécanismes relatifs aux stratégies adaptatives liées notamment aux transferts de gènes (par le biais du pollen) et à la biologie de la

reproduction. Le présent travail vise à traiter de la variation de la biologie reproductive à travers l'étude des grains de pollen de ces deux espèces de Graminées. Le nombre de grains de pollen produits, leur taille et leur viabilité sont examinés.

Mots clés: *Hordeum vulgare* L., *Hordeum bulbosum* L., Pollen, Production Pollinique, Viabilité Pollinique, Surface Pollinique.

Food Safety Concerns of Synthetic Azo Dyes: Evidence of Tartrazine-Induced Hepatic Oxidative Imbalance and Biochemical Disorders in Rats

Nassima BALLI, Saliha DJABALI, Hanane BOUTENNOUN, and Lilia BOUSSOUF

ABSTRACT

Synthetic azo dyes, particularly tartrazine (E102), are among the most widely used food additives, yet their safety remains a major concern. This study aimed to evaluate the hepatic oxidative imbalance and biochemical alterations induced by subchronic tartrazine exposure in Wistar rats. Animals were orally administered tartrazine at different doses for 30 days. Hepatic oxidative status was assessed through lipid peroxidation (malondialdehyde, MDA) and antioxidant enzymes (superoxide dismutase, SOD; catalase, CAT). Results revealed a marked dose-dependent increase in MDA levels, especially in the liver, associated with altered SOD and CAT activities, indicating redox imbalance and oxidative stress. In parallel, serum lipid profiles demonstrated significant dyslipidemia: a rise in low-density lipoprotein cholesterol (LDL-C) and triglycerides, with no significant change in high-density lipoprotein cholesterol (HDL-C). These biochemical disorders reflect an increased risk of metabolic and cardiovascular disturbances. Collectively, the findings highlight that tartrazine induces both hepatic oxidative damage and lipid metabolism disruption, underlining its potential threat to food safety and consumer health. This work reinforces the necessity of re-evaluating synthetic azo dyes in the context of environmental and food security challenges.

Keywords: Tartrazine; Oxidative Stress; Liver; HDL-C; LDL-C; Triglycerides; Food Safety.

Contribution à l'Étude de l'Activité Antibactérienne du Miel Naturel d'Origine Algérienne

Nouha OUARTSI

RÉSUMÉ

Le miel est l'un des produits naturels est très connu pour ses caractéristiques nutritionnelles et thérapeutiques en raison de la grande variété de ses composants et de leur contribution à plusieurs activités biologiques telles que les antioxydants, les antimicrobiens. Le présent travail rapporte sur l'évaluation de l'effet antibactérien de quatre échantillons de miel naturel (miel d'Arbousier, d'Eucalyptus, de Jujubier et de Montagne) aux concentrations de 100, 75, 50 et 25%, récoltés de trois sites du territoire de Skikda. Il s'agit de Filfila, Azzaba et Oum Toub. L'activité antibactérienne des différents échantillons de miel naturel a été testée sur trois bactéries pathogènes, résistantes aux antibiotiques, isolées des infections urinaires et cutanées, à savoir :

Escherichia coli, *Pseudomonas aeruginosa* et *Staphylococcus aureus*. L'activité antibactérienne a été déterminée par la méthode de diffusion en milieu gélosé. Les résultats obtenus ont montré que les miels exercent une activité inhibitrice intéressante vis-à-vis des bactéries testées. Cet effet inhibiteur a été constaté pour les quatre échantillons de miel, avec des différences d'un échantillon à un autre et d'une souche bactérienne à une autre. La majorité des miels testés, à une concentration de 50%, ont montré un pourcentage d'inhibition allant de 65 à 75% pour *Escherichia coli*. *Staphylococcus aureus* est le microorganisme le plus sensible aux différents miels testés avec un pourcentage d'inhibition estimé à 98% pour des concentrations de 100% et 75%. Une vaste étude est nécessaire pour prendre en considération les types de miel qui inhibent les souches microbiennes et leur concentration optimale afin de l'utiliser comme antibiotique naturel.

Mots clés: Activité Antibactérienne ; Miel Naturel ; *Escherichia coli* ; *Pseudomonas aeruginosa* ; Molécule Bioactive.

Antibiotic Resistance in Agricultural Environments: Impact of Soil and Manure Contamination on Food Safety

Raouya MOSTEFAOUI, Karima ZENATI, and Dahbia LOURABI

ABSTRACT

Agricultural environments play a crucial role in food production but also act as significant reservoirs of contaminants that threaten food safety. The use of animal manure as fertilizer, while beneficial for soil fertility can introduce pathogenic microorganisms, antibiotic residues, and resistance genes into agricultural soil. These contaminants can persist and spread through complex environmental pathways, ultimately reaching edible crops and entering the food chain. In this study, 30 environmental samples (19 soil, and 11 manure) were collected from farms in Béjaïa, Bouira, Boumerdes and Jijel. Samples were pre-enriched in nutrient broth, and screening for extended-spectrum β -lactamase (ESBL) and carbapenemase-producing Gram-negative bacteria was performed. A volume of 50 μ L of pre-enrichment culture was inoculated into 1 mL of Carba MTL broth and incubated for 12 h at 37 °C. Positive cultures were plated on MacConkey agar, and isolates were identified using conventional methods. The presence of ESBL and carbapenemase was confirmed by the Double-Disk (DD) and Carbapenem Inactivation Method (CIM) tests. Twelve isolates were recovered: 08 Enterobacterales (01 *Escherichia coli* and 07 *Enterobacter* spp.) and 04 *Pseudomonas aeruginosa*. All *P. aeruginosa* and *E. coli* isolates were carbapenemase producers but ESBL negative. Carbapenem-resistant isolates also exhibited co-resistance to gentamicin and other β -lactams. These findings indicate that raw vegetables may serve as reservoirs and transmission pathways for clinically relevant resistant bacteria, emphasizing the need for stricter control of agricultural inputs to limit AMR dissemination through the food chain.

Keywords: Agricultural Environment; Soil; Manure; Resistant Bacteria; Antibiotic Resistance; Food Safety.

Human Milk Contamination by Heavy Metals

Safia HABILA, Amina BOUNAR, and Rayan LAARIBI

ABSTRACT

Breast milk is an exceptional nutritional source for infants, offering several short- and long-term advantages for both moms and infants. This study aims to evaluate health risks linked to exposure to cadmium, lead, and zinc through the consumption of breast milk among women living in Jijel province. A total of 46 breast milk samples were collected and analyzed using atomic absorption spectrometry. The results showed the distribution levels of trace elements in breast milk to be in the order $Cd (21.73 \pm 1.43) < Pb (69.635 \pm 3.049) < Zn (4012.5 \pm 321)$. Lead (Pb) and cadmium (Cd) levels exceeded WHO safety limits. However, Zn concentrations were within international limits. The EDI values of Cd and Pb were higher than the MTDI. THQ values were below 1 in all samples. CR values for Cd were slightly above the limit implying that 4 out of every 10,000 infants under 6 months, 2 out of every 10,000 infants aged between 6 and 12 months, and 1 out of every 10,000 infants over 12 months are at risk of developing cancer due to exposure to cadmium through breastfeeding. These findings highlight the need to regularly monitor health and take urgent action to protect the environment in the regions affected.

Keywords: Breast Milk; Infants; Breastfeeding; Heavy Metals; Risk Assessment.

Electrochemical Monitoring of Pharmaceutical Contaminants: Case Study of Carbamazepine Detection and Validation in Water Systems

Lydia TAOURI, Mustapha BOUROUINA, Saliha BACHA and Didier HAUCHARD

ABSTRACT

Pharmaceutical residues in aquatic systems have emerged as contaminants of growing concern due to their persistence, bioaccumulation potential and toxicological impacts. Among them, carbamazepine (CBZ), one of the most prescribed antiepileptic drugs, which represents one of most emerging pollutants that is frequently detected in surface water and groundwater, because of its high stability and resistance to conventional treatment processes. It represents indirect risks to food safety because traces of CBZ can enter agricultural irrigation networks and subsequent human exposure through the food chain. In this work, we report the design, optimization and validation of an electrochemical micro-sensor for the selective detection of CBZ in water samples. The micro-sensor is simple to use, cost-efficient with a large quantification range from 0.01 to 1 $\mu\text{mol.L}^{-1}$ and low detection limit of 8.17 nmol.L^{-1} , making it suitable for trace analysis. Moreover, the developed device exhibit a high sensitivity, a good repeatability and reproducibility for the quantification of CBZ. Validation was carried out using real water matrices, demonstrating good recovery rates and a relation standard deviation less than 4%. The proposed micro-sensor exhibited good selectivity against common interfering substances, making it a promising tool that contributes to food safety by reducing the risk of pharmaceutical contamination in crops and, ultimately, in human consumption.

Keywords: Carbamazepine; Micro-Sensor; Electrochemical Detection; Water; Environmental Monitoring; Food Safety.

Co-Occurrence of Heavy Metal and Antibiotic Resistance in Agricultural Environments: Evidence from Bejaia Province, Algeria

Karima ZENATI, Raouya MOSTEFAOUI, Djellali BELHADI, and Dahbia LOURABI

ABSTRACT

Introduction: Modern farming practices, including the uncontrolled use of antibiotics, agrochemicals, manure, and untreated wastewater for irrigation, contribute to pre-harvest contamination and promote the co-selection of bacteria resistant to both antibiotics and heavy metals. Understanding this relationship is essential to assess the environmental and food safety risks associated with agricultural ecosystems. **Material and Methods:** Samples of irrigation water (n=10), cultivated soil (n = 16), and manure (n = 4) were collected from eight farms in Bejaia province. After pre-enrichment in nutrient broth, antibiotic-resistant Gram-negative bacteria were screened in Carba MTL broth and isolated on MacConkey agar. Identification was performed using CHROMagar Orientation and confirmed by biochemical testing. Antibiotic susceptibility was determined according to EUCAST (2023) guidelines. Heavy metal resistance was evaluated on Mueller–Hinton agar supplemented with copper, cadmium, and zinc (100 – 800 $\mu\text{g/mL}$), and lead (800 – 3200 $\mu\text{g/mL}$). **Results:** Thirty-seven Enterobacterial strains were isolated from agricultural soil (n = 17), irrigation water (n = 18), and manure (n = 2). All antibiotic-resistant bacteria were mainly isolated from irrigation water. Susceptibility testing showed that 13 strains were resistant to carbapenems, typically restricted to hospital use, including 02 *E. coli*, 08 *Enterobacter* sp., 02 *K. oxytoca*, and 01 *K. pneumoniae* due to enzymatic production. Furthermore, ESBL production was observed in one *K. pneumoniae* and one *K. oxytoca* isolated from well water used for crop irrigation on the same farm. All antibiotic-resistant strains showed co-resistance to the heavy metals tested. The MICs ranged from 100 to 800 $\mu\text{g/mL}$ for copper, cadmium, and zinc, and from 800 to 3200 $\mu\text{g/mL}$ for lead. **Conclusion:** These results enhance our understanding of the link between agricultural practices and food safety and suggest that agroecosystems (soil, water, and manure) may serve as potential sources for the transmission of antimicrobial resistance to humans through agricultural products.

Keywords: Agroecosystem; Antibiotic Resistance; Heavy Metals; Food Security; Co-Resistance.

Electrochemical Microsensors for Monitoring Emerging Pollutants: A Contribution to Environmental Safety

Siham AMRA, Bouchra DAHMOUNE, Mustapha BOUROUINA, and Didier HAUCHARD

ABSTRACT

Emerging micropollutants have become a critical environmental concern due to their persistence, bioaccumulative behavior, and toxicity, even at trace levels. These contaminants such as pharmaceutical residues, pesticides, personal care products, and industrial chemicals are continuously released into aquatic environments, where they can alter biological functions, disrupt

endocrine systems, and threaten the survival of aquatic organisms. Their long term accumulation in water and sediments represents a serious risk for ecosystem stability and environmental safety. To address these challenges, our research focuses on the design and development of highly sensitive miniaturized electrochemical micro-sensors based on nanostructured carbon materials. The use of a cavity microelectrode significantly enhances the electroactive surface area, promoting rapid electron transfer and efficient adsorption of target molecules. This configuration provides improved sensitivity, selectivity, and reproducibility, allowing the detection and quantification of emerging pollutants at ultra-trace concentration levels. Electrochemical detection offers several advantages compared to other analytical strategies. It provides direct and real time measurement, requires minimal sample preparation, and is compatible with portable and low cost systems suitable for in situ analysis. Moreover, the integration of nanostructured materials such as carbon nanotubes or carbon black greatly amplifies the electrochemical signal, resulting in remarkable detection limits in the nanomolar range and stable long term sensor performance. The developed micro-sensors constitute a promising analytical tool for environmental monitoring, particularly for the continuous assessment of water quality and contamination levels. Their small size, fast response, and high analytical efficiency make them ideal candidates for future autonomous monitoring platforms. Overall, this work demonstrates the potential of electrochemical micro-sensing technology as an effective and sustainable approach for the early detection of emerging contaminants and the protection of environmental integrity.

Keywords: Electrochemical Micro-Sensors; Emerging Pollutants; Environmental Monitoring; Nanostructured Carbon Materials; Water Quality; Cavity Microelectrode.

Physiological Behavior of Some Varieties of Durum Wheat (*Triticum durum* Desf.) Facing Water Deficit

Samira BENHAMICHE-HANIFI

ABSTRACT

Introduction: Food security depends heavily on the production of durum wheat, a key crop in Mediterranean areas. However, drought is one of the main yield-limiting factors, affecting various physiological processes. The assessment of tolerance to water stress therefore appears essential to guarantee sustainable production. **Methods:** Durum wheat varieties were subjected to water stress induced by a moderate cessation of irrigation at the juvenile stage. The parameters studied concern relative water content, chlorophyll and proline. **Results:** The water deficit caused a notable drop in water (-39,17 %) content and chlorophyll (-45,34 %), reflecting an alteration of turgor and photosynthetic activity. On the other hand, a significant accumulation of proline was observed (+98,70 %). Thus, under drought conditions, osmolytes such as proline are often elevated; they promote osmotic adjustment by reducing internal water potential, which allows cells to retain water and preserve their integrity. **Conclusion:** The genotypes studied adopt certain physiological strategies with a view to better performance in the face of water stress. The identification of these criteria constitutes a relevant tool for varietal selection, genetic improvement and optimization of cultivation practices in drought conditions.

Keywords: Durum Wheat; Water Stress; Chlorophyll; Proline; Yield.

Effet Protecteur de la Spiruline (*Spirulina platensis*) sur la Toxicité Orale des Métaux Lourds (Hg, Cd et Pb) sur la Reproduction et le Profil Hématologique chez le Rat Wistar

Hicham BELLALA, Ahmed chiheb BOUZAR et Mokhtar GUERZOU

RÉSUMÉ

La spiruline est une cyanobactérie de grand intérêt nutritionnel. Elle est consommée comme complément alimentaire, du fait de sa richesse en plusieurs nutriments essentiels et substances bioactives pouvant préserver et améliorer la santé humaine. Ce travail, a pour objectif d'évaluer l'effet protecteur de la spiruline (*Spirulina platensis*) sur les effets toxiques des métaux lourds (Hg, Cd et Pb) sous forme de : chlorure de mercure (II), chlorure de cadmium et l'acétate de plomb (II), par voie orale sur la reproduction et le profil hématologique chez les rats femelles de la souche Wistar. Après dix semaines d'expérimentation *in vivo*, les observations des résultats de la reproduction et les analyses hématologiques du sang (FNS) montrent que les rats du lot traité par les 3 métaux lourds présentent des signes de toxicité subchronique qui se manifestent par : des troubles de comportement, perte d'appétit et de poids corporel (31,15 %). Diminution de la fertilité avec une foetotoxicité. Anémie et augmentation du nombre des leucocytes (7,47 %) et des plaquettes sanguines (18,33 %). Chez les rats femelles du lot traité par les trois métaux lourds associés à la spiruline nous avons constaté d'une façon globale une régression de la majorité des effets toxiques observés chez le précédent lot de rats. La spiruline semble avoir sur les rats : un effet calmant très apparent. Un effet Stimulant de l'appétit avec augmentation du poids corporel (10,81 %). Un effet stimulant de la fertilité avec une protection des fœtus. Une Diminution de l'anémie érythrocytaire (28,16 %), stimulation du système immunitaire avec une augmentation du nombre des leucocytes (12,05 %) est également observée. Remarque : Tous les travaux de l'expérimentation animale de cette étude ont été réalisés selon la directive 2010/63/ EU relative aux principes d'éthique et directives pour l'expérimentation animale à des fins scientifiques et protection des animaux de laboratoire.

Mots clés : Spiruline ; Métaux Lourds ; Toxicité ; Rat Wistar ; Effet protecteur.

Caractérisation de Souches de *Lactiplantibacillus plantarum* Isolées de Fruits Algériens : Potentiel Probiotique et Applications en Biopréservation

Lylia OUARABI, Samia FARADJI-HAMMA, Liza OUARABI et Djamel DRIDER

RÉSUMÉ

Vingt et une souches de bactéries lactiques (BAL) ont été isolées de fruits algériens, notamment la mûre blanche (*Morus alba* L.), la figue de Barbarie (*Opuntia ficus-indica*), la datte (*Phoenix dactylifera* L.), le raisin (*Vitis vinifera*) et la figue (*Ficus carica*). Dix souches tolérantes au pH acide et aux sels biliaires ont été identifiées comme *Lactiplantibacillus plantarum* par spectrométrie de masse MALDI-TOF et séquençage de l'ADN r 16S. Leurs propriétés de surface (auto-agrégation, hydrophobicité, formation de biofilm) ont ensuite été

évaluées et analysées par analyse en composantes principales, ce qui a permis de sélectionner cinq souches (F8, F13, FB23, D21 et M1). Ces souches se sont révélées sûres, capables d'adhérer aux cellules épithéliales humaines Caco-2, et actives contre *Escherichia coli* ATCC 8739 et *Staphylococcus aureus* ATCC 6538 grâce à la production d'acide lactique (jusqu'à 12 g/L), de plantaricines, ou des deux combinés. Elles ont également montré une forte activité antioxydante lors des tests DPPH et ABTS. Ces résultats soulignent le potentiel des souches de *L. plantarum* issues de fruits algériens comme probiotiques et agents naturels de biopréservation, avec des applications prometteuses dans les aliments fonctionnels. En contribuant à améliorer la santé intestinale, à réduire les infections d'origine alimentaire et à prolonger la durée de conservation des denrées, ces souches représentent des candidates intéressantes pour de futures innovations biotechnologiques.

Mots clés: Bactéries Lactiques ; Probiotiques ; Antagonisme ; Culture Cellulaire ; Bactériocine.

Enhancing Antioxidant Activity and Stability of Food Biopackaging

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ABSTRACT

This study investigates biodegradable films incorporating *Moringa oleifera* leaves extract (MOLE) as active food packaging. The antioxidant activity of MOLE was evaluated through DPPH radical scavenging and ferric reducing power assays, while its antibacterial effect against four foodborne pathogens was determined using the microdilution method. Starch and psyllium gum/starch (PG-S) films enriched with MOLE were prepared and characterized by Differential Scanning Calorimetry (DSC), Thermogravimetric Analysis (TGA), Fourier Transform Infrared Spectroscopy (FTIR), and antioxidant activity tests. Fresh minced beef was packaged with the developed films, and lipid oxidation was monitored using thiobarbituric acid reactive substances (TBARS).

Keywords: MOLE; Bioactive Food Packaging; Meat Shelf Life; Film Stability.

Evaluation of Antioxidants and Application of *Linum usitatissimum* L. Seed Extracts for Inhibition of Steel Corrosion in Acidic Environment

Wassila BELKHIRI-BEDER, Kahina AOUDIA, Naima BRINIS, Hassiba TIGHIDET, Nabila CHERCHOUR, and Houa HAMMACHE

ABSTRACT

The present study highlights the potential of natural extracts from *Linum usitatissimum* L. seeds (flax) as a source of natural antioxidants that can be used in applications other than food. The extraction of bioactive compounds was carried out at different temperatures (25°C, 35°C, and 50°C) in hydrochloric acid solutions (0.1 M and 0.05 M). The results showed that the extract obtained at 50°C in HCl at 0.05 M

had the highest phenolic compound content and significant antioxidant activity, as confirmed by DPPH, FRAP, and reducing power tests. In addition to their nutritional value and recognized beneficial effects on human health (fiber, essential fatty acids, antioxidants), these extracts have been shown to protect metal surfaces against corrosion. When applied to water distribution pipes, they offer a sustainable and safe alternative to conventional chemical inhibitors, with advantage of being non-toxic and beneficial if ingested. Corrosion tests, conducted using electrochemical polarization and impedance spectroscopy, have shown that these extracts significantly reduce steel mass loss and promote the formation of a protective layer through adsorption. The inhibitory effectiveness, which increases with concentration up to an optimal threshold, reflects a mixed mechanism. These results confirm the value of flaxseed extracts as a green, safe, and effective alternative, combining material protection, food safety, and health benefits.

Keywords: *Linum usitatissimum* L.; Antioxidants; Antioxidant Activities; Corrosion; Green Chemistry; Environnement.

Problem of Aflatoxins and Ochratoxin A in Algerian Dried Figs

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ABSTRACT

The fig (*Ficus carica* L.) is a fruit of significant nutritional value, known for its richness in dietary fiber, essential minerals, vitamins, and carbohydrates. In Algeria, dried figs are a commonly consumed product, often processed and stored using traditional methods that may predispose them to microbial contamination. This study aimed to assess the fungal contamination of dried figs from two local Algerian varieties, namely «Thaamriouth» and «Abarkan». To investigate fungal presence, a combination of cultural and molecular techniques was employed. Initial fungal screening involved direct plating of fig samples onto Dichloran Glycerol Agar (DG18), a medium selective for xerophilic fungi. Isolated fungal colonies were then purified, and species identification was further refined using molecular methods, specifically polymerase chain reaction (PCR) with species specific primers. In parallel, contamination by mycotoxins specifically aflatoxins and ochratoxin A was quantified using high performance liquid chromatography coupled with a fluorescence detector (HPLC/FLD), a sensitive method suitable for trace detection. The microbiological results revealed that the most frequently isolated fungal group belonged to the *Aspergillus* section *Nigri*, present in 70% of the samples. Other fungi detected included members of the order *Mucorales* (15%), *Penicillium* species (10%), and a minority (5%) from the *Aspergillus* section *Flavii*, which includes known aflatoxin producers. PCR-based identification confirmed the presence of *Aspergillus niger* and *Aspergillus awamori*, both known for their ability to grow in high-sugar, low-moisture environments. However, HPLC/FLD analysis revealed no detectable levels of aflatoxins (B1, B2, G1, G2) or ochratoxin A in any of the tested samples. Despite the absence of mycotoxins in the analyzed batches, the presence of potentially toxigenic fungi underscores the latent risk of contamination

under suboptimal storage or processing conditions. These findings highlight the importance of implementing good agricultural and post-harvest handling practices to ensure the microbiological safety of dried figs intended for human consumption.

Keywords: Aflatoxins; *Aspergillus*; Dried Figs; Nigri; Ochratoxin A.

UPLC-DAD-ESI-MS Analysis of Dark Roasted Coffee

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ABSTRACT

Coffee is one of the most popular beverages consumed worldwide with over 400 billion cups consumed each year. It is also the most important traded product in the world after fuel. Global output reached 8.2 million tons in 2011. World consumption of coffee increase annually to reach 7.9 million tons in 2011. The purpose of this study was to identify the antioxidant contents, precisely hydroxycinnamic acids in Arabica and Robusta coffee beans after dark roasting (240°C/25min) using the UPLC-DAD-ESI-MS analysis. Despite the high degree of roasting applied in Algerian coffee beans, the dark roasted coffee evaluated in this study represented an important source of chlorogenic acid and derivatives. The UPLC-DAD-ESI-MS analysis has allowed the identification of 14 compounds including CQA derivatives and feruloylquinic acids and dicaffeoylquinic acids.

Keywords: *Coffea arabica*; *Coffea canephora*; Acides Chlorogeniques Derivates; Antioxidants; UPLC.

Sustainable Food Packaging from Agri-food By-Products: Enhancing Food Security through Circular Economy Innovation

Kahina DJAOUD, Wassim RAHAL, Nassim BOUACHERINE, Boualem CHENNIT, Lila BOULEKBACHE-MAKHLouF, Fatiha BRAHMI, and Hayate GUEMGHAR

ABSTRACT

The packaging industry is undergoing rapid transformation in response to growing consumer demand for healthier, safer, and more sustainable food options. This study explored the development of innovative active food packaging films by valorizing agri-food waste, specifically olive pomace from traditional (TOP) and modern (MOP) oil extraction processes, alongside onion peels (OP). The techno-functional properties, phytochemical composition, and antioxidant activities of these by-products were comprehensively evaluated. Onion peels exhibited superior performance with a swelling capacity of 7.00 mL/g, water retention capacity of 7.38 g/g, oil retention capacity of 5.72 g/g, and notably higher phenolic compound content (178.07 mg GAE/g DM) and antioxidant activity compared to both olive pomace samples. A mixture design approach was implemented to optimize biofilm formulations incorporating these by-products as natural antioxidant sources. Predictive mathematical models were developed to correlate total phenolic content and DPPH radical scavenging activity of the resulting biofilms. The optimized formulation comprised 34% traditional olive pomace and 66% onion peel, yielding biofilms with

total phenolic content ranging from 2.08 to 8.24 mg GAE/g DM and DPPH radical scavenging activity between 12.42 and 21.22%. These findings demonstrate the significant potential of agri-food waste valorization in developing active packaging materials with enhanced antioxidant properties, thereby advancing sustainable packaging solutions and promoting circular economy principles within the food industry.

Keywords: Valorization; Olive Pomace; Onion Peel; Active Biofilm; Mixture Design; Sustainable Packaging.

Bioactive Compound Content and Antioxidant Activity of some Tomato Varieties

Nour El Yakine GUERMI and Abderrahmane MOKRANI

ABSTRACT

Introduction: Tomatoes (*Solanum lycopersicum*) are among the most widely consumed vegetables globally, used in various dishes and processed products. They are considered a valuable dietary source due to their rich content of bioactive compounds (polyphenols, flavonoids, vitamin C and lycopene), and possessing antioxidant properties that can reduce the risk of cancer and cardiovascular diseases. However, the antioxidant content in tomatoes can differ based on the variety. **Materials and Methods:** This study examined the impact of different varieties on some physicochemical parameters, bioactive compounds (total carotenoids, ascorbic acid content, total polyphenols, and total flavonoids), and the antioxidant activity (total antioxidant activity, DPPH radical scavenging activity, ABTS radical scavenging activity, and reducing power) of eight Algerian tomato varieties. **Results:** The physicochemical parameter tests revealed significant differences ($p < 0.05$) among the eight tomato varieties: humidity (94.63 to 96.2%), pH (4.08 to 4.59), titratable acidity (0.44 to 0.65 g CAE/100 g FM), Brix levels (4.54 to 5.1 °B), and ash levels (0.32 to 0.72%). The results also showed that the variety significantly affects the content of carotenoids (34.63 to 74.89 mg β E/100 g DM), ascorbic acid (37.45 to 78.74 mg AAE/100g DM), total polyphenols (783 to 985 mg GAE/100g DM), and total flavonoids (29.99 to 61.67 mg QE/100g DM). Additionally, the antioxidant activity varied significantly: total antioxidant activity (5488.33 to 7875.24 mg TE/100g DM), DPPH-RSA (231.68 to 395.91 mg TE/100g DM), ABTSRSA (586.91 to 788.17 mg TE/100g DM), and reducing power (1212.93 to 1615.26 mg AAE/100 g DM). **Conclusion:** based on the results obtained, tomato powder is a good source of antioxidants and has good antioxidant activity.

Keywords: Tomato; Ascorbic Acid; Carotenoids; Phenolic Compounds; Antioxidant Activity; Bioactive Compounds.

Mellisopallynological Analysis, Authenticity, Phenolic Content and Antioxidant Activities of Algerian Honeys

Rim SALHI, Nadia AMESSIS-OUCHEMOUKH, Rania AGABI, Roukia BOUIZAR, Abel ZENATI, Nawel GUENAOUI, and Salim OUCHEMOUKH

ABSTRACT

The relationship between *Apis mellifera* bees and its plant pollination service provides many honeys with peculiar characteristics. In general,

the botanical source directly influences the chemical characteristics and biological potential of the honey. The specific floral origin determines the unique composition of phytochemicals present in the honey. These compounds, including flavonoids, phenolic acids, and terpenes, contribute to the honey's distinctive aroma, flavor, and therapeutic properties. This study characterized 3 Algerian honey sample from different regions by melissopalynological analysis (method without acetolysis), physicochemical characteristics (such as moisture, pH, ash, 5-hydroxymethylfurfural content and proline content), phenolic compounds, and antioxidant capacity (DPPH scavenging method). Our results indicated the presence of different plant families like Asteraceae and Fabaceae with a different contribution. The honeys were in accordance with international physicochemical standards. The data of moisture, pH, free acidity, 5-HMF, proline, and phenolic compounds found in our honey samples indicated their high quality. In addition, the antioxidant potential observed was significant. This study is the first report on the composition of Algerian honeys and demonstrated its high quality and potential for national and international marketing.

Keywords: Melissopalynological Analysis; Algerian Honey; Antioxidant Activities; *Apis mellifera*.

Agro-Industrial Food Waste Valorization Strategies: Strengths and Weaknesses

Salima ACHERAR and Hayata HADDADI-GUEMGHAR

ABSTRACT

Food processing represents the fastest growing industries during the recent decades, resulting the rejection of large amounts of by-products with low economic value, they have been used as feedstock or dumped in landfills. However, their composition in phytonutrients and bioactive compounds have attracted the attention of scientist to explore them along with the apparition of the new concept of green chemistry. Mustard by-products are obtained after condiment processing or oil extraction in, form of brans and cakes. Previous studies have highlighted and studies the different nutraceutical effects of mustard residues bioactive compounds and the results obtained were promising. The biggest challenge is to find a sustainable way for their valorization withing environmental and economic conditions. Valorization strategies could meet numerous issues which could stop their sustainable exploration process. The use of mustard by-products in food applications and in non-application have been studies by several researchers using different methods each caring their own advantages and disadvantages. Choosing a valorization strategy for industrial waste of mustard depends on the suitability of the method chosen and the costs requested and with the respect of environment and human health.

Keywords: Mustard By-Products; Valorization Strategy; Environmental Conditions; Economic Conditions; Food-Applications; Non-Food Applications.

Biosynthesis of Green Silver Nanoparticles by *Diplotaxis Tenuifolia* Extract and their Bioactivity

Houria TARMOUL, Fatiha BRAHMI, Ouarda ISSAADI, and Lila BOULEKBACHE-MAKHLLOUF

ABSTRACT

Nanotechnology concerns the design and manufacture of objects or materials smaller than 100 nanometers. These nanomaterials are composed of nanoparticles. Silver and its compounds have been used for their antibacterial and therapeutic applications for thousands of years. Extracts from different parts of plants are involved in the biosynthesis of silver nanoparticles (Ag NPs) of different sizes and shapes. The aim of the present work is the biological biosynthesis and characterization of silver nanoparticles by the aqueous extract of *Diplotaxis tenuifolia*, the demonstration of the antimicrobial activity of the synthesized Ag NPs and studying the cytotoxicity of these particles. Nanoparticles were synthesized using a biological method. Aqueous plant extract was added to a silver nitrate (AgNO_3) solution for Ag^+ ion reduction. The mixture was left under stirring with heating. Characterization by UV-visible spectroscopy, FTIR and DRX were carried out, and the antibacterial activity of the Ag NPs synthesized was tested on 4 pathogenic bacterial strains: *E. coli*, *K. Pneumoniae*, *Staphylococcus aureus*, and *Enterococcus faecalis*, and Three types of pathogenic fungal strains: *Aspergillus flavus*, *Aspergillus niger*, and *Candida albicans* sp. To study the cytotoxicity of the synthesised AgNPs, the haemolysis method was used. It is based on the evaluation method based on measurement of haemoglobin efflux from red blood cells in suspension. Biosynthesis was confirmed by color change. The synthesis of silver nanoparticles was successfully completed, and a very dark brown color was observed. The development of this coloration is an indication of the ability of *D. tenuifolia* aqueous extracts to biochemically reduce silver nitrate. The formation of silver nanoparticles was monitored by measuring the UV-Vis absorption spectrum in the 190 – 700 nanometer wavelength range. The spectrum shows a clear absorbance band at around 325 nm. Fourier transform infrared spectroscopy affirmed the role of *Diplotaxis tenuifolia* as a reducing and capping agent of silver ions. The X ray diffraction revealed their crystalline nature. The (Ag NPs) synthesized showed good antibacterial and antifungal activity against all the strains used, with considerable zones of inhibition. AgNPs at low concentrations showed a cytoprotective effect on red blood cells, with a haemolysis rate of less than 9%. In conclusion, the bio-ingredients present in the plant extract were effective for the synthesis of Ag nanoparticles. The synthesized AgNPs have an effective bactericidal and antifungal activity against pathogenic bacterial and fungal strains and they are not toxic according to the hemolysis assay.

Keywords: Biosynthesis; Nanoparticles; *D. tenuifolia*; Activity; Antiacterial; Antifungal; Cytotoxicity.

Une Approche Digitale Innovante pour la Caractérisation Morphologique et Culturelle de Quelques Espèces du genre *Alternaria* sp. Et *Colletotrichum* sp.

Tiziri SAHEL, Ali KEROUM, Nessma ABDESSEMED, Abdelmoumen TAOUTAOU, Nessrine MEZYOUN, Nessma ABDESSEMED et Djida AYAD

ABSTRACT

Les agents phytopathogènes fongiques constituent une menace majeure pour la production agricole et causent des pertes annuelles estimées entre 10% à 30%. Pour une meilleure gestion, une identification et une caractérisation de l'agent causal sont primordiales. L'identification des agents causant et la caractérisation morphologique

repose sur la mensuration de la croissance mycélienne des champignons sur différents milieux et la mensuration de la taille des spores ainsi que leur intensité. Ces mesures sont faites à l'aide d'une règle, micromètre et cellule mallacez respectivement qui nécessite beaucoup de concentration et de temps. Des nouvelles méthodes plus rapides et plus précises telle que les technique de reconnaissance et de traitements d'Images dont on Identifie le pathogène à partir d'une milliers d'images ou photo de feuilles malades (qui présente de symptômes) qui sont ensuite entraîné dans un modèle de discrimination, les plateformes de proximité telle que les smartphones et Applications combiné avec un algorithme IA pour identifier les symptômes de maladies fongiques en offrant un outil diagnostique accessible Peuvent etre des alternatives aux anciennes méthodes. Dans ce contexte porte notre objectif visant l'utilisation de deux logiciels à savoir ; Image J et Mesurim pour la mesurer de la taille des spores et leurs l'intensités. Des isolats d'*Alternaria* (C4C, P15 et P3) et de *Colletotrichum* (P21, P28 et P20C) ont été utilisé pour tester l'efficacité des deux logiciel en comparant avec les méthodes traditionnelle. Les résulte obtenus ont montré que en utilisant les logiciels à savoir ; Image J et Mesurim la mensuration de longueur et largeur de dizaines jusques une centaine de spores montre une précision de 90% dans un intervalle de de temps réduit ainsi que pour le diamètre de colonies fongiques. Avec Mesurim la surface de nécroses mesurées est précise en cliquant point par point pour délimiter le contour de la lésion. La procédure d'utilisation de ces deux logiciels est simple, rapide à apprendre et pour des échantillons de taille moyenne (quelques dizaines à une centaine de spores). Ces deux logiciels sont Automatisés et reproductibles (un grand nombre d'images peut être analysé).

Mots clés: *Alternaria* spp.; *Colitotrichum* spp.; Image J; Approches Inovantes.

Optimization through Artificial Neural Networks (ANNs) of the Microwave-Assisted Extraction of Total Phenolic Compounds (TPCs) From Almond Skins and assessment of the Antioxidant and Antihyperglycemic Activity of the Extracts

Lila HARKAT-MADOURI, Hanane TOUATI, Lila BOULEKBACHE-MAKHLOUF, Khodir MADANI, and Hayate HADDADI-GUEMGHAR

ABSTRACT

Artificial intelligence (AI) offers innovative opportunities in food technology, particularly for optimizing extraction processes from agro-industrial by-products. In this work, an artificial neural network (ANN) model was applied to optimize the microwave-assisted extraction (MAE) of total phenolic compounds (TPCs) from almond skins, a by-product rich in antioxidants. The ANN model was developed by a back-propagation learning algorithm. The ANN was compared with the conventional response surface methodology (RSM) and achieved a higher predictive accuracy ($R^2 = 0.99$) than RSM ($R^2 = 0.97$), confirming its ability to model complex non-linear interactions among extraction parameters (microwave power, extraction time, and ethanol concentration). Optimal conditions predicted by the ANN (562 W, 30 s, 53% ethanol) yielded 560.8 mg GAE/100 g dry matter. The extract exhibited strong antioxidant tested by 1,1-diphenylpicrylhydrazyl (DPPH) radical scavenging activity ($IC_{50} = 5.39 \pm 0.35 \mu\text{g/mL}$), phosphomolybdate ammonium assay, hydroxyl radical

scavenging activity ($IC_{50} = 42002 \text{ mg/mL}$), and ability of chelating ferrous ions. The antihyperglycemic activity test revealed that the almond skin extract inhibits strongly α -amylase activity with $IC_{50} = 27.87 \mu\text{g/mL}$ which was close to IC_{50} of the therapeutic drug acarbose ($IC_{50} = 14.24 \mu\text{g/mL}$). AI-driven modeling thus proves to be an effective tool for improving precision, reducing experimental costs, and accelerating the development of eco-efficient processes for food by-product valorization.

Keywords: Artificial Neural Network; Modelization; Ecoextraction; Almond Skin; Antioxydant Activity; Antihyperglycemic Activity.

Predictive Modeling of Bioactive Compound Recovery from *Opuntia ficus-indica* Cladodes Using RSM and ANN-GA

Amira OUFIGHOU, Fatiha BRAHMI, Sabiha ACHAT, Sofiane YEKENE, Sara SLIMANI, Younes ARROUL, Lila BOULEKBACHE-MAKHLOUF, and Federica BLANDO

ABSTRACT

Opuntia ficus-indica (OFI) cladodes are valuable and underestimated by-products that provide significant amounts of biologically active compounds. In this study, microwave-assisted extraction (MAE) was performed for the recovery of phenolic compounds from OFI cladodes using two approaches: response surface methodology (RSM) and artificial neural network-genetic algorithm (ANN-GA), which were then compared following statistical indicators. A 4-factor-3-level central composite design was used to optimize MAE to obtain a maximum yield of total phenolic compounds of 2177.01 mg GAE/100 g DW when desirability was maximized to 0.99. For ANN, mean square error for training, validation, and testing were 0.0001, 0.019, and 0.266, respectively. The correlation coefficient between experimentally obtained total phenolic content and predicted values by ANN were 0.996 for training, 0.998 for validation, and 0.995 for testing, indicating the good predictive ability of the model. GA was implemented in the ANN model to determine the optimum conditions of the inputs and predict the TPC value. The predicted value of TPC by ANN was 1824.19 mg GAE/100g DW; this value was achieved after 51 generations and was validated experimentally after applying the corresponding conditions ($1827.38 \pm 88.67 \text{ mg GAE/100g DW}$). The optimal extraction conditions provided by ANN-GA were a 40% ethanol concentration, 100 W of microwave power, extraction time of 1 min, and 27 mL/g of solid-to-liquid ratio. Verification confirmed that both RSM and ANN predicted high fitness and correlation between experimental and predicted values and exhibited high TPC yield. However, the extraction conditions predicted by ANN compared to RSM were more interesting from the techno-economical point of view, considering the time and solvent amount saved.

Keywords: *Cactus cladodes*; Phenolic Content; Response Surface Methodology; Artificial Neural Network; By-Product Valorisation.

Evaluation of the Gastroprotective and Anti-ulcer Effects of *Linum usitatissimum* Fixed Oil and Its Anti-inflammatory Activity on the Colon in an Ethanol-Induced Ulcer Mouse Model

Hania BOUDAOU-OUAHMED, Nourinne BRIBI, Lina MEZHOU, and Kamilia TINOUCHE

ABSTRACT

Gastric ulcers and chronic inflammatory bowel diseases (IBD) remain major therapeutic challenges. This study investigates the gastroprotective and anti-inflammatory effects of fixed oil extracted from *Linum usitatissimum* (flaxseed) in a murine model of ethanol-induced gastric ulceration and colitis ulcer. Intra-gastric administration of 96% ethanol (10 ml/kg) induced severe mucosal damage, with an ulcer index of 2.66 ± 0.16 and an ulceration rate of 44.53%. Misoprostol (200 µg/kg) significantly reduced lesions (ulcer index: 0.5 ± 0.22 , $p < 0.001$), achieving 74.34% inhibition. Flaxseed oil at 50, 100, and 200 mg/kg demonstrated dose-dependent protection, with ulcer indices of 1.75 ± 0.33 , 1.58 ± 0.30 , and 0.83 ± 1.16 , corresponding to inhibition rates of 22.48%, 43.51%, and 68.20%, respectively. Histopathological analysis confirmed mucosal disorganization and leukocyte infiltration in the control group, whereas the treated groups exhibited epithelial regeneration and glandular restoration. In the colon, ethanol administration reduced its length to 8.3 ± 0.2 cm compared to 10.1 ± 0.3 cm in the control group. Treatment with flaxseed oil significantly improved the weight-to-length (P/L) ratio, indicating reduced inflammation by 35.97%, 41.33%, and 40.12% at doses of 50, 100, and 200 mg/kg, respectively. These effects were accompanied by a marked reduction in edema and inflammatory cell infiltration. These findings highlight the therapeutic potential of *Linum usitatissimum* oil as a cytoprotective and anti-inflammatory agent in gastrointestinal disorders.

Keywords: *Linum usitatissimum*; Fixed Oil; Gastric Ulcer; Intestinal Inflammation; Murine Model.

Integrating Citrus Peel Waste as a Biopreservative Agent for Thomson Orange Fruits

Merihane GHARZOULI and Abdelhakim AOUF

ABSTRACT

Citrus industry produces significant peel wastes, which can negatively affect the environment and the economy. On the other hand, these wastes are rich of functional secondary metabolites such as volatile oils. Algeria is the third-largest producer of citrus fruits in North Africa, however these crops are vulnerable to fungal attacks, especially by the green and blue mold *Penicillium digitatum* and *Penicillium italicum* respectively. Generally, synthetic chemicals and additives are used to combat such harmful molds, nevertheless, consumers are preferring safe products for their health and the environment. In this study, the nanoemulsified essential oil extracted from lemon fruit peel was formulated using the High Energy Method of Ultrasonication and applied as a coating on Thomson orange fruits. The GC-MS was used to evaluate the chemical composition of the essential oil and its nanoemulsion. The antimicrobial activity was evaluated using both in vitro and in vivo assays. The results indicated that the Ultrasonication significantly influenced $p < 0.05$ the chemical composition of the free

essential oil. The tested essential oil and its nano-emulsion showed potent antifungal activity both in vitro and in vivo, particularly against the *Penicillium* species. The application of the nanoemulsion of lemon EO limited the fungal proliferation in Thomson orange fruits. This study highlights the potential application and valorization of citrus peel as a biopreservative agent on fruits offering natural, cheap and economic preservative to synthetic fungicides.

Keywords: Lemon peel; Nanoemulsions; Orange Fruits; *P. digitatum*; Biopreservation.

Pectins from Orange and Pomegranate Peels: Potential for Valorization and Application in the Agri-Food Industry

Meryem AMIMOUR, Sarra LEHAÇANI, and Norhane ALIANE

ABSTRACT

The valorization of agricultural co-products represents an essential strategy to reduce agri-food waste and to develop new functional ingredients. The extraction of pectin from fruit peels is part of a circular economy and sustainability approach, while also meeting a growing demand for natural additives. In this context, the present study explores the potential of orange (*Citrus sinensis*) and pomegranate (*Punica granatum*) peels, two Mediterranean co-products, as sources of pectin. The peels, previously dried and ground, were subjected to acid extraction, and the resulting pectins were characterized. The parameters studied included extraction yield, moisture content, ash content, alkalinity, equivalent weight, methoxyl content, galacturonic acid content, degree of esterification, and solubility. These analyses are used to compare the two pectins in terms of purity, gelling capacity and stability. The results highlight distinct profiles between the two pectins. Orange pectin exhibited a higher yield, greater purity, a significant galacturonic acid content, and favorable gelling properties. In contrast, pomegranate pectin was characterized by markedly higher solubility. These differences suggest potential for differentiated applications in the food industry as well as in other sectors where pectins are used as functional ingredients. To illustrate their applicability, the extracted pectins were incorporated into jam formulations. A sensory evaluation ($n = 15$) revealed a significant improvement in the texture, color, and gel consistency compared to the pectin-free control. These findings confirm the potential of orange and pomegranate peels as renewable sources of pectin, supporting a circular economy approach that contributes to waste reduction, local value creation, and the promotion of sustainable food security.

Keywords: Co-Product Valorization; Orange Peel; Pomegranate Peel; Pectin.

Sustainable Valorization of *Punica granatum* L. Peels: Dual Anti-Urease and Antioxidant Potentials for Food Safety and Therapeutic Applications

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ABSTRACT

Pomegranate fruit peels (*Punica granatum* L.), commonly discarded as waste in the agro-food industry, represent an underexploited resource with considerable potential for sustainable valorization. This study investigates the effects of an ethanolic extract of *Punica granatum* L. (EEPG) on urease enzymatic activity, an essential enzyme implicated in *Helicobacter pylori* infection, the leading cause of ulcer formation. Indeed, its antioxidant properties at various concentrations through DPPH radical scavenging activity and lipid peroxidation inhibition assays were assessed. Additionally, a comprehensive quantitative analysis of total phenols, flavonoids, and condensed tannins in the EEPG was conducted.

Keywords: Pomegranate Fruit Peels; Urease Enzymatic Activity; Antioxidant Activity; Phenolic Compounds; Co-Products.

Green Protein Innovation: Optimization of Enzymatic Extraction from *Moringa oleifera* Leaves

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ABSTRACT

With the growing demand for sustainable and nutritious protein sources, plant proteins have attracted increasing attention as alternatives to animal ones. Innovations in plant protein processing aim not only to enhance protein yield and quality, but also to ensure functional and nutritional suitability for food applications. *Moringa oleifera* leaves (MOL), derived from a perennial leafy tree, known for its high nutritional value, have emerged as a promising source of plant protein. The goal of this study was to optimize the production of a novel Green Protein Concentrate (GPC) from MOL, using an enzymatic process with Viscozyme L and to evaluate its amino acids profile and quality. Optimization of experimental design was performed and the protein extraction yield measured with Kjeldahl method (AOAC, 2000), was selected as the evaluated response. Two-level fractional factorial design (2^{k-1}) was initially used to screen five independent variables: X_1 : temperature; X_2 : pH; X_3 : enzyme concentration; X_4 : incubation time and X_5 : enzyme/ substrate (E/S) ratio. Variables found to be statistically significant ($p < 0.050$) were further optimized using a Central Composite Design (CCD). The three key factors identified were temperature (X_1), time (X_2) and enzyme concentration (X_3). The optimal extraction conditions were $X_1 = 30^\circ\text{C}$, $X_2 = 20$ minutes of incubation and $X_3 = 60$ FBG units (Fungal Beta-Glucanase Units) of enzyme concentration. Under these conditions, the resulting GPC contained 55.7% protein. HPLC with FMO/OPA revealed a well-balanced amino acid profile, with the total essential amino acid content (TEAAs) in the GPC surpassing that of untreated MOL (488.6 mg/g vs. 402.9 mg/g of protein respectively). The produced GPC meets the quality recommendation pattern of FAO/WHO/UNU (2007). therefore, several applications as a protein rich ingredient are foreseen in the food industry, especially for infant, senior or sports nutrition.

Keywords: *Moringa oleifera*; Green Protein Concentrate; Optimization; Enzymatic Extraction; Essential Amino Acids.

Effect of Sonication Time–Amplitude Interaction on the Physicochemical and Antioxidant Properties of Crystallized Honey

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ABSTRACT

Ultrasound was evaluated in this study as a novel liquefaction treatment for crystallized Bejaia nectar honey of Algerian origin based on sonication amplitude (20, 60, 100%) and time (10, 15, 20 min) effects on physicochemical and antioxidant properties. Measured parameters were moisture, Brix, color, hydroxymethylfurfural (HMF), crystal content and size, phenolics, and antioxidant activity (DPPH). The specific values of the measurements for the treatment conditions were as follows: moisture $16.74 \pm 0.75\%$, Brix $81.54 \pm 0.75\%$, color 0.24 ± 0.01 , HMF 23.99 ± 2.84 mg/kg, phenolics 1501.30 ± 8.85 mg/kg, DPPH 138.98 ± 23.52 mg/kg, crystal proportion $40.39 \pm 32.93\%$ and crystal size $1042, 45 \pm 1253.26$ nm, respectively. Sonication intensity significantly lowered moisture (17.8 to 15.8%), increased Brix (80.4 to 82.4%), and progressively removed crystals, the best removal being with 100% amplitude for 20 min. Significantly, color, HMF, phenolics, and antioxidant activity were preserved, ensuring thermal degradation-free existence. Amplitude was identified as the most important parameter for the majority of characteristics through statistical analysis with a quadratic effect on phenolics. Optimized sonication with ultrasound generally represents a fast, non-destructive method along with being an eco-friendly alternative to the thermal melting process, thus facilitating the complete melting of honey without any loss of nutritional and physicochemical properties.

Keywords: Honey; Ultrasound; Crystallization; Antioxidants; Quality.

Valorisation du Miel Algérien comme Ingrédient Fonctionnel dans les Barres Protéinées : Etude Physico-Chimique et Antioxydante

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RÉSUMÉ

Dans un contexte où l'innovation alimentaire vise à associer nutrition et bien-être, le miel représente une source naturelle prometteuse d'antioxydants et de composés bioactifs. Ce travail s'inscrit dans une démarche de valorisation du miel algérien à travers une étude comparative de huit échantillons de miels, dont six d'origine algérienne et deux importés d'Espagne. Les analyses physico-chimiques réalisées ont permis de caractériser leurs principaux paramètres de qualité (pH, conductivité électrique, teneur en sucres, humidité, etc.). Le dosage des polyphénols totaux a révélé une variabilité notable entre les échantillons, avec des valeurs s'étendant de $117,17 \pm 2,58$ mg EAG/g à $38,70 \pm 1,23$ mg EAG/g, selon l'origine botanique et géographique. L'évaluation de l'activité antioxydante a montré que quatre miels présentaient une inhibition totale (100 %) à la concentration de 740 µg/ml, tandis que trois miels atteignaient cette inhibition dès 320 µg/ml, traduisant un fort pouvoir antioxydant pour certaines variétés locales. Ces résultats suggèrent un potentiel d'utilisation du miel, notamment des variétés les plus riches en composés phénoliques et à

forte activité antioxydante, comme ingrédient fonctionnel dans la formulation de barres protéinées innovantes, à haute valeur nutritionnelle et fonctionnelle.

Mots clés : Miel ; Polyphénols ; Activité Antioxydante ; Innovation Alimentaire ; Barre Protéinée.

Effect of Storage and Cooking on the Phenolic Compound Content and Antioxidant Activity of a Vegetable: Green Bean (*Phaseolus vulgaris*)

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ABSTRACT

This study investigated the effect of storage and steam cooking on the physicochemical parameters, antioxidant contents—including total polyphenols, flavonoids, anthocyanins, and flavonols—and the antioxidant and antiradical activities of green beans (*Phaseolus vulgaris*). Results showed that fresh green beans contain approximately 89% water. Steam cooking increased moisture content and non-enzymatic browning, while freezing also raised moisture and titratable acidity but led to decreases in pH, non-enzymatic browning, and ash content. The total polyphenol content was highest in steam-cooked extracts (1011.67 ± 47 mg/100 g Ech), followed by fresh (985 ± 16 mg/100 g Ech) and frozen samples (605 ± 31 mg/100 g Ech). Similarly, the levels of flavonoids, anthocyanins, and flavonols increased after steam cooking (105.52 ± 8.75 ; 3.9 ± 0.32 ; and 15.15 ± 0.62 mg/100 g Ech, respectively) compared to fresh samples, while freezing caused a marked decrease in these compounds. Steam-cooked extracts also exhibited the highest reducing power (ferric chloride and phosphomolybdate assays) and the strongest radical scavenging activities against DPPH• and ABTS•+, with inhibition percentages of 88.18% and 87% and IC₅₀ values ranging from 0.84 ± 0.1 to 1.91 ± 0.04 . Conversely, frozen samples showed slightly lower antioxidant activity compared to fresh ones. Overall, the results suggest that both fresh and steam-cooked green beans are valuable sources of natural antioxidants.

Keywords: *Phaseolus vulgaris* L.; Antioxidant Activity; Steam Cooking; Storage.

Evolution des Caractéristiques Physico-chimiques, Composition Phénoliques et Activité Antiradicalaire de la Confiture de Jujube au Cours de la Conservation à 5°C

Salima ZEMOURI, Meriem AMRANE-ABIDER et Nassima CHERAFT-BAHLOUL

RÉSUMÉ

La confiture est considérée comme un premier effort pour conserver les fruits. Elle est obtenue par cuisson des fruits avec des sucres et d'autres ingrédients. La conservation des confitures est une étape importante entre la fabrication et la consommation. Elle sert notamment à empêcher la croissance de microorganismes et de maîtriser la détérioration de la qualité des produits. L'objectif de ce travail est l'étude de l'évolution des paramètres physico-chimiques (Humidité,

pH, acidité titrable, Brix et couleur), des composés phénoliques (polyphénols totaux (PPT), flavonoïdes) et de l'activité antiradicalaire (DPPH) de la confiture traditionnelle de jujube au cours de la conservation durant 50 jours à 5°C. Les résultats obtenus montrent qu'un stockage de 50 jours à 5°C engendre des changements sur les paramètres physico-chimiques de la confiture de jujube. L'augmentation du pH mesurée (de 4,77 à 5,09) durant toute la période de conservation est accompagnée d'une diminution de l'acidité titrable (0,14 mg EAC/100gr) durant les 6 premiers jours puis une augmentation pour le reste de la période de stockage pour atteindre une valeur de 0,63 mg EAC/100gr. Le suivi de la teneur en PPT de la confiture de jujube montre une augmentation durant toute la période de stockage pour atteindre une valeur finale de 458,47 mg EAG/100gr. Par ailleurs les flavonoïdes marquent une régression (de 81,19 à 59,95 mg EQ/100g) durant les 10 premiers jours puis une stabilité pour le reste de la durée de conservation. L'activité antiradical DPPH marque une régression significative durant la période de stockage (de 82,18% à 33,33%). En conclusion, la confiture de jujube peut servir comme une bonne source de composés phénoliques et flavonoïdes. Cependant, les conditions et la durée de stockage sont des facteurs très importants qui doivent être maîtrisés afin de conserver la valeur et la qualité des composants de cette dernière.

Mots Clés : Confiture ; Jujube ; Conservation ; Composés Phénoliques ; Température.

Carcinogenic and Non-Carcinogenic Health Risk Assessment of Heavy Metals in Edible Chicken Parts

Amina BOUNAR and Safia HABILA

ABSTRACT

Due to their toxic nature and ability to persist in biological systems, heavy metals in poultry have become a significant public health and environmental issue. The objective of this research was to assess Pb and Cd residues in chicken meat and liver and assess carcinogenic and non-carcinogenic risks for consumers in Jijel city. The results demonstrated that Pb and Cd concentrations in chicken meat and liver exceeded the established permissible limits. The Estimated Daily Intake (EDI) of Pb through meat slightly surpassed the Tolerable Daily Intake (TDI), whereas liver exhibited the lowest EDI values. Hazard Quotient (HQ) and Hazard Index (HI) values for Pb in meat were greater than 1, indicating a potential health risk, while corresponding values for liver remained below 1. The Incremental Lifetime Cancer Risk (ILCR) associated with liver fell within the acceptable safety range. On the other hand, Cd in meat presented an ILCR exceeding the acceptable threshold ($>1 \times 10^{-4}$), thereby indicating a potential carcinogenic risk to consumers.

Keywords: Heavy Metals; Health Risk Assessment; Chicken; Liver.

Effects of Metribuzin on Hepatic, Renal and Reproductive Functions in Rabbits: Protective Role of *Laurus nobilis*

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ABSTRACT

Our study evaluates the toxicity of metribuzin, a herbicide used in agriculture, and its impact on parameters related to hepatic, renal, and reproductive functions. Eighteen male rabbits were divided into three groups of six: a control group receiving tap water by gavage, a group treated with 10% metribuzin (Mtz), and a group treated with a combination of 10% metribuzin and *Laurus nobilis* infusion at 4 mg/mL (Mtz/L). We analyzed variations in hematological, biochemical, and male fertility marker parameters, as well as histological changes in control and treated rabbits. Results showed that metribuzin treatment induced hemolytic anemia, with a decrease in red blood cells and hemoglobin, and an increase in white blood cells in treated groups compared to the control group. Biochemical parameters related to hepatic and renal functions, such as glucose, creatinine, urea, cholesterol, and triglycerides, showed significant increases, as well as elevated serum transaminases (AST, ALT) in treated rabbits. Furthermore, male fertility parameters, including sperm concentration, motility, and vitality, decreased in treated rabbits. Histological alterations in the liver, kidneys, testes, and epididymis confirmed the biochemical results. In conclusion, metribuzin exposure induced significant disturbances in hepatic, renal, and reproductive functions. However, *Laurus nobilis* administration in infusion form led to a slight correction of these values due to its corrective effect.

Keywords: Fertility; Herbicide; Rabbits; *Laurus nobilis*, Toxicity, Transaminases.

Effet Antibactérien de Quelques Bactéries Lactiques Isolées des Produits Laitiers Traditionnels à l'Égard des Bactéries Pathogènes (*S. aureus*, *E. coli*)

Karima BENACHOUR-KADA, Loubna MOUHOU et Yamina SAYAH

RÉSUMÉ

Les bactéries lactiques sont un groupe hétérogène de microorganismes produisant de l'acide lactique comme produit principal du métabolisme. Elles sont présentes à l'état libre dans l'environnement ou vivent en association avec un hôte, tel que l'Homme ou l'animal, dans un écosystème bactérien comme le tractus gastro-intestinal ou génital des mammifères. Ces bactéries sont des micro-organismes utiles à l'Homme. Elles lui permettent de fabriquer et de conserver un nombre important d'aliments. Elles sont surtout connues pour le rôle qu'elles jouent dans la préparation des laitages fermentés et elles sont utilisées également dans le saumurage des légumes, la boulangerie, la fabrication du vin, le saurissage des poissons, des viandes et des salaisons. Elles interviennent dans l'industrie laitière et dans la fermentation de nombreux autres produits alimentaires, en contribuant à la texture, à la saveur des aliments, à la production de composés aromatiques et en assurant une bonne sécurité alimentaire. Elles inhibent le développement de certains micro-organismes grâce à la synthèse de molécules antibactériennes telles que les acides organiques, notamment l'acide lactique, du peroxyde d'hydrogène et des bactériocines ou par la compétition nutritionnelle. L'objectif de ce travail consiste à l'évaluation de l'activité antibactérienne des souches de bactéries lactiques isolées des produits laitiers traditionnels à l'égard des souches pathogènes dont : *Staphylococcus aureus* et *Escherichia coli* contaminants des produits alimentaires. Un total de trente souches de bactéries lactiques est utilisé dans cette étude. Ces bactéries appartiennent aux

genres : *Lactobacillus*, *Leuconostoc* et *Lactococcus* et 70 souches de bactéries pathogènes appartenant aux espèces de *Staphylococcus aureus* et *Escherichia coli*, ont été testées. L'activité antibactérienne des souches lactiques à l'égard des souches pathogènes (*E. coli* et *S. aureus*), est révélée par le test des spots, des puits et par microplaque. Les diamètres des zones d'inhibition obtenues varient entre 12 et 45 mm. L'activité antibactérienne enregistrée à l'égard des deux espèces bactériennes testées est très importante et confirmée par le test des microplaques. Une diminution de la population bactérienne pathogène atteint 80 % en utilisant les surnageant des bactéries lactiques. Les résultats obtenus affirment que les souches de bactéries lactiques utilisées sont dotées d'une activité antibactérienne très importante à l'égard des bactéries pathogènes d'origine alimentaire.

Mots clés : Activité Antibactérienne ; Bactéries Lactiques ; *Staphylococcus aureus* ; *Escherichia coli*.

Total Polar Compounds and Volatile Aldehydes Formation During Deep-Frying Process

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ABSTRACT

Deep-frying, remains one of the most popular cooking method worldwide. However, during this high temperature process several quality changes occur in the frying oil, as the formation of a multitude of volatile and non-volatile compounds; some of which are recognized as potentially deleterious to human health. Therefore, the choice of stable frying oils is of a major importance. *Moringa oleifera* seeds oil (MOO), naturally rich in MUFA (66.5 – 81.7% oleic acid) is receiving increased attention for its high stability. This study aimed to determine the total polar compounds (TPC) and volatile aldehydes formation in MOO under deep-frying conditions, while using sunflower oil (SFO) for comparison. MOO was extracted with light petroleum ether (b.p 40-60°C) for 6 h using Soxhlet, and subjected to a degumming process according to Anwar *et al.* (2005). Frying protocol was conducted under domestic deep-frying conditions (180°C, 15h of heating time in 5 consecutive days), as previously detailed by Boukandoul *et al.* (2019). Total polar compounds (TPC) were quantified according to Marquez-Ruiz *et al.*, (1996). Volatiles were analyzed according to Molina-Garcia *et al.*, (2017). TPC in frying oils gives an overview on their oxidative and hydrolytic degradation. After 15h, TPC in MOO was 16%, below the limit (25%), while SFO exceeded this limit only after 9h (26%). Volatiles are commonly formed during oil degradation. After 15h, total volatiles were 280 mg/kg in MOO (112 mg/kg represented alkanals, 160 mg/kg represented alkenals and 8 mg/kg corresponded to alkadienals). While, SFO doubled these values after only 9h, with 426 mg/kg total volatiles (101 mg/kg, 147 mg/kg and 175 mg/kg for alkanals, alkenals and alkadienals, respectively). These results suggested MOO to be very stable under frying conditions, with low values of TPC and volatiles. Moreover, its usability for deep frying processes should be encouraged.

Keywords: *Moringa oleifera* Oil; Sunflower Oil; Deep-Frying; Total Polar Compounds; Volatile Aldehydes.

Cleaning Adherent Spores of *Bacillus cereus* and *Bacillus licheniformis* on SS Coupons by NaOH Solution

Khadija MEDJAHDI and Nassima DIDOUH

ABSTRACT

The remaining spores after cleaning-in-place were shown to be able to attach to stainless-steel and form biofilms causing recurrent contamination, health risk to the consumers in addition to economic loss. This study aimed to explore factors influencing the efficiency of cleaning procedures such as chemical concentration, temperature and exposure time on adherent spores to stainless steel (SS) coupons. First, sterile coupons were immersed vertically in UHT milk for 1 hour. Then, coupons were exposed to a suspension of spores (7 spores mL^{-1}) for 4 hours at room temperature in dynamic conditions. Soiled coupons were immersed vertically in preheated NaOH (60° and 70°C) at different concentrations (0.5%, 1% 2% w/v). The detached spores were enumerated on TSA after 24h at 30°C . A reduction of 1.32 ± 0.05 in the number of spores adhering to the SS coupons was achieved following cleaning at 60°C with alkali (NaOH) at 0.5% and 1% (w/v) after 30 minutes. While increasing this concentration to 2% (w/v) allowed for a decimal reduction of 2.51. Our results offer noteworthy findings pertinent to cleaning practices within the food industry where the application of moderate concentrations of NaOH (2%) for 30 min resulted in weak detachment of spores. For practical industrial use, the findings delineated in this research will enable food manufacturers to make well-informed decisions and pursue further investigations to improve cleaning in place.

Keywords: Spores; Cleaning; Adhesion; Stainless Steel, *Bacillus*.

Contribution à la Cartographie du *Micropterus salmoides* dans le Nord de l'Algérie : Une Ressource Halieutique d'Eaux Douces à Haute Qualité Nutritionnelle

Kaouther MEDJAHED, Zakia KACI, Mohammed BICHE et Miliani DJEZZAR

RÉSUMÉ

La valorisation des poissons d'eau douce constitue une alternative stratégique pour renforcer la sécurité alimentaire durable. La présente étude vise à cartographier la répartition du *Micropterus salmoides* (Lacepède, 1802), communément appelé achigan à grande bouche, dans le nord de l'Algérie. Cette ressource piscicole est appréciée pour sa chair blanche, ferme et savoureuse, et recherchée tant pour la pêche sportive que pour la consommation humaine. Une campagne d'échantillonnage a été réalisée entre janvier et septembre 2025 à l'aide de filets maillants dans plusieurs lacs de barrage du nord de l'Algérie. La présence de l'espèce a été confirmée sur plusieurs sites, témoignant de sa bonne adaptation aux milieux artificiels d'eau douce. Les sites où aucune capture n'a été réalisée ne sont pas cités, car l'absence apparente pourrait résulter de conditions locales de capture et non d'une absence réelle de l'espèce. Une revue bibliographique indique que *M. salmoides* possède une chair riche en protéines, en acides aminés essentiels et en minéraux, comparable à celle de certains poissons marins. Ceci montre que l'espèce étudiée représente à la fois un élément clé pour l'équilibre écologique des écosystèmes aquatiques continentaux et une ressource

potentielle à valoriser dans une stratégie nationale de sécurité alimentaire durable.

Mots clés : *Micropterus salmoides* ; Nord de l'Algérie ; Lac de Barrage ; Cartographie ; Valeur Nutritionnelle.

Optimization of Phenolic Compound Extraction from *Crataegus laciniata* Leaves and Fruit, and their Antioxidant Potential: Toward Sustainable Food Applications

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ABSTRACT

Introduction: Ensuring sustainable food security requires innovative strategies to preserve food quality and nutritional value while reducing reliance on synthetic additives. Natural antioxidants from plant sources represent a promising alternative. *Crataegus laciniata*, a species rich in phenolic compounds, offers potential as a sustainable source of bioactive molecules for food preservation and health promotion. This study aimed to optimize the extraction of phenolic compounds from *C. laciniata* leaves and evaluate their antioxidant activity. **Materials and Methods:** Ultrasound-assisted extraction (UAE) was applied to maximize the recovery of phenolic compounds. Optimization was performed by varying parameters such as solvent concentration, extraction time, and temperature. The extracts were then analyzed for total phenolic content (TPC) and total flavonoid content (TFC). Antioxidant activity was assessed using radical scavenging assays (DPPH, ABTS) and ferric reducing antioxidant power (FRAP). **Results:** The optimized extraction conditions significantly enhanced the yield of phenolic and flavonoid compounds. The obtained extracts demonstrated strong antioxidant potential across all tested assays, with scavenging activities comparable to standard antioxidants. These results highlight the efficiency of UAE as a green technology for producing bioactive extracts with high functional value. **Conclusion:** Optimization of phenolic extraction from *Crataegus laciniata* leaves provides a sustainable source of natural antioxidants with potential applications in the agri-food sector. Such extracts could contribute to extending shelf life, reducing food waste, and supporting healthier diets, thereby addressing key challenges of sustainable food security.

Keywords: *C. laciniata*; Phenolic Compounds; Ultrasound-Assisted Extraction; Antioxidant Activity; Sustainable Food Security.

An Innovative Biopesticide for Sustainable Food Security : Fumigant Activity of a Local *Eucalyptus globulus* Ecotype against *Cydia pomonella*

Riyadh RAHMOUNI and Farid MEZERDI

ABSTRACT

Within the framework of sustainable food security, the escalating resistance of major pests like the codling moth, *Cydia pomonella*, to conventional insecticides presents a significant challenge to crop stability. In Algeria, where apple cultivation is a vital socio-economic

sector, the reliance on synthetic pesticides has led to environmental concerns and resistance issues, creating an urgent need for effective local solutions. This study presents an innovative approach by evaluating a locally sourced essential oil from an Algerian *Eucalyptus globulus* ecotype as a fumigant biopesticide. The oil was obtained by hydrodistillation (1.3% v/w yield) and analyzed by GC-MS. The chemical profile of the volatile fraction was dominated by eucalyptol (50.33%) and p-cymene (24.06%). The essential oil demonstrated potent fumigant toxicity against fifth-instar larvae in bioassays conducted at concentrations from 2.08 to 16.66 µl/L air. The 24-hour lethal concentration (LC) was 8.72 µl/L air, and 100% mortality was achieved after 48 hours at the highest concentration. These findings highlight the potential of this local resource as a sustainable and effective tool for pest management. This distinct chemotype underscores the value of exploring regional biodiversity for novel agrochemical compounds and offers a tangible contribution towards reducing dependence on imported chemicals. Integrating this biopesticide into IPM programs can therefore directly enhance Algeria's agricultural sovereignty and sustainable food security.

Keywords: *Cydia pomonella*; *Eucalyptus globulus*; Essential Oil; Fumigant Toxicity; Biopesticide; Integrated Pest Management (IPM); Sustainable Food Security; 1,8-Cineole.

Distribution et Territoires des Mâles Nicheurs de la Cisticole des Joncs *Cisticola juncidis* en Algérie

Mourad ZEMOURI, Abdelazize Franck BOUGAHAM, Mourtala Issa OUMAROU et Walid MAMACHE

RÉSUMÉ

La Cisticole des joncs *Cisticola juncidis* est un oiseau de groupe des passereaux qui habite les terres inondables, les zones humides et les régions de basse altitude. L'étude des territoires et des caractéristiques d'habitat de cet oiseau n'a jamais été abordée en Afrique du Nord, notamment en Algérie. Notre étude de la cartographie des territoires de cette espèce s'est déroulée le long de la bande littorale à l'Est de la ville de Bejaia (Nord-Est Algérien) durant la période de reproduction 2023. Nous avons utilisé la méthode des points d'écoute appliquée sur des lignes de trajets pour localiser les mâles chanteurs et délimiter leurs territoires. L'espèce habite les endroits avec une végétation composée généralement de *Juncus acutus*, de *Phragmites communis*, de *Carex vulpinoidea*, de *Dittrichia viscosa* et d'*Impenota cylindrica*. La cartographie des territoires révèle que les mâles nicheurs sont territoriaux, mais des cas de chevauchement des cantons de l'espèce étaient notés. Les données sur les densités des territoires et l'habitat de l'espèce semblent similaires à celles relevées ailleurs dans son aire de distribution.

Mots clés : Cisticole des Joncs ; Habitat ; Cartographie ; Territoire ; Algérie.

Cadre Réglementaire Régissant la Gestion et la Valorisation des Déchets en Algérie

Fatima BELAITOUCHE

RÉSUMÉ

La gestion des déchets en Algérie est encadrée principalement par la loi n° 01-19 du 12 décembre 2001, modifiée par la loi 25-02 de 2025 qui vise à instaurer une économie verte et circulaire. Cette réglementation

fixe les modalités de gestion, de contrôle, de tri, de traitement et de valorisation des déchets, avec un accent particulier sur la protection de la santé publique et de l'environnement. La loi 25-02 introduit plusieurs principes clés, notamment : La stratégie nationale de gestion intégrée des déchets, incluant les déchets ménagers, inertes et dangereux. La responsabilité élargie du producteur (REP), obligeant les producteurs à valoriser les déchets issus de leurs produits, L'éco-conception pour réduire l'impact des produits tout au long de leur cycle de vie. La sortie du statut de déchet vers celui de matière ou produit lorsqu'une valorisation conforme aux normes est réalisée. L'organisation des filières de tri, recyclage et valorisation, ainsi que la mise en place d'un système numérique de gestion des déchets. Le renforcement des sanctions pour abandon et mauvaise gestion des déchets. Les opérations de valorisation des déchets doivent respecter des critères techniques et environnementaux stricts, sans danger pour la santé, la faune, la flore ou le paysage. Des autorisations spécifiques sont requises selon le type de déchets à traiter, délivrées par les autorités compétentes. Par ailleurs, la loi interdit certains usages nocifs, comme la réutilisation d'emballages chimiques pour des produits alimentaires, et impose des amendes pour non-respect des systèmes de collecte et tri. Ce cadre réglementaire vise à assurer une gestion durable, réduire les impacts environnementaux des déchets, et promouvoir le recyclage et la valorisation pour une économie circulaire en Algérie.

Mots clés : Déchets ; Gestion des Déchets ; Valorisation ; Cadre Réglementaire.

Valorization of *Pistacia lentiscus* Waste for Bioactive Biodegradable Food Films

Kenza MOULAOU, Sonia BARACHE, Cylia BARACHE, and Djebbar ATMANI

ABSTRACT

The sustainability of modern food systems relies heavily on the innovation of packaging materials capable of ensuring product protection while minimizing environmental impact. In this context, the present study investigates the valorization of waste derived from the fruits of *Pistacia lentiscus* for the development of biodegradable and bioactive food packaging films. This approach is part of a circular economy strategy aimed at converting agro-industrial by-products into high-value functional materials. The plant residues, still rich in polyphenols, flavonoids, and natural pigments, were incorporated into a biopolymer-based polymeric matrix, resulting in films with satisfactory structural integrity and homogeneous morphology. The incorporation of these natural residues induced favorable modifications in the optical and mechanical properties of the films, enhancing their flexibility and visual appearance while maintaining good cohesion within the polymer network. Antioxidant assays demonstrated a remarkable radical-scavenging activity, as confirmed by DPPH, ABTS, and total antioxidant capacity tests. These findings highlight the persistence of residual bioactive compound within the film structure, contributing to oxidative protection and potentially extending the shelf life of packaged food by delaying lipid oxidation and quality degradation. Beyond its functional performance, this biomaterial represents a tangible example of sustainable plant biomass valorization, offering an eco-efficient solution that aligns with the principles of food safety and environmental responsibility. The films developed from *Pistacia lentiscus* waste thus emerge as an eco-innovative alternative to conventional plastic packaging, combining biodegradability, bioactivity, and renewable resource utilization. This work underscores

the crucial role of applied biochemistry and green material science in developing intelligent, sustainable packaging systems that contribute to global food security and environmental preservation.

Keywords: *Pistacia lentiscus* Waste; Biodegradable Film; Antioxidant Activity; Food Packaging, Sustainable Food Safety.

Formulation of a Probiotic Fermented Milk Beverage Fortified with Pomegranate Peel Powder

Farida BENDALI

ABSTRACT

Interest for fermented beverages is increasing worldwide because of their health benefits. The latter are mainly linked to the microorganisms (bacteria, yeasts and moulds) used for their manufacture. Addition of plant ingredients could enhance their beneficial effects by improving their bioactive potential. In our laboratory (Bejaia University), we try to contribute to the formulation of new beverages based on traditional fermented dairy products, but with introduction of selected lactic acid bacteria (LAB) strains as probiotics and supplementation with some local fruits alike, dates, dry figs and pomegranate as bioactive sources. In the present work we focused on a manufacture of a *L. ben-* like fermented milk enriched with a probiotic *Lactocaseibacillus paracasei* DZ strain and pomegranate peels powder. For this, 1 litre of pasteurized reconstituted milk (90°C/ 10 min), enriched with 0.04 % of detanninated pomegranate peel, was inoculated with the probiotic strain (106 CFU/mL) and a starter (*Lactococcus lactis* 103 CFU/mL) and incubated for 8 h at 30°C. After reaching the desired final pH (4.3), the fermented milk was refrigerated (6°C) and subjected to physicochemical (titratable acidity, fats, dry extract and viscosity), microbiological (LAB, total coliforms, fecal coliforms, coagulase + *Staphylococci*, *Salmonella* and *Listeria monocytogenes*) and sensorial analyses. The antioxidant and anti-inflammatory activities were also determined using DPPH and protein denaturation tests respectively. The results revealed a high survival rate of the probiotic strain, an acceptable microbiological quality of the beverage, acidity of 81°D, MG=1.47% and a dry extract=89.6 g/L. High antioxidant and anti-inflammatory activities were recorded. The sensory evaluation revealed its consumer acceptance. In conclusion, the study revealed the suitability of this new formulation, associating *Lactocaseibacillus paracasei* as a probiotic strain and detanninated pomegranate peels for human consumption.

Keywords: Fermented milks; *Lactocaseibacillus paracasei*; Pomegranate Peels; New Formulation.

Elaboration des Cartes Numériques de Productions Potentielles de Compostage en Algérie par le Logiciel Arcgis

Amel Souhila BELOUHRANI, Hafsa BELHADI et Nadjib DROUICHE

RÉSUMÉ

La gestion des déchets ménagers et l'augmentation du volume de ces derniers sous le triple effet de la croissance économique, démographique et du niveau de vie, rendent nécessaire l'importance de résoudre le problème de ces déchets par le tri, le recyclage et la

valorisation. L'objectif de cette étude est l'élaboration des cartes numériques des zones potentielles de production de compostage en Algérie, et ce dans le but de favoriser la gestion efficace des déchets organiques et par conséquent protéger l'environnement. Pour la réalisation de ces cartes nous avons utilisé le système d'information géographique logiciel ArcGIS version 10.8. Les données ont été collectées au niveau de l'Agence Nationale des Déchets et du Ministère de l'Agriculture et de Développement Rural. Les données collectées pour réaliser cette étude, nous ont permis d'élaborer les cartes : Des quantités des déchets ménagers, des quantités estimées de la production de compostage, la surface agricole utile (SAU), et la production agricole totale. Les principaux résultats obtenus ont montré que les régions du Nord du pays sont les plus productives en déchets organiques. Ces régions comprennent les principales grandes villes du pays. Les cartes numériques élaborées montrent que l'Algérie possède des zones de productions importantes de compostage qui pourront être localisées essentiellement au Nord et dans une partie des wilayas du Sud, où les déchets ménagers organiques sont importants. Les sols agricoles algériens sont pauvres en matières organiques, le taux de MO ne dépasse pas les 2.5%. Le compost est une solution pour l'amendement organique de ces sols et par conséquent l'augmentation des rendements agricoles.

Mots clés : Compostage ; Déchets Ménagers Organiques ; ArcGIS ; Sols Agricoles ; Systèmes de Productions Agricoles.

Valorization of Algerian Date Pits for the Development of Biodegradable and Bioactive Packaging Films

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ABSTRACT

This study explores the potential of date pits (*Phoenix dactylifera* L.) as a sustainable raw material for the production of biodegradable and functional packaging films. Physicochemical analyses of Deglet El Ghers, confirmed its suitability for biofilm formulation. which displayed outstanding antioxidant capacity (IC₅₀ = 6.91 µg/mL), exceeding that of the Trolox standard. Film composition was optimized using Response Surface Methodology (RSM) to examine the influence of date pit powder, agar, and glycerol on tensile strength (TS) and antioxidant activity (AA). The optimal formulation—0.47 g powder, 0.56 g agar, and 0.30 mL glycerol—yielded predicted TS and AA values of 31.07 MPa and 47.59%, respectively, with a high desirability score of 0.84. The optimized films also exhibited notable antimicrobial activity against *Pseudomonas aeruginosa*. A synergistic effect was observed in composite films combining powder and extract, producing an inhibition zone of 15.5 ± 0.5 mm. Overall, these results highlight date pits as a promising, underutilized resource for developing biodegradable and active packaging materials, contributing to the advancement of a sustainable circular bioeconomy.

Keywords: Date Pits; Biodegradable Packaging; Active Films; Antioxidant Activity; Response Surface Methodology; Antimicrobial Activity; Circular Bioeconomy.

Extraction of Edible Vegetable Oil from Wild Jujubes Seed Kernels

Asma BOUDRIA-LARACHI and Louiza KOUADRI

ABSTRACT

Ziziphus lotus is a species endemic to the Maghreb and the Mediterranean basin. Its fruits, called jujubes, have several nutritional, cosmetic, and medicinal applications. The kernels, considered as by-products of jujube fruit consumption, are produced in large quantities after the manufacture of jujube flour or molasses. In this study, the jujube seeds were valorized through the production of a high-quality vegetable oil with significant nutritional value. The aim was to determine both the chemical composition of *Ziziphus lotus* seed oil and its antioxidant properties. Our results showed a high extraction yield with an average of 28%. The HPLC analysis of the oil results showed a high tocopherol content, exceeding 97 mg/L of oil. The extraction of the phenolic fraction revealed a satisfactory polyphenol content (about 25 mg GAE/g extract) and a flavonoid content reaching 2.6 mg QE/g extract. Furthermore, the oil exhibited a good antioxidant activity, as demonstrated by DPPH, FRAP, and ABTS assays. Gas chromatography analysis of the fatty acid composition of *Z. lotus* seed oil showed a predominance of monounsaturated fatty acids, mainly oleic acid (64.53%), followed by polyunsaturated fatty acids, particularly linoleic acid (17.39%) and gadoleic acid (2.87%). The saturated fatty acids were represented by palmitic acid (7.14%) and stearic acid (6.64%). Minor components included myristic (0.06%), palmitoleic (0.1%), and arachidonic acids (1.12%). It is well known that oils rich in monounsaturated fatty acids are beneficial to human health. Oleic acid plays a fundamental role in the prevention of cardiovascular diseases and is essential for healthy skin development. This kind of oil is recommended for patients with high cholesterol levels, as it can reduce blood cholesterol levels, modulate immune function, decrease LDL oxidation sensitivity, and improve HDL levels. In this context, *Ziziphus lotus* seed oil appears to be an excellent candidate as a potential dietary source of monounsaturated fatty acids. Moreover, its strong antioxidant activity suggests that it could be advantageously used as a functional or nutraceutical food to prevent or mitigate oxidative stress-related diseases.

Keywords: *Z. lotus*; Antioxidant Activity; Tocopherols; Polyphenols; Oxidative Stress.

Polysaccharide from *Lepidium sativum* Seeds: A Potentially Biocompatible Biopolymer

Yasmine ACHAT, Khalef LEFSIH, Lila BOULEKBACHE, Fatima DJENAD, Tassadit SAHKI, Sabrina IDIR, Sonia BENSIDHOUM-OUKHMAMANOU, and Siham BEDDAR

ABSTRACT

Traditional medicine employs a wide range of natural remedies, including various mushroom species, oils, and medicinal plants. The effectiveness of these remedies is closely related to their composition and content of biologically active substances such as phenols, terpenoids, and polysaccharides. Polysaccharides are known to possess important pharmacological activities, including anti-cancer properties, biocompatibility, and blood sugar regulation. *Lepidium sativum* L., commonly known as garden cress and referred to as “Hab el Rashaad”

in Arabic, has been cultivated since antiquity. It was used by Persians and Romans both as a vegetable (leaves) and as a spice (seeds), as well as for its medicinal properties due to its rich composition of bioactive compounds. The aim of this study was to evaluate the biocompatibility of polysaccharides extracted from *Lepidium sativum* seeds (LSP). The seeds were ground, and the resulting powder was pretreated through delipidation and depigmentation using n-hexane and 96% ethanol, respectively. Polysaccharides were then extracted with hot distilled water. The obtained polysaccharide was collected, lyophilized, and characterized by determining the extraction yield, total sugar content, and protein content. Biocompatibility of LSP was assessed in vitro using human fibroblast cells and the CCK-8 assay. The results showed that LSP consisted of 85.4% total sugars and 12% proteins. Furthermore, LSP exhibited no cytotoxic effects at 50 µg/mL and promoted cell proliferation at 500 µg/mL. These findings suggest that LSP possesses potential pro-proliferative effects and could be useful for pharmaceutical applications, particularly in wound healing.

Keywords: *Lepidium sativum*; Polysaccharide; Biocompatibility.

Effect of Variety and Solvent Type on the Extraction of Phenolic Compounds from Carob (*Ceratonia siliqua* L.) Pulp

Nada BOUGRIOU, Nabila BRAHMI, and Leila BENATALLAH

ABSTRACT

Carob (*Ceratonia siliqua* L.) is a Mediterranean leguminous tree valued for its pulp, which is rich in bioactive compounds such as polyphenols, flavonoids, and tannins known for their antioxidant properties. The efficiency of extracting these compounds largely depends on the choice of solvent, as solvent polarity influences both yield and composition of the extracted phytochemicals. The two-way ANOVA revealed a significant effect of variety on total phenolic content (TPC) ($p < 0.001$), while the solvent type alone showed no significant influence ($p > 0.05$). However, the interaction between variety and solvent was highly significant ($p < 0.001$), indicating that the extraction efficiency of phenolic compounds varied depending on both the variety and the solvent used. Variety B extracted with solvent M exhibited the highest TPC (39.57 ± 1.71 mg GAE/g DW), while variety L extracted with solvent M showed the lowest (13.52 ± 1.45 mg GAE/g DW). In contrast, for total flavonoid content (TFC), the results indicated that solvent type had a strong and significant effect ($p < 0.001$), whereas neither variety ($p > 0.05$) nor the interaction term ($p > 0.05$) were significant. Higher TFC values were obtained with solvent A for both varieties, reaching 5.99 ± 1.53 mg QE/g DW in variety B and 5.20 ± 0.10 mg QE/g DW in variety L. These results suggest that flavonoid extraction is primarily governed by solvent polarity, while phenolic extraction is influenced by both variety and solvent interaction. Understanding the effect of solvent type is therefore essential to optimize extraction conditions and enhance the functional potential of carob-based products.

Keywords: Carob Pulp; Phenolic Compounds; Flavonoids; Solvent Type; Varietal Differences; Extraction Efficiency.

Elaboration d'un Emballage Alimentaire à Base d'un Coproduit de Dattes Locales (*Deghlet Nour* et *Deghla Baidha*)

Lila BOULEKBACHE, Hossam MEKERLOUF, Chaima AMRANE, Sabrina SAIT, Fatiha BRAHMI, Kahina DJAOUD, Sonia OUKHMANOU, Nabila DJERRADA et Hayatte GUEMGHAR HADDADI

RÉSUMÉ

Le potentiel des noyaux de dattes en tant que source de composés bioactifs a attiré une attention considérable dans le domaine de l'emballage et de la conservation des aliments. Cette étude vise à explorer les composés phénoliques de deux variétés de noyaux de dattes, *Deghlet Nour* et *Deghla Baidha*, dans le développement d'un biofilm antioxydant pour la conservation des aliments. Le processus d'extraction a impliqué le séchage des noyaux de dattes à 40°C pendant une semaine, suivi d'une extraction assistée par ultrasons utilisant de l'éthanol à 80%. La teneur en polyphénols a été déterminée en utilisant la méthode Folin-Ciocalteu, l'activité antioxydante par le test DPPH et leur efficacité antibactérienne a été testée contre les bactéries communes de détérioration en utilisant la méthode de diffusion sur disque. Des biofilms de CMC (Carboxyméthyl Cellulose) ont été mélangés avec des extraits des deux variétés de noyaux de dattes pour évaluer leur efficacité combinée. Les résultats ont montré que les noyaux de *Deghlet Nour* avaient une teneur plus élevée en polyphénols (45,2 mg GAE/g ES) avec une activité antioxydante de 30,53 µg/mL, tandis que les noyaux de *Deghla Baidha* contenaient 37,2 mg GAE/g ES et présentaient une activité antioxydante de 33,47 µg/mL. Les tests antibactériens ont révélé que les extraits de *Deghlet Nour* et de *Deghla Baidha* avaient des effets inhibiteurs faibles sur *E. coli* et *Bacillus subtilis* avec des zones d'inhibition de 2 mm et 4 mm, respectivement. Les extraits testés montrent un potentiel antioxydant qui mérite d'être valorisés par leur application les emballages alimentaires.

Mots clés : Noyaux de Dattes ; Composés Phénoliques ; Activités Biologiques ; Biofilm ; Carboxyméthyl Cellulose ; Emballage Alimentaire.

Investigation of Animal and Plant-Based Rennet Substitutes: Characterization and Application in the Manufacture of 'Camembert' Cheese

Farid BOUKHALFA, Naima BELKACEM, Younes ARROUL, and Asma YAKOUBI

ABSTRACT

The objective of this study was to investigate the possibility of replacing rennet with ficin as a plant-based milk-coagulating agent. Ficin was extracted from the latex of the fig tree (*Ficus carica* L.), and the resulting enzymatic extract was characterized by determining its coagulating activity, clotting strength, and proteolytic activity. The optimal parameters (pH, temperature, CaCl₂ concentration) and their influence on the enzymatic activity of the crude ficin extract were studied. The results showed that the ficin extract had a coagulating activity of 253.01 CU (Clotting Units), a clotting strength of 22,771, and a proteolytic activity of 358 µg tyrosine equivalent/mL/min. A «Camembert» soft-type cheese was prepared from reconstituted milk

(milk powder and raw cow's milk) coagulated with the ficin extract. The results of the sensory analysis revealed that this cheese had better organoleptic qualities than the control cheese (a softer texture and a well-appreciated bitter taste). The study's results demonstrate that ficin extract can replace rennet in cheese manufacturing. This research deserves to be expanded to the production of different cheese types.

Keywords: *Ficus carica*; Ficin; Enzymatic Activity; Clotting Strength; Camembert.

Valorization of Hawthorn Leaves (*Crataegus* spp.) as a Rich Source of Bioactive Phenolics: Antioxidant and Antimicrobial Insights

Ouarda ISSAADI

ABSTRACT

Hawthorn leaves (*Crataegus* spp.), often considered secondary by-products compared to fruits, represent a valuable source of bioactive phenolics with potential applications in food and nutraceutical industries. In this study, four Algerian hawthorn samples (Fe1–Fe4) were investigated to assess their phenolic composition, antioxidant capacity, and antimicrobial activity, with a focus on the effect of defatting pretreatments. Spectrophotometric and HPLC-DAD analyses revealed high levels of total phenolics, flavonoids, flavonols, condensed tannins, and proanthocyanidins, with defatted extracts consistently outperforming non-defatted counterparts. Proanthocyanidins and vitexin derivatives emerged as predominant compounds, particularly in Fe3-def, which exhibited exceptional enrichment. Hydroxycinnamic acids, mainly chlorogenic and neochlorogenic acids, were also significantly enhanced after defatting, underscoring the efficiency of this pretreatment in improving recovery of polar phenolics. Antioxidant activity, assessed by FRAP, DPPH, ABTS, and EPR assays, demonstrated strong radical-scavenging and electron-donating potential, with notable correlations between phenolic enrichment and bioactivity. Defatted extracts consistently showed superior performance, highlighting the synergistic contribution of flavonols, proanthocyanidins, and vitexin-type flavonoids. Antimicrobial assays confirmed a broad but variable inhibitory spectrum. Defatted extracts displayed stronger inhibition, particularly against Gram-positive bacteria such as *Staphylococcus aureus*, where Fe3-def retained up to 73% of gentamicin's effect. Although less potent than conventional antibiotics, the extracts exhibited relevant levels of activity, reinforcing their potential as natural antimicrobial agents. Overall, these findings demonstrate that hawthorn leaves, especially when pretreated by defatting, represent an underutilized co-product with significant nutraceutical and food innovation potential. Their phenolic richness and bioactivity justify further exploration for functional food formulations and natural preservation strategies.

Keywords: Hawthorn Leaves; *Crataegus* spp.; Phenolic Compounds; Proanthocyanidins; Antioxidant Activity; Antimicrobial Activity; Co-Product Valorization; Food Innovation.

Optimization of High-Protein Chocolate Bar Production Using Pumpkin Seed Flour and Date Kernel Flour

Nadia BOUAOUDIA-MADI, Abdeldjalil MIHOUBUI, Daoude ELHADI, Souhaib BENOUIOUA, Elmadani HADELI, Sonia OUKHMANOU-BENSIDHOUM, and Sofiane DAIRI

ABSTRACT

The growing demand for nutritious foods, particularly among young adults, has stimulated the development of protein-enriched energy products. In this context, the present study focused on developing an innovative chocolate bar formulated with pumpkin seed flour and date kernel flour. A D-optimal experimental design, consisting of ten formulations, was applied to optimize the proportions of pumpkin seed flour (X1), date flour (X2), date kernel flour (X3), and cocoa butter (X4). Nutritional evaluation of the ten products included proximate composition (proteins, sugars, lipids), phytochemical content, and dietary fiber analysis was focussed. The best-performing formulations, combining pumpkin seed and date kernel flours, showed superior nutritional quality with a protein content of 14.96 g/100 g, a high total phenolic compound content (118.93 mg GAE/g DW), and strong antioxidant capacity assessed by DPPH (86.46%). Sensory evaluation confirmed good overall acceptability. These results highlight the potential of high-protein chocolate bars made with pumpkin seed and date kernel flours as a promising functional food.

Keywords: Energy Bars; Pumpkin Seed Flour; Date Kernel Flour; Antioxidants; Optimization; Protein.

Effect of Prickly Pear Cladode Mucilage and its Silver Nanoparticles on *Escherichia coli* Removal Using Electrocoagulation-Electroflotation (EC-EF) Process

Nawel ADJEROUD-ABDELLATIF, Fares BOUDJOUAN, Muhammad ALI KASIRYE, and Hana LEKRIM

ABSTRACT

The increasing global demand for safe water, coupled with growing concerns over water contamination, has increased the need for effective and sustainable treatment technologies. *Escherichia coli* remains one of the most common bacterial indicators of fecal pollution and a major contributor to water contamination and waterborne diseases. Ensuring effective disinfection to eliminate *E. coli* and other pathogens is therefore critical for public health protection. Electrocoagulation electroflotation (EC-EF) is an electrochemical treatment method known for its ability to remove a wide range of pollutants, including microorganisms. This study aims to improve the disinfection performance of EC-EF by integrating mucilage extracted from prickly pear cladode as a bio flocculant as well as silver nanoparticles (AgNPs) synthesized using mucilage. Mucilage based silver nanoparticles (AgNPs) were used in their basic pellet and supernatant forms (not calcinated forms) and as calcinated forms. EC-EF without adjuvants addition gave an *E. coli* removal efficiency value of 61.94% however all the added flocculants gave better performance yields: mucilage at 7,5 mg gave 66,7%, the pellet AgNPs at 5 mg exhibited a better bacterial removal efficiency (8 6,62 %), resulting in an enhancement of EC-EF by 24,68 % in comparison to the control, their calcinated forms

showed a better stability. The UV visible and FTIR analysis showed typical mucilage and nanoparticle characteristics. These results highlight the potential of combining EC-EF with green coagulants and biosynthesized nanomaterials to develop effective, low cost, and environmentally friendly water disinfection strategies.

Keywords: Prickly Pear; Cladodes; Mucilage; EC-EF; *E. coli*; Silver Nanoparticles; Turbidity.

Optimization of Microwave-Assisted Extraction of Total Phenolics from *Touareg* Variety Potato Peels Using the RSM-Approach

Tassadit SAHKI, Fatiha BRAHMI, Fatima DJENAD, Yasmine ACHAT, and Lila BOULK BACHE-MAKHLOUF

ABSTRACT

Introduction: Fruit and vegetable by-products, such as potato peel waste (PPW), represent valuable sources of bioactive compounds. Their valorization offers a sustainable strategy to reduce food waste. In this context, the present study focused on the valorization of potato peel waste from the *Touareg* variety cultivated in Algeria by optimizing the microwave-assisted extraction (MAE) of total phenolic content (TPC) using response surface methodology (RSM). **Methodology:** The experimental work included the determination of the proximate composition of potato peels, including moisture, ash, carbohydrate, and dietary fiber. The total phenolic content and total flavonoid content were quantified, along with the antioxidant capacity assessed by DPPH and phosphomolybdate assay. Additionally, FTIR analysis was performed to identify the main functional groups in the extracts. **Results:** Optimization using response surface methodology identified the optimal MAE conditions as 66.75% ethanol concentration, 500 W microwave power, and 6 minutes extraction time. Under these conditions, the extraction yield of phenolic and flavonoid compounds was maximized. The antioxidant assays confirmed strong radical scavenging capacity, which correlated positively with the phenolic content, highlighting the efficiency of the optimized MAE process. **Conclusion:** The findings of this study demonstrate the high potential of *Touareg* potato peel waste as a natural source of antioxidants. Microwave-assisted extraction, optimized through response surface methodology, proved to be a rapid, efficient, and eco-friendly technique for the recovery of bioactive compounds.

Keywords: Potato Peel; Bioactive Compounds; MAE; RSM; Antioxidant Capacity.

Phytochemical Characterization of Bioactive Compounds and Antioxidant Activity of some Olive By-Products

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ABSTRACT

This study involved the extraction and analysis of phenolic compounds (total phenolics, flavonoids and ortho-diphenols) from eight samples

of solid (olive pomace) and liquid (olive mill wastewater) olive by-products, and the evaluation of the antioxidant activity of the extracts obtained (reducing power, hydrogen peroxide inhibition, free radical scavenging activity and chelating activity). Spectrophotometric methods were used to perform the analysis. The results showed that phenolic compound content and antioxidant activity vary significantly depending on the sample. The study revealed the richness of the two by-products (pomace and mill wastewater) in various compounds and thus exert considerable antioxidant activity. This encourages their valorization by using the extracts as ingredients in the food and/or cosmetics fields.

Keywords: Olive Pomace; Olive Mill Wastewater; Antioxidant; Extraction, Antioxidant Activity.

Accelerated Solvent Extraction (ASE) for the Recovery of Phenolic Compounds from *Crataegus monogyna* fruits

Yasmine Lina SIMOUD, Nacim NABET, Norelhouda ABDERREZAG, and Jose A. MENDIOLA

ABSTRACT

Accelerated solvent extraction (ASE) also known as pressurized solvent extraction, is an advanced extraction technique that shares fundamental principles with Soxhlet extraction. However, ASE employs elevated temperature and pressure to achieve rapid extraction with minimal solvent consumption. This study investigated an ASE method to optimize phenolic compound recovery and extraction yield from *Crataegus monogyna*, a medicinal plant known for its antihyperglycemic and cardioprotective properties, using response surface methodology (RSM) based on a central composite design (CCD). A two-factor experimental design was implemented, examining temperature and mixture of green solvent (ethanol/water), at three levels each, while pressure and extraction time were kept constant. Total phenolic content (TPC) was quantified using the Folin-Ciocalteu method and expressed as milligrams of gallic acid equivalents per gram (mg GAE/g), and extraction yield was determined gravimetrically and expressed as percentage (%). The results revealed that the developed model regarding phenolic content and extraction yield, through experimental design, expressed high levels of significance with good concordance between predicted and experimental data ($R^2 > 0.9$). The predicted optimal conditions were: a temperature of 175°C and an ethanol concentration of 36.6%. Under these optimal conditions, an extraction yield of 86.15% and a total phenolic content of 70.94 mg GAE/g of dry extract were obtained.

Keywords: Accelerated Solvent Extraction (ASE); Central Composite Design (CCD); *Crataegus monogyna*; Phenolic Compounds.

Impact de l'Enrichissement du Fromage Halloumi par Deux Espèces de Nigelle

Leila BENAZZOUZ-SMAIL, Sabiha ACHAT, Fatiha BRAHMI, Ines BENHEDDAD et Sonia HAMIDOUCHE

RÉSUMÉ

Le fromage Halloumi, traditionnellement chypriote, est apprécié en Méditerranée pour sa propriété unique de ne pas fondre à la cuisson.

Cette étude visait à développer deux variétés enrichies de ce fromage en incorporant deux espèces de graines de nigelle (*Nigella sativa* L. et *Nigella damascena* L.) et d'évaluer leur impact sur ses propriétés physico-chimiques, sensorielles, rhéologiques et son activité antioxydante durant le stockage. Cinq formulations de fromage Halloumi ont été préparées : des contrôles (100% Vache (C), 100% Chèvre (G), Mélange 80% Vache / 20% Chèvre (CG)) et deux fromages enrichies basées sur le mélange CG (*Nigella sativa* L. (CGNS) et *Nigella damascena* L. (CGND)). Des analyses physico-chimiques, microbiologiques, une évaluation de l'activité antioxydante (incluant la teneur phénolique totale) et des analyses sensorielles ont été menées. Les analyses physico-chimiques ont révélé que les fromages sont une bonne source de protéines (13,5 à 16,5%) et sont riches en matières grasses (18 à 20,5%), avec une teneur en sel relativement élevée (4,4 à 5,2%). La qualité microbiologique s'est avérée satisfaisante. L'ajout des graines de nigelle a conféré une activité antioxydante significative aux fromages. Cependant, cette capacité antioxydante a été limitée par la durée de stockage, un effet attribué à l'influence de la conservation en saumure. Les analyses sensorielles ont finalement désigné le fromage CGNS (mélange Vache/Chèvre épicé à *Nigella sativa* L.) comme étant le plus apprécié par les panélistes pour sa couleur, son odeur et sa bonne élasticité. L'enrichissement du Halloumi avec *Nigella sativa* L. améliore ses qualités organoleptiques et lui confère une activité antioxydante importante, bien que celle-ci soit affectée par la conservation en saumure. Le fromage CGNS représente ainsi la formulation la plus appréciée.

Mots clés : Fromage Halloumi ; Analyse Sensorielle ; Graines de Nigelle, *Nigella sativa* L., *Nigella damascena*, activité Antioxydante.

Enhancement of Quality and Thermal Stability of Edible Oil by Natural Antioxidants from Bay Leaf

Aicha BENBOURICHE, Hayette HADDADI-GUEMGHAR, and Mostapha BACHIR-BEY

ABSTRACT

Soybean oil is one of the most widely consumed edible oils in both domestic and industrial food processing. Nevertheless, its high proportion of polyunsaturated fatty acids renders it highly susceptible to oxidative deterioration under thermal conditions. To overcome this drawback, the present study explored the potential of improving the thermo-stability of refined soybean oil (170 °C, 24 h/day for 3 consecutive days) through supplementation with phenolic compounds extracted from bay leaves (*Laurus nobilis*). The extract was applied at concentrations of 20, 40, and 60 mg/L, with untreated oil serving as the control. Quality attributes and oxidative stability were assessed before and after heat treatment by monitoring UV absorption coefficients, acidity, peroxide and iodine values, as well as total phenolic content and antioxidant activity. Results indicated that enrichment with bay leaf phenolic extract enhanced the quality parameters of soybean oil while mitigating oxidation. The highest concentration (60 mg/L) was particularly effective in preserving unsaturated fatty acid bonds and significantly improving thermo-stability. These findings highlight bay leaf phenolic extract as a valuable natural source of bioactive compounds with strong potential for enhancing the oxidative and thermal stability of refined soybean oil.

Keywords: Natural Extract; Bay Leaf; Soybean Oil; Thermal Oxidative Stability

Evaluation of the Effect of Microwave Treatment on the Microbiological Safety and Physicochemical Stability of Orange Juice

Akila AMIR, Ourdia KERNOU, and Khodir MADANI

ABSTRACT

Ensuring the microbiological safety and nutritional quality of fruit juices is a key challenge for the food industry. Among microorganisms of sanitary concern, *Escherichia coli* is widely used as an indicator of fecal contamination and the effectiveness of disinfection processes. In this context, the objective of this study was to evaluate the effectiveness of microwave heating as an innovative alternative to conventional thermal methods for the inactivation of *E. coli* in orange juice, while maintaining the physicochemical and nutritional stability of the product. Rouiba orange juice was artificially inoculated with *E. coli* strain ATCC 25922 and subjected to two power levels (600 W and 900 W) for varying exposure times. The treated samples were analyzed to assess microbial reduction and the stability of physicochemical parameters (pH, °Brix, titratable acidity, and vitamin C content) during an eight-day storage period. Results showed that at 600 W, the final temperature (< 57 °C) led to a limited microbial reduction (-1.36 to -3.13 log), comparable to the natural effect of juice acidity. In contrast, treatment at 900 W reached a temperature of 64.17 °C in 45 seconds, achieving a maximal inactivation of 6.30 log, meeting microbiological safety standards. The physicochemical characteristics (pH ? 3.27; 11 °Brix) remained stable, as did titratable acidity, while a slight degradation of vitamin C was observed, mainly due to thermal and oxidative effects. Overall, these findings confirm that microwave heating is an effective, rapid, and energy-efficient technique to ensure the microbiological safety of orange juice while preserving its key nutritional qualities. It represents a sustainable and promising alternative to conventional thermal treatments, supporting the development of processing methods that are both quality-oriented and environmentally friendly.

Keywords: Orange Juice; *Escherichia coli*; Microwave Heating; Microbiological Safety; Nutritional Quality.

Optimization of Firm Yogurt Production using «*Pistacia lentiscus*»

Rabha AYAD, Abed ARABI, Dyhia SADOU, and Yazid RAHMOUNE

ABSTRACT

Yogurt is a food that can be improved on several levels by using many different types of materials (microorganisms, plants). In this work, different aspects of yogurt production were touched upon: microbiology, physicochemistry, technology and the computer aspect through the use of mixing plans to optimize an optimal yogurt formula and build a predictive mathematical model. At the end of this work, 12 yogurts were manufactured by varying the quantities of milk powder, sugar and powdered oilcake from an aromatic plant "*Pistacia lentiscus*", following the mixing plan generated by SAS.JMP 7 software. The results obtained from the microbiological analysis of the raw materials and the yoghurts produced were satisfactory, showing a total absence of pathogenic germs and spoilage, while the total aerobic mesophilic flora was present, but did not exceed the values of the

official journal of Algerian regulations. The titratable acidity pH values are $4 < \text{pH} < 4.6$ and $70 < \text{°D} < 99$, thus complying with regulatory standards even after 14 days of storage. Lentisque powder had a positive effect on extending the shelf life of manufactured yogurts beyond 14 days, via its antioxidant activity and phenolic compounds, which acted as natural preservatives, exerting antimicrobial activity against pathogenic and spoilage germs.

Keywords: Yogurt; *Pistacia lentiscus*; Mixing Plan; Microbiological Analysis; Physicochemical analysis.

Evaluation de Quelques Propriétés Biologiques d'une Huile d'Oléastre Enrichie par les Feuilles d'Oléastre

Badria BOUFENCHOCHA, S. DAIRI, S. SAIT-DIB, A. BOUFERSADA, A. CHEKCHAK et L. MIMOUNE

RÉSUMÉ

L'olivier (*Olea europaea* L.) est l'un des arbres fruitiers les plus emblématiques et les plus répandus du bassin méditerranéen. Parmi ses sous-espèces sauvages, l'oléastre (*Olea europaea* subsp. *sylvestris*) se distingue par sa grande résistance et par les multiples bienfaits de son huile pour la santé. L'huile issue de l'oléastre est particulièrement riche en composés phénoliques bioactifs endogènes, connus pour leurs propriétés biologiques remarquables. Dans cette étude, une méthode d'enrichissement assistée par ultrasons a été appliquée afin d'extraire les polyphénols totaux à partir des feuilles d'oléastre et d'évaluer les activités antioxydantes, anti-inflammatoires de l'extrait d'huile obtenu. Les résultats obtenus démontrent que l'huile d'oléastre enrichie à l'aide de feuilles de la même plante, riches en polyphénols et en flavonoïdes, présente une amélioration significative de ses activités antioxydantes, de sa stabilité oxydative ainsi que de ses effets anti-inflammatoires et antidiabétiques. Ces propriétés renforcent l'intérêt de cette huile comme produit naturel à fort potentiel bénéfique pour la santé humaine.

Mots clés : Huile d'Oléastre ; Feuilles d'Oléastre ; Ultrasons ; Extraction ; Enrichissement.

New Nutraceutical Formulations from Edible Organs and Waste of Algerian Artichokes

Nabila BRAHMI-CHENDOUEH, Roukia BOUIZAR, Dihia BABOURI, and Naoual KHEYAR

ABSTRACT

Edible, plant-derived foodstuffs are recognized as precious sources of polyphenol compounds, whose consumption has proven to have multiple beneficial effects on human health. However, the awareness that cooking processes are able to induce qualitative changes in their native occurrence and that their bioavailability after food ingestion is poor led the research to move toward the preparation of nutraceutical supplements aimed at maximizing their content by effective extractive techniques and protecting them from degradation. The present work fits into this context, proposing a green, ready-to-use formulation of capitula, stems, and leaves of Algerian artichokes, in which natural deep eutectic solvents were exploited as extracting solvents but not removed at the end of the process. MTT test on the Caco-2 cell line highlighted that mitochondrial redox activity

inhibition was absent below the 50 µg/mL tested dose. Simulated *in vitro* digestion was used as a predictive model for formulation bioaccessibility, where the joint approach with UHPLC-HRMS techniques allowed to define the release of each polyphenol from the investigated matrices. The capitula-based sample was the richest one in flavonoids, especially luteolin and apigenin glycosides, which survived in the intestinal digesta. On the contrary, simple phenols characterized the stem sample, whose release was mainly in the gastric chime.

Keywords: NaDES; *Cynara cardunculus* var. *scolymus*; Polyphenols; Simulated *in vitro* Digestion; UHPLC-HRMS.

Comparative Study of Oven and Microwave Drying of Garlic

Sara GUÉMOUNI, Khokha MOUHOUBI, Sabrina DJEBARI, Wassila BELKHIRI-BEDER, Sarah CHAIBI, Fatiha BRAHMI, and Khodir MADANI.

ABSTRACT

Drying is one of the processes used to dehydrate food in order to increase its shelf life and reduce its weight and size, and facilitate storage. This study presents the characteristics of drying and aims to predict the drying kinetics of garlic slices (*Allium sativum*) using a conventional method with a ventilated oven and an innovative and more environmentally friendly method using a microwave. First, the kinetics relating to moisture content (MR) as a function of time (t) at several powers (300, 400, 500, 600, 700, 800 and 900 W) and oven temperatures (40, 60, 80, 100 and 120 °C) was monitored. Next, mathematical modelling of these kinetics was determined using appropriate mathematical equations. Comparing the two drying processes, convective and microwave, in terms of reduction in drying times, leads to the most remarkable observation, namely that microwaves are much more effective at drying garlic slices than convective drying, as they offer better results in terms of drying time and energy savings. Furthermore, this comparison of the two processes in terms of drying speed leads to the conclusion that microwave drying is much more efficient than convective drying, as the power of microwaves has an accelerating effect on the drying speed.

Keywords: Garlic; Drying Kinetics; Microwave Drying; Convective Drying; Drying rate.

Upgrading the Physicochemical and Nutritional Quality of Yogurt by Incorporating *Rosmarinus officinalis* Polyphenols with Antioxidant Activity

Hanane BOUTENNOUN, Lilia BOUSSOUF, Nassima BALLI, and Saliha DJABALI

ABSTRACT

The enrichment of yogurt with natural bioactive compounds is a promising approach to improve its functional and nutritional qualities. *Rosmarinus officinalis*, an aromatic plant rich in polyphenols, has strong antioxidant potential that can be harnessed to enhance dairy products. This study investigated the effect of incorporating *R. officinalis* polyphenols on the physicochemical and nutritional properties of yogurt for 21 days of refrigerated storage with particular attention to their antioxidant contribution. Yogurt formulations were

supplemented with polyphenol-rich extracts of *R. officinalis* and compared with unsupplemented control samples. Physicochemical parameters, including pH and titratable acidity were monitored during storage while nutritional properties were evaluated through sugar and protein contents. Antioxidant activity was determined using standard assays (DPPH radical scavenging activity and the reducing power). The results demonstrated that supplementation with *R. officinalis* polyphenols improved the antioxidant capacity of yogurt and enriched its nutritional composition by modulating sugar and protein contents. Physicochemical analyses revealed favorable effects on pH stability and acidity balance during storage. These findings demonstrate that *R. officinalis* polyphenols can effectively improve the nutritional value and physicochemical stability of yogurt. The incorporation of such natural antioxidants provides an interesting approach to the development of functional dairy products that combine health benefits with strong consumer appeal.

Keywords: *Rosmarinus officinalis*; Polyphenols; Antioxidant; Yogurt; Physicochemical; Nutritional Quality.

Elaboration de Fromages Frais Enrichis aux Lentilles Corail : Le Petit Suisse

Sonia MEDOUNI-ADRAR, Lamia MEDOUNI-HAROUNE, Lahlou BERKANI, Mouhend Arzi KSOURI, Ouahiba SOUFIMADDI, Aida MEKHOUKHE, Sabine CHABANE et Tinhinane BELLOUL, and Farida DJELILI-MAMOU

RÉSUMÉ

Ce travail de recherche s'inscrit dans une dynamique d'innovation agroalimentaire visant à enrichir des fromages frais type petit suisse avec des poudres de lentilles corail (*Lens culinaris* Medik), qu'elles soient torréfiées ou non. L'objectif principal est de maximiser l'apport nutritionnel en protéines tout en préservant les qualités organoleptiques du produit fini, afin de le rendre acceptable et attrayant, notamment pour une population cible souvent réticente à la consommation de légumineuses : les enfants. La démarche expérimentale a été conduite au sein du laboratoire de recherche et développement de l'unité Danone Djurdjura Algérie, selon un protocole rigoureux comprenant la préparation des matières premières, la formulation des produits, et la réalisation d'analyses physico-chimiques, microbiologiques et sensorielles. Les résultats ont montré que l'enrichissement en lentilles permettait d'augmenter significativement la teneur en protéines des fromages frais, tout en respectant les normes internes de qualité. Les lentilles torréfiées ont été particulièrement appréciées pour leur capacité à améliorer la saveur et l'arôme du produit, et la formulation contenant 3 % de lentilles torréfiées sucrées a obtenu le meilleur score d'acceptabilité sensorielle, avec une moyenne de 7/9. Fait remarquable, plus de 85 % des dégustateurs n'ont pas détecté la présence de lentilles, ce qui témoigne d'une intégration réussie sans altération perceptible du goût ou de l'apparence.

Mots clés : Fromage Frais ; Lentilles ; Petit Suisse ; Enrichissement ; Analyse Sensorielle.

Roasted Date Seed Oil as a Natural Alternative to the Synthetic Antioxidant TBHQ in Bakery Margarine

Rahma MAYOUF, Fatiha HAMITRI-GUERFI, Aicha BENBOURICHE, Samir HADJAL, Lila BOULEKBACHE-MAKHLOUF, and Imène FELFOUL

ABSTRACT

Bakery margarine is highly susceptible to lipid oxidation, a major factor limiting its shelf life and quality. Synthetic antioxidants such as tert-butylhydroquinone (TBHQ) are commonly used to improve oxidative stability, but their potential health risks have raised increasing interest in natural alternatives. This study investigated the effect of roasted and unroasted date (*Phoenix dactylifera* L.) seed oils as natural antioxidant sources in bakery margarine. Oils were extracted and characterized for phenolic composition and antioxidant capacity. Bakery margarines were formulated with 10 g/kg of roasted oil (ROM) or unroasted oil (UOM) and compared with commercial margarine containing 200 mg/kg TBHQ (MC). Quality attributes, oxidative stability (induction time, peroxide value under accelerated storage), and fatty acid profile were evaluated. Roasting significantly enhanced the phenolic content and antioxidant activity of date seed oil, leading to superior oxidative stability. Margarine enriched with roasted oil exhibited a longer induction time (31 hours) compared to UOM (24.6 hours) and comparable resistance to oxidation as MC, without compromising physicochemical or textural properties. These findings demonstrate that roasted date seed oil is a promising natural alternative to synthetic antioxidants, supporting its potential application as a functional ingredient for improving the stability and quality of bakery fats.

Keywords: Date Seed Oil; Roasting; Functional Ingredient; Oxidative Stability; Margarine.

Technofunctional Properties of an Infant Flour Enriched with Low-Market-Value Dried Figs

Asma YAKOUBI, Farid BOUKHALFA, Mohammed Tahar BOUBEZARI, Younes AROUL, Amina MIHOUBI, and Lynda DERRI

ABSTRACT

Infant flours need to meet strict requirements regarding digestibility, texture, and ease of preparation, while also providing the essential nutrients required during weaning. Incorporating dried figs, which are naturally rich in fiber and bioactive compounds, offers a natural way to enhance their functional qualities. In this study, we assessed the technofunctional properties of an infant flour enriched with dried figs, focusing on solubility, swelling capacity, foaming capacity, emulsifying ability, and water retention. The results showed very high solubility (99.92%), a swelling capacity of 3.9 mL/g, a foaming capacity of 16%, an emulsifying ability of 21.25%, and a water retention capacity of 1 g/g. These findings suggest that infant flour enriched with dried figs demonstrates valuable technofunctional properties suited to infants' specific needs, making it a promising natural alternative for developing balanced and functional infant products.

Keywords: Infant Flour; Dried Fig; Solubility; Swelling; Technofunctional Properties.

Etude de la Qualité d'une Margarine Liquide aux Epices

Zakia BEY-OULD SI SAID, Hayet IDIR-HIMED, Rachida AIDAT-AMOKRANE et Lila BOULEKBACHE MAKHLOUF

RÉSUMÉ

À l'origine, la margarine a été créée comme une alternative moins coûteuse au beurre. Elle était initialement produite à partir d'huiles végétales hydrogénées. Toutefois, au fil du temps, la composition et l'image de la margarine ont évolué, afin de s'adapter aux préférences changeantes des consommateurs et aux avancées technologiques dans le domaine de l'alimentation. La formulation d'une margarine liquide épicée constitue une démarche innovante, s'inscrivant dans une dynamique de diversification et d'amélioration des produits alimentaires. Cette étude a permis d'approfondir les différentes dimensions techniques, scientifiques et sensorielles nécessaires à la conception d'un tel produit, en intégrant les connaissances actuelles sur la margarine et les épices. Les cinq meilleures recettes de margarine formulées ont été évaluées en situation réelle, en les appliquant sur le produit auquel elles étaient destinées et ce en termes de goût, d'odeur, de couleur et de texture. Ensuite, elles ont été soumises à des tests physicochimiques et microbiologiques. La margarine liquide a une humidité comprise entre 13,5 et 17,68%. Les autres paramètres sont dans les normes, tel que l'acidité (< 0,2), le point de fusion (< 37°C), la teneur en sel (0,1 - 0,4) et l'indice de peroxyde (< 5). Les résultats ont révélé la bonne qualité microbiologique des margarines liquides formulées. L'analyse sensorielle a révélé une acceptabilité élevée de la margarine liquide épicée. Ces résultats confirment le potentiel commercial de cette innovation, répondant à une demande croissante pour des produits alimentaires savoureux et sains.

Mots clés : Corps gras ; Margarines Liquide ; Epices ; Indice de Peroxyde ; Acidité ; Corps Gras.

Assessment of Dietary Patterns Associated with Non-Communicable Diseases Using a Food Frequency Questionnaire in the Algerian Population

Nabyla KHALED KHODJA, Fatiha BRAHMI, and Samira NEGRICHI

ABSTRACT

Introduction: Non-communicable diseases (NCDs) are major contributors to global morbidity and mortality. Dietary habits play a crucial role in both the prevention and progression of these conditions. WHO-recommended dietary adjustments include balancing energy intake, reducing consumption of trans and saturated fats and increasing consumption of unsaturated fats, increasing consumption of fruits and vegetables, and reducing consumption of sugar and salt. **Methods:** A cross-sectional survey was designed to investigate the associations between dietary habits (protective factors and risky factors) and the prevalence of non-communicable diseases (cardiovascular, metabolic, digestive, inflammatory, and nervous system disorders) within an Algerian adult population. The final analysis comprised data from 322 participants. Data were analyzed statistically with SPSS (version 25). **Results:** Findings indicate that frequent consumption of plant-based foods—particularly vegetables, fruits, whole grains, dried fruits, and herbal teas—was strongly associated with reduced prevalence of several

NCDs. Conversely, higher intakes of sweetened beverages, sweets, and processed meats were more common among participants with metabolic, cardiovascular, and nervous system diseases. Differences in beverage and meat consumption patterns were also observed between disease groups. **Conclusion:** These findings highlight the significance of encouraging balanced dietary patterns full of preventive foods while restricting the use of highly processed and sugary foods.

Keywords: Non Communicable Diseases; Protective Food; Hazard Food; Food Frequency Questionnaire.

Moringa oleifera Seed in Wastewater Treatment by Coagulation-Flocculation using Artificial Neural Network and Response Surface Methodology

Amina KRIBECHE, N. BEN HAMICHE, B. LADJOUZE, R. CHEMACHE, and H. DJOUDI

ABSTRACT

The efficacy of the coagulation-flocculation process employing dehulled *Moringa oleifera* seed cake powder (MO-DS) as coagulant was investigated for optimization purposes. Domestic wastewater from the Wastewater Treatment Plant (WWTP) of Sidi Ali Lebhar, located in Bejaia town (Northeastern Algeria), was investigated to optimize variables affecting the coagulation-flocculation process, using Box-Behnken design (BBD) and Artificial neural network (ANN) methods. Three parameters were investigated, namely MO dosage, fast mixing, and low mixing. Four models have been released for Suspended Solids (TSS) removal. Both techniques provided accurate models. The ANN model presented better performance based on the values of R² (0.99) for MO-DS coagulant. TSS removal was up to 73.8% for MO-DS coagulants. Other physicochemical parameters were tested in the validation for generalization step. The models' further validation demonstrated the reliability of both models to be generalized for turbidity, heavy metals, nitrites and phosphorus removal, but not for BOD, COD and nitrates removal.

Keywords: *Moringa oleifera*; Coagulation-Flocculation Wastewater; Treatment; RSM; ANN.

Dietary Patterns and Cancer Prevention: An Epidemiological Comparison Between Maghreb, Gulf, and Western Populations

Sabrina ZEGHICHI, Wassila BELKHIRI-BEDER, Kaoutar BALAMANE, Maroua BELKIF, and Basmala Imane HAMRI

ABSTRACT

This study presents a computational epidemiological analysis of dietary patterns and cancer incidence across Maghreb, Western, and Gulf regions. Data from the Global Cancer Observatory (GLOBOCAN 2022) and FAO food consumption datasets were processed to examine correlations between diet composition and cancer rates. Results show that the Maghreb region records a mean cancer incidence of 134 cases per 100,000 population, markedly lower than 278 in European Mediterranean countries, 356 in Gulf countries, and over 410 in Western nations (UK and USA). Colorectal cancer accounted for 11.8% of total cancer cases in the Maghreb compared to 15.6% in Western countries, while breast cancer represented 21.4% in the

Maghreb and 28.9% in the Gulf region. Diet composition analysis revealed that olive oil provides 60–70% of total lipid intake in Maghreb diets, versus 30–40% in Gulf diets and less than 25% in Western ones. Populations consuming > 400 g/day of fruits and vegetables and >25 g/day of dietary fiber exhibited a 30 – 35% lower relative risk of digestive cancers. Conversely, Western diets, high in red meat and refined sugars, were associated with a 1.8 – 2.3-fold higher risk of colorectal and pancreatic cancers. Computational analysis confirmed strong negative correlations between plant-based food intake and cancer incidence ($r = -0.78, p < 0.01$), and positive correlations between saturated fat consumption and cancer rates ($r = +0.72, p < 0.05$). These findings demonstrate the preventive potential of Maghreb dietary patterns and support the integration of traditional, plant-rich, unsaturated fat-based diets into public health strategies for cancer prevention.

Keywords: Cancer; Diet; Epidemiology; Maghreb; Computational Analysis.

AI and Nutrition: A Bibliometric Analysis of Research Trends and Developments

Salim ZABAR and Yakoub FENNI

ABSTRACT

The world is witnessing a rapid acceleration in the adoption of artificial intelligence (AI) across various fields, from healthcare and engineering to nutrition. AI has emerged as a powerful tool for analyzing nutritional data, optimizing dietary strategies, and advancing public health initiatives. As global interest in the intersection of AI and nutrition continues to grow, it becomes essential to understand the research trends shaping this field. This study aims to analyze the scientific advancements in AI and nutrition through a bibliometric approach, focusing on the most influential topics, key researchers, and significant developments. Data was extracted from the Scopus database on July 19, 2024, covering publications from 2013 to 2023. The initial search identified 1,167 documents, which were refined to 350 relevant articles based on subject area filters and document type criteria. The findings highlight four main aspects: (1) the annual distribution of research on AI and nutrition, (2) the most influential journals and authors, (3) the most productive countries in this domain, and (4) the key research terms used over the past decade. The results reveal the rapid evolution of AI applications in nutrition science, providing a roadmap for future research in this multidisciplinary field.

Keywords: Artificial Intelligence; Nutrition; Bibliometric Analysis; Research Trends; Developments.

Use of Chitosan Enriched with *Zingiber officinale* Essential Oil as a Natural Approach to Inhibit *Aspergillus niger*

Yamina BEN MIRI and Djamel DJENANE

ABSTRACT

The growing demand for natural preservatives has driven research into plant-derived compounds with antimicrobial properties. Among them, *Zingiber officinale* (ginger) essential oil (EO) is recognized for its potent bioactivity, particularly against fungal pathogens responsible for food spoilage and mycotoxin contamination. This study investigates the

antifungal performance of *Zingiber officinale* EO, both alone and in combination with chitosan (CH), against the toxigenic fungus *Aspergillus niger*, a widespread contaminant of postharvest commodities. Dried rhizomes of *Zingiber officinale* were subjected to hydrodistillation using a Clevenger-type apparatus for 6 hours to obtain the essential oil. The oil was dried over anhydrous magnesium sulfate, filtered, and stored in sealed amber vials at 4 °C until use. Chitosan solutions (1% w/v) were prepared in 1% acetic acid and sterilized by filtration. The antifungal assays were conducted using *Aspergillus niger* strains previously isolated from spoiled dates and maintained on potato dextrose agar (PDA). Mycelial growth inhibition was determined by the poisoned food technique, where PDA plates were supplemented with EO at concentrations of 0.5%, 1%, 2%, and 4%. For CH-EO combinations, 1% CH was supplemented with 1% EO and incorporated into PDA. Colony diameters were measured daily, and growth inhibition (%) was calculated in comparison to untreated controls. Conidial germination was evaluated by incubating conidial suspensions (10^6 spores/mL) in potato dextrose broth supplemented with different treatments. After 24 hours at 28 °C, germination rates were determined microscopically by counting at least 200 spores per replicate. All experiments were carried out in triplicate. *Zingiber officinale* EO exhibited a strong dose-dependent antifungal activity against *Aspergillus niger*. Mycelial growth was inhibited by 27.14% at 0.5%, 48.33% at 1%, and 78.02% at 2%, while total inhibition was observed at 4%. Spore germination was also significantly suppressed, with inhibition values ranging from 34% at 0.5% to 86.66% at 2%, and complete inhibition recorded at 4%. The incorporation of EO into chitosan further enhanced antifungal activity. When 1% EO was combined with 1% CH, mycelial growth inhibition reached 85%, markedly higher than either treatment alone. Spore germination was reduced by up to 93%, confirming the synergistic effect of the CH-EO system. These results demonstrate that *Zingiber officinale* EO possesses remarkable antifungal activity against *Aspergillus niger*, and its incorporation into chitosan matrices significantly enhances this effect. The CH-EO formulation therefore represents a promising natural strategy for controlling fungal contamination and preserving the quality of postharvest products. Further studies should explore its application under commercial storage and distribution conditions to validate its practical effectiveness and potential for large-scale use in food preservation.

Keywords: Chitosan; *Zingiber officinale*; Essential Oil; *Aspergillus niger*; Natural Preservative.

Sustainable Valorization of Prickly Pear (*Opuntia ficus-indica* L.) Cladodes into Beverages: Sensory Quality and Anticoagulant Activity

Farida BENMEZIANE, Dalila LARROUS, Lynda DJERMOUNE-ARKOUB, and Aya HAMIOUD

ABSTRACT

Objectives: The study aimed to valorize prickly pear (*Opuntia ficus-indica* L.) cladodes from locally cultivated plants in El-Tarf district by developing a variety of functional beverages. It further sought to evaluate their sensory attributes and assess their anticoagulant activity. **Methods:** Prickly pear cladodes were cleaned, rinsed, chopped, and blended to obtain juice for beverages formulation. The prepared beverages were stored under refrigeration for 60 days to monitor changes in sensory attributes. Anticoagulant activity was assessed using TCK test targeting the endogenous coagulation pathway. **Results:** sensory evaluation over 60 days showed that sugar-sweetened beverages achieved the highest and most stable scores across most sensory attributes. Sugar-free non-carbonated beverage were the least appreciated (scores between 2.2 and 3.1 on 5-point hedonic scale), while those sweetened with date juice showed lower color acceptability. The anticoagulant potency of cladode-based beverages was dose-dependent, with carbonated drinks generally exhibiting longer TCK times than non-carbonated ones, particularly the carbonated date-sweetened date (150 – 168 s), which exhibited the strongest anticoagulant effect. **Conclusion:** These findings support the potential of prickly pear cladodes as a natural raw material for developing functional beverages with desirable sensory quality and potential anticoagulant activity. The valorization of this underutilized agro-industrial resource represents an important step towards sustainable development. Promoting strategies for its reuse could promote both environmental preservation and support the creation of innovative, value-added food products.

Keywords: Prickly pear (*Opuntia ficus-indica* L.); Cladodes; Sensory Evaluation; Anticoagulant Activity.

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